CITY ENGINEERING COLLEGE

(Doddakallsandra, Off Kanakapura Road, Bangalore-560061)

Department of Chemistry

Faculty Academic File

NAME: Sunitha N

DESIGNATION: Asst. Prof

SEMESTER: I, II

SECTION: C, A,B

SUBJECT NAME & CODE: Engg. Chemistry, 18CHE12

ACADEMIC YEAR: 2020-2021

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CITY ENGINEERING COLLEGE

DEPARTMENT OF ....Chemistry..........

CONTENTS

1.	Individual Time Table
2.	Calendar of Events
3.	University Syllabus
4.	Below average Student's list and Topper's list
5	Lesson Plan
6	Record of Class Work - Section-wise (Xerox Copy of Attendance Format)
7	University Question Papers : Min.05
8	Unit-wise Assignment Question Bank(all units) : Min 08 Questions per Unit
9	Internal Test: 9.1: Attendance Shortage List -- Test-1, Test -2 & Test-3 9.2: Internal Question Paper & Scheme --- Test-1, Test-2 & Test-3 9.4: Counseling form
10	Result Analysis & Feedback 10.1: Final internal Test Marks List (University Copy) 10.2: Subject Result & student feed back

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CITY
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VISION

Making Remarkable Contribution by Disseminating Knowledge on Emerging Trends in Engineering and Technology through various Programmes, Innovation and Research so as to Excel in Quality both at National and International level and to provide Career Guidance & Training for Employment.

MISSION

M1- To encourage Knowledge Acquisition and Foster Innovation & Research.

M2- To Prepare Students for Immediate Employment, leading to Technological and Socio- economical growth.

M3- To Provide Guidance for a Productive Career under various programmes.

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PROGRAM OUTCOMES (PO)

PO1 – Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 – Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 – Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 – Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 – Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 – The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 – Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 – Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 – Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 – Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 – Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 – Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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CITY
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DEPARTMENT OF CHEMISTRY

VISION

- To convey knowledge on engineering chemistry to stakeholders for engineering applications.

MISSION

- Facilitate the faculty to strengthen their knowledge and skills using ICT tools.
- Motivate and train students in theory and laboratory practices.
- Succeed to deal with societal issues like preserving green environment.

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DEPARTMENT OF BASIC SCIENCE

ONLINE CIRCULAR

Ref No: CEC/BS/DAC/ACY 2020-21/OR/01 Date: 15-12-2020

This is to inform the members of Department Advisory Committee that online meeting is scheduled on 20-12-2020 at 10: 30 AM.

Agenda:

- Commencement of online classes for 1st semester students
- Phase I online Student Induction Programme for 1st semester students
- Organizing online value added courses/ certificate courses in the curriculum

Convener
Dr. Rajasekhar. P

Jyothi
HOD
Dr. Jyothi. P

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DEPARTMENT OF BASIC SCIENCE

Department Advisory Committee Meeting

Date: 20-12-2020
Time: 10:30 AM

DAC Members Present:

Sl. No	Member Name	Designation	Role	Signature
1	Dr. P. Rajshekar	HOD & Professor	Convener	
2	Mrs. Sunitha. N	Assistant Professor	Member	
3	Mrs. Anu Radha U	Assistant Professor	Member	
4	Mrs. Sowmya P	Assistant Professor	Member	Soumya.
5	Dr. Sujatha	HOD & Professor	Member	
6	Mrs. Lakshmi D R	Assistant Professor	Member	Lakshmi
7	Mrs. Nagashree. G	Assistant Professor	Member	
8	Mrs. Ashwini Hindiholi	Associate Professor	Member	
9	Dr. Jyothi	Associate Professor	Member	Jyothi
10	Vanitha G .R	Assistant Professor	Member	
11	Mrs. Gayatri annasagaram	Assistant Professor	Member	
12	Mrs. Kalavathi	Assistant Professor	Member	
13	Mrs. Gana Priya	Assistant Professor	Member	
14	Mrs. Reena Patro	Assistant Professor	Member	
15	Mr. Anand K .R	Assistant Professor	Member	
16	Mr. Sudish Kumar. N	Manager, TCS	Employer (Industry Expert)	

Agenda of the Meeting:

- Inauguration programme for 1st semester students in online mode
- Online commencement of orientation programme from 4th to 14th February 2021
- Online classes for 1st semester students will be from 15th February 2021
- Organizing online value added courses/ certificate courses in the curriculum like Leadership Skills.

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Minutes of Meeting:

The members discussed suggestions for improvement and reviewed the meeting agenda.

- The committee decided to organize value added course on Leadership Skills
- Committee reviewed strategies to boost student participation in online academic enrichment courses
- Committee summarized the issues faced by the rural students while taking classes in online mode.

P. Rajasekhar
Convener
Dr. Rajasekhar. P

Jyothi
HOD
Dr. Jyothi. P

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CITY ENGINEERING COLLEGE
ONLINE TIME TABLE –FIRST SEMESTER DEC-2020-21
CHEMISTRY CYCLE

SECTION: C

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 - 12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON	CHE	CPS	BREAK			LUNCH	ELN	MAT	
TUE	ELN	CPS					EME	CHE	
WED	CHE	MAT					ELN	EME	
THU	MAT	CHE					CPS	EGH	
FRI	EME	ELN					CPS		
SAT									

MAT- Dr. Jyothi.P & Mrs. Gayathri A
CPS – Mr. Deepak. N.S
EME – Mr. Shruthi
CPL- Mr. Ramesh B

CHE - Dr. Rajasekhar.P & Mrs. Sunitha.N
ELN-Mr. Arabindo Koti
EGH- Dr. K. Sujatha & Mrs. Nagashree G

PROCTORS - Mrs. Sunitha. N & Mrs. Gayathri A

P. Raja Sekhar

HOD

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CITY ENGINEERING COLLEGE
ONLINE TIME TABLE –FIRST SEMESTER DEC-2020-21
CHEMISTRY CYCLE

Mrs. Sunitha. N (SN)

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 -12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON			BREAK			LUNCH			
TUE								CHE	
WED									
THU		CHE							
FRI									
SAT									

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CITY ENGINEERING COLLEGE
ONLINE TIME TABLE –FIRST SEMESTER DEC-2020-21
CHEMISTRY CYCLE

Dr. P. Rajasekar.P (PRS)

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 - 12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON	CHE		BREAK			LUNCH			
TUE									
WED	CHE								
THU									
FRI									
SAT									

Raja Sekar

HOD

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ENGINEERING CHEMISTRY

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18CHE12/22**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 3:2:0**	**Exam Hours**	**: 03**
	Credits : 04		

Course Learning Objectives:

This course **(18CHE12/22)** will enable students to

- Master the basic knowledge of engineering chemistry for building technical competence in industries, research and development.
- To develop knowledge in the fields of use of free energy in chemical equilibrium, electrochemistry and energy storage systems, Corrosion and metal finishing.
- To understand the importance of energy systems, environmental pollution, waste management, water chemistry, Instrumental methods of analysis and Nanomaterials.

MODULE-I

Electrochemistry and Energy storage systems

Use of free energy in chemical equilibria: Thermodynamic functions: Definitions of free energy and entropy. Cell potential, derivation of Nernst equation for single electrode potential, numerical problems on E, E0, and Ecell

Electrochemical energy systems: Reference electrodes: Introduction, construction, working and applications of Calomel electrode. Ion-selective electrode – Definition, construction and principle of Glass electrode and determination of pH using glass electrode. Electrolyte concentration cells, numerical problems

Energy storage systems: Introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Ni-MH and Li-ion batteries

(RBT Levels: L3)

MODULE-II

Corrosion and Metal finishing

Corrosion: Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion - Differential metal and differential aeration - pitting and water line). Corrosion control: Anodizing – Anodizing of aluminium, Cathodic protection - sacrificial anode and impressed current methods, Metal coatings – Galvanization

Metal finishing: Introduction, Technological importance. Electroplating: Introduction, principles governing electroplating-Polarization, decomposition potential and overvoltage. Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of nickel & copper, distinction between electroplating and electroless plating processes

(RBT Levels: L1 & L2)

MODULE-III

Energy Systems

Chemical Fuels: Introduction, classification, definitions of CV, LCV, and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Knocking of petrol engine – Definition, mechanism, ill effects and prevention. Power alcohol, unleaded petrol and biodiesel

Fuel Cells: Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte, and solid oxide fuel cell (SOFCs)

Solar Energy: Photovoltaic cells- introduction, construction and working of a typical PV cell, Preparation of solar grade silicon by Union Carbide Process/Method. Advantages & disadvantages of PV cells

MODULE - IV

Environmental Pollution and Water Chemistry

Environmental Pollution: Air pollutants: Sources, effects and control of primary air pollutants: Carbon monoxide, Oxides of nitrogen and sulphur, hydrocarbons, Particulate matter, Carbon monoxide, Mercury and Lead. Secondary air pollutant: Ozone, Ozone depletion

Waste Management: Solid waste, e-waste & biomedical waste: Sources, characteristics & disposal methods (Scientific land filling, composting, recycling and reuse)

Water Chemistry: Introduction, sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation, boiler corrosion (due to dissolved O_2, CO_2 and MgC_{l2}). Sources of water pollution, Sewage, Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD. Chemical analysis of water: Sulphates (gravimetry) and Fluorides (colorimetry). Sewage treatment: Primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis

(RBT Levels: L3)

Module V

Instrumental methods of analysis and Nanomaterials

Instrumental methods of analysis: Theory, Instrumentation and applications of Colorimetry, Flame Photometry, Atomic Absorption Spectroscopy, Potentiometry, Conductometry (Strong acid with a strong base, weak acid with a strong base, mixture of strong acid and a weak acid with a strong base)

Nanomaterials: Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nanoscale materials: Fullerenes, Carbon nanotubes and graphenes – properties and applications

(RBT Levels: L1 & L2)

Course Outcomes: On completion of this course, students will have knowledge in:

CO1 : Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.

CO2 : Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electroless plating.

CO3 : Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.

CO4 : Environmental pollution, waste management and water chemistry.

CO5 : Different techniques of instrumental methods of analysis. Fundamental principles of nano materials.

Question Paper Pattern:

- **The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 60.**
- The question paper will have **ten** full questions carrying equal marks.
- Each full question carries **20** marks.
- There will be **two** full questions (with a **maximum** of **three** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Textbooks:

1. P.C. Jain & Monica Jain. **"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi (2015- Edition).
2. S. S. Dara, A textbook of Engineering Chemistry, 10th Edition, S Chand & Co., Ltd., New Delhi, 2014.
3. Physical Chemistry, by P. W. Atkins, Oxford Publications (Eighth edition-2006).

Reference books:

1. O.G. Palanna, **"Engineering Chemistry"**, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint (2015- Edition).
2. R.V. Gadag & A. Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi (2015- Edition).
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition-2013.
4. B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for Engineering Students, Subhash Publications, Bengaluru, (2015- Edition).

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CITY ENGINEERING COLLEGE

DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR ODD SEMESTER FOR ACADEMIC YEAR 2019-2020

Course Title: **Engineering Chemistry**	Course Code : 18CHE12
Total contact hours: L:T:P:S :: 05 (3L+2T)	End Term Marks : 100
Internal Marks : 40	
Semester : I	Academic year : 2020-2021
Lesson plan Author: Dr. P. Rajasekhar & Sunitha. N	Date :03/01/2021

Course Objective:

This course (**18CHE12/22**) will enable students to

- Master the basic knowledge of engineering chemistry for building technical competence in industries, research and development.
- To develop knowledge in the fields of use of free energy in chemical equilibrium, electrochemistry and energy storage systems, Corrosion and metal finishing.
- To understand the importance of energy systems, environmental pollution, waste management, water chemistry, Instrumental methods of analysis and Nanomaterials.

Course Outcomes:

On completion of this course, students will have knowledge in:

CO1: Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.

CO2: Causes & effects of corrosion of metals and control of corrosion. Modification of Surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electroless plating.

CO3: Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cell. Utilization of solar energy for different useful forms of energy.

CO4: Environmental pollution, waste management and water chemistry.

CO5: Different techniques of instrumental methods of analysis. Fundamental principles of nanomaterials.

MODULE-1

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
1	1	Thermodynamic functions: Definitions of free energy and entropy. Cell potential, derivation of Nernst equation for single electrode potential	L3	CO1
	2	Numerical problems on E, Eo, and Ecell.	R,U	CO1
	3	Reference electrodes: Introduction, construction, working and applications of Calomel electrode.	R,U	CO1

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		using glass electrode.	R,U,E,C	CO1
2	1	Electrolyte concentration cells, numerical problems.	R,U	CO1
	2	**Energy storage systems:** Introduction, classification - primary, secondary and reserve batteries.	R,U	CO1
	3	Construction, working and applications of Ni-MH and Li-ion batteries.	R,U	CO1

MODULE-2

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
4	1	**Corrosion** Introduction, Electrochemical theory of corrosion	R,U	CO2
	2	Factors affecting the rate of corrosion ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity and temperature.	R,U	CO2
	3	Types of corrosion - Differential metal and Differential aeration - pitting and water line)	R,U	CO2
	4	Corrosion control: Anodizing – Anodizing of aluminium, Cathodic protection	R,U	CO2
5	1	sacrificial anode and impressed current methods, Metal coatings - Galvanization.	R,U	CO2
	2	**Metal finishing:** Introduction, Technological importance. Electroplating: Introduction, principles governing electroplating- Polarization,	R,U	CO2
	3	decomposition potential and overvoltage	R,U	CO2
	4	Electroplating of chromium (hard and decorative).	R,U	CO2
6	1	electroless plating of copper	R,U	CO2
	2	Electroless plating: Introduction, electroless plating of nickel	R,U	CO2
	3	distinction between electroplating and electroless plating processes.	R,U	CO2
	4	**Chemical Fuels:** Introduction, classification, definitions of CV, LCV, and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter	R,U	CO3
	5	numerical problems	R,U	CO3

MODULE-3

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
7	1	Knocking of petrol engine – Definition, mechanism, ill effects and prevention.	R,U	CO3
	2	Power alcohol, unleaded petrol and biodiesel	R,U	CO3
	3	**Solar Energy:** Photovoltaic cells- introduction, construction and working of a typical PV cell.	R,U,E	CO3
	4	**Fuel Cells:** Introduction, differences between conventional cell and fuel cell, limitations & advantages.	R,U	CO3
8	1	Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte	R,U	CO3
	2	solid oxide fuel cell (SOFCs).	R,U	CO3
	3	**Solar Energy**: Photovoltaic cells- introduction, construction and working of a typical PV cell	R,U	CO3
	4	Preparation of solar grade silicon by Union Carbide Process/Method. Advantages & disadvantages of PV cells.	R,U	CO3
	1	**Environmental Pollution:** Air pollutants: Sources, effects and control of primary air pollutants: Carbon monoxide,	R,U,C	CO4
9	2	Oxides of nitrogen and sulphur,	R,U, A1	CO4
	3	hydrocarbons, Particulate matter	R,U	CO4
	4	Carbon monoxide, Mercury	R,U	CO4
	5	Lead. Secondary air pollutant: Ozone, Ozone depletion	R,U	CO4

MODULE-4

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
10	1	**Waste Management:** Solid waste, e-waste & biomedical waste	R,U,	CO4
	2	Sources, characteristics & disposal methods (Scientific land filling, composting, recycling and reuse).	R,U	CO4
	3	**Water Chemistry:** Introduction, sources and impurities of water	R,U	CO4
	4	boiler feed water, boiler troubles with disadvantages	R,U	CO4
11	1	scale and sludge formation	R,U	CO4
	2	boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$)	R,U	CO4
	3	Sources of water pollution, Sewage	R,U	CO4

	4	Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD	R,U	CO4
12	1	numerical problems on COD	R,U	CO4
	2	Chemical analysis of water: Sulphates (gravimetry)	R,U	CO4
	3	Fluorides (colorimetry).	R,U	CO4
	4	Sewage treatment: Primary, secondary (activated sludge) and tertiary methods	R,U	CO4

MODULE-5

Week	**Days/ Date**	**Contents of Module**	**Bloom's Taxonomy Level**	**Course Outcome (CO)**
13	1	Softening of water by ion exchange process	R,U,A2	CO4
	2	Desalination of sea water by reverse osmosis.	R,U	CO4
	3	**Instrumental methods of analysis:** Theory, Instrumentation and applications of Colorimetry	R,U	CO5
	4	Flame Photometry	R,U	CO5
14	1	Atomic Absorption Spectroscopy	R,U,E	CO5
	2	Potentiometry	R,U	CO5
	3	Conductometry (Strong acid with a strong base, weak acid with a strong base	R,U	CO5
	4	mixture of strong acid and a weak acid with a strong base	R,U	CO5
15	1	Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties)	R,U	CO5
	2	Synthesis of nanomaterials: Top down and bottom up approaches	R,U,A1,C	CO5
	3	Synthesis by Sol-gel	R,U	CO5
	4	precipitation	R,U	CO5
16	1	chemical vapour deposition	R,U	CO5
	2	Nanoscale materials: Fullerenes	R,U	CO5
	3	Carbon nanotubes	R,U	CO5
	4	graphenes – properties and applications	R,U,A1,C	CO5

Bloom's Taxonomy Level
R-Remembering U-Understanding A1-Applying A2-Analysing E-Evaluating C-Creating

Text Books:

1. P.C. Jain & Monica Jain. **"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi (2015 Edition).
2. S. S. Dara, A textbook of Engineering Chemistry, 10th Edition, S Chand & Co., Ltd., New Delhi, 2014.
3. Physical Chemistry, by P. W. Atkins, Oxford Publications (Eighth edition-2006).

Reference books:

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2. R.V. Gadag & A. Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi (2015- Edition).

3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition-2013.

4. B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for Engineering Students, Subhash Publications, Bengaluru, (2015- Edition).

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VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

B.E.SYLLABUS FOR 2018-2022

Engineering Chemistry

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the Academic Year 2018-19)

Course Code: 18CHE12/22
Contact Hours/Week: 05 (3L+2T)
Total Hours: 50 (8L+2T per module)
Semester: I/II

CIE Marks: 40
SEE Marks: 60
Exam. Hours: 03
Credits: 04(3:2:0)

Course Learning Objectives: This course (18CHE12/22) will enable students to

- Master the basic knowledge of engineering chemistry for building technical competence in industries, research and development.
- To develop knowledge in the fields of use of free energy in chemical equilibrium, electrochemistry and energy storage systems, Corrosion and metal finishing.
- To understand the importance of energy systems, environmental pollution,waste management, water chemistry, Instrumental methods of analysis and Nanomaterials.

MODULES

MODULE- I: Electrochemistry and Energy storage systems

Use of free energy in chemical equilibria: Thermodynamic functions: Definitions of free energy and entropy, Cell potential, derivation of Nernst equation for single electrode potential, numerical problems on E, E^0, and E_{cell}.

Electrochemical Systems: Reference electrodes: Introduction, construction, working and applications of Calomel electrode. Ion-selective electrode – Definition, construction and principle of Glass electrode, and determination of pH using glass electrode. Electrolyte concentration cells, numerical problems.

Energy storage systems: Introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Ni-MH and Li-ion batteries.

(RBT Levels: L3)

MODULE-II: Corrosion and Metal finishing

Corrosion: Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion - Differential metal and Differential aeration - pitting and water line). Corrosion control: Anodizing – Anodizing of aluminium, Cathodic protection - sacrificial anode and impressed current methods, Metal coatings - Galvanization.

Metal finishing: Introduction, Technological importance. Electroplating: Introduction, principles governing electroplating-Polarization, decomposition potential and overvoltage. Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of nickel & copper, distinction between electroplating and electroless plating processes.

(RBT Levels: L1 & L2)

MODULE-III : Energy Systems

Chemical Fuels: Introduction, classification, definitions of CV, LCV, and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Knocking of petrol engine – Definition, mechanism, ill effects and prevention. Power alcohol, unleaded petrol and biodiesel.

Fuel Cells: Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte, and solid oxide fuel cell (SOFCs).

Solar Energy: Photovoltaic cells- introduction, construction and working of a typical PV cell. Preparation of solar grade silicon by Union Carbide Process/Method. Advantages & disadvantages of PV cells.

(RBT Levels: L3)

MODULE IV: Environmental Pollution and Water Chemistry

Environmental Pollution: Air pollutants: Sources, effects and control of primary air pollutants: Carbon monoxide, Oxides of nitrogen and sulphur, hydrocarbons, Particulate matter, Carbon monoxide, Mercury and Lead. Secondary air pollutant: Ozone, Ozone depletion.

Waste Management: Solid waste, e-waste & biomedical waste: Sources, characteristics & disposal methods (Scientific land filling, composting, recycling and reuse).

Water Chemistry: Introduction, sources and impurities of water; boiler feed water; boiler troubles with disadvantages -scale and sludge formation, boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$). Sources of water pollution, Sewage, Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD. Chemical analysis of water: Sulphates (gravimetry) and Fluorides (colorimetry). Sewage treatment: Primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis.

(RBT Levels: L3)

MODULE-V: Instrumental methods of analysis and Nanomaterials

Instrumental methods of analysis: Theory, Instrumentation and applications of Colorimetry, Flame Photometry, Atomic Absorption Spectroscopy, Potentiometry, Conductometry (Strong acid with a strong base, weak acid with a strong base, mixture of strong acid and a weak acid with a strong base).

Nanomaterials: Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nanoscale materials: Fullerenes, Carbon nanotubes and graphenes – properties and applications.

(RBT Levels: L1 & L2)

Course Outcomes: On completion of this course, students will have knowledge in:

CO1: Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.

CO2: Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electroless plating.

CO3: Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.

CO4: Environmental pollution, waste management and water chemistry.

CO5: Different techniques of instrumental methods of analysis. Fundamental principles of nanomaterials.

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Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 60.

- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:

1. P.C. Jain & Monica Jain. "Engineering Chemistry", Dhanpat Rai Publications, New Delhi (2015 Edition).
2. S. S. Dara, A textbook of Engineering Chemistry, 10th Edition, S Chand & Co., Ltd., New Delhi, 2014.
3. Physical Chemistry, by P. W. Atkins, Oxford Publications (Eighth edition-2006).

Reference books:

1. O.G. Palanna, "Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd. New Delhi. Fourth Reprint (2015- Edition).
2. R.V. Gadag & A. Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi (2015- Edition).
3. "Wiley Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi. Second Edition-2013.
4. B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for Engineering Students, Subhash Publications, Bengaluru, (2015- Edition).

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Assignment -1

Module -1 Electrochemistry & Energy Storage Systems

Electrochemistry:-

1.Derive Nernst Equation for Single electrode potential?
2.Define reference electrode and Ion selective electrode?
3.Explain construction &working of calomel electrode?
3.Explain construction &working of concentration cells?
4.Explain the construction & working of Glass electrode?
5.Explain the determination of $_pH$ using Glass electrode?

ENERGY STORAGE SYSTEMS:-

1.Write a note on classification of batteries?
2. Explain the construction & working of Ni-MH battery?
3.Write a note on Li-ion batteries?

Assignment -2

Module -2 Corrosion & Metal finishing

Corrosion:-

1.Explain the electrochemical theory of corrosion taking Fe as example?
2.Write a note on factors affecting the rate of corrosion
  i) Ratio of anodic to cathodic areas ii) $_pH$
3. Write a note on factors affecting the rate of corrosion
  i) Nature of corrosion product ii)conductivity iii) Temperature
4.Explain about Differential metal corrosion?
5.Explain about Differential aeration corrosion ? (pitting & Water-line)
6.Write a note on Anodizing?
7. Write a note on galvanization?
8.Define cathodic protection? Explain about sacrificial anodic method?
9.Explain about impressed current method?

Metal Finishing:-

1.Write a note on
  i)polarization ii) Decomposition potential iii) over-voltage
2.Write a note on Technological importance of Metal Finishing?
3. Explain the electroplating of Chromium?

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4.Mention the differences between between electroplating & electroless plating?
5. Explain the electrolessplating of Copper?
6. Explain the electrolessplating of Nickel?

Assignment -3

Module -3 Fuels & Solar Energy

Fuels:-

1.Explain the classification of fuels?
2.Explain the determination of calorific value of fuels using Bomb calorimeter?
3.Define octane number & cetane number?
4.Explain the mechanism of knocking?
5. Write a note on unleaded petrol?
6.Write a note on power alcohol?
7.Write a note on biodiesel?

FUEL CELLS:-

1. Explain the construction & working of CH_3OH-O_2 fuel cell?
2.Mention the differences between conventional cell and fuel cell?
3. Write a note on solid oxide fuel cell?

Solar Energy:-

1. Explain construction & working of photovoltaic cell?
2. Explain preparation of solar grade cell by union carbide process?
3. Write a note on advantages and disadvantages of fuel cell?

Assignment -4

Water Chemistry:-

1.Explain scale & sludge formation in boilers?
2.Define COD? Explain the determination of COD of waste water sample?
3.Explain softening of water by Ion –exchange method?
4.Explain desalination of water by Reverse Osmosis?
5.Write a note on colorimetry analysis of fluorides?
6. Write a note on gravimetric estimation of sulphates?
7.Write a note on boiler corrosion?
8.Write a note on activated sludge method?

Environmental Pollution:-

1. Write a note on carbon dioxide?
2. Write a note on carbon mono oxide?
3. Write a note on oxides of nitrogen?
4. Write a note on oxides of sulphur?
5. Write a note on ozone depletion?
6. Write a note on e-waste management?
7. Write a note on mercury?
8. Write a note on lead?
9. Write a note on biomedical waste management?
10. Write a note on lead?

Assignment -5

Module-5

Instrumental method of analysis:-

1. Explain instrumentation and application of flame photometry?
2. Explain instrumentation and application of potentiometry?
3. Explain instrumentation and application of conductometry?
4. Explain instrumentation and application of Atomic absorption spectroscopy?

Nano Materials:-

1. Explain the sysnthesis of nanomaterials by sol-gel method?
2. Explain the sysnthesis of nanomaterials by precipitation method?
3. Explain the sysnthesis of nanomaterials by chemical vapour deposition?
5. Write a note on graphene?
6. Write a note on carbon Nano tubes?
7. Write a note on Fullerenes?

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I Internal Test

Course:- Engg. Chemistry 18CHE12
Programme:- CS, AI, ME, CV
Sem & Sec:- I & C

Date:- 19/02/2021
Time:-10.30-12.00 P.M
Max.Marks-50

Q.No.	ANSWER ALL QUESTIONS	MARKS	CO'S	BT Level
	PART-A			
1.a)	Define single electrode potential? Derive Nernst equation for single electrode potential?	6	CO1	BT1
b)	Outline construction & working of calomel electrode?	4	CO1	BT2
	OR			
2.a)	Define concentration cell? Build construction and working of concentration cell?	6	CO1	BT3
b)	Write a note on Decomposition potential with neat labelled figure?	4	CO1	BT3
	PART-B			
3.	Explain working of Glass electrode and explain determination of PH using glass electrode?	10	CO1	BT2
	OR			
4.a)	Electrochemical cell consists of Cu electrode dipped in 0.5M $CuSO_4$& Ag electrode dipped in 0.25M $AgNO_3$. Write cell scheme, half cell and net cell reactions. Also calculate emf. SRP of Cu & Ag are 0.34&0.8V	6	CO1	BT5
b)	The EMF of the cell $Ag/AgCl_{(0.1M)}//AgCl_{(XM)}/Ag$ is 0.07V. Find X at 298 K?	4	CO1	BT5
	PART-C			
5.a)	Define Concentration cell? Calculate the potential of the cell at 298K $Ag/AgCl_{(0.005M)}//AgCl_{(0.5M)}/Ag$.	6	CO1	BT5
b)	Define metal finishing? Write any 3 technological importance of metal finishing?	4	CO1	BT1

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6.a)	Write a note on factors affecting the rate of corrosion i) Ratio of anodic to cathodic areas ii) PH	6	CO2	BT2
b)	Write a note on factors affecting the rate of corrosion i) Nature of corrosion product ii)Temperature	4	CO2	BT2

([illegible])

PART-D

7.a)	Explain about Differential aeration corrosion?	4	CO2	BT2
b)	Explain galvanization process ~~of aluminium~~?	6	CO2	BT2

OR

8.	What is metallic corrosion? Describe the electrochemical theory of corrosion taking iron as an example	10	CO2	BT1

PART-E

9.a)	Explain sacrificial anodic method and impressed current method?	7	CO2	B[illegible]
b)	Summarize on Anodizing of aluminium?	3	CO2	BT2

OR

10.	Explain: (i) Differential metal corrosion & (ii) Water-line corrosion	10	CO2	BT5

Course outcomes:-

CO1--- Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.

CO2-- Causes and effects of corrosion of metals and control of corrosion.

Blooms Taxanomy:-

BT1—Knowledge BT2---Understand BT3---Apply BT5----Evaluate.

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CITY ENGINEERING COLLEGE

DEPARTMENT OF Chemistry

SCHEME FOR VALUATION

Internal Test I

Semester & Section: I, C

Date: 19/2/21

Question No.	Details of the answer	Marks Distribution	Total Marks
1. a.	Def.	1M	
	$\Delta G = -nFE$		
	$\Delta G^\circ = -nFE^\circ$	2M.	6M
	$\Delta G = \Delta G^\circ + RT\ln k_c$., substitution	1+1	
	$E = E^\circ + \frac{0.0591}{n} \log [M^{n+}]$	1M	
2.	Fig. + Expl. + reactions + Emf.		
	Anode: $2Hg + 2Cl^- \longrightarrow Hg_2Cl_2 + 2e^-$	1+1+1+1	4m.
	Cathode :- $Hg_2Cl_2 + 2e^- \longrightarrow 2Hg + 2Cl^-$		
	$E = E^\circ - 0.0591 \log [Cl^-]$		
2. a.	Fig. + Expl. + Emf.	1+1+2+2	6M
	Anode :- $Zn \longrightarrow \underset{(C_1M)}{Zn^{2+}} + 2e^-$		
	Cathode.. $\underset{(C_2)}{Zn^{2+}} + 2e^- \longrightarrow Zn$		
	$\underset{(CM)}{Zn^{2+}} \longrightarrow \underset{(C_1M)}{Zn^{2+}}$		
	EmF $= \frac{0.0591}{n} \log\left(\frac{C_2}{C_1}\right)$.		
b.	Fig. + Expl.	1+3	4m.
3.	Fig.	1M	
	$E_b = E_1 - E_2$		
	$E_b = \frac{RT}{F}(\ln c_2 - \ln c_1)$	1M	

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DEPARTMENT OF ....

SCHEME FOR VALUATION_

Internal Test ....

Semester & Section:

Date:

Question No.	Details of the answer	Marks Distribution	Total Marks
	$E_b = -\frac{RT}{F} \ln c_1 + \frac{RT}{F} \ln c_2$.		
	$E_b = L + \frac{RT}{F} \ln c_2$.		
	$E_b = L + \frac{0.0591}{1} \log [H^+]$	-1M	
	$pH = -\log [H^+]$.		
	$E_b = L - 0.0591\ pH$	— 1M.	
	$E_a = E_b + E_{Ag\vert AgCl} + E_{asym}$		
	$E_a = L - 0.0591 pH + E_{Ag\vert AgCl} + E_{asym}$.	} 2M.	
	$E_a = L_1 - 0.0591 pH$.		10 M.
	Fig. + Expl.	1+1	
	$E_{cell} = E_a - E_{SCE}$.		
	$E_{cell} = L_1 - 0.0591 pH - E_{SCE}$.	} 2M.	
	$pH = \frac{L_1 - E_{SCE} - E_{cell}}{0.0591}$		
4.	$E_{cell} = E^\circ_{cell} + \frac{0.0591}{n} \log \frac{[\text{Metal ion conc. cath}]}{[\text{Metal ion conc. anod}]}$	1M.	
	$= 0.46 + \frac{0.0591}{2} \log \frac{(0.25)^2}{0.5}$	2M.	
	$= 0.46 - 0.0266$		
	$= 0.433\ V$		
	Anode: $Cu \longrightarrow Cu^{2+} + 2e^-$	1M.	
	Cathod: $2Ag^+ + 2e^- \longrightarrow 2Ag$.		

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DEPARTMENT OF Chemistry

SCHEME FOR VALUATION

Internal Test I

Semester & Section: I, C

Date:

Question No.	Details of the answer	Marks Distribution	Total Marks
	$E^\circ_{cell} = E^\circ_C - E^\circ_A$. $0.8 - 0.34 = 0.46$	1M	6M.
	Cell Rep. $Cu \mid Cu^{2+}_{(0.5)} \parallel Ag^{+}_{(0.25)} \mid Ag$	1M	
b.	$E_{cell} = \frac{0.0591}{n} \log\left(\frac{C_2}{C_1}\right)$. $0.07 = \frac{0.0591}{1} \log\left(\frac{x}{0.1}\right)$	1M	
	$\frac{0.07}{0.0591} = \log x - \log(0.1)$	1M.	4M.
	$1.1844 = \log x - (-1)$ $\log x = 0.1844$ $x = 1.5289M$	2M	
5. a.	$E = \frac{0.0591}{n} \log\left(\frac{C_2}{C_1}\right)$ + oef	1+2	
	$= \frac{0.0591}{1} \log\left(\frac{0.5}{0.005}\right)$	2M	6M.
	$= 0.1182V$	1M	
b.	Def. + 3 tech. importance.	1+3	4M.
6. a.	Expl. ii) Expl.	3x2	6M.
b	Expl. ii) Expl.	3+1	4M.

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DEPARTMENT OF ……………………………………

SCHEME FOR VALUATION

Internal Test …………

Semester & Section: Date:

Question No.		Details of the answer	Marks Distribution	Total Marks
7.	a.	Fig. + Expl.	2+2	4M
	b.	Fig. + Expl.	3+3	6 M.
8.		Expl. $Fe \rightarrow Fe^{2+} + 2e^-$ $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$ $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$ $2H^+ + 2e^- \rightarrow H_2$ $Fe(OH)_2 + O_2 + (n-2)H_2O \rightarrow Fe_2O_3 \cdot nH_2O$	5M 5M	10 M.
9.	a.	Fig. + Expl. + Fig. + expl.	2+2 +1+2	7M.
	b.	Fig. + Expl.	1+2	3 M.
10.	(i)	Expl. + Fig. + reaction $Fe \rightarrow Fe^{2+} + 2e^-$ $O_2 + 2H_2O + 4e^- \rightarrow OH^-$	2+2+1.	10 M.
	(ii)	Expl. + Fig. + reaction.	2+2+1	

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II Internal Test

Course:- Engg. Chemistry 18CHE22
Programme:- CS, AI, CV, ME,IS
Sem & Sec:- I, C

Date:- 16/03/2021
Time:-10.30-12.00
Max.Marks-50

Q.No.	ANSWER ALL QUESTIONS	MARKS	CO'S	BT Level
	PART-A			
1.a)	Determination of fluorides in water by colorimetrically?	4	CO2	BT2
b)	Develop electroplating process of hard chromium with reactions?	6	CO2	BT6
	OR			
2.a)	Create electroless plating of nickel with suitable reactions?	6	CO2	BT6
b)	In a COD test 30.2 cm^3 and 14.5 cm^3 of 0.05N FAS solution are required for blank and sample titration respectively. The volume of test sample used was 25 cm^3. Calculate COD of sample titration?	4	CO2	BT5
	PART-B			
3.a)	Explain desalination of water by reverse osmosis?	4	CO4	BT5
b)	Explain procedure, principle & Calculation for COD estimation?	6	CO4	BT5
	OR			
4.a)	Summarize on Activated sludge method?	4	CO4	BT2
b)	Write 6 Differences between electroplating and electroless plating process?	6	CO4	BT5
	PART-C			
5.	Outline softening of water by Ion exchange method and write a note on boiler troubles caused to the boiler by scale and sludge formation?	10	CO2	BT2
	OR			
6.a)	Define knocking & its mechanism ?	6	CO3	BT1
b)	Outline on biodiesel?	4	CO3	BT2
	PART-D			
7.a)	Brief on power alcohol?	4	CO3	BT1
b)	When 0.935g of fuel is subjected for complete combustion in excess of oxygen the increase in temperature of water in a calorimeter containing 1240g of water was 2.35°C.Evaluate HCV, LCV of the fuel, if water equivalent of calorimeter is 130g. Given specific heat of steam=2454J./Kg, specific heat of water is 4.187 J/g?K and % of H_2 in coal sample is 5.8	6	CO3	BT2

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OR

8.	Build determination of calorific value of solid fuel using bomb calorimeter with formula ?	10	CO3	BT3

PART-E

9.a)	Define NCV & GCV	6	CO4	BT1
b)	Write a note on unleaded Petrol ?	4	CO4	BT2

OR

10.	Define Solar cell and Build construction and working of photovoltaic cell with its advantages and disadvantages?	10	CO3	BT3

Course outcomes:-

CO2-- Modification of surface properties of metals to develop resistance to corrosion, wear. Tear, impact etc. by electroplating and electrolessplating.

CO3 – Production and comsumption of energy for industrialization of country and living standards of people. Utilization of solar energy for different useful forms of energy.

CO4- Water chemistry

Blooms Taxanomy:-

BT1—Knowledge, BT2---Understand , BT3---Apply , BT4—Analyzing , BT5----Evaluate ,

BT6-- creating.

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DEPARTMENT OF ......Chemistry..............

SCHEME FOR VALUATION

Internal Test ...II......

Semester & Section: I, C.

Date: 16/3/21.

Question No.	Details of the answer	Marks Distribution	Total Marks
1. a.	Expl. + reaction + procedure + Graph	1+1+1+1	4M.
b.	Pre treating of object. composition of plating bath with rea's + Appli	1M. 4+1	6M.
2. a.	Catalytic activation of object composition of plating bath + reactions.	1M 4+1	6M.
b.	1 ml of 1 N FAS = 8mg of O_2 (30.2-14.5)ml of 0.05 N FAS = ? 6.28 mg of O_2. 25ml of waste water = 6.28 mg of O_2. 1000ml of waste water = $\frac{1000 \times 6.28}{25}$ = 251.2mg of O_2/L	2M 2M	4M
3. a.	Fig. + Expl.	1+3	4M
b.	Procedure + Principle + Cal.	2+2+2	6M.
4. a.	Fig. + Expl.	2+2	4M.
b.	Diff. b/w electroplating & electroless plating	1x6	6M.
5.	Fig. + reactions + Expl. + reactions + disadvantages.	1+2+2 3+2	5M. 5M.

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DEPARTMENT OF ……………………………………

SCHEME FOR VALUATION

Internal Test …………

Semester & Section:

Date:

Question No.	Details of the answer	Marks Distribution	Total Marks
6.	Def. + Mech. + ill effects	2+3+1	6M
b.	Expl.	4M	4M.
7. a.	Expl.		4M.
b	HCV = $\frac{(W+w)\times S\times(t_2-t_1)}{m}$		
	= $\frac{(1240+130)\ 2.35\times 4.187}{0.935\times10^{-3}}$	4M.	
	= 14417.16 kJ/kg.		6M.
	CCV = 14417.16 − 0.09 × 5.8 × 2454	2M	
	= 13136.174 kJ/kg.		
8.	Fig. + Expl. + formula + terms.	2+4+2+2	10M
9.	Def.	3M×2	6M.
b.	Antiknocking agents eg. & its importance	4M	
10.	Fig. + Expl. + Adv. + disadvantages	2+4+2+2	10M

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III Internal

Course:- Engg. Chemistry 18CHE12/22
Programme:- CS, ME,CV,EC,AI
Sem & Sec:- I, C

Date:- 06/04/2021
Time:-10.30-12.00 PM
Max.Marks-50

Q.No	ANSWER ALL QUESTIONS	MARKS	CO'S	BT Level
	PART-A			
1.a)	Show properties and application of fullerene?	4	CO5	BT2
b)	Explain the sources, effects and control of CO_2 pollution?	6	CO4	BT2
	OR			
2.a)	Explain the sources, effects and control of particulate matter?	6	CO4	BT2
b)	Explain the sources, effects and oxides of N_2 pollution?	4	CO4	BT1
	PART-B			
3.a)	Elaborate properties and application of carbon nano tubes?	4	CO5	BT6
b)	Explain synthesis of nano materials by chemical vapour deposition?	6	CO5	BT2
	OR			
4.a)	Explain the causes, effects of Oxides of sulphur?	5	CO4	BT2
b)	Explain the sources, effects and CO_2 pollution?	5	CO4	BT6
	PART-C			
5.	Explain synthesis of nano materials by sol-gel method?	10	CO5	BT2
	OR			
6.a)	Build the construction & working of CH_3OH-O_2 fuel cell?	6	CO3	BT3
b)	Recall the differences between conventional cell and fuel cell?	4	CO3	BT1
	PART-D			
7.a)	Build the construction & working of solid oxide fuel cell?	4	CO3	BT3
b)	Outline instrumentation of potentiometry?	6	CO5	BT2
	OR			
8.	Explain the theory and instrumentation of conductometry?	10	CO5	BT2

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PART-E

9.a)	Write a note on properties of nano particles a) Surface area b) Optical property?	5	CO5	BT2
b)	Elaborate properties and application of graphene?	5	CO5	BT6

OR

10.	Explain the theory of conductometry experiment taking i)strong acid with strong base and ii) mixture of strong acid, weak acid with strong base ?	10	CO5	BT2

Course outcomes:-

CO4-- waste management, water chemistry

CO5 – Fundamental principles of nano materials, different techniques of instrumental methods of analysis.

Blooms Taxanomy:-

BT1—Knowledge, BT2---Understand, BT3---Apply, BT4—Analyzing, BT5----Evaluate,

BT6-- creating.

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DEPARTMENT OF ....Chemistry........

SCHEME FOR VALUATION

Internal Test ....III....

Semester & Section: I, C

Date: 6/04/21

Question No.	Details of the answer	Marks Distribution	Total Marks
1. a.	Properties, .. application	2×2	4M
b.	source, effect, control of CO_2 pollution	3×2	6M
2. a.	source, effect, control of Particulate matter	3×2	6M
b.	source, effects of oxides of N_2	2×2	4M
3. a.	properties & application of CNT	2×2	4M.
b.	synthesis + fig.	3+1	4M.
4. a.	causes, effect of oxides of 'S'	3+2	5M.
b.	~~causes~~ sources, effect of CO.	3+2	5M.
5.	Synthesis + Fig. + reactions	6+2+2	10M.
6. a.	construction, working of CH_3OH-O_2 fuel cell reactions + fig. +	3+2+1	6M.
b.	Any 4 differences.	4×1	4M.
7. a.	reactions + Fig. + construction	2+1+1	4M.

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CITY ENGINEERING COLLEGE

DEPARTMENT OF ....

SCHEME FOR VALUATION

Internal Test ....

Semester & Section:

Date:

Question No.	Details of the answer	Marks Distribution	Total Marks
b.	Instrumentation + Fig.	3+3	6m.
8.	Theory + Instrumentation.	5+5	10 m.
9. a.	Surface area. + optical properties of NM.	2+3	5m.
b.	Properties + application of graphene	2+3	5m.
10.	(i) S.A + S.B. (ii) S.A, N.A + S.B.	5+5	10m.

Staff

HOD

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Principal
City Engineering College,
Bangalore-560 061

Year : 2020 - 2021

Semester : [✓ Odd] / Even

Name of the Teacher : Dr. P. Rajasekhar & Sunitha N.

Designation : Prof. & H.OD Asst. Prof.

Department : Chemistry

Sem/ Branch	Subject Code	Subject
1. I / CS, AS, EC, ME, CV	18CHE12	Engg. Chemistry
2.		
3.		

	Initials at the End of the			
	1st Month	2nd Month	3rd Month	Semester
Staff				
HOD				
Principal				

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ATTENDANCE

SSESS

Sl. No.	Reg.No.	Name	1/2 1	4/2 2	6/2 3	8/2 4	11/2 5	15/2 6	9/2/21 7	10/2/21 8	16/2/21 9	17/2/21 10	24/2/21 11	22/2 12	23/2 13	24/2 14	% of Attendan
1	20CS075	Swati satish kumar kudragi	1	2	3	4	5	6	7	8	9	9	10	11	12	13	
2	20CS076	Syed Houzaifa	1	2	3	4	5	6	6	7	7	8	9	10	11	12	
3	77	Syed Nawaz	1	2	3	4	5	6	7	8	8	9	10	11	12	13	
4	78	Tariq Anjum	1	2	3	4	5	6	7	8	8	9	10	11	12	13	
5	79	Tarun. V	1	2	3	4	5	6	7	8	8	9	10	11	12	13	
6	80	Tejas. B. R	1	2	2	4	5	6	7	8	8	9	10	11	12	13	
7	81	Tejas. J. kumar	1	2	3	4	5	6	7	8	8	9	10	11	12	13	
8	82	Umme Hani M.A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
9	84	Vaishnavi. K	1	2	3	4	5	6	7	8	9	9	10	11	12	13	
10	85	Venugopal. D	1	2	3	4	5	6	7	8	9	9	10	11	12	13	
11	86	Vishwa. V	1	2	3	4	5	6	7	8	8	9	10	11	12	13	
12	87	Vivek Gautam	1	2	3	4	5	6	7	8	9	9	10	11	12	13	
13	88	Yarub Baba	1	2	3	4	5	6	6	7	8	9	10	11	12	13	
14	89	Yashashree. R	1	2	3	4	5	6	7	8	9	9	10	11	12	13	
15	90	Yashaswini: R. P	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
16	AI001	Abdul Faheem	1	2	3	4	5	6	7	8	8	9	10	11	12	13	
17		~~Darshan kumar P~~															
18	003	kedar Joshi	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
19	004	kokila. K. R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
20	~~00~~	~~Nisarga P~~															
21	007	Sharona Sam	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
22	008	Suhas Ganjawar	1	2	3	4	5	6	7	8	8	9	10	11	12	13	
23	009	Syeda Aliyah Bakshi	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
24	IS001	Aayusha Kumari	1	2	3	4	5	6	7	8	9	9	10	11	12	13	
25	002	Amisha Rashminath	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
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			15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
1	20CS075	Swati sateesh kumar k	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
2	20CS076	Syed Houzaifa	13	14	14	15	16	17	18	19	20	21	22	23	24	25	26	
3	77	Syed Nawaz	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
4	78	Tariq Anjum	14	15	15	16	17	18	19	20	21	22	23	24	25	26	27	
5	79	Tarun. V	14	15	16	17	18	19	20	21	22	23	24	25	26	27	27	
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13	88	Yarub Baba	14	15	16	17	17	18	19	20	21	22	23	24	25	26	27	
14	89	Yashashree. R	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
15	90	Yashaswini. R. P	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
16	AI001	Abdul Faheem	14	15	15	16	17	18	19	20	20	21	22	23	24	25	26	
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20	~~80~~	~~Nisarga R~~																
21	007	Sharona Sam	15	16	17	18	19	20	21	22	23	24	25	26	27	28	28	
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24	IS001	Aayusha kumari	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
25	002	Amisha Rashminath	15	16	18	17	18	19	19	20	21	22	23	24	25	26	27	
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									9/2/21	10/2/21	16/2/21	17/2/21	17/2/21	24/2/21	23/2	24/2
26	IS003	Likith · R · J	1	2	3	4	5	6	7	7	8	9	9	10	11	12
27	AI002	Hafira Ahmed	1	2	3	4	5	6	7	8	9	10	10	11	12	13
28	EC002	Keerthi · A	1	2	3	4	5	6	7	8	8	9	9	10	11	12
29	EC003	Sukruth · S R	1	2	3	4	5	6	7	8	9	10	10	11	12	13
30	ME001	Suhas · B	1	2	3	4	5	6	7	8	9	10	10	11	12	13
31	CV001	Thyagaraj · K	1	2	3	4	5	6	7	8	8	9	9	9	10	11
32	20CS045	P. kumaraswamy	1	2	3	4	5	6	7	8	8	9	9	10	11	12
33	AI005	Rithik · mariam · S	1	2	3	4	5	6	7	8	9	10	10	11	12	13
34	CS083	Manoj Kumar · V	1	2	3	4	5	6	7	8	9	10	11	12	13	14
35	ME002	Abhilash.	1	2	3	4	5	6	7	7	8	8	9	10	11	12
36	CS072	Subhandu Sagar	1	2	3	4	5	6	7	8	8	9	9	10	11	12
37	CS055	Nimmi Sagar	1	2	3	4	5	6	7	8	8	9	10	11	12	13
38	CS015	Anushree	1	2	3	4	5	6	7	8	9	10	10	11	12	13
39	CS057	Pooja.S	1	2	3	4	5	6	7	8	8	9	9	10	11	12
40	CS064	Sagar N	1	2	3	4	5	6	7	8	9	10	10	11	12	13
41	EC001	Bhanuchandana	1	2	3	4	5	6	6	7	8	9	10	10	11	12
42	CS026	Deepak. Kumar	1	2	3	4	5	6	7	8	9	10	11	12	13	14
43	CS032	Fauzia · T	1	2	3	4	5	6	6	7	8	9	9	10	11	12
44	CS020	Bhagyashree	1	2	3	4	5	6	7	8	9	10	11	12	13	14
45	CS023	Chaitanya.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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26	IS003	Likith·R·J	13	14	14	15	16	17	18	19	20	21	22	23	24	25	26
27	AI002	Hajira Ahmed	14	15	15	16	17	18	19	20	21	22	23	24	25	26	27
28	EC002	Keerthi·A	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
29	EC003	Sukruth·S R	14	15	16	17	18	19	20	21	22	23	24	25	26	27	27
30	ME001	Suhas·B	14	15	16	16	17	18	19	20	20	21	22	22	23	24	25
31	CV001	Thyagaraj·K	12	13	14	14	15	16	17	18	19	19	20	21	22	23	24
32	20CS045	P. Kumaraswamy	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
33	AI005 ~~AI023~~	Rithik·Mariam·S	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
34	CS083	Manoj Kumar·V	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
35	ME002	Abhilash.	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
36	CS072	Subhandu Sagar	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
37	CS055	Nimmi Sagar	14	15	16	17	18	19	20	21	22	23	24	25	26	27	18
38	CS015	Anushree	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
39	CS057	Pooja.S	13	14	15	16	17	18	18	19	20	21	22	23	24	25	26
40	CS064	Sagar N	14	15	16	17	18	19	19	20	21	22	23	23	24	25	26
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42	CS026	Deepak. Kumar	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
43	CS032	Fouzia.T	13	14	14	15	16	17	17	18	19	20	21	22	23	24	24
44	CS020	Bhagyashree	15	16	17	19	18	19	19	20	21	22	23	24	25	25	25
45	CS023	Chaitanya.	15	16	17	18	19	19	20	21	22	23	24	25	26	27	28
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LESSON PLAN

Week	Date		Topics Planned
	From	To	
I	4/1/21	10/1/2021	Electrochemistry & Energy Storage Systems Derivation of Nernst Eqn, problems on Nernst Eqn. Entropy, cell potential, Derivation of Nernst Eqn for single electrode potential,
II	11/1/21	17/1/21	Problems on E, E°, Ecell. Reference electrodes- construction & working of calomel electrode, Ion selective electrode, Glass electrode, Det. of pH using glass electrode, conc. cells & problems.
III	18/1/21	24/1/21	Introduction, classification of batteries. construction & working of Ni-MH, Li-Ion battery. Module-II Introduction, Electrochemical theory of corrosion, factors affecting rate of corrosion.
IV	25/1/21	31/1/21	ratio of anodic to cathodic area, Nature of metal, nature of corrosion product, pH, conductivity, temp., differential metal, Differential aeration, corrosion control, Anodizing,
V	1/02/21	7/2/21	cathodic protection, sacrificial anode, galvanization. Metal finishing:- Introduction, Technological importance. Electroplating, Polarization, decomposition potential, over voltage, electroplating of Cr, Electroless plating of Ni, Cu. Diff. b/w electroplating & electroless plating.
VI	8/2/21	14/2/21	Module-3:- Introduction, Definitions of CV, GCV, NCV, Det of calorific value of bomb. Calorimeter, knocking of Petrol, ill effects, preventing Power alcohol, unleaded Petrol, bio-diesel, fuel cell, CH_3OH-O_2 fuel cell, solid oxide fuel cell,
VII	15/2/21	21/2/21	Difference b/w fuel cell & battery, solar energy:- photovoltaic cells, construction & working of PV cells, Preparation of solar grade silicon, Union carbide process, Adv. & dis. of PV cells
VIII	22/2/21	28/2/21	Module-4 Environmental pollution, Air pollutants, source effects, control of primary air pollutants, CO, Oxides of N_2, oxides of 'S'. hydrocarbons,

LESSON PLAN

Week	Date		Topics Planned
	From	To	
IX	1/3/21	7/3/21	Particulate matter, CO_2, Hg, Pb, secondary air pollutant - O_3, ozone depletion.
X	8/3/21	14/3/21	Waste Management :- solid waste, e-waste, bio medical waste, sources characteristics, & disposal methods (scientific land filling, composting, recycling).
XI	15/3/21	21/3/21	Water Chemistry:- Introduction, source & impurities of water, boiler feed water, boiler trouble with disadvantages, scale & sludge formation boiler corrosion. sources of water pollution
XII	22/3/21	28/3/21	sewage, definitions of BOD, COD, Determination of COD, chemical analysis of water, sulphates, sewage treatment, Primary, secondary.
XIII	29/3/21	4/4/21	tertiary methods, softening of water, Ion exchange method, Desalination of water by reverse osmosis.
XIV	5/4/21	11/4/21	Module 5:- Theory, Instrumentation, applications of colorimetry, flame photometry, atomic absorption spectroscopy, potentiometry, conductometry.
XV	12/4/21	18/4/21	Nano materials:- Introduction, size dependent properties, synthesis of Nano materials, sol-gel, Precipitation, chemical vapor
XVI			deposition, Nano scale materials, fullerenes, Carbon Nano tubes, graphenes properties application.

Teachers Signature

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RECORD OF CLASS WORK

Date	Period	Topics Covered
31/12/20	1st	Introduction to electrochemistry
4/1/21	4th	Derivation of Nernst Eqn.
7/1/21	3rd	Problems on Nernst Eqn.
11/1/21	2nd	Reference electrode, Construction &
		working of calomel electrode.
18/1/21	4th	Construction & working of Glass
		electrode, Determination of pH
		using glass electrode.
23/1/21	1st	Construction & working of conc. cell
25/1/21	3rd	Problems on conc. cell.
29/1/21.	4th	Problems on conc cell, & Nernst Eqn
1/2/21	2nd	construction & working of Li-ion battery
4/2/21	3rd	construction & working of Ni-MH battery,
6/2/21	1st	Polarization, decomposition potential, overvoltage.
8/2/21	2nd	Electroplating of Cr.
11/2/21.	4th	Technological importance of M.F.
15/2/21	2nd	Diff. btw electroplating & electroless plating
22/2/21	1st	Electroless plating of Ni, Cu.
23/2/21	4th	Determination of COD.
24/2/21	2nd	Problems on COD.
27/2/21	3rd	Determination of F^-, SO_4^{2-} in water
1/3/21	4th	Reverse Osmosis, Ion exchange Method.
4/3/21	3rd	Sewage treatment. Primary, secondary
		& tertiary treatment.

Teachers Signature

HOD'S Signature

RECORD OF CLASS WORK

Date	Period	Topics Covered
10/3/21	2nd	~~Analysis of sulphates, Fluorides~~, Boiler Corrosion, Scale & Sludge formation
18/3/21	1st	Sol-gel method, precipitation method of Nano particle synthesis.
22/3/21	2nd	Chemical vapour deposition, fullerenes, CNT.
29/3/21	4th	Graphene., pollutant :- CO & CO_2.
1/4/21.	1st	Oxides of N_2, S, hydrocarbon, particulate matter,
8/4/21	3rd.	Hg, Pb, Ozone & its depletion.
9/4/21	2nd	solid waste, e-waste, biomedical waste.

Teachers Signature

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DEPARTMENT OF BASIC SCIENCE
ACADEMIC YEAR 20-21 EVEN SEMESTER
CIRCULAR

Ref No: CEC/BS/DAC/ACY/2020-21/OR/01 Date: 17-05-2020

This is to inform the members of Department Advisory Committee that meeting is scheduled on 19-05-2021 at 10: 00 AM in Physics Laboratory.

Agenda:

- Commencement of classes for 2nd semester students
- Conduction of Talents Day
- Organizing Battle of Science- Project Exhibition
- Organizing value added courses/ circular courses in the curriculum
- Organizing FDP

HOD
Dr. K Sujatha
Department of Physics

HEAD OF THE DEPT. OF PHYSICS
CITY ENGINEERING COLLEGE,
Doddakallasandra Kanakapura Main Road,
BANGALORE - 560 062.

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DEPARTMENT OF BASIC SCIENCE

Department Advisory Committee Meeting

Date: 19-05-2021
Time: 10:00 AM
Venue: Physics Laboratory

List of DAC Members

Sl. No	Member Name	Designation	Role	Signature
1	Dr. P. Rajasekar	HOD & Professor	Convenor	
2	Mrs. Sunitha N	Assistant Professor	Member	
3	Mrs. Anu Radha U	Assistant Professor	Member	
4	Mrs. Sowmya P	Assistant Professor	Member	
5	Dr. Sujatha	HOD & Professor	Member	
6	Mrs. Nagashree. G	Assistant Professor	Member	
7	Mrs. Ashwini Hindiholi	Assistant Professor	Member	
8	Dr. Jyothi P	Associate Professor	Member	
9	Mrs. Vanitha G R	Assistant Professor	Member	
10	Mrs. Gayatri	Assistant Professor	Member	
11	Mrs. Kalavathi	Assistant Professor	Member	
12	Mrs. Gana Priya	Assistant Professor	Member	
13	Mrs. Reena Patro	Assistant Professor	Member	

Agenda of the Meeting:

- Commencement of classes for 2nd semester students
- Conduction of Talents Day
- Organizing Battle of Science- Project Exhibition
- Organizing value added courses/ certificate courses in the curriculum
  Organizing FDP

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Minutes of Meeting:

The members discussed suggestions for improvement and reviewed the meeting agenda.

- Battle of Science is a project exhibition focuses on displaying interests and diverse projects.
- Discussed about a location with enough space for display of projects and ECE laboratory are chosen for exhibition.
- Setting up a registration process for participants.
- Providing certificates to all participants and cash prize for winners.
- Organized Online Certificate course on "Leadership Skills"
- Value added course on public speaking skills to be organized.

Convenor
Dr. Rajasekhar. P
Department of Chemistry

Dr P. RAJASEKHAR,
M.Sc; M.Phil; Ph.D
HEAD OF THE DEPT. OF CHEMISTRY
CITY ENGINEERING COLLEGE
Doddakallasandra, Kanakapura Main Road
BANGALORE - 560 062.
Ph (O) 26669313 (M) 92428 92734

HOD
Dr. K Sujatha
Department of Physics

HEAD OF THE DEPT. OF PHYSICS
CITY ENGINEERING COLLEGE,
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BANGALORE - 560 062.

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ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ವಿಟಿಯು ಅಧಿನಿಯಮ ೧೯೯೪"ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ಜ್ಞಾನ ಸಂಗಮ", ಬೆಳಗಾವಿ–೫೯೦೦೧೮, ಕರ್ನಾಟಕ, ಭಾರತ
Visvesvaraya Technological University
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama" Belagavi-590018, Karnataka, India
Phone: (0831) 2498100, Fax: (0831) 2405467, Website: vtu.ac.in

Dr. A. S. Deshpande B.E., M.Tech., Ph.D.
Registrar

Phone: (0831) 2498100
Fax: (0831) 2405467

Ref: VTU/BGM/BOS/A9/2020-21 / 345

Date: 21 APR 2021

Revised - CIRCULAR

Subject: Commencement of EVEN semesters of UG programs for the year 2020-21 regarding...

Reference: Hon'ble Vice-Chancellor Approval dated 21.04.2021

Concerning the subject cited above, the revised - academic calendar related to the EVEN semester/s of B.E./B.Tech./B.Plan./B.Arch. programmes is notified as attached.

The Principals of Affiliated, Constituent, and Autonomous Engineering Colleges are hereby informed to bring the contents of this circular to the notice of all the concerned.

Sd/-
REGISTRAR

Encl: As mentioned above.
To,
1. The Principals of all affiliated/ constituent /Autonomous Engineering Colleges under the ambit of VTU Belagavi.
2. The Chairpersons of all Departments, Centres for PG Studies in Belagavi, Kalaburgi, Muddenahalli, and Mysore.

Copy to.
1. To the Hon'ble Vice-Chancellor through the secretary to VC, VTU Belagavi for information
2. The Registrar (Evaluation), VTU Belagavi for information.
3. The Regional Directors (I/c) of all the regional offices of VTU for circulation.
4. The Special Officer CNC VTU Belagavi for uploading on VTU website
5. PS to Registrar VTU Belagavi
6. All the concerned Special Officer/s and Caseworker/s of the academic section, VTU, Belagavi

21.4.2021.
REGISTRAR

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Revised-Academic Calendar of EVEN semesters of UG Programmes for 2020-2021

Semesters EVENTS	IV semester B.E./B.Tech.	IV semester B.Arch./ B.Plan.	VI semester B.E./B.Tech.	VI semester B.Plan./B.Arch	VIII semester B.E./B.Tech.	VIII semester B.Plan.	VIII semester B.Arch
Commencement of EVEN Semester	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021
Last Working day of EVEN Semester	07.08.2021	07.08.2021	07.08.2021	07.08.2021	#20.07.2021	#20.07.2021	07.08.2021
Practical Examinations	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	---	---	---	---
Theory Examinations	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	10.08.2021 To 31.08.2021	22.07.2021 To 30.07.2021	22.07.2021 To 30.07.2021	10.08.2021 To 17.08.2021
Internship	---	---	---	---	---	---	---
Internship Viva-Voce/ Project Viva-Voce	---	---	---	---	02.08.2021 To 06.08.2021	---	---
Professional training / Organization study	---	---	---	---	---	---	---
Commencement of ODD Semester	13.09.2021	13.09.2021	13.09.2021	13.09.2021	---	---	23.08.2021

- The classroom sessions for even the semester should commence from the dates mentioned above.
- The Institute needs to function for **six days** a week with additional hours **(Saturday is a full working day).** #if required the college can plan to have extra classes even on Sundays also.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- Notification regarding the Calendar of Events relating to the conduct of **University Examinations** will be issued by the Registrar (Evaluation) from time to time.
- The faculty/staff shall be available to undertake any work assigned by the university.
- Academic Calendar may be modified based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Revised Academic Calendar is also applicable for **Autonomous Colleges.** In case if any changes are to be affected by Autonomous Colleges in the academic terms and examination schedule, they could do so with the approval of the University.

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21.04.2021.

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CITY ENGINEERING COLLEGE BENGALURU 560061-ACADEMIC CALENDER APPLIED SCIENCE AND HUMANITES-2020-2021(EVEN SEM)

May-21			Jun-21		Jul-21		Aug-21	
DAY	DATE	EVENT	DATE	EVENT	DATE	EVENT	DATE	EVENT
SAT	1							
SUN	2						1	
MON	3						2	
TUE	4		1	7th day orientation			3	
WED	5		2	8th day orientation			4	
THU	6		3	9th day orientation	1		5	
FRI	7		4	10 day orientation	2		6	
SAT	8	2nd satuarday holiday	5		3		7	
SUN	9		6		4		8	
MON	10		7		5		9	last working day of 2nd,4th,and6th sems
TUE	11		8		6		10	
WED	12		9		7		11	
THU	13		10		8		12	
FRI	14	ramzan	11		9		13	
SAT	15		12	2nd satuarday holiday	10	2nd satuarday holiday	14	2nd satuarday holiday
SUN	16		13		11		15	Independence day
MON	17		14		12		16	
TUE	18		15		13		17	
WED	19	MoM CURRICULAM ENRICHMENT	16		14		18	
THU	20		17		15		19	
FRI	21	starting day of 2nd,4th,and6th	18		16		20	
SAT	22	4th satuarday holiday	19		17		21	
SUN	23		20		18		22	
MON	24	statrs 2nd phase induction (online)	21		19		23	
TUE	25	2nd day orientation	22		20		24	
WED	26	budda poornima	23		21	bakrid	25	
THU	27	3rd day orientation	24		22		26	
FRI	28	4th day orientation	25		23		27	
SAT	29		26	4th satuarday holiday	24	4th satuarday holiday	28	4th satuarday holiday
SUN	30	5th day orientation	27		25		29	
MON	31	6th day orientation	28		26		30	
TUE			29		27		31	
WED			30		28			
THU					29			
FRI					30			
SAT					31			

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CITY
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ACADEMIC YEAR: 2020-21

DEPARTMENT OF BASICSCIENCE

COURSE PREFERENCE

Name of the Faculty: Dr. Sujatha K

Designation: Professor and HOD

Sl. No	Course Code and Name	Year/Semester
1.	18PHY22 ENGINEERING PHYSICS FOR C SECTION	2021/II

Signature of Faculty

Department of Physics

HOD

Department of Physics

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CITY
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ACADEMIC YEAR: 2020-21

DEPARTMENT OF BASICSCIENCE

COURSE PREFERENCE

Name of the Faculty: Mrs. Nagasree G

Designation: Assistant Professor

Sl. No	Course Code and Name	Year/Semester
1.	18PHY22 ENGINEERING PHYSICS FOR C SECTION	2021/II

Signature of Faculty
Department of Physics

HOD
Department of Physics

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CITY ENGINEERING COLLEGE
TIME TABLE –SECOND SEMESTER MAY – 2020-21
PHYSICS CYCLE

SECTION: C **ROOM NO: A005**

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 -12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON	CIV	ELE	BREAK	MAT	PHY	LUNCH	EGD	EGD	
TUE	ELE	PHY		CIV	MAT		←------PHYL/EGDL/ELEL/C1/C2/C3-----→		
WED	MAT	ELE		PHY	EGH		←------PHYL/EGDL/ELEL/C2/C3/C1-----→		
THU	PHY	MAT		ELE	CIV		PHY	EGH	LIBARARY
FRI	MAT	←-----PHYL		EGDL/ELEL/ C3/C1/C2-----→			EDUSAT/DEP/COLLEGE ACVIVITIES		
SAT	ELE	CIV		PHY					

MAT- Dr. Jyothi.P
CIV - Prof.Veeresh
EGH - Dr.K.Sujatha & Prof. Nagashree G
PHYL-Dr.K.Sujatha & Prof. Nagashree G

ELE – Dr. Shalini Prasad
PHY - Dr.K.Sujatha & Prof. Nagashree G
EGD – Prof. Shruthi & Prof Anil
ELEL - Prof. Mallikarjuna.G.S & Dr. Shalini Prasad

PROCTORS - Prof. Nagashree G & Prof. Shruthi

Principal
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TIME TABLE –SECOND SEMESTER DEC – 2020-21
PHYSICS CYCLE

Dr. K. Sujatha **SUBJECT CODE: 18PHY12**

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 -12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON			BREAK		C	LUNCH			
TUE							←------PHYL/C1-----→		
WED							←------PHYL/C2-----→		
THU	C	←PHYL/B3		PHYL/B3 ------------→					
FRI									
SAT									

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TIME TABLE –SECOND SEMESTER DEC – 2020-21
PHYSICS CYCLE

Mrs. Nagashree. G **SUBJECT CODE: 18PHY12**

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 -12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON			/BREAK			LUNCH			
TUE		C							
WED				C					
THU									
FRI		←-----PHYL		EGDL/ELEL/ C3/C1/C2-----→					
SAT				C					

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VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

B.E. SYLLABUS FOR 2018-2022

ENGINEERING PHYSICS

(Common to all Branches)

(Effective from the academic year 2018-19)

Course Code : 18PHY12/22	**CIE Marks : 40**
Contact Hours/Week : 05(3L+2T)	**SEE Marks: 60**
Total Hours: 50 (8L+2T per module)	**Exams. Hours: 03**
Semester: I/II	**Credits: 04(3:2:0)**

Course Learning Objectives: This course (**18PHY12/22**) will enable students to

- Learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.
- Gain the knowledge of newer concepts in modern physics for the better appreciation of modern technology

MODULES

MODULE-I :

Oscillations and Waves

Free Oscillations: Definition of SHM, derivation of equation for SHM, Mechanical and electrical simple harmonic oscillators (mass suspended to spring oscillator), complex notation and phasor representation of simple harmonic motion. Equation of motion for free oscillations, Natural frequency of oscillations.

Damped and forced oscillations: Theory of damped oscillations: over damping, critical & under damping, quality factor. Theory of forced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance.

Shock waves: Mach number, Properties of Shock waves, control volume. Laws of conservation of mass, energy and momentum. Construction and working of Reddy shock tube, applications of shock waves.

Numerical problems

(RBT Levels L1, L2, L3)

MODULE-II:

Elastic properties of materials:

Elasticity: Concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, strain hardening and strain softening, failure (fracture/fatigue), Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (n) in terms of α and β. Relation between Y, n and K, Limits of Poisson's ratio.

Bending of beams: Neutral surface and neutral plane, Derivation of expression for bending moment. Bending moment of a beam with circular and rectangular cross section. Single cantilever, derivation of expression for young's' modulus

Torsion of cylinder: Expression for couple per unit twist of a solid cylinder (Derivation), Torsional pendulum-Expression for period of oscillation.

Numerical problems

(RBT Levels L1, L2, L3)

MODULE- III:

Maxwell's equations, EM waves and Optical fibers

Maxwell's equations: Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem. Description of laws of electrostatics, magnetism and Faraday's laws of EMI. Current density & equation of Continuity; displacement current (with derivation) Maxwell's equations in vacuum

EM Waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane electromagnetic waves in vacuum, their transverse nature, polarization of EM waves(Qualitative)

Optical fibers: Propagation mechanism, angle of acceptance. Numerical aperture. Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient. Discussion of block diagram of point to point communication. Merits and demerits

Numerical problems

(RBT Levels L1, L2)

MODULE IV:

Quantum Mechanics and Lasers

Quantum mechanics: Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle and applications (non confinement of electron in the nucleus), Schrodinger time independent wave equation, Significance of Wave function, Normalization, Particle in a box, Energy eigen values of a particle in a box and probability densities

Lasers: Review of spontaneous and stimulated processes, Einstein's coefficients (derivation of expression for energy density). Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of CO2 and semiconductor Lasers.

Application of Lasers in Defense (Laser range finder) and Engineering (Data storage)

Numerical problems

(RBT Levels L1, L2, L3)

MODULE-V:

Material science

Quantum Free electron theory of metals: Review of classical free electron theory, mention of failures. Assumptions of Quantum Free electron theory, Mention of expression for density of states, Fermi-Dirac statistics (qualitative), Fermi factor, Fermi level, Derivation of the expression for Fermi energy, Success of QFET.

Physics of Semiconductor: Fermi level in intrinsic semiconductors, Expression for concentration of electrons in conduction band, Hole concentration in valance band (only mention the expression), Conductivity of semiconductors(derivation), Hall effect, Expression for Hall coefficient(derivation)

Dielectric materials: polar and non-polar dielectrics, internal fields in a solid, Clausius-Mossotti equation(Derivation), mention of solid, liquid and gaseous dielectrics with one example each. Application of dielectrics in transformers.

Numerical problems

(RBT Levels L1, L2, L3)

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Course Outcomes:

Upon completion of this course, students will be able to

1. Understand various types of oscillations and their implications, the role of Shock waves in various fields and Recognize the elastic properties of materials for engineering applications
2. Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
3. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation
4. Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields
5. Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 60.

- The question paper will have **ten full** questions carrying equal marks.
- Each full question consisting of 20 marks.
- There will be **two** full questions (with a **maximum of four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

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DEPARTMENT OF PHYSICS

LESSON PLAN FOR EVEN SEMESTER FOR ACADEMIC YEAR 2020 - 21

Course Title: Engineering Physics	Course Code : 18PHY22
Total contact hours: L:T:P:S :: 05 (3L+2T)	End Tenn Marks : I00
Internal Marks : 40	
Semester : II	Academic year 2020-21
Lesson plan Author: Dr k Sujatha & Nagashree G	Date 19/05/2021

Course Objective:

This course (18PHY12/22) will enable students to

C Learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.

O Gain the knowledge of newer concepts in modern physics for the better appreciation of

Course Outcomes:

On completion of this course, students will have knowledge in:

CO I: Understand various types of oscillations and their implications, the role of Shock waves in various fields and Recognize the elastic properties of materials for engineering applications

C02: Realize the interrelation between time varying ele iric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.

C03: Compute Eigen values, Eigenfunctions, mom..:ntum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave quation

C04: Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields

COS: Understand various electrical and theimal properties of materials like conductors, semiconductors and dielectrics using dlfthent theoretical models.

MODULE-I

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
I	I	Definition of SHM, derivation of equation for SHM, Mechanical and electrical simple harmonic oscillators (mass suspended to spring oscillator), complex notation and phasor representation of simple harmonic motion.	R,U	COl
	2	Equation of motion for free oscillations, Ntural frequency or oscillations.	R,U	COl

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		damping Quality factor.		
	4	Theory of forced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance.	R,U,E,C	CO1
2	1	Mach number, Properties of Shock waves, control volume.	R,U	CO1
	2	Laws of conservation of mass, energy and momentum	R,U	CO 1
	3	Construction and working of Reddy shock tube, applications of shock waves. Numerical problems	R,U	CO1

MODULE-2

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
4	1	Concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, strain hardening and strain softening	R,U	C02
	2	Failure (fracture/fatigue), Hooke's law, different elastic moduli : Poisson's ratio, Expression for Young's modulus (Y)	R,U	C02
	3	Bulk modulus (K) and Rigidity modulus (n) in terms of and ρ. Relation between Y, n and K, Limits of Poisson's ratio	R,U	C02
5	1	Neutral surface and neutral plane, Derivation of expression for bending moment	R,U	C02
	2	Bending moment of a beam with circular and rectangular cross section	R,U	CO2
	3	Single cantilever, derivation of expression for young's' modulus	R,U	C02
	4	Expression for couple per unit twist of a solid cylinder (Derivation), Torsional pendulum-Expression for period of oscillation. Numerical problems	R.U	CO2

MODULE-3

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
6	1	Fundamentals of vector calculus.	R.U	CO3
	2	Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem.	R.U	CO3
	3	Description of laws of electrostatics, magnetism and Faraday's Jaws of EMI	R,U,E	CO3
	4	Current density & equation of Continuity; displacement current (with derivation) Maxwell's equations in vacuum	R,U	CO3
7	1	The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations),	R,U	CO3
	2	Plane electromagnetic waves in vacuum, their transverse nature, polarization of EM waves(Qualitative)	R,U	CO3
8	1	Propagation mechanism, angle of acceptance. Numerical aperture.	R.U,C	CO4
	2	Modes of propagation and Types of optical fibers.	R,U,Al	CO4
	3	Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient.	R,U	CO4
	4	Discussion of block diagram of point to point communication. Merits and demerits	R,U	CO4
	5	Numerical problems	R,U	CO4

MODULE-4

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
9	1	Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle and applications	R,U,	CO4
	2	Schrodinger time independent wave equation, Significance of Wave function	R,U	CO4
	3	Normalization, Particle in a box, Energy eigen values of a particle in a box and probability densities .	R,U	CO4
10	1	Review of spontaneous and stimulated processes, Einstein's	R,U	CO4

		coefficients (derivation of expression for energy density)		
	2	Requisites of a Laser system.	B,U	C04
	3	Conditions for laser action. Principle Construction and working of C02 and semiconductor Lasers.	R,U	C04
	4	Application of Lasers in Defense (Laser range finder) and Engineering (Data storage) ' Numerical problems	R,U	C04

MODULE-S

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO_l
13	I	Review of classical free electron theory, mention of failures.	R,U,A2	C04
	2	Assumptions of Quantum Free electron theory	R,U	C04
	3	Mention of expression for density of states	R,U	COS
	4	Fermi-Dirac statistics (qualitative), Fermi factor	RU	COS
14	1	Fermi level, Derivation of the expression for Fermi energy, Success ofQFET.	R,U,E	COS
	2	Fermi level in intrinsic semiconductors	R,U	COS
	3	Expression for concentration of electrons in conduction band	R,U	COS
	4	Hole concentration in valance band (only mention the expression)	R,U	COS
15	I	Conductivity of semiconductors(derivation), Hall effect, Expression for Hall coefficient(derivation)	R,U	COS
	2	polar and non-polar dielectrics	R,U.Al,C	COS
	3	internal fields in a solid	R,U	COS
	4	Clausius-Mossotti equation(Derivation)	R,U	COS
16	1	mention of solid, liquid and gaseous	R,U	COS
	2	dielectrics with one example each.	R,U	COS
	3	Application of dielectrics in transformers	R,U	COS
	4	Numerical problems	R.U,Al,C	COS

Bloom's Taxonomy Level

R-Remembering U-Understanding A-Applying A2-Analysing E-Evaluating C-Creating

Text Books:

1. A Text book of Engineering Physics- M.N A vadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand & Company Ltd, New Delhi
2. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017
3. Concepts of, Modem Physics-Arthur Beiser: 6th ;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006

Reference books:

1. Introduction to Mechanics —MK Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009
2. Lasers and Non Linear Optics – BB laud, 3rd Ed, New Age International Publishers 2011
3. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018
4. Shock waves made simple- Chintoo S Kumar, K Takayama and K.PJ Reddy: Willey India Pvt. Ltd. New Delhi2014
5. Introduction to Electrodynamics- David Griffiths: 4th Ed, Cambridge University Press 2017

Signature of Staff **Signature of HOD**

CITY
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Question Bank

Course Name: Engineering Physics **Course Code: 18PHYS22**

Semester: II **Section: C**

Module 1-Free oscillations

1.Define Simple Harmonic Motion. Derive the equation of motion foe SHM.

2.Derive the expression for force constants for series and parallel combination of springs.

3.Explain how Complex notation Phasor representation is represented.

4.Define free oscillations with example. Mention the equation of motion of natural frequency of vibration.

5.What are Damped oscillations. Give the theory. Discuss the case of under damping, over damping and critical damping.

6.Define Quality factor with equation. Give its Physical significance.

7.What are Forced Oscillations .Derive the expressions for amplitude and Phase of Forced vibrations. Explain all the three cases.

8.Write a short notes on a)Sharpness of Resonance b)Helmoltz Resonator

Shock waves

1. Define Mach Number and Mach angle

2.Distinguish between Acoustic ,Ultrasonic ,subsonic, supersonic, transonicand hypersonic waves.

3.What are shock waves and mention the properties of shock waves.

4.Explain Control Volume.

5.State and explain the law of conservation of mass ,momentum and energy with expressions .

6.Describe the construction and working of Reddy Shock tube experiment.

7.What are the applications of Shock waves.

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Module 2-Eiastic properties of materials

1.Explain Elasticity and Plasticity with examples.

2.Explain the importance of elasticity in engineering materials.

3.Explain the terms Stress and Strain. Discuss the three types of Stresses.

4.Discuss briefly the effect of stress, temperature, annealing and impurities on elasticity.

5.Describe Strain hardening and Strain softening.

6.State and explain Hooke's law with stress-strain curve.

7.Discuss three different moduli of elasticity with equations.

8.Define Lateral Strain and Linear Strain and s derive the expression for Poisson's ratio.

9.Derive the relation between shear strain, longitudinal strain and compression strain.

1O. Derive the relation between Y,η and б.

11. Derive the relation between K, Y and б.
0

12. Derive the relation between K, and Y.

13.Discuss the limiting values of б and limitations of Poisson's ratio.

14.Define Beam and explain different types of beams and mention their engineering applications .

15.Define neutral surface and neutral axis.

16.Define bending moment and derive the expression for bending moment in terms of moment of inertia. Mention the expression for bending moment for circular and rectangular cross section.

17.Describe a single cantilever and hence derive the expression for depression.

18.Explain Torsional oscillations. Derive the expression for Couple per unit twist for a solid cylinder.

19.Mention the expression for Time period for Torsional oscillations .Briefly explain the applications of torsional pendulum.

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Module 3

Maxwell's Equations and Electro magnetic waves

1.Explain Scalar Product and Vector product.

2.Describe Vector Operator and explain the concepts of gradient, divergence and curl along with physical significance.

3.Discuss three different types of integration like linear ,surface and volume integrations.

4.Explain Gauss flux theorem in electrostatics and magnetism.

5.Derive Gauss Divergence theorem. Mention Stokes theorem.

6.Discuss Maxwell- Ampere's law, Biot-Savarts law.

7.Explain briefly the Faraday's law of electromagnetic induction. Express the same in the differential form of maxwell's equation in the case of time-varying fields.

8.Discuss Continuity equation. Define Dispalcement current and arrive the expression for the same.

9.List the Maxwell's equations for time-varying condition and for static conditions .

10.Derive wave equation in terms of electric field using Maxwell's equations.

11 .Explain the plane electromagnetic waves in vacuum along with the equations for E,B and c.

12. Explain the transverse nature of electromagnetic waves and explain linear ,elliptical and circular polarizations.

Optical Fibers

1.Describe the propagation mechanism of light through in an optical fiber.

2.What is numerical aperture? Obtain an expression for numerical aperture in an optical fiber and then arrive the condition for propagation .

3.Explain modes of propagation and V number.

4.Explain different types of optical fibers.

5. Define attenuation. Explain different types of attenuation, mention the expression for attenuation coefficient.

6.Explain point to point communication system with the help of block diagram.

7.Explain merits and demerits of optical fiber communications.

Module 4- Quantum Mechanics

1.Give a brief account of blackbody radiation and Planck's radiation law with two conditions .

2.Explain dual nature of matter waves.

3.State de Broglie's hypothesis. Show tat the deBroglie wavelength of an electron is found to be equal to 1.226N nm.

4. Explain Heisenberg's uncertainity principle and show that electrons cannot exists within the nucleus.

5.Construct one dimensional time independent schrodinger wave equation.

6.What are the properties of wavefunction.

7.Explain the terms probability density , normalization.

8.Discuss Eigenvalues and Eigenfunctions.

9.Solve schrodinger wave equation for the allowed energy values in the case of particle in a box.

10. Discuss Probability for a particle in a potential well of infinite height.

Lasers

1.Explain Induced absorption, Spontaneous emission, stimulated emission.

2.Derive the expression for energy density using Einstein's coefficients.

3.Explain the requisites of a laser system.

4.Explain the condition for laser action.

5.Explain three different vibrational modes of $C0_2$ molecule. With a neat energy level diagram explain the construction and working of $C0_2$ laser .

6. Explain the construction and working of Semiconductor laser .

7.Describe how a laser range finder is made use of in defense.

8.Explain how data storage is achieved in a compact disc.

Module 5 -Material Science

1.What are the assumptions of classical free electron theory and the failures of classical free electron theory.

2.What are the assumptions of Quantum free electron theory.

3.Define density of states and mention the expression for density of states.

4.Explain Fermi levei, Fermi energy, Fermi-Dirac statistics.

5.Define Fermi Factor. Discuss the variation of Fermi Factor on different conditions of temperature and energy.

6.Derive the expression for Fermi energy at zero Kelvin. Mention the expression for Fermi velocity and Fermi temperature.

7. Discuss the success of Quantum free electron theory.

8.Discuss the Fermi level in intrinsic semiconductor. Mention the expression for electron and hole concentration in intrinsic semiconductor.

9.Derive the relation between Fermi energy and energy gap for an intrinsic semiconductor.

10.Derive the expression for electrical conductivity of semiconductors.

11.What is Hall Effect? Obtain the expression for Hall voltage in terms of Hall coefficient.

12.What are dielectric materials .Explain the types of dielectric materials. Discuss solid ,liquid and gaseous dielectic with one example each.

13.Explain polarization and the types of polarization. Mention the relation between dielectric constant and polarization.

14.Define internal field in case of solids and mention its expression for one dimensional case, three dimensional caseand Lorentz field.

15.Derive Clausius-Mossotti equation.

16.Mention the application of dielectric in transformers.

Staff
Mrs. Nagasree G
Department of Physics

HOD
Dr. Sujatha
Department of Physics

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Assignment Questions

Odd Semester 20-21

Course Name: Engineering Physics **Course Code: 18PHYS22**

Semester: II **Section: C**

Module 1-Free oscillations

1.Define Simple Harmonic Motion. Derive the equation of motion foe SHM.

2.Derive the expression for force constants for series and parallel combination of springs.

3.Explain how Complex notation Phasor representation is represented.

4.Define free oscillations with example. Mention the equation of motion of natural frequency of vibration.

5.What are Damped oscillations. Give the theory. Discuss the case of under damping, over damping and critical damping.

6.Define Quality factor with equation. Give its Physical significance.

7.What are Forced Oscillations .Derive the expressions for amplitude and Phase of Forced vibrations. Explain all the three cases.

8.Write a short notes on a)Sharpness of Resonance b)Helmoltz Resonator

Shock waves

1. Define Mach Number and Mach angle

2.Distinguish between Acoustic ,Ultrasonic ,subsonic, supersonic, transonicand hypersonic waves.

3.What are shock waves and mention the properties of shock waves.

4.Explain Control Volume.

5.State and explain the law of conservation of mass ,momentum and energy with expressions .

6.Describe the construction and working of Reddy Shock tube experiment.

7.What are the applications of Shock waves.

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Module 2-Eiastic properties of materials

1.Explain Elasticity and Plasticity with examples.

2.Explain the importance of elasticity in engineering materials.

3.Explain the terms Stress and Strain. Discuss the three types of Stresses.

4.Discuss briefly the effect of stress, temperature, annealing and impurities on elasticity.

5.Describe Strain hardening and Strain softening.

6.State and explain Hooke's law with stress-strain curve.

7.Discuss three different moduli of elasticity with equations.

8.Define Lateral Strain and Linear Strain and s derive the expression for Poisson's ratio.

9.Derive the relation between shear strain, longitudinal strain and compression strain.

1O. Derive the relation between Y, η and ϭ.

11. Derive the relation between K, Y and ϭ.
0

12. Derive the relation between K, and Y.

13.Discuss the limiting values of ϭ and limitations of Poisson's ratio.

14.Define Beam and explain different types of beams and mention their engineering applications .

15.Define neutral surface and neutral axis.

16.Define bending moment and derive the expression for bending moment in terms of moment of inertia. Mention the expression for bending moment for circular and rectangular cross section.

17.Describe a single cantilever and hence derive the expression for depression.

18.Explain Torsional oscillations. Derive the expression for Couple per unit twist for a solid cylinder.

19.Mention the expression for Time period for Torsional oscillations .Briefly explain the applications of torsional pendulum.

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Module 3

Maxwell's Equations and Electro magnetic waves

1.Explain Scalar Product and Vector product.

2.Describe Vector Operator and explain the concepts of gradient, divergence and curl along with physical significance.

3.Discuss three different types of integration like linear ,surface and volume integrations.

4.Explain Gauss flux theorem in electrostatics and magnetism.

5.Derive Gauss Divergence theorem. Mention Stokes theorem.

6.Discuss Maxwell- Ampere's law, Biot-Savarts law.

7.Explain briefly the Faraday's law of electromagnetic induction. Express the same in the differential form of maxwell's equation in the case of time-varying fields.

8.Discuss Continuity equation. Define Dispalcement current and arrive the expression for the same.

9.List the Maxwell's equations for time-varying condition and for static conditions .

10.Derive wave equation in terms of electric field using Maxwell's equations.

11.Explain the plane electromagnetic waves in vacuum along with the equations for E,B and c.

12. Explain the transverse nature of electromagnetic waves and explain linear ,elliptical and circular polarizations.

Optical Fibers

1.Describe the propagation mechanism of light through in an optical fiber.

2.What is numerical aperture? Obtain an expression for numerical aperture in an optical fiber and then arrive the condition for propagation .

3.Explain modes of propagation and V number.

4.Explain different types of optical fibers.

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16.Mention the application of dielectric in transformers.

Staff
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Department of Physics

HOD
Dr. Sujatha
Department of Physics

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SUB CODE:18PHY22

CITY ENGINEERING COLLEGE
I Internal Test

Sem & Branch: CS/EC/CIV/ME
Sub Name: Engineering Physics
Max Marks: 50

Date:29/06/2021
Time: 10:30-12:00
Duration: 1:30 hr.

Note: Answer all Questions selecting any ONE FULL questions from each part

Q No.	Sub Q No.	Questions	Marks	CO's
		PART-A		
1	a	Derive the relation between K ,Y and σ	6	CO1
	b	Define neutral surface and neutral axis	4	CO1
		OR		
2	a	Explain different types of Optical fibers.	6	CO2
	b	The refractive indices of core and cladding are 1.5 and 1.48 respectively in an optical fiber. Find the numerical aperture and angle of acceptance.	4	CO2
		PART-B		
3		Derive the expression for energy density using Einstein's coefficients.	10	CO4
		OR		
4		Define attenuation. Explain different types of attenuation with suitable diagrams.	10	CO2
		PART-C		
5	a	Explain Spontaneous emission and Stimulated emission	6	CO4
	b	The average output power of a laser source is emitting a laser beam of wavelength 6328 A° is 5 mw. Find the number of photons emitted per second by the laser .	4	CO4

OR

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6		Derive the relation between elongation strain, compression strain and shearing strain . Define all three elastic moduli.	10	CO1 CO1

PART-D

7		What is numerical aperture. Obtain the expression for numerical aperture in an optical fiber and then arrive the condition for propagation.	10	CO2

OR

8		Explain three different vibrational modes of co$_2$ molecule. With a neat energy level diagram explain the construction and working of co$_2$ laser.	10	CO4

9	a	Describe how a laser range finder is made use of in defence.	6	CO4
	b	The attenuation in an optical fiber 3.6 dB/Km.What fraction of initial intensity remains after i) 1 Km ii) 3 Km.	4	CO4

OR

10		Explain the construction and working of semiconductor laser with a suitable diagram.	10	CO1

CO1—Understand various types of oscillations and their implications, the role of shock waves in various fields and recognize the elastic properties of materials for engineering applications.

CO2---Reliaze the interrelation between time varying electric field and magnetic field,the transverse nature nature of the EM waves and their role in Optical fiber communications.

CO4---Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields.

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DEPARTMENT OF ......PHYSICS..............

SCHEME FOR VALUATION_

Internal Test ......I.......

Semester & Section: IInd / C

Date: 30/06/2021

Question No.	Details of the answer	Marks Distribution	Total Marks
	Part-A		
① ⓐ	Explanation of Elastic moduli, K,Y	2M	
	arrive the relation b/w	2M	6M
	K,Y & σ $y = 3K(1-2\sigma)$	2M	
ⓑ	Def of. neutral surface & neutral axis	2M	4M
	Explanation of both	2M	
	(OR)		
② ⓐ	Types of optical fiber	2M	6M
	explanation of all three	4M	
ⓑ	Give $n_1 = 1.5$, $n_2 = 1.48$		
	$N \cdot A = \sqrt{n_1^2 - n_2^2}$	2M	4M
	$\theta = \sin^{-1}(N \cdot A)$	2M	
	Part-B		
③	cases of absorption & emission	2M	
	processes with expression	4M	10M
	arrive upto $U_\nu d\nu = \frac{A}{B(e^{h\nu/kT} - 1)}$	6M	
	(OR)		
④	Attenuation def & Explanation	2M+2M	
	Explanation of three types with suitable diagrams	2M+2M+2M	10M

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DEPARTMENT OF PHYSICS

SCHEME FOR VALUATION_

Internal Test I

Semester & Section: IInd/C

Date: 30/6/21

Question No.	Details of the answer	Marks Distribution	Total Marks
	Part C		
⑤ ⓐ	explaination of spontaneous & stimulated emission	3M 3M	6M
ⓑ	$\lambda = 6328\ A^\circ$, $P = 5\ mW$, $N = ?$ $N \times \Delta E = P_{out}$, $\Delta E = \frac{hc}{\lambda}$	2M 2M	4M
⑥	Relation arrive b/w three strains, elongation strain = compression + shearing strain	6M 4M	10M
	part-D		
⑦	Numerical aperture def & explant diagram and explanation arrive upto $N.A = \sqrt{n_1^2 - n_2^2}$	2M+2M 4M+2M	10M
	(OR)		
⑧	Explanation of modes CO_2 laser construction and working diagram & Explanation	3M 3M+2M 2M	10M
	part-E		
⑨ ⓐ	laser range finder explantion with suitable diagram	3M 3M	6M

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SCHEME FOR VALUATION_

Internal Test ......I.....

Semester & Section: IInd/C

Date: 30/6/21

Question No.	Details of the answer	Marks Distribution	Total Marks
9 b	attenuation is 3.6 dB/km after 1km & 3km	2M	
	[illegible] arrive the final expression	2M	4M
	(OR)		
10.	Semiconductor laser	2M	
	construction & working	4M	
	diagram & Explanation	2M	10M
	with suitable diagrams	2M	

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Year : 2020 - 2021

Semester : ~~Odd~~ / [✓ Even]

Name of the Teacher : Dr. K. Suprabha Mrs Nagashree G.

Designation : Prof. Asst Prof.

Department : Physics

Sem/ Branch	Subject Code	Subject
1. II - C	18PHY22	Engineering Physics
2. All branches		
3.		

	Initials at the End of the			
	1st Month	2nd Month	3rd Month	Semester
Staff	28/5/21	25/6/21	10/7/21	
HOD				
Principal				

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ATTENDANCE

Sl. No.	Reg.No.	Name	19/5	20/5	21/5	22/5	24/5	25/5	[illegible]/5	26/5	28/5	28/5	31/5	1/6	2/6	2/6
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1CE20CS75	Swati Sateesh Kumar Kerabrgi	1	2	3	4	5	5	6	7	8	9	10	11	12	13
2	20CS76	Syed Houzaifa	1	2	3	3	4	5	6	7	8	9	10	11	12	12
3	CS77	Syed Nawaz	1	2	3	4	5	6	7	8	9	10	11	.	12	13
4	CS78	Tariq Anjum	1	1	2	3	3	4	5	6	6	7	7	8	9	10
5	CS79	Tarun. V	1	2	2	3	4	5	6	7	8	8	9	10	11	12
6	CS80	Tejas. B.R	1	2	3	4	5	6	7	8	9	10	11	12	13	14
7	CS81	Tejas T. Kumar	.	1	2	3	4	5	6	7	8	9	10	11	12	13
8	CS82	Umme Hani M A	1	2	3	4	5	6	6	7	8	9	10	11	12	13
9	CS87	Vivek Gautam	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10	CS84	Vaishnavi. K	1	2	3	4	5	6	7	7	8	9	10	11	12	13
11	CS85	Venugopal	1	2	3	4	5	6	7	8	9	10	11	12	13	14
12	CS86	Vishwa. V	1	2	3	4	5	6	7	8	9	10	11	12	13	14
13	CS88	Yarub Baba	.	1	2	2	3	4	5	6	7	7	8	9	10	11
14	CS89	Yashashree. R	1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	CS90	Yashaswini R.P	1	2	3	3	4	5	6	7	8	9	10	.	11	12
16	AI001	Abdul Faheem	1	2	3	4	4	5	6	7	8	9	10	11	12	13
17	AI003	Kedar Joshi	.	1	2	3	4	5	6	7	8	9	10	11	12	13
18	AI004	Kokila	1	2	3	4	5	5	6	7	8	9	10	11	12	13
19	AI007	Sharona Sam	1	2	2	3	4	5	6	7	8	9	10	11	12	13
20	AI008	Suhas Gajanana	1	2	3	4	5	6	7	8	9	10	11	12	13	14
21	AI009	Syeda Aliyah Bakshi	1	2	3	4	5	6	7	8	9	10	11	12	13	14
22	IS001	Ayusha Kumari	.	1	2	3	4	5	6	7	8	9	10	11	12	13
23	IS002	Amisha Rashminath	1	2	3	4	5	6	7	8	9	10	11	12	13	14
24	IS003	Likhith R.J	1	2	3	4	5	5	6	7	8	9	10	11	12	13
25	AI002	Hajira Ahmed	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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	Initials															

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ATTENDANCE

Sl. No.	Reg.No.		19/5 1	20/5 2	21/5 3	22/5 4	24/5 5	25/5 6	26/5 7	27/5 8	28/5 9	29/5 10	31/5 11	1/6 12	2/6 13	3/6 14
26	EC 001	Bhanu chandan	1	2	3	4	4	5	5	6	7	8	9	10	11	12
27	EC002	Keerthi . A	.	1	2	3	4	5	6	7	8	9	10	11	12	13
28	EC003	Sukruta . S.R	1	1	2	3	4	5	6	7	8	9	10	11	12	13
29	ME001	Suhas. B	1	2	3	4	5	6	7	7	8	9	10	11	12	13
30	ME002	Abhilash A . Suvan	1	2	3	3	4	5	6	7	8	9	10	11	12	13
31	CV001	Thyagaraj . K	1	2	3	4	5	6	7	8	9	10	11	12	13	14
32	CS032	Fouzia . J	1	2	3	4	4	5	1	7	7	8	9	10	11	12
33	CS045	kumara swamy	1	2	3	4	5	6	7	8	9	10	11	12	.	13
34	CS 83	V. Manoj Kumar	.	1	2	3	4	5	6	7	8	9	10	11	12	13
35	CS 15	Anushree . B.S	1	2	3	4	5	6	7	8	9	10	11	12	13	14
36	CS 64	Sagar . N	1	2	3	4	4	5	6	7	8	9	10	11	12	13
37	CS 57	Pooja . S	1	.	2	3	4	5	7	8	9	10	11	12	13	14
38	CS 72	Subhendu Sagar	1	2	3	4	4	5	6	7	8	9	10	11	12	13
39	CS 55	Nimmi Sagar	.	1	2	3	4	5	6	7	8	9	10	11	12	13
40	AI005	Rithik Mariyan . S	1	2	3	4	4	5	6	7	8	9	10	11	4.	12
41	CS026	Deepak Kumar . R	1	2	3	4	5	6	7	8	9	10	11	12	13	14
42	CS020	Bhagyashree	.	1	2	3	4	5	6	7	7	8	9	10	11	12
43	CS023	Chaitanya . C	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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DEPARTMENT OF BASIC SCIENCE
ACADEMIC YEAR 20-21 ODD SEMESTER
CIRCULAR

Ref No: CEC/BS/DAC/ACY/2020-21/OR/01 Date: 21-12-2020

This is to inform the members of Department Advisory Committee that meeting is scheduled on 04-01-2021 at 10: 00 AM in Physics Laboratory.

Agenda:

- Commencement of classes for 1st semester students
- Student Induction Programme for 1st semester students
- Conduction of Talents day
- Organizing value added courses/ certificate courses, seminars & webinars in the curriculum.

HOD
Dr. K Sujatha
Department of Physics

HEAD OF THE DEPT. OF PHYSICS
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DEPARTMENT OF BASIC SCIENCE

Department Advisory Committee Meeting

Date: 04-01-2021
Time: 10:00 AM
Venue: Physics Laboratory

List of DAC Members

Sl. No	Member Name	Designation	Role	Signature
1	Dr. P. Rajasekar	HOD & Professor	Convenor	
2	Mrs. Sunitha N	Assistant Professor	Member	
3	Mrs. Anu Radha U	Assistant Professor	Member	
4	Mrs. Sowmya P	Assistant Professor	Member	
5	Dr. K Sujatha	HOD & Professor	Member	
6	Mrs. Nagasree G	Assistant Professor	Member	
7	Mrs. Ashwini Hindiholi	Assistant Professor	Member	
8	Dr. Jyothi P	Associate Professor	Member	Jyothi
9	Mrs. Vanitha G R	Assistant Professor	Member	
10	Mrs. Gayatri	Assistant Professor	Member	
11	Mrs. Kalavathi	Assistant Professor	Member	
12	Mrs. Gana Priya	Assistant Professor	Member	
13	Mrs. Reena Patro	Assistant Professor	Member	

Agenda of the Meeting:

- Inauguration programme for 1st semester students on 21st December 2020.
- Commencement of orientation Programme from 22nd December 2020.
- Conduction of Talents day on 29th December 2020.
- Classes for 1st semester students will be from 4th January 2021.
- Organizing value added courses/ certificate courses in the curriculum like Entrepreneurship and innovation.
- Organizing seminars and webinars.

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Minutes of Meeting:

The members discussed suggestions for improvement and reviewed the meeting agenda.

- The committee decided to organize Certification course on "Communication Proficiency".
- It was discussed to conduct Talents Day on 29th December 2020.
- Committee decided to conduct webinar on Introduction to Research Methodology.
- Committee members agreed to conduct a seminar on career guidance --Navigating Your Future.

Convenor
Dr. Rajasekhar. P
Department of Chemistry

Dr P. RAJASEKHAR,
M.Sc; M.Phil; Ph.D
HEAD OF THE DEPT. OF CHEMISTRY
CITY ENGINEERING COLLEGE.
Doddakallasandra, Kanakapura Main Road
BANGALORE - 560 062.
Ph (O) 26669313 (M) 92428 92734

HOD
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ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ವಿಟಿಯು ಅಧಿನಿಯಮ ೧೯೯೪"ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ಜ್ಞಾನ ಸಂಗಮ", ಬೆಳಗಾವಿ-೫೯೦೦೧೮, ಕರ್ನಾಟಕ, ಭಾರತ

Visvesvaraya Technological University
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama" Belagavi-590018, Karnataka, India
Phone: (0831) 2498100, Fax: (0831) 2405467, Website: vtu.ac.in

Registrar
Phone: (0831) 2498100
Fax: (0831) 2405467

Ref: VTU/BGM/BOS/A9/2020-21 /6652 Date: 12 MAR 2021

Revised -NOTIFICATION

Subject: Academic Calendar for I semester (revised) B.E./B.Tech./B.Plan./B.Arch., for the year 2020-21 regarding...

Reference:

1. VTU/BGM/SO2/2020-21/5296, dated 15.01.2021
2. Hon'ble Vice-Chancellor's approval dated 12.03.2021

Revised Academic Calendar for I semester of B.E./B.Tech./B.Arch./B.Plan., for the Year 2020-21 is hereby notified as below-

Events	Dates
Commencement of ODD Semester	14.12.2020
Last Working day of ODD Semester	**10.04.2021**
Practical Examinations	**05.05.2021 to 15.05.2021**
Theory Examinations	**19.04.2021 to 03.05.2021**
Internship	-----
Internship Viva-Voce	-----
Professional training / Organization study	-----
Commencement of EVEN Semester	**19.05.2021**

The Principals of Affiliated, Constituent, and Autonomous Engineering Colleges are hereby informed to bring the contents of this Notification to the notice of all the concerned.

Sd/-

REGISTRAR

To,

1. The Principals of all affiliated/ constituent /Autonomous Engineering Colleges under the ambit of VTU Belagavi.
2. The Chairpersons of all Departments, Centres for PG Studies in Belagavi, Kalaburgi, Muddenahalli, and Mysore.

Copy to.

1. To the Hon'ble Vice-Chancellor through the secretary to VC, VTU Belagavi for information
2. The Registrar (Evaluation), VTU Belagavi for information.
3. The Regional Directors (I/c) of all the regional offices of VTU for circulation.
4. The Special Officer CNC VTU Belagavi for uploading on VTU website
5. PS to Registrar VTU Belagavi
6. All the concerned Special Officer/s and Caseworker/s of the academic section, VTU, Belagavi

Rangu B.I
12/03/21
REGISTRAR

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CITY ENGINEERING COLLEGE BENGALURU 560061-ACADEMIC CALENDER APPLIED SCIENCE AND HUMANITES-2020-2021(ODD SEM)

	FEBAURAY-2021		March-2021		April-2021		May-2021	
DAY	DATE	EVENT	DATE	EVENT	DATE	EVENT	DATE	EVENT
MON	1	MoM on curriculam enrichment	1					
TUE	2	starting day of 1,3and 5th sems	2					
WED	3		3					
THU	4	1 st phase orientation day starts(online)	4		1			
FRI	5	2ndday oriantaion	5		2			
SAT	6	3rd day orientation	6		3		1	LABOUR'S DAY
SUN	7	4th day orientation	7		4		2	
MON	8	5th day orientation	8		5		3	
TUE	9	6th day orientation	9		6		4	
WED	10	7th day orientation	10		7		5	
THU	11	8nd day orientation	11	maha shivarathri	8		6	
FRI	12	9th day orientation	12		9		7	
SAT	13	2nd satuarday holiday	13	2nd satuarday holiday	10	2nd satuarday holiday	8	2nd satuarday holiday
SUN	14	10 day orientation	14		11		9	
MON	15		15		12		10	
TUE	16		16		13	ugadi	11	
WED	17		17		14	Dr Ambedkar jayanti	12	
THU	18		18		15		13	
FRI	19		19		16		14	
SAT	20		20		17		15	
SUN	21		21		18		16	
MON	22		22		19		17	
TUE	23		23		20		18	
WED	24		24		21		19	last working day of 1st,3rdand 5th sems
THU	25		25		22		20	
FRI	26		26		23		21	
SAT	27	4th satuarday holiday	27	4th satuarday holiday	24	4th satuarday holiday	22	4th satuarday holiday
SUN	28		28		25		23	
MON			29	holi(gh)	26		24	
TUE			30		27		25	
WED			31		28		26	
THU					29		27	
FRI					30		28	
SAT							29	
SUN							30	
MON							31	

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CITY
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ACADEMIC YEAR: 2020-21

DEPARTMENT OF BASICSCIENCE

COURSE PREFERENCE

Name of the Faculty: Dr. Sujatha K

Designation: Professor and HOD

Sl. No	Course Code and Name	Year/Semester
1.	18PHY12 ENGINEERING PHYSICS FOR B SECTION	2020/I

Signature of Faculty

Department of Physics

HOD

Department of Physics

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CITY
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ACADEMIC YEAR: 2020-21

DEPARTMENT OF BASICSCIENCE

COURSE PREFERENCE

Name of the Faculty: Mrs. Nagasree G

Designation: Assistant Professor

Sl. No	Course Code and Name	Year/Semester
1.	18PHY12 ENGINEERING PHYSICS FOR A SECTION	2020/I

Signature of Faculty

Department of Physics

HOD

Department of Physics

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CITY ENGINEERING COLLEGE
TIME TABLE –FIRST SEMESTER DEC – 2020-21
PHYSICS CYCLE

SECTION: A **ROOM NO: A006**

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 -12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON	MAT	PHY	/BREAK	CIV	ELE	LUNCH	←------PHYL/EGDL/ELEL/A1/A2/A3-----→		
TUE	PHY	MAT		EGD	EGD		ELE	CIV	
WED	CIV	←----PHYL/		EGDL/ELEL/A2/A3/A1----→					
THU	ELE	CIV		PHY	MAT		←------PHYL/EGDL/ELEL/A3A1/A2 -----→		
FRI	ELE	CIV		MAT	PHY				
SAT	PHY	ELE		MAT					

MAT- Dr. Jyothi.P & Prof. Vanitha G
CIV - Prof. Raghu
EGH - Dr.K.Sujatha & Prof. Nagashree G
PHYL-Dr.K.Sujatha & Prof. Nagashree G

ELE - Prof. Mallikarjuna.G.S
PHY - Dr.K.Sujatha & Prof. Nagashree G
EGD - Dr. Karunakara, Prof.Anil
ELEL - Prof. Mallikarjuna.G.S & Prof. Ravindra.S

PROCTORS - Prof. Nagashree.G & Prof. Vanitha G

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CITY ENGINEERING COLLEGE
TIME TABLE –FIRST SEMESTER DEC – 2020-21
PHYSICS CYCLE

SECTION: B **ROOM NO: A005**

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 -12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON	CIV	ELE	BREAK	MAT	PHY	LUNCH	EGD	EGD	
TUE	ELE	PHY		CIV	MAT		←------PHYL/EGDL/ELEL/B1/B2/B3-----→		
WED	MAT	ELE		PHY	CIV		←------PHYL/EGDL/ELEL/B2/B3/B1-----→		
THU	MAT	←-----PHYL		EGDL/ELEL/ B3/B1/B2-----→			PHY	EGH	LIBARARY
FRI	PHY	MAT		ELE	CIV		EDUSAT/DEP/COLLEGE ACVIVITIES		
SAT	ELE	CIV		PHY					

MAT- Dr. Jyothi.P
CIV - Prof.Veeresh
EGH - Dr.K.Sujatha & Prof. Nagashree G
PHYL-Dr.K.Sujatha & Prof. Nagashree G
ELE – Dr. Shalini Prasad
PHY - Dr.K.Sujatha & Prof. Nagashree G
EGD – Prof. Shruthi & Prof Anil
ELEL - Prof. Mallikarjuna.G.S & Dr. Shalini Prasad

PROCTORS - Prof. Nagashree G & Prof. Shruthi

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CITY ENGINEERING COLLEGE
TIME TABLE –FIRST SEMESTER DEC – 2020-21
PHYSICS CYCLE

Dr. K. Sujatha **SUBJECT CODE: 18PHY12**

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 -12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON			BREAK			LUNCH			
TUE		B					←----------------PHYL/B1 -------------------→		
WED				B			←----------------PHYL/B2-------------------→		
THU		←PHYL/B3		PHYL/B3 ------------→			B		
FRI	B								
SAT				B					

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TIME TABLE –FIRST SEMESTER DEC – 2020-21
PHYSICS CYCLE

Mrs. Nagashree. G **SUBJECT CODE: 18PHY12**

DAY	9:00-10:00	10:00-11:00	11:00-11:15	11:15 -12:15	12:15-1:15	1:15-2:00	2:00-3:00	3:00-4:00	4:00-5:00
MON		A	/BREAK			LUNCH	←-------------------- PHYL/A2---------------------→		
TUE	A								
WED		←PHYL/A2		PHYL/A2---------→					
THU				A			←---------------------- PHYL/A2--------------------→		
FRI									
SAT	A								

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VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

B.E. SYLLABUS FOR 2018-2022

ENGINEERING PHYSICS

(Common to all Branches)

(Effective from the academic year 2018-19)

Course Code : 18PHY12/22	**CIE Marks : 40**
Contact Hours/Week : 05(3L+2T)	**SEE Marks: 60**
Total Hours: 50 (8L+2T per module)	**Exams. Hours: 03**
Semester: I/II	**Credits: 04(3:2:0)**

Course Learning Objectives: This course (**18PHY12/22**) will enable students to

- Learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.
- Gain the knowledge of newer concepts in modern physics for the better appreciation of modern technology

MODULES

MODULE-I :

Oscillations and Waves

Free Oscillations: Definition of SHM, derivation of equation for SHM, Mechanical and electrical simple harmonic oscillators (mass suspended to spring oscillator), complex notation and phasor representation of simple harmonic motion. Equation of motion for free oscillations, Natural frequency of oscillations.

Damped and forced oscillations: Theory of damped oscillations: over damping, critical & under damping, quality factor. Theory of forced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance.

Shock waves: Mach number, Properties of Shock waves, control volume. Laws of conservation of mass, energy and momentum. Construction and working of Reddy shock tube, applications of shock waves.

Numerical problems

(RBT Levels L1, L2, L3)

MODULE-II:

Elastic properties of materials:

Elasticity: Concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, strain hardening and strain softening, failure (fracture/fatigue), Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (n) in terms of α and β. Relation between Y, n and K, Limits of Poisson's ratio.

Bending of beams: Neutral surface and neutral plane, Derivation of expression for bending moment. Bending moment of a beam with circular and rectangular cross section. Single cantilever, derivation of expression for young's' modulus

Torsion of cylinder: Expression for couple per unit twist of a solid cylinder (Derivation), Torsional pendulum-Expression for period of oscillation.

Numerical problems

(RBT Levels L1, L2, L3)

MODULE- III:

Maxwell's equations, EM waves and Optical fibers

Maxwell's equations: Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem. Description of laws of electrostatics, magnetism and Faraday's laws of EMI. Current density & equation of Continuity; displacement current (with derivation) Maxwell's equations in vacuum

EM Waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane electromagnetic waves in vacuum, their transverse nature, polarization of EM waves(Qualitative)

Optical fibers: Propagation mechanism, angle of acceptance. Numerical aperture. Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient. Discussion of block diagram of point to point communication. Merits and demerits

Numerical problems

(RBT Levels L1, L2)

MODULE IV:

Quantum Mechanics and Lasers

Quantum mechanics: Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle and applications (non confinement of electron in the nucleus), Schrodinger time independent wave equation, Significance of Wave function, Normalization, Particle in a box, Energy eigen values of a particle in a box and probability densities

Lasers: Review of spontaneous and stimulated processes, Einstein's coefficients (derivation of expression for energy density). Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of CO2 and semiconductor Lasers.

Application of Lasers in Defense (Laser range finder) and Engineering (Data storage)

Numerical problems

(RBT Levels L1, L2, L3)

MODULE-V:

Material science

Quantum Free electron theory of metals: Review of classical free electron theory, mention of failures. Assumptions of Quantum Free electron theory, Mention of expression for density of states, Fermi-Dirac statistics (qualitative), Fermi factor, Fermi level, Derivation of the expression for Fermi energy, Success of QFET.

Physics of Semiconductor: Fermi level in intrinsic semiconductors, Expression for concentration of electrons in conduction band, Hole concentration in valance band (only mention the expression), Conductivity of semiconductors(derivation), Hall effect, Expression for Hall coefficient(derivation)

Dielectric materials: polar and non-polar dielectrics, internal fields in a solid, Clausius-Mossotti equation(Derivation), mention of solid, liquid and gaseous dielectrics with one example each. Application of dielectrics in transformers.

Numerical problems

(RBT Levels L1, L2, L3)

Course Outcomes:

Upon completion of this course, students will be able to

1. Understand various types of oscillations and their implications, the role of Shock waves in various fields and Recognize the elastic properties of materials for engineering applications
2. Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
3. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation
4. Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields
5. Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 60.

- The question paper will have **ten full** questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

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DEPARTMENT OF PHYSICS

LESSON PLAN FOR ODD SEMESTER FOR ACADEMIC YEAR 2020 - 21

Course Title: Engineering Physics	Course Code : 18PHY21
Total contact hours: L:T:P:S :: 05 (3L+2T)	End Tenn Marks : I00
Internal Marks : 40	
Semester : IIII	Academic year 2020-21
Lesson plan Author: Dr k Sujatha & Nagashree G	Date 04/0l/2021

Course Objective:

This course (18PHY12/22) will enable students to

C Learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.

O Gain the knowledge of newer concepts in modern physics for the better appreciation of

Course Outcomes:

On completion of this course, students will have knowledge in:

CO I: Understand various types of oscillations and their implications, the role of Shock waves in various fields and Recognize the elastic properties of materials for engineering applications

C02: Realize the interrelation between time varying ele iric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.

C03: Compute Eigen values, Eigenfunctions, mom..:ntum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave quati on

C04: Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields

COS: Understand various electrical and theimal properties of materials like conductors, semiconductors and dielectrics using difthent theoretical models.

MODULE-I

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
I	I	Definition of SHM, derivation of equation for SHM, Mechanical and electrical simple harmonic oscillators (mass suspended to spring oscillator), complex notation and phasor representation of simple harmonic motion.	R,U .	COl
	2	Equation of motion for free oscillations, Ntural frequency or oscillations.	R,U	COl

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		dampingQuality factor.		
	4	Theory offorced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance.	R,U,E,C	COl
2	1	Mach number, Properties of Shock waves, control volume.	R,U	COl
	2	Laws of conservation of mass, energy and momentum	R,U	CO l
	3	Construction and working of Reddy shock tube, applications of shock waves. Numerical problems	R,U	COl

MODULE-2

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
4	1	Concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, strain hardening and strain softening	R,U	C02
	2	Failure (fracture/fatigue), Hooke's law, different elastic moduli : Poisson's ratio, Expression for Young's modulus (Y)	R,U	C02
	3	Bulk modulus (K) and Rigidity modulus (n) in terms of and p. Relation between Y, n and K, Limits of Poisson's ratio	R,U	C02
5	1	Neutral surface and neutral plane, Derivation of expression for bending moment	R,U	C02
	2	Bending moment of a beam with circular and rectangular cross section	R,U	CO2
	3	Single cantilever, derivation of expression for young's' modulus	R,U	C02
	4	Expression for couple per unit twist of a solid cylinder (Derivation), Torsional pendulum-Expression for period of oscillation. Numerical problems	R.U	CO2

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MODULE-3

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
6	1	Fundamentals of vector calculus.	R.U	C03
	2	Divergence and curl of electric field and magnetic field .(static), Gauss' divergence theorem and Stokes' theorem.	R.U	C03
	3	Description of laws of electrostatics, magnetism and Faraday's ·laws of EMI	R,U,E	C03
	4	Current density & equation . of Continuity; displacement current (with derivation) Maxwell's equations in vacuum	R,U	C03
7	I	The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations),	R,U	C03
	2	Plane electromagnetic waves in vacuum, their transverse nature, polarization of EM waves(Qualitative)	R,U	C03
8	I	Propagation mechanism, angle of acceptance. Numerical aperture.	R.U,C	C04
	2	Modes of propagation and Types of optical fibers.	R,U,Al	C04
	3	Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient.	R,U	C04
	4	Discussion of block diagram of point to point communication. Merits and demerits	R,U	C04
	5	Numerical problems	R,U	C04

MODULE-4

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (COl
9	I	Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle and applications	R,U,	C04
	2	Schrodinger time independent wave equation, Significance of Wave function	R,U	C04
	3	Normalization, Particle in a box, Energy eigen values of a particle in a box and probability densities .	R,U	C04 -
10	1	Review of spontaneous and stimulated processes, Einstein's	R,U	C04

		_coefficients (derivation of expression for energy density)		. . . .
	2	Requisites of a Laser system.	B,,U	C04
	3	Conditions for laser action. Principle Construction and working of C02 and semiconductor Lasers.	R,U	C04
	4	Application of Lasers in Defense (Laser range finder) and Engineering (Data storage) ' Numerical problems	R,U	C04

MODULE-S

Week	Days/ Date	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO_l
13	I	Review of classical free electron theory, mention of failures.	R,U,A2	C04
	2	Assumptions of Quantum Free electron theery	R,U	C04
	3	Mention of expression for density of states	R,U	COS
	4	Fermi-Dirac statistics (qualitative), Fermi factor	RU	COS
14	1	Fermi level, Derivation of the expression for Fermi energy, Success ofQFET.	R,U,E	COS
	.2	Fermi level in intrinsic semiconductors	R,U	COS
	3	Expression for concentration of electrons in conduction band	R,U	COS
	4	Hole concentration in valance band (only mention the expression)	R,U	COS
15	I	Conductivity of semiconductors(derivation), Hall effect, Expression for Hall coefficient(derivation)	R,U	COS
	2	polar and non-polar dielectrics	R,U.Al,C	COS
	3	internal fields in a solid	R,U	COS
	4	Clausius-Mossotti equation(Derivation)	R,U	COS
16	1	mention of solid, liquid and gaseous	R,U	COS
	2	dielectrics with one example each.	R,U	COS
	3	Application of dielectrics in transformers	R,U	COS
	4	Numerical problems	R.U,Al,C	COS

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Bloom's Taxonomy Level

R-Remembering U-Understanding A-Applying A2-Analysing E-Evaluating C-Creating

Text Books:

1. A Text book of Engineering Physics- M.N Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand & Company Ltd, New Delhi
2. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017
3. Concepts of, Modem Physics-Arthur Beiser: 6th ;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006

Reference books:

1. Introduction to Mechanics —MK Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009
2. Lasers and Non Linear Optics – BB laud, 3rd Ed, New Age International Publishers 2011
3. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018
4. Shock waves made simple- Chintoo S Kumar, K Takayama and K.PJ Reddy: Willey India Pvt. Ltd. New Delhi2014
5. Introduction to Electrodynamics- David Griffiths: 4th Ed, Cambridge University Press 2017

Signature of Staff **Signature of HOD**

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Question Bank

Course Name: Engineering Physics **Course Code: 18PHYS12**

Semester: I **Section: A, B**

Module 1-Free oscillations

1.Define Simple Harmonic Motion. Derive the equation of motion foe SHM.

2.Derive the expression for force constants for series and parallel combination of springs.

3.Explain how Complex notation Phasor representation is represented.

4.Define free oscillations with example. Mention the equation of motion of natural frequency of vibration.

5.What are Damped oscillations. Give the theory. Discuss the case of under damping, over damping and critical damping.

6.Define Quality factor with equation. Give its Physical significance.

7.What are Forced Oscillations .Derive the expressions for amplitude and Phase of Forced vibrations. Explain all the three cases.

8.Write a short notes on a)Sharpness of Resonance b)Helmoltz Resonator

Shock waves

o

1. Define Mach Number and Mach angle

2.Distinguish between Acoustic ,Ultrasonic ,subsonic, supersonic, transonicand hypersonic waves.

3.What are shock waves and mention the properties of shock waves.

4.Explain Control Volume.

5.State and explain the law of conservation of mass ,momentum and energy with expressions .

6.Describe the construction and working of Reddy Shock tube experiment.

7.What are the applications of Shock waves.

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Module 2-Elastic properties of materials

1.Explain Elasticity and Plasticity with examples.

2.Explain the importance of elasticity in engineering materials.

3.Explain the terms Stress and Strain. Discuss the three types of Stresses.

4.Discuss briefly the effect of stress, temperature, annealing and impurities on elasticity.

5.Describe Strain hardening and Strain softening.

6.State and explain Hooke's law with stress-strain curve.

7.Discuss three different moduli of elasticity with equations.

8.Define Lateral Strain and Linear Strain and s derive the expression for Poisson's ratio.

9.Derive the relation between shear strain, longitudinal strain and compression strain.

1O. Derive the relation between Y,η and Ϭ.

11. Derive the relation between K, Y and Ϭ.
0

12. Derive the relation between K, and Y.

13.Discuss the limiting values of Ϭ and limitations of Poisson's ratio.

14.Define Beam and explain different types of beams and mention their engineering applications .

15.Define neutral surface and neutral axis.

16.Define bending moment and derive the expression for bending moment in terms of moment of inertia. Mention the expression for bending moment for circular and rectangular cross section.

17.Describe a single cantilever and hence derive the expression for depression.

18.Explain Torsional oscillations. Derive the expression for Couple per unit twist for a solid cylinder.

19.Mention the expression for Time period for Torsional oscillations .Briefly explain the applications of torsional pendulum.

Module 3

Maxwell's Equations and Electromagnetic waves

1.Explain Scalar Product and Vector product.

2.Describe Vector Operator and explain the concepts of gradient, divergence and curl along with physical significance.

3.Discuss three different types of integration like linear, surface and volume integrations.

4.Explain Gauss flux theorem in electrostatics and magnetism.

5.Derive Gauss Divergence theorem. Mention Stokes theorem.

6.Discuss Maxwell- Ampere's law, Biot-Savarts law.

7.Explain briefly the Faraday's law of electromagnetic induction. Express the same in the differential form of maxwell's equation in the case of time-varying fields.

8.Discuss Continuity equation. Define Displacement current and arrive the expression for the same.

9.List the Maxwell's equations for time-varying condition and for static conditions.

1O. Derive wave equation in terms of electric field using Maxwell's equations.

11.Explain the plane electromagnetic waves in vacuum along with the equations for E, B and c.

12. Explain the transverse nature of electromagnetic waves and explain linear , elliptical and circular polarizations.

Optical Fibers

1.Describe the propagation mechanism of light through in an optical fiber.

2.What is numerical aperture? Obtain an expression for numerical aperture in an optical fiber and then arrive the condition for propagation.

3.Explain modes of propagation and V number.

4.Explain different types of optical fibers.

5. Define attenuation. Explain different types of attenuation, mention the expression for attenuation coefficient.

6.Explain point to point communication system with the help of block diagram.

7.Explain merits and demerits of optical fiber communications.

Module 4- Quantum Mechanics

1. Give a brief account of blackbody radiation and Planck's radiation law with two conditions.

2.Explain dual nature of matter waves.

3.State de Broglie's hypothesis. Show that the de-Broglie wavelength of an electron is found to be equal to 1.226N nm.

4. Explain Heisenberg's uncertainty principle and show that electrons cannot exists within the nucleus.

5.Construct one dimensional time independent Schrodinger wave equation.

6.What are the properties of wavefunction.

7.Explain the terms probability density, normalization.

8.Discuss Eigenvalues and Eigenfunctions.

9.Solve Schrodinger wave equation for the allowed energy values in the case of particle in a box.

10. Discuss Probability for a particle in a potential well of infinite height.

Lasers

1.Explain Induced absorption, Spontaneous emission, stimulated emission.

2.Derive the expression for energy density using Einstein's coefficients.

3.Explain the requisites of a laser system.

4.Explain the condition for laser action.

5.Explain three different vibrational modes of $C0_2$ molecule. With a neat energy level diagram explain the construction and working of $C0_2$ laser .

6. Explain the construction and working of Semiconductor laser .

7.Describe how a laser range finder is made use of in defense.

8.Explain how data storage is achieved in a compact disc.

Module 5 -Material Science

1.What are the assumptions of classical free electron theory and the failures of classical free electron theory.

2.What are the assumptions of Quantum free electron theory.

3.Define density of states and mention the expression for density of states.

4.Explain Fermi level, Fermi energy, Fermi-Dirac statistics.

5.Define Fermi Factor. Discuss the variation of Fermi Factor on different conditions of temperature and energy.

6.Derive the expression for Fermi energy at zero Kelvin. Mention the expression for Fermi velocity and Fermi temperature.

7. Discuss the success of Quantum free electron theory.

8.Discuss the Fermi level in intrinsic semiconductor. Mention the expression for electron and hole concentration in intrinsic semiconductor.

9.Derive the relation between Fermi energy and energy gap for an intrinsic semiconductor.

10.Derive the expression for electrical conductivity of semiconductors.

11.What is Hall Effect? Obtain the expression for Hall voltage in terms of Hall coefficient.

12.What are dielectric materials .Explain the types of dielectric materials. Discuss solid ,liquid and gaseous dielectric with one example each.

13.Explain polarization and the types of polarization. Mention the relation between dielectric constant and polarization.

14.Define internal field in case of solids and mention its expression for one dimensional case, three-dimensional case and Lorentz field.

15.Derive Clausius-Mossotti equation.

16.Mention the application of dielectric in transformers.

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Mrs. Nagasree G	**Dr. Sujatha**
Department of Physics	**Department of Physics**

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CITY ENGINEERING COLLEGE
I Internal Test

Sem & Branch: CS
Sub Name:Engineering Physics
Max Marks: 50

Date:19/02/2021
Time: 10:30-12:00
Duration: 1:30 hr.

Note: Answer all Questions selecting any ONE FULL questions from each part

Q No.	Sub Q No.	Questions	Marks	CO's
		PART-A		
1	a	Obtain an expression for energy density of radiation under equilibrium condition in terms of Einstein's coefficients.	10	CO4
		OR		
2	a	With a neat diagram derive an expression for numerical aperture in terms of refractive indices of core and cladding of an optical fiber.	7	CO3
	b	The refractive indices of core and cladding are 1.50 and 1.48 respectively in an optical fiber. Find the numerical aperture and angle of acceptance.	3	CO3
		PART-B		
3	a	Set up time-independent schrodinger wave equation for a particle in one dimensional potential well of infinite height .	10	CO4
		OR		
4	a	Describe how a laser range finder is made use of in defence.	6	CO4
	b	The ratio of population of two energy levels is 1.059×10^{-30}. Find the wavelength of light emitted by spontaneous emission by 330 k.	4	CO4

PART-C

5	a	Describe the construction and working of $C0_2$ laser with suitable diagrams. Mention different vibrational modes of $C0_2$ molecule.	10	CO4

OR

6	a	Obtain the wave function for a particle in an infinite potential well along with normalization condition .	10	CO4

PART-D

7	a	Explain the different types of optical fibers.	6	CO3
	b	Find the attenuation in an optical fiber of length 500 m, when a light signal of power 100mW emerges out of the fiber with a power of 90 mW.	4	CO3

OR

8	a	Discuss the condition for laser action.	6	CO4
	b	A pulsed laser emits photons of wavelength 780 nm with 20 mW average power /pulse.Calculate the number of photons contained in each pulse if the pulse duration is 10 ns.	4	CO4

9		State and explain Heisenberg's uncertainity principle .Show that electron cannot exixts inside the nucleus.	10	CO4

OR

10	a	State de Broglie concept of matter waves. Derive the expression for de Broglie wavelength for an accelerated electron .	7	CO4
	b	The position and momentum of an electron with energy 0.5 KeV are determined.What is the minimum percentage uncertainity in its momentum if the uncertainity in the measurement of its position if $0.5A^0$	3	C[illegible]

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DEPARTMENT OF ....Physics............

SCHEME FOR VALUATION_

Internal Test ....I....

Semester & Section: Ist / A,B

Date: 17|02|2021

Question No.	Details of the answer	Marks Distribution	Total Marks
	Part-A		
① ⓐ	Cases of absorption & emission processes with expression	3M	10M
	arrive upto $u_\lambda d\lambda = \frac{A}{B\left(e^{h\nu/kT}-1\right)}$	7M	
	(or)		
② ⓐ	Def and diagram	2M	
	Explanation, arrive upto $NA = \sqrt{n_1^2-n_2^2}$	3M	7M
	$N{\cdot}A = \sin\theta$	2M	
ⓑ	$n_1 = 1.50,\ n_2 = 1.48$		
	$N{\cdot}A = \sqrt{n_1^2-n_2^2} = 0.244$	2M	3M
	$\theta = \sin^{-1}(N.A) = 14.1^\circ$	1M	
	Part-B		
③ ⓐ	$\lambda = h/p$ and $\psi = Ae^{i(kx-\omega t)}$	2M	
	arrive upto $\frac{1}{\lambda^2} = -\frac{1}{4\pi^2\psi}\frac{d^2\psi}{dx^2}$	4M	10M
	arrive upto $\frac{d^2\psi}{dx^2} + \frac{8\pi^2 m}{h^2}(E-V)\psi = 0$	4M	
	(OR)		
④ ⓐ	laser range finder explanation	5M	6M
	diagram	1M	
ⓑ	$\frac{N_2}{N_1} = e^{-hc/\lambda kT}$, $\frac{N_2}{N_1} = 1.059\times10^{-30}$	2M	
	$\lambda = 632$ nm	2M	4M

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SCHEME FOR VALUATION_

Internal Test ....I....

Semester & Section: Ist/A, B

Date: 17/02/2021

Question No.	Details of the answer	Marks Distribution	Total Marks
	Part-C		
⑤ ⓐ	3 Modes of vibration	3M	
	construction of CO_2 laser	3M	10M
	working, energy level diagram with explanation	4M	
	(or)		
⑥	Diagram and explanation	2M	
	arrive upto $\frac{d^2\psi}{dx^2}+k^2\psi=0$ and	2M	10M
	upto $E = n^2h^2/8ma^2$	3M	
	and $\psi_n = \sqrt{\frac{2}{a}}\sin\left(\frac{n\pi}{a}\right)x$	3M	
	Part-D		
⑦ ⓐ	Explanation of three types of optical fibers	3M×2	6M
ⓑ	$\Delta E = \frac{hc}{\lambda} = 2.55\times10^{-19}$	2M	4M
	$N\times\Delta E = E \Rightarrow N = 7.86\times10^{8}$	2M	
	(or)		
⑧ ⓐ	Explanation with diagram	4M	6M
	population inversion	2M	
ⓑ	$\lambda = 780nm$, $P = 20mW$, $t = 10ns$		
	$N\times\Delta E = E$, $\Delta E = hc/\lambda$	2M	4M
	$\alpha = 0.915\ dB/km$	2M	

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SCHEME FOR VALUATION

Internal Test ...I....

Semester & Section: Ist | A,B

Date: 17|04|2021

Question No.	Details of the answer	Marks Distribution	Total Marks
9	HUP. Statement	2M	10M
	To show that elec cannot exist inside the nucleus,	2M	
	relations $\Delta x \Delta p_x \geq h/4\pi$ $\Delta E \Delta t \geq h/4\pi$	4M	
	To show upto $E \geq 85$ MeV	2M	
	(OR)		
10 (a)	Matter waves explanation	2M	7M
	$\lambda = h/p$ $p = mv$	2M	
	arrive upto $\lambda = \frac{h}{\sqrt{2meV}}$ $= \frac{1.226}{\sqrt{V}}$ nm	3M	
(b)	$\Delta x \Delta p_x \geq \frac{h}{4\pi}$	1M	3M
	$P = \sqrt{2mE}$	1M	
	% uncertainty = 8.8%	1M	

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CITY ENGINEERING COLLEGE
II Internal Test

Sem & Branch: CS
Sub Name:Engineering Physics
Max Marks: 50

Date :16/03/2021
Time: 10:30-12:00
Duration: 1:30 hr.

Note: Answer all Questions selecting any ONE FULL questions from each part

Q No.	Sub Q No.	Questions	Marks	CO's
		PART-A		
1	a	Define Simple harmonic motion. Derive the equation of motion for SHM. Give the characteristics of SHM	10	CO4
		OR		
2	a	Explain the terms stress and strain. State and explain Hook's law with a suitable graph.	7	CO3
	b	Calculate the force required to produce an extension of 1 mm in steel wire of length 2 meters and diameter 1 mm.	3	CO3
		PART-B		
3	a	What are damped vibrations? Derive the general solution for damped vibrations.	10	CO4
		OR		
4	a	Explain control volume. Discuss the basics of conservation of mass, momentum and energy with expressions.	7	CO4
	b	The distance between two pressure sensors in a shock tube is 100 mm.the time taken by a shock wave to travel this distance is 200 μs. If the velocity of sound under the same condition is 340 m/s. Find the Mach number of the shock wave.	3	CO4

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DEPARTMENT OF Physics

SCHEME FOR VALUATION

Internal Test II

Semester & Section: Ist / A, B

Date: 13/03/2021

Question No.	Details of the answer	Marks Distribution	Total Marks
	part-A		
① ⓐ	SHM definition & explanation	2M + 4M	10M
	arrive upto $\frac{d^2x}{dt^2} + \omega^2 x = 0$, $\omega = \sqrt{\frac{K}{m}}$	4M	
	(OR)		
② ⓐ	Explain stress & strain with exp.	2M	7M
	Stress / strain curve and explanation	3M	
	with a suitable graph	2M	
ⓑ	$Y = \frac{FL}{a x}$, $Y = \frac{FL}{\pi R^2 x}$, $R = \frac{d}{2}$	2M	3M
	$F = 78.54$	1M	
	part-B		
③	Damped oscillations def & theory	4M	10M
	arrive upto $m\frac{d^2x}{dt^2} + r\frac{dx}{dt} + Kx = 0$	4M	
	and $x = \frac{x_0}{2}\left[\left[1 + \frac{b}{\sqrt{b^2-\omega^2}}\right] e^{(-b+\sqrt{b^2-\omega^2})t} + \left[1 - \frac{b}{\sqrt{b^2-\omega^2}}\right] e^{(-b-\sqrt{b^2-\omega^2})t}\right]$	2M	
	(OR)		
④	control volume, Explanation of	2M	7M
	conservation of mass, momentum & energy	4M 1M	

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SCHEME FOR VALUATION

Internal Test II

Semester & Section: Ist/A,B

Date: 13/03/2021

Question No.	Details of the answer	Marks Distribution	Total Marks
④ ⓑ	M = ?, $U_s = \frac{d}{t} = 500$ m/s	1M	3M
	$M = \frac{U_s}{a} = 1.47$	2M	
	part-C		
⑤ ⓐ	Definitions of elastic moduli	4M	10 M
	arrive upto elongation strain + compression strain = shearing strain	6M	
	(OR)		
⑥	Diagram and explanation	4M	
	shock waves explanation	2M	10M
	Construction and working	2M	
	applications	2M	
	Part-D		
⑦ ⓐ	Explanation & expression	2M	
	Condition explanation	2M	6M
	Note on sharpness of resonance	2M	
ⓑ	$x = -0.03$ m, $m = 0.5$ kg		
	$k = \frac{-F}{x} = 163.3$ Nm, $f = \frac{\omega}{2\pi} = 2.8$ Hz	2M	
	$\omega = \sqrt{\frac{k}{m}} = 18.1$ rad/s, $T = \frac{1}{f} = 0.353$	2M	4M

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DEPARTMENT OF Physics

SCHEME FOR VALUATION

Internal Test II

Semester & Section: Ist / A, B

Date: 13/03/2021

Question No.	Details of the answer	Marks Distribution	Total Marks
	(OR)		
8	α and β explanation with expression	4M	
	arrive at the relation b/w Y, K & σ $Y = 3K(1-2\sigma)$	6M	10M
	Part - E		
9	Forced vibrations statement, def, ex;	2M	
	theory of forced vibrations	4M	
	arrive, upto $a = \frac{F/m}{\sqrt{4b^2p^2+(\omega^2-p^2)^2}}$	2M	10M
	& $\alpha = \tan^{-1}\left(\frac{2bp}{\omega^2-p^2}\right)$	2M	
10 (a)	explanation & expressions	2M	
	diagrams of series & parallel circuits	2M	7M
	arrive upto $K_s = \frac{K_1K_2}{K_1+K_2}$ & $K_p = K_1+K_2$	3M	
(b)	shock wave definition	1M	
	Distinguish b/w all the waves	2M	3M

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III Internal Test

Sem & Branch: Ist A,B/CS
Sub Name:Engineering Physics
Max Marks: 50

Date :06/04/2021
Time: 10:30-12:00
Duration: 1:30 hr.

Note: Answer all Questions selecting any ONE FULL questions from each part

Q No.	Sub Q No.	Questions	Marks	CO's
		PART-A		
1	a	Define beam and explain different types of beam. Obtain an expression for the bending moment of a beam with rectangular cross section.	10	CO2
		OR		
2	a	Explain the operator '∇' and explain the concept of gradient and divergence along with physical significance.	7	CO3
	b	Determine the constant C such that, the vector $\vec{A} = (x+ay)\hat{a}_x + (y+bz)\hat{a}_y + (x+cz)\hat{a}_z$ is solenoidal.	3	CO3
		PART-B		
3	a	Define Fermi energy. Derive the expression for Fermi energy at zero Kelvin.	10	CO5
		OR		
4	a	Explain a)Stokes's theorem b)Gauss law of magnetostatics c)Biot savarts law	7	CO3
	b	Calculate the Fermi energy in eV for a metal at zero Kelvin, whose density is 10500 kg/m^3, atomic weight is 107.9, and it has one conduction electron per atom.(1 J= 6.24 x 10^{18} and N_A= 6.025 x 10^{26} /k mole)	3	CO5

PART-C

5	a	Explain Fermi factor. Discuss the variation of Fermi factor with a suitable graph.	10	CO5

OR

6		Obtain the expression for the depression at the free end of a cantilever.	10	CO2

PART-D

7	a	Explain linear integral, surface integral and volume integrations.	6	CO3
	b	Calculate the curl of $\vec{A}$, given $\vec{A} = (1+yz^2)\hat{a}_x + xy^2\,\hat{a}_y + x^2y\,\hat{a}_z$	4	CO3

OR

8		Derive the expression for Couple per unit twist of a solid cylinder.	10	CO2

PART-E

9		What are the assumptions of Quantum free electron theory. Discuss the success of Quantum free electron theory.	10	CO5

OR

10	a	What is a torsional pendulum? Derive the expression for period of oscillation for a torsional pendulum.what are the applications of torsional pendulum.	7	CO2
	b	Calculate the angular twist of a wire of length 0.3 m, and radius 0.2×10^{-3} m when a torque of 5×10^{-4} Nm is applied. Rigidity modulus of the material 8×10^{10} N/m^2	3	CO3

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DEPARTMENT OF Physics

SCHEME FOR VALUATION

Internal Test III

Semester & Section: I/A, B

Date: 05/04/2021

Question No.	Details of the answer	Marks Distribution	Total Marks
	Part-A		
①	Definition of beam & types of beam	4M	
	arrive at the expression for bending moment of a beam $B.M = \frac{Y}{R} I_g = \frac{Y}{R}\left(\frac{bd^3}{12}\right)$	6M	10M
② ⓐ	Explanation of the operator ∇	2M	
	Concept of gradient $\vec{E} = -\frac{\partial V}{\partial r} \hat{a}_r$ $\vec{E} = -\nabla V$	2M	
	Concept of divergence, $\nabla \cdot \vec{A}$	2M	7M
	& physical significance	1M	
ⓑ	$\nabla \cdot \vec{A} = 0$ ($\vec{A}$ is solenoidal)	1M	
	$\nabla \cdot \vec{A} = \frac{\partial A_x}{\partial x} + \frac{\partial A_y}{\partial y} + \frac{\partial A_z}{\partial z}$	1M	3M
	$c = -2$	1M	
	Part-B		
③	Define fermi energy	2M	
	$N(E)dE = g(E)dE \times f(E)$	2M	
	arrive upto $E_{F_0} = \left(\frac{h^2}{8m}\right)\left(\frac{3n}{\pi}\right)^{2/3}$	3M	10M
	$E_{F0} = Bn^{2/3}$	3M	

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Internal Test ....

Semester & Section:

Date:

Question No.	Details of the answer	Marks Distribution	Total Marks
	(OR)		
④ ⓐ	Explanation of stokes theorem $\int(\nabla\times\vec{F})\cdot d\vec{s} = \oint \vec{F}\cdot d\vec{l}$	2M	
	Explanation of Gauss law of magnetostatics, $\nabla\cdot\vec{B} = 0$	2M	7M
	Biot savarts law, $dH = \frac{Idl\sin\theta}{4\pi r^2}$	3M	
ⓑ	$E_F = \left(\frac{h^2}{8m}\right)\left(\frac{3}{\pi}\right)^{2/3} n^{2/3}$	1M	
	$= 5.5$ eV	2M	3M
	Part-C		
⑤ ⓐ	fermi factor Explanation	2M	
	three cases Explanation with suitable graph	2M	
	$f(E) = 1 \;\forall\; E < E_F$	2M	
	$f(E) = 0 \;\forall\; E > E_F$	2M	10M
	$f(E) = 0.5 \;\forall\; E > E_F$	2M	

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DEPARTMENT OF ......Physics.........

SCHEME FOR VALUATION_

Internal Test ....III...

Semester & Section: I/A, B

Date: 05/04/2021

Question No.	Details of the answer	Marks Distribution	Total Marks
⑥	(OR) Diagram and explanation	2M	
	B.M = F× ⊥r distance	2M	
	arrive upto $dy = \frac{W}{YI_g}\left(Lx - \frac{x^2}{2}\right) dx$	2M	10M
	arrive upto $y_0 = \frac{WL^3}{3YI_g}$	2M	
	and $Y = \frac{4WL^3}{y_0 b d^3}$	2M	
	part D		
⑦ ⓐ	Linear Integral explanation and diagram ∴ Line integral = $\oint_L \vec{A} \cdot \vec{dl}$	2M	
	Surface Integral explanation & diagram ∴ Surface Integral = $\oint_S (\vec{A} \cdot \hat{a}_N) ds$	2M	6M
	Volume integral explanation & dia $= \oint \rho_v dV$	2M	

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DEPARTMENT OF Physics

SCHEME FOR VALUATION

Internal Test III

Semester & Section: I / A, B

Date: 05/04/2021

Question No.	Details of the answer	Marks Distribution	Total Marks
⑥	(OR) Diagram and explanation	2M	10M
	B.M = F x ⊥r distance	2M	
	arrive upto $dy = \frac{W}{YI_g}\left(Lx - \frac{x^2}{2}\right)dx$	2M	
	arrive upto $y_0 = \frac{WL^3}{3YI_g}$	2M	
	and $Y = \frac{4WL^3}{y_0 bd^3}$	2M	
	part D		
⑦ ⓐ	Linear Integral explanation and diagram ∴ Line integral = $\oint_L \vec{A}\cdot d\vec{l}$	2M	6M
	Surface Integral explanation & diagram ∴ Surface Integral = $\oint_S (\vec{A}\cdot\hat{a}_N)\,ds$	2M	
	Volume Integral explanation & dia $= \oint \rho_v \, dV$	2M	

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SCHEME FOR VALUATION

Internal Test ....

Semester & Section:

Date:

Question No.	Details of the answer	Marks Distribution	Total Marks
⑦ⓑ	$\vec{A} = (1+yz^2)\hat{a}_x + xy^2\hat{a}_y + x^2y\hat{a}_z$	2M	
	$\nabla \times \vec{A} = x^2\hat{a}_x - 2(x-yz)\hat{a}_y + (y^2-z^2)\hat{a}_z$	2M	4M
	(OR)		
⑧	diagram and explanation	2M	
	arrive upto $F = \frac{2\pi n\theta}{L} r^2 dr$	4M	10M
	arrive upto $C = \left(\frac{\pi n R^4}{2L}\right)$	4M	
	part E		
⑨	assumptions of QFET	4M	
	Success of QFET		
	$\sigma \propto \frac{1}{T}$	4M	10M
	$\sigma = \frac{ne^2}{m}\left(\frac{\lambda}{V_F}\right)$	2M	
	(a)		
⑩ⓐ	Torsional pendulum def & diagram	1M+2M	
	applications. expression, $T = 2\pi\sqrt{\frac{I}{C}}$	2M+2M	7M
ⓑ	$\theta = ?$, $\tau = C\theta$, $C = \frac{\pi n R^4}{2L}$, $\theta = 0.75$ rad	1+2	3M

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Year : 2020 - 2021 Semester : [✓ Odd] / Even

Name of the Teacher : Dr. K. Sujatha & Nagashree G

Designation : HOD & prof , Asst. prof

Department : Physics

Sem/ Branch	Subject Code	Subject
1. Ist/ CS	18PHY12	Engineering physics
2.		
3.		

	Initials at the End of the			
	1st Month	2nd Month	3rd Month	Semester
Staff	GA 23/2/21	GA 30/3/21	GA 29/4/21	Ist
HOD				
Principal				

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CITY ENGINEERING COLLEGE
Kanakapura Main Road, Bangalore-560061

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Kanakapura Main Road, Bangalore-560061

ATTENDANCE

Sl. No.	Reg.No.	Name	1/2	2/2	4/2	5/2	6/2	8/2	8/2	9/2	[illegible]	12/2	[illegible]	22/02	23/02	24/02
		A - Section	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1CE20CS001	Abhay	1	2	3	4	5	6	7	8	9	10	11	12	12	13
2	002	Abhinav Kumar Singh	1	2	3	4	5	6	7	8	9	10	11	12	13	14
3	003	Abhishek Vats	1	2	3	4	5	6	7	7	8	9	10	11	12	13
4	004	Adarsh Mishra. S	1	2	3	3	3	4	5	6	7	8	9	10	11	12
5	047	Adhithi. M.R	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6	005	Adithi. B	1	2	3	4	5	6	7	8	9	10	11	12	13	14
7	006	Afnan Ahmed	1	2	3	3	4	5	6	7	8	9	9	10	10	11
8	007	Aishwarya	1	2	3	4	5	6	7	8	9	10	11	12	13	14
9	008	Ajay Anupam	1	2	3	4	5	6	7	8	9	9	10	10	10	11
10	009	Amir Anjum	1	2	3	4	5	5	6	6	7	8	9	10	11	12
11	010	Amulya. Y.R	1	2	3	4	4	5	6	7	8	9	9	10	12	13
12	011	Anand. M	1	2	3	4	4	5	6	7	8	9	10	10	11	12
13	012	Ananya. B.C	1	2	3	4	5	6	7	8	9	10	11	12	13	14
14	013	Ananya Bhagavan	1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	014	Anuradha Sharma	1	2	3	4	5	6	7	8	9	10	11	12	13	14
16	016	Aravind. V	1	2	3	4	5	6	7	8	9	10	11	11	12	13
17	017	Astha	1	2	3	4	5	6	7	8	9	9	10	10	11	12
18	018	B. Dhanalakshmi Bai	1	2	3	4	5	6	7	8	9	10	11	12	13	14
19	019	Benitta Hathsiyal	1	2	3	4	4	5	6	7	8	9	10	11	12	12
20	021	Bhargavi. N. Prakash	1	2	3	4	5	6	7	8	9	10	11	12	13	14
21	022	Chandana. G	1	2	3	4	4	5	6	7	8	9	9	10	11	11
22	031	D.R. Mohan Kumar	1	2	3	4	5	6	7	8	9	10	11	11	12	13
23	024	Daniya Khanum	1	2	3	4	5	6	7	8	9	10	11	12	13	14
24	025	Deeksha. R. Gowda	1	2	3	4	5	5	6	7	8	9	10	10	11	12
25	027	Deepashree. N	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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	Initials															

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ATTENDANCE

Sl. No.	Reg.No.		1/2 1	2/2 2	4/2 3	5/2 4	6/2 5	8/2 6	7	9/2 8	11/2 9	12/2 10	13/2 11	22/2 12	23/2 13	24/2 14
26	028 ✓	Deepthi. S	1	2	3	4	5	6	7	8	9	10	11	12	13	14
27	029 ✓	Dhanush Kumar. D	1	2	3	4	5	6	7	8	9	10	11	12	13	14
28	030	Divyashree	1	2	3	4	5	6	7	8	9	9	10	10	11	12
29	033 ✓	Ganesh	1	2	3	4	5	6	7	8	9	10	10	11	11	12
30	034 ✓	Girija Narayan Hegde	1	2	3	4	5	6	7	8	8	9	10	11	12	13
31	035 ✓	Gowtham. S. V	1	2	3	4	5	6	7	8	9	10	11	12	12	13
32	036 ✓	Haleema Sultana	1	2	3	4	5	6	7	8	9	10	11	12	13	14
33	037	Iram Shaikh	1	2	3	4	5	6	7	8	9	10	4	11	12	13
34	1CE20AI006	Sharon Zipporah Sebastian	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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CITY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CIRCULAR

Ref. No: CEC/CSE/DAC/2020-2021/02 **Date: 06/04/2021**

All the members of Department Advisory Committee are informed to attend a meeting which will be held as follows

Date: 09/04/2021
Time: 11.30 AM
Venue: LAB C107

Agenda of the Meeting:

- Changes in the class timetable
- Conducting online classes
- Lab manual preparation
- Research activities
- Conducting courses on Aptitude and writing skills

Mr. Vivekavardhana Reddy

HOD

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CITY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Department Advisory Committee Meeting

Date: 09-04-2021
Time: 11:30 AM

DAC Members Present:

Sl. No	Member Name	Designation	Role	Sign
1	Mr. Vivekavardhana Reddy	HOD	Convenor	
2	Dr. Nandakumar A N	Professor	Member	
3	Dr. Sowmya Naik P T	Professor	Co-Convenor	
4	Mr. Girish G A	Assistant Professor	Member	
5	Mr. Surendranath Gowda	Assistant Professor	Member	Surendra
6	Mrs. Ambika P R	Assistant Professor	Member	
7	Mrs. Laxmi M C	Assistant Professor	Member	
8	Mrs. Archana Bhat	Assistant Professor	Member	
9	Mr. Vinodh Kumar S	Assistant Professor	Member	
10	Mr. Vivekraj G K	Technical Product Manager, Sabre India	Industry Expert	
11	Mr. Devraj K	Founder & CEO, EtherScale	Alumni	

The Department Advisory Committee meeting was conducted at Department of CSE, on 3rd of February 2020, at 11:30 AM.

Agenda of the Meeting:

- Changes in the class timetable
- Conducting online classes
- Lab manual preparation
- Research activities
- Conducting courses on Aptitude

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Minutes of Meeting:

The following points were discussed in the meeting:

- It was found that conducting online classes according to the regular timings is difficult due to network issues and low bandwidth. Therefore, classes will be conducted in four slots per day. If students willing to attend offline classes, they can attend during allotted hours only.
- The HOD informed the faculty in-charge of each lab to prepare a lab manual and also suggested to make use of GIT-hub repository for mini projects and lab assignments.
- The HOD discussed about conducting online workshop on latest tools and technologies. He also suggested faculties to involve in research activities as the new research centre is started.
- The members suggested to conduct online courses on Aptitude and writing skills which can help them to face the interviews.

HOD

cc to Principal

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Revised-Academic Calendar of EVEN semesters of UG Programmes for 2020-2021

Semesters EVENTS	IV semester B.E./B.Tech.	IV semester B.Arch./ B.Plan.	VI semester B.E./B.Tech.	VI semester B.Plan./B.Arch	VIII semester B.E./B.Tech.	VIII semester B.Plan.	VIII semester B.Arch
Commencement of EVEN Semester	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021
Last Working day of EVEN Semester	07.08.2021	07.08.2021	07.08.2021	07.08.2021	#20.07.2021	#20.07.2021	07.08.2021
Practical Examinations	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	---	---	---	---
Theory Examinations	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	10.08.2021 To 31.08.2021	22.07.2021 To 30.07.2021	22.07.2021 To 30.07.2021	10.08.2021 To 17.08.2021
Internship	---	---	---	---	---	---	---
Internship Viva-Voce/ Project Viva-Voce	---	---	---	---	02.08.2021 To 06.08.2021	---	---
Professional training / Organization study	---	---	---	---	---	---	---
Commencement of ODD Semester	13.09.2021	13.09.2021	13.09.2021	13.09.2021	---	---	23.08.2021

- The classroom sessions for even the semester should commence from the dates mentioned above.
- The Institute needs to function for **six days** a week with additional hours **(Saturday is a full working day).** #if required the college can plan to have extra classes even on Sundays also.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- Notification regarding the Calendar of Events relating to the conduct of **University Examinations** will be issued by the Registrar (Evaluation) from time to time.
- The faculty/staff shall be available to undertake any work assigned by the university.
- Academic Calendar may be modified based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Revised Academic Calendar is also applicable for **Autonomous Colleges.** In case if any changes are to be affected by Autonomous Colleges in the academic terms and examination schedule, they could do so with the approval of the University.

21.04.2021.

REGISTRAR

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Department of Computer Science & Engineering					Calendar of Events Even Semester of 2020-21			
APRIL 2021			MAY / JUNE 2021		JUNE/ JULY 2021		JULY/ AUGUST 2021	
DAY	**Date**	**EVENT**	**Date**	**EVENT**	**Date**	**EVENT**	**Date**	**EVENT**
MON			3		7		12	Third CIE – 8th Sem
TUE			4		8		13	
WED			5		9		14	
THU	1		6		10		15	
FRI	2	Good Friday	7		11		16	
SAT	3		8		12		17	
SUN	4		9		13		18	
MON	5		10		14		19	
TUE	6		11		15	Second CIE – 8th Sem	20	Last Working Day: 8th Sem
WED	7		12		16		21	
THU	8		13		17		22	22nd to 30th – 8th Sem Theory Exam
FRI	9		14	Basava Jayanti	18		23	
SAT	10		15		19		24	
SUN	11		16		20		25	
MON	12		17		21		26	
TUE	13	Ugadi	18		22		27	
WED	14	Ambedkar Jayanthi	19		23	Technical Seminar	28	
THU	15		20		24		29	Third CIE – 4th & 6th Sem
FRI	16		21		25		30	
SAT	17		22		26		31	
SUN	18		23		27		Aug 1	
MON	19	Commencement of 4th, 6th, 8th Semester	24	Project Phase – II Presentation	28	Second CIE – 4th & 6th Sem	2	2nd to 8th Internship / Project Viva
TUE	20		25		29		3	
WED	21		26		30		4	
THU	22		27		July 1		5	
FRI	23		28	Guest Lecture	2		6	
SAT	24		29		3		7	Last Working Day: 4th& 6th Sem
SUN	25		30		4		8	
MON	26	Workshop/ Technical Activities	31	First CIE – 4th, 6th & 8th Sem	5	Final Demo of Projects	9	
TUE	27		June 1		6		10	
WED	28		2		7		11	
THU	29		3		8		12	
FRI	30		4		9		13	
SAT	May 1	MAY DAY	5		10		14	
SUN	2		6		11		15	

Practical Exam for 4th & 6th Sem : 9.8.21 to 19.8.21, Theory exams : 23.8.21 to 9.9.21

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Near Doddakallasandra Metro Station,
Doddakalasandra, Bangalore – 560 062.

ACADEMIC YEAR : 2020-21 (Even).

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE PREFERNCE

Name of the Faculty: Dr. A. Nandakumar

Designation: Professor

Year / Semester: 2020 - 21

Sl.No	Course Code and Name	Year/Semester
1.	Internet of Things - 17CS81	4th / 8th
2.	MC & ES - 18CS44	2nd / 4th
3.	Remote Sensing & GIS - 18CV651	3rd / 6th
4.	User Interface Design - 17CS832.	4th / 8th

NK

Signature of faculty

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Near Doddakallasandra Metro Station,
Doddakalasandra, Bangalore – 560 062.

ACADEMIC YEAR : 2020-21 (Even)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE PREFERNCE

Name of the Faculty: B. Ramesh
Designation: Assistant Professor
Year / Semester: 3/6

Sl.No	Course Code and Name	Year/Semester
1.	18CS 62 – Computer	3/6
	Graphics & Visualization	
2.	18CS 42 – Design &	2/4
	Analysis of Algm.	
3.	18CS 44 – MicroContro	2/4
	-ller & Embedded System	

Signature of faculty

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ACADEMIC YEAR: 2020 - 2021(Even)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE ALLOCATION

Sl.No	Name of the Faculty	Course Code and Name	Year/ Semester	Signature
1	Dr. Sowmya Naik	17CS832 – User Interface Design	4th / 8th	
2	Dr. Venkatesan	17CS81 – Internet of Things and Applications	4th / 8th	
3	Dr. A. N. Nandakumar	17CS81 – Internet of Things and Applications	4th / 8th	
4	Mr.Vivekavardhana Reddy	18CV651 – Remote Sensing & GIS 17CS61 – Cryptography, network Security & Cyber Law	3rd / 6th 3rd / 6th	
5	Mr. Nandish A C	18CS44 - Microcontroller and Embedded System 18CSL48 – Microcontroller and Embedded System Lab	2nd / 4th	
5	Mr. Girish G.A	17CSP85 – Project Work 18CS61 – System Software and Compiler 18CSL66 – System Software Lab 17CS63 – System Software & Compiler Design 17CSL67 - System Software and Operating System Lab 18CS45 – Object Oriented Concepts	4th / 8th 3rd / 6th 3rd / 6th 3rd / 6th 3rd / 6th 2nd / 4th	

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6	Mr. Surendranath Gowda	17CS653 – Operations Research 18CS44 – Microcontroller and Embedded Systems 18CSL48 – Microcontroller and Embedded System Lab	3rd / 6th 2nd / 4th 2nd / 4th	Surendra
7	Mr. Vinodh Kumar	17CS82 – Big Data Analytics	4th / 8th	
8	Mr. B. Ramesh	18CS62 – Computer Graphics and Visualization 18CSL67 – Computer Graphics & Visualization Lab with mini project 17CS664 – Python Application Programming 17CSL68 – Computer Graphics Lab with Mini Project	3rd / 6th 3rd / 6th 3rd / 6th 3rd / 6th	
9	Mrs. Punitha P	18CV651 – Remote Sensing & GIS	3rd / 6th	
10	Mrs. Ambika P R	17CS64 – Operating System 18CS43 – Operating Systems 18CSL48 – Microcontroller and Embedded System Lab	3rd / 6th 2nd /4th 2nd / 4th	
11	Mrs. Laxmi M C	17CS84 – Internship 18CS46 – Data Communication 18CSL47 – Design and Analysis of Algorithms Lab 18CS42 – Design and Analysis of Algorithm	4th /8th 2nd / 4th 2nd / 4th	
12	Mrs. Archana Bhat	18CS43 – Operating System 18CS44 - Microcontroller and Embedded System 18CSL48 – Microcontroller and	2nd/ 4th 2nd / 4th	

		Embedded System Lab		
13	Mrs. Shashikala H C	18CSMP68 – Mobile App Development 18CS46 – Data Communication	3rd / 6th 2nd / 4th	Shashi. H C
14	Mrs. Nandini S B	18CS62 – Computer Graphics and Visualization 18CSL67 – Computer Graphics & Visualization Lab with mini project 17CS62 - Computer Graphics and Visualization	3rd / 6th 3rd / 6th	Nandini
15	Mrs. Sangeetha Rao. S	18CS63 – Web Technologies and its Applications 18CSL67 – Computer Graphics & Visualization Lab with mini project	3rd / 6th 3rd / 6th	
16	Mrs. Tejaswini B. N	18CS61 – System Software and Compiler 18CSL66 – System Software Lab	3rd / 6th 3rd / 6th	Teju
17	Mrs. Swethashree R. N	18CS42 – Design and Analysis of Algorithm 18CSL47 – Design and Analysis of Algorithms Lab	2nd/ 4th 2nd/ 4th	Swetha
18	Ms. Vinutha H M	18CSMP68 – Mobile App Development 18CS642 – Object Oriented Modelling and Designing 18CSL66 – System Software Lab	3rd / 6th 3rd / 6th 3rd / 6th	Vinutha
19	Ms. Pushpa	18CSL67 – Computer Graphics & Visualization Lab with mini project 18CS642 – Object Oriented Modelling and Designing	3rd / 6th 3rd / 6th	Pushpa

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20	Mr. Gangappa	18CSMP68 – Mobile App Development 17CS62 - Computer Graphics and Visualization	3rd / 6th	
21	Ms. Nagashree R. A	18CS63 – Web Technologies and its Applications 17CS63 – System Software & Compiler Design	3rd / 6th 3rd / 6th	
22	Mr. Doreswamy	18CS842 – Software Testing 17CS64 – Operating System	4th /8th OTE 3rd / 6th	
23	Mrs. Deepika R	17CS84 – Internship 18CS45 – Object Oriented Concepts 18CSL47 – Design and Analysis of Algorithms Lab	4th / 8th 2nd / 4th	
24	Mrs. Kavyashree Yadav	10IS81 – Software Architecture	4th/8th OTE	
25	Mrs. Sowmya L. D	10CS82 – System Modelling and Simulation	4th /8th OTE	
26	Mrs. Manjula S	18CS842 – Software Testing	4th /8th OTE	
27	Mrs. Sriraksha S	10CS834 – Network Management System	4th /8th OTE	

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CITY ENGINEERING COLLEGE

Department Of CSE

Apr – July 2021

Time Table for IV Sem A Section

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	MES	M4	OOC	OS	DAA
TUE	OOC	OS	DC	DAA	MES
WED	M4	DAA	MES	DC	OOC
THU	DC	OOC	OS	DAA	M4
FRI	OS	DC	M4	MES	
SAT	MES LAB		DAA LAB		

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18CS42	Design and Analysis of Algorithm	DAA	Prof. Swetha Shree
2	18CS43	Operating Systems	OS	Prof. Archana Bhat
3	18CS44	Microcontroller and Embedded Systems	MES	Prof. Nandish A C/ Prof. Surendranath Gowda
4	18CS45	Object Oriented Concepts	OOC	Prof. Deepika R
5	18CS46	Data Communication	DC	Prof. Laxmi M C
6	18CSL47	Design and Analysis of Algorithm Laboratory	DAA LAB	Prof. Swetha Shree/ Prof. Laxmi M C
7	18CSL48	Microcontroller and Embedded Systems Laboratory	MES LAB	Prof. Surendranath Gowda/ Prof. Archana Bhat
8	18MAT41	Complex Analysis, Probability and Statistical Methods	MAT41	

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CITY ENGINEERING COLLEGE

Department Of CSE

Apr – July 2021

Time Table for IV Sem B Section

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	OS	M4	DAA	MES	OOC
TUE	DAA	MES	DC	OOC	OS
WED	M4	OOC	OS	DC	DAA
THU	DC	DAA	MES	OOC	M4
FRI	MES	DC	M4	OS	
SAT	DAA LAB		MES LAB		

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18CS42	Design and Analysis of Algorithm	DAA	Prof. Swetha Shree
2	18CS43	Operating Systems	OS	Prof. Ambika P R
3	18CS44	Microcontroller and Embedded Systems	MES	Prof. Archana Bhat
4	18CS45	Object Oriented Concepts	OOC	Prof. Deepika R
5	18CS46	Data Communication	DC	Prof. Shashikala H C
6	18CSL47	Design and Analysis of Algorithm Laboratory	DAA LAB	Prof. Swetha Shree/ Prof. Deepika R
7	18CSL48	Microcontroller and Embedded Systems Laboratory	MES LAB	Prof. Archana Bhat/ Prof. Ambika P R
8	18MAT41	Complex Analysis, Probability and Statistical Methods	MAT41	

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Department Of CSE

Apr – July 2021

Time Table for IV Sem C Section

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	OOC	MES	DC	M4	OS
TUE	DAA	OOC	DC	MES LAB	
WED	OS	DAA	M4	OOC	DC
THU	MES	DC	OOC	DAA	M4
FRI	OS	MES	DAA LAB		
SAT	DAA	M4	OS	MES	

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18CS42	Design and Analysis of Algorithm	DAA	Prof. Laxmi M C
2	18CS43	Operating Systems	OS	Prof. Ambika P R
3	18CS44	Microcontroller and Embedded Systems	MES	Prof. Surendranath Gowda
4	18CS45	Object Oriented Concepts	OOC	Prof. Girish G A
5	18CS46	Data Communication	DC	Prof. Shashikala H C
6	18CSL47	Design and Analysis of Algorithm Laboratory	DAA LAB	Prof. Laxmi M C/ Prof. Deepika R
7	18CSL48	Microcontroller and Embedded Systems Laboratory	MES LAB	Prof. Surendranath Gowda/ Prof. Ambika P R
8	18MAT41	Complex Analysis, Probability and Statistical Methods	MAT41	

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Department Of CSE

Apr – July 2021

Time Table for VIII Sem A Section

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	IOT	BDA	UID	Project/ Seminar	
TUE	BDA	UID	IOT	Project/ Seminar	
WED	UID	IOT	BDA	Project/ Seminar	
THU	IOT	BDA	UID		
FRI					
SAT					

Sl . No	Course Code	Course Name	Course	Faculty Name
1	17CS81	Internet of Things and Applications	IOT	Dr. A N Nanda Kumar / Dr. Venkatesan
2	17CS82	Big Data Analytics	BDA	Prof. Vinodh Kumar S
3	17CS832	User Interface Design	UID	Dr.Sowmya Naik
4	17CS84	Internship / Professional Practice		Prof. Laxmi M C/ Prof. Deepika R
5	17CSP85	Project Work Phase II		Prof. Girish G A
6	17CSS86	Seminar		

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Department Of CSE

Apr – July 2021

Time Table for VIII Sem B Section

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	UID	IOT	BDA	Project/ Seminar	
TUE	IOT	BDA	UID	Project/ Seminar	
WED	BDA	UID	IOT	Project/ Seminar	
THU	UID	IOT	BDA		
FRI					
SAT					

Sl . No	Course Code	Course Name	Course	Faculty Name
1	17CS81	Internet of Things and Applications	IOT	Dr.A N Nanda Kumar / Dr. Venkatesan
2	17CS82	Big Data Analytics	BDA	Prof. Vinodh Kumar S
3	17CS832	User Interface Design	UID	Dr. Sowmya Naik
4	17CS84	Internship / Professional Practice		Prof. Laxmi M C/ Prof. Deepika R
5	17CSP85	Project Work Phase II		
6	17CSS86	Seminar		

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Apr – July 2021

Time Table for VIII Sem (OTE Batch)

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM
MON	SA	SMS	NMS	ST
TUE	SMS	NMS	ST	SA
WED	NMS	ST	SA	SMS
THU	ST	SA	SMS	NMS
FRI	Project / Seminar			
SAT	Project/ Seminar			

Sl . No	Course Code	Course Name	Course	Faculty Name
1	10IS81	Software Architecture	SA	Mrs. Kavyashree Yadav
2	10CS82	System Modeling and Simulation	SMS	Mrs. Sowmya L D
3	10CS834	Network Management Systems	NMS	Mrs. Sriraksha S
4	10CS842	Software Testing	ST	Mr. Doreswamy/ Mrs. Manjula S

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Apr – July 2021

Time Table for VI Sem C Section (17 - Scheme)

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	CNS	Python	OS	CG	OR
TUE	OR	OS	CNS	CG LAB	
WED	CG	OR	SS&CD	CNS	Python
THU	CNS	OR	CG	SS&CD	OS
FRI	OS	SS&CD	Python	SS & OS LAB	
SAT	Python	CG	SS&CD		

Sl . No	Course Code	Course Name	Course	Faculty Name
1	17CS61	Cryptography, Network Security & Cyber Law	CNS	Prof. Vivekavardhana Reddy
2	17CS62	Computer Graphics and Visualization	CGV	Prof. Nandini/ Prof. Gangappa
3	17CS63	System Software and Compiler Design	SS & CD	Prof. Girirsh G A/ Prof. Nagashree
4	17CS64	Operating Systems	OS	Prof. Ambika P R/ Prof. Doreswamy
5	17CS653	Operations Research	OR	Prof. Surendranath Gowda
6	17CS664	Python Application Programming	Python	Prof. Ramesh
7	17CSL67	System Software & Operating System Lab	SS & OS Lab	Prof. Girish G A
8	17CSL68	Computer Graphics Lab with Mini Project	CG Lab	Prof. Ramesh B

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Apr – July 2021

Time Table for VI Sem C Section

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	CG	OOMD	WEB	SS & C	
TUE	RG&GIS	CG	OOMD	MAD LAB	
WED	WEB	SS & C	RG&GIS	OOMD	
THU	RG&GIS	OOMD	CG	CG LAB	
FRI	SS & C	WEB	RG&GIS	SS & C LAB	
SAT	WEB	CG	SS & C		

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18CS61	System Software and Compilers	SS&C	Prof. Girish G A
2	18CS62	Computer Graphics and Visualization	CGV	Prof. Ramesh B
3	18CS63	Web Technologies and its applications	WEB	Prof. Sangeetha Rao
4	18CS642	Object Oriented Modelling and Design	OOMD	Prof. Vinutha H M
5	18CV651	Remote sensing and GIS	RS&GIS	Prof. Punitha
6	18CSL66	System Software Laboratory	SS Lab	Prof. Girish G A/ Vinutha
7	18CSL67	Computer Graphics Lab with Mini Project	CG Lab	Prof. Ramesh B/ Prof. Sangeetha Rao
8	18CSMP68	Mobile app development	MAD Lab	Prof. Shashikala / Prof. Gangappa

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Apr – July 2021

Time Table for VI Sem B Section

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	RG&GIS	CG	SS&C	CG LAB	
TUE	OOMD	SS&C	RG&GIS	WEB	
WED	CG	OOMD	WEB	SS & C LAB	
THU	WEB	RG&GIS	SS&C	CG	
FRI	CG	SS&C	OOMD	RG&GIS	
SAT	MAD LAB		WEB	OOMD	

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18CS61	System Software and Compilers	SS&C	Prof. Tejaswini B N
2	18CS62	Computer Graphics and Visualization	CGV	Prof. Nandini S B
3	18CS63	Web Technologies and its applications	WEB	Prof. Sangeetha Rao
4	18CS642	Object Oriented Modelling and Design	OOMD	Prof. Vinutha H M
5	18CV651	Remote sensing and GIS	RS&GIS	Prof. Vivekavardhana Reddy / Prof. Punitha P
6	18CSL66	System Software Laboratory	SS Lab	Prof. Tejaswini/ Vinutha
7	18CSL67	Computer Graphics Lab with Mini Project	CG Lab	Prof. Nandini/ Prof. Sangeetha Rao
8	18CSMP68	Mobile app development	MAD Lab	Prof. Vinutha/ Prof. Shashikala

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Apr – July 2021

Time Table for VI Sem A Section

DAY	9:15 – 10:00 AM	10:30 – 11:15 AM	11:45 – 12:30 PM	1:00 – 1:45 PM	2:15 – 3:00 PM
MON	SS&C	WEB	RG&GIS	SS & C LAB	
TUE	OOMD	RG&GIS	SS&C	CG	
WED	WEB	CG	OOMD	MAD LAB	
THU	CG	SS&C	WEB	RG&GIS	
FRI	RG&GIS	OOMD	CG	SS&C	
SAT	CG LAB		WEB	OOMD	

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18CS61	System Software and Compilers	SS&C	Prof. Tejaswini B N
2	18CS62	Computer Graphics and Visualization	CGV	Prof. Nandini S B
3	18CS63	Web Technologies and its applications	WEB	Prof. Nagashree R A
4	18CS642	Object Oriented Modelling and Design	OOMD	Prof. Pushpa
5	18CV651	Remote sensing and GIS	RS&GIS	Prof. Vivekavardhana Reddy
6	18CSL66	System Software Laboratory	SS Lab	Prof. Tejaswini/ Prof.Girish G A
7	18CSL67	Computer Graphics Lab with Mini Project	CG Lab	Prof. Nandini/ Prof. Pushpa
8	18CSMP68	Mobile app development	MAD Lab	Prof. Vinutha / Prof. Gangappa

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MICROCONTROLLER AND EMBEDDED SYSTEMS
(Effective from the academic year 2018 -2019)
SEMESTER – IV

Course Code	**18CS44**	**CIE Marks**	**40**
Number of Contact Hours/Week	**3:0:0**	**SEE Marks**	**60**
Total Number of Contact Hours	**40**	**Exam Hours**	**03**

CREDITS –3

Course Learning Objectives: This course (18CS44) will enable students to:

- Understand the fundamentals of ARM based systems, basic hardware components, selection methods and attributes of an embedded system.
- Program ARM controller using the various instructions
- Identify the applicability of the embedded system
- Comprehend the real time operating system used for the embedded system

Module 1	**Contact Hours**
Microprocessors versus Microcontrollers, **ARM Embedded Systems**: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software. **ARM Processor Fundamentals**: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table, Core Extensions **Text book 1: Chapter 1 - 1.1 to 1.4, Chapter 2 - 2.1 to 2.5** **RBT: L1, L2**	**08**
Module 2	
Introduction to the ARM Instruction Set: Data Processing Instructions, Programme Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants **ARM programming using Assembly language:** Writing Assembly code, Profiling and cycle counting, instruction scheduling, Register Allocation, Conditional Execution, Looping Constructs **Text book 1: Chapter 3:Sections 3.1 to 3.6 (Excluding 3.5.2), Chapter 6(Sections 6.1 to 6.6)** **RBT: L1, L2**	**08**
Module 3	
Embedded System Components: Embedded Vs General computing system, History of embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems Core of an Embedded System including all types of processor/controller, Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components. **Text book 2:Chapter 1(Sections 1.2 to 1.6),Chapter 2(Sections 2.1 to 2.6)** **RBT: L1, L2**	**08**
Module 4	
Embedded System Design Concepts: Characteristics and Quality Attributes of Embedded Systems, Operational quality attributes, non-operational quality attributes, Embedded Systems-Application and Domain specific, Hardware Software Co-Design and Program Modelling, embedded firmware design and development **Text book 2: Chapter-3, Chapter-4, Chapter-7 (Sections 7.1, 7.2 only), Chapter-9 (Sections 9.1, 9.2, 9.3.1, 9.3.2 only)** **RBT: L1, L2**	**08**
Module 5	
RTOS and IDE for Embedded System Design: Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Multiprocessing and Multitasking, Task Communication (without any program), Task synchronization issues – Racing and	**08**

Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan.

Text book 2: Chapter-10 (Sections 10.1, 10.2, 10.3, 10.4 , 10.7, 10.8.1.1, 10.8.1.2, 10.8.2.2, 10.10 only), Chapter 12, Chapter-13 (block diagram before 13.1, 13.3, 13.4, 13.5, 13.6 only)

RBT: L1, L2

Course Outcomes: The student will be able to :

- Describe the architectural features and instructions of ARM microcontroller
- Apply the knowledge gained for Programming ARM for different applications.
- Interface external devices and I/O with ARM microcontroller.
- Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
- Develop the hardware /software co-design and firmware design approaches.
- Demonstrate the need of real time operating system for embedded system applications

Question Paper Pattern:

The question paper will have ten questions.

- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module

Textbooks:

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. Shibu K V, “Introduction to Embedded Systems”, Tata McGraw Hill Education, Private Limited, 2 nd Edition.

Reference Books:

1. Raghunandan..G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication,2019 2. The Insider’s Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005. 3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015. 4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

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DEPARTMENT OF CSE

LESSON PLAN FOR EVEN SEMESTER FOR ACADEMIC YEAR 2020 - 2021

Course Title: Microcontroller and Embedded Systems	Course Code : 18CS44
Total contact hours: 3 : 0 : 0	End Term Marks :60
Internal Marks : 40	
Semester : IV – ‘B’	Academic year : 2020-21
Lesson plan Author: Mrs. Archana Bhat	Date :15/04/2021

Course objectives: This course will enable students to
1. Understand the fundamentals of ARM based systems, basic hardware components, selection methods and attributes of an embedded system.
2. Program ARM controller using the various instructions
3. Identify the applicability of the embedded system
4. Comprehend the real time operating system used for the embedded system

Course Outcomes: The students shall able to:
1. Describe the architectural features and instructions of ARM microcontroller
2. Apply the knowledge gained for Programming ARM for different applications.
3. Interface external devices and I/O with ARM microcontroller.
4. Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
5. Develop the hardware /software co-design and firmware design approaches.
6. Demonstrate the need of real time operating system for embedded system applications

Module 1

Week	Contents of Module	Bloom’s Taxonomy Level	Course Outcome (CO)
1	Microprocessors versus Microcontrollers	L1, L2	CO1
1	**ARM Embedded Systems**: The RISC design philosophy, The ARM Design Philosophy	L1, L2	CO1
1	Embedded System Hardware, Embedded System Software	L1, L2	CO1
2	**ARM Processor Fundamentals**: Registers	L1, L2	CO1
2	Current Program Status Register	L1, L2	CO1
2	Pipeline, Exceptions	L1, L2	CO1
3	Interrupts, and the Vector Table	L1, L2	CO1
3	Core Extensions	L1, L2	CO1

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Module 2

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
3	**Introduction to the ARM Instruction Set :** Data Processing Instructions	L1, L2	CO1
4	Programme Instructions, Software Interrupt Instructions	L1, L2	CO1
4	Program Status Register Instructions, Coprocessor Instructions, Loading Constants	L1, L2	CO1
4	**ARM programming using Assembly language:** Writing Assembly code	L1, L2	CO1
5	Profiling and cycle counting	L1, L2, L3	CO2
5	Instruction scheduling	L1, L2, L3	CO2
5	Register Allocation, Conditional Execution	L1, L2, L3	CO2
6	Looping Constructs		
FIRST CIE			

Module 3

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
6	**Embedded System Components:** Embedded Vs General computing system, History of embedded systems,	L1, L2	CO3, CO4
7	Classification of Embedded systems	L1, L2	CO3, CO4
7	Major applications areas of embedded systems, purpose of embedded systems	L1, L2	CO3, CO4
7	**Core of an Embedded System:** Processor/controller, Memory,	L1, L2	CO3, CO4
8	Sensors, Actuators, LED, 7 segment LED display	L1, L2	CO3, CO4
8	Stepper Motor, Keyboard, Push button switch	L1, L2	CO3, CO4
8	Communication Interface	L1, L2	CO3, CO4
9	Embedded firmware, Other system components.	L1, L2	CO3, CO4

Module 4

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)

9	**Embedded System Design Concepts:** Characteristics	L1, L2	CO5
9	Quality Attributes of Embedded Systems	L1, L2	CO5
10	Operational quality attributes	L1, L2	CO5
SECOND CIE			
10	Non-operational quality attributes	L1, L2	CO5
10	Embedded Systems-Application and Domain specific	L1, L2	CO5
11	Hardware Software Co-Design	L1, L2	CO5
11	Program Modeling	L1, L2	CO5
12	Embedded firmware design and development	L1, L2	CO5

Module 5

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
12	**RTOS and IDE for Embedded System Design:** Operating System basics	L1, L2	CO6
12	Types of operating systems, Task, process and threads	L1, L2	CO6
13	Thread preemption, Multiprocessing and Multitasking	L1, L2	CO6
13	Task Communication, Task synchronization issues – Racing and Deadlock	L1, L2	CO6
13	Concept of Binary and counting semaphores	L1, L2	CO6
14	How to choose an RTOS, Integration and testing of Embedded hardware and firmware	L1, L2	CO6
THIRD CIE			
LAB INTERNALS			
15	Embedded system Development Environment – Block diagram	L1, L2	CO6
15	Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan	L1, L2	CO6

RBT Level

L1-Remembering L2-Understanding L3-Applying L4-Analysing L5-Evaluating L6-Creating

Text Books:

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM System Developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd Edition.

Reference Books:

1. Raghunandan..G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication,2019
2. The Insider’s Guide to the ARM7 Based Microcontrollers, Hitex Ltd., 1st edition, 2005.
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015.
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

e- Learning Resources:

1. NPTEL Course – Embedded System Design With ARM
   https://www.digimat.in/nptel/courses/video/106105193/L01.html

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CITY ENGINEERING COLLEGE

Department of Computer Science and Engineering

Sem : IV – B **Subject: Microcontroller and Embedded Systems** **Sub Code: 18CS44**

Assignment Questions on Module 1

1. What is microprocessor and microcontroller? Differentiate between microprocessor and microcontroller
2. Differentiate between RISC and CISC processors.
3. Explain with neat block diagram the ARM based embedded device microcontroller.
4. Explain ARM core data flow model with a neat diagram.
5. With diagram explain the various blocks in a 3 stage pipeline of ARM processor organization.
6. Explain the various fields in current program status register.
7. Describe the processor modes of CPSR with respect to ARM processor.
8. Explain the programmer’s model of ARM processor with complete register sets available.
9. Discuss the core extensions for ARM processor.
10. Explain briefly the interrupt and the vector table.

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Department of Computer Science and Engineering

Sem: IV – B **Subject: Microcontroller and Embedded Systems** **Sub Code: 18CS44**

Assignment 2

1. If r5=5, r7=8 and using the following instruction, write values of r5, r7 after execution MOV r7, r5, LSL #2
2. If r1=0b1111, r2=0b0101, find r0 after BIC r0, r1, r2
3. Find the number of cycles required to execute the following instructions
   LDRB r0, [r1]
   EOR r0, [r1]
   ADD r0, r0, r1
4. Write an ARM assembly language program to multiply an eight bit number by 8 and divide by 4
5. Write an ARM assembly language program to read the contents of one 16-bit variable and copy this to internal RAM. [Hint: use LDRB instruction and 'ALIGN' Directive]
6. Write an ARM assembly language program to copy a block of data (block 1) to another block (block 2)

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Question Bank – Module 1

Subject: Microcontroller and Embedded Systems **Sub Code: 18CS44**

1. Define microprocessor and microcontroller.
2. Compare microprocessor and microcontroller.
3. Explain major design rules of RISC processors.
4. Compare RISC and CISC.
5. Write a note on instruction set for embedded systems.
6. Explain with neat block diagram the ARM based embedded device microcontroller (or) Explain the architecture of a typical embedded device based on ARM core with neat diagram
7. Discuss AMBA bus technology.
8. Explain AMBA bus protocol.
9. Write a note on memory hierarchy.
10. List and explain various memory types used in embedded system.
11. Compare SRAM and DRAM.
12. Compare DRAM and SDRAM.
13. Write a note on embedded system software.
14. Explain various components of embedded system software.
15. Explain ARM core data flow model with a neat diagram.
16. Explain registers used under various modes. Or explain the programmer's model of ARM processor with complete set of registers.
17. Explain the concept of pipeline and interrupts used in ARM processor.
18. With diagram explain the various blocks in a 3 stage pipeline of ARM processor organization.
19. Describe the various modes of operation of ARM processor. Or Describe the processor modes of CPSR with respect to ARM processor.
20. Explain the various fields in current program status register.
21. Explain the condition flags of ARM Processor.
22. Explain various exceptions/ interrupts supported by ARM processor.
23. Explain the concept of core extensions in ARM processor
24. Discuss the following with diagrams.
    a. Von – Neumann architecture
    b. Harvard architecture with TCM

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Question Bank – Module 2

Subject: Microcontroller and Embedded Systems **Sub Code: 18CS44**

1. Briefly explain the data processing instructions for ARM processor.
2. With example explain the barrel shift operations in ARM processor.
3. Explain briefly the arithmetic instructions with syntax and example.
4. Illustrate branch instructions.
5. Discuss load and store instructions.
6. Write a note on software interrupt instruction.
7. Explain briefly program status register instructions with syntax and example
8. Explain briefly coprocessor instructions with syntax and example
9. How to load constants? Explain with example.
10. Explain the structure of an ARM assembly language module with the help of example.
11. What is an assembler directive? Explain any four assembler directive.
    Explain how to convert C function into assembly function with the help of example
12. Write a note on profiling and cycle counting.
13. Describe ARM9TDMI pipeline.
14. Write a note on load scheduling by preloading and unrolling
15. How conditional execution is efficiently used instead of conditional branches?
16. Write a note on register allocation.
17. How we can use more than 14 local variables in the assembly code.
18. Write a note on looping constructs.

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Question Bank – Module 3

Subject: Microcontroller and Embedded Systems **Sub Code: 18CS44**

1. Briefly describe the classification of embedded systems.
2. List different purposes of embedded system with examples.

   Or

   Explain various purposes of embedded systems in detail with illustrative examples.
3. What is an embedded system? Differentiate between general purpose computing and embedded system.
4. What are the different types of memories used in embedded system design? Explain the role of each.
5. Compare the following

   a. RAM and ROM b. FPGA and ASIC
6. What is Programmable Logic Device (PLD)? What are the different types of PLDs? Explain the role of PLDs in embedded system design.
7. Explain the following

   a. I2C b. 1-Wire interface c. SPI interface d. Reset Circuit
8. Write a note on

   a. Real Time Clock b. Watch dog timer c. Brown-out protection circuit
9. Explain the different step modes for stepper motor
10. Explain the sequence of operation for communicating with an I2C slave device
11. Explain the following

    a. SPI b. Optocoupler
12. What is memory shadowing? What is its advantage?
13. What is Relay? What are the different types of relays available? Explain the role of relay in embedded system.
14. Explain the different external interfaces in brief.
15. Define sensors and actuators. Explain with suitable examples.
16. With a neat diagram, explain the elements of an embedded system.
17. Differentiate between a .RISC and CISC architecture b. Little and Big Endian architecture

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Question Bank – Module 4

Subject: Microcontroller and Embedded Systems **Sub Code: 18CS44**

1. Explain the different characteristics of embedded system.
2. Explain quality attribute in the embedded system development context? What are the different quality attributes to be considered in an embedded system design.
3. What are the operational and non-operational quality attributes of an embedded systems?
4. Explain the role of embedded systems in automotive domain.
5. Explain the different types of serial interface bus used in Automotive.
6. Explain the different electronic control units (ECUs) used in automotive systems.
7. Explain the different communication buses used in automotive application.
8. What is hardware software co-design? Explain the fundamental issues in hardware software co-design.
9. Compare the following
    a. C v/s Embedded C b. Compiler v/s Cross Compiler
10. Design FSM model for tea/coffee vending machine.
11. Explain with a neat diagram, how source file to object file translation takes place.
12. Explain the different embedded firmware design approaches.
13. Explain the assembly language based embedded firmware development with a diagram and mention its advantages and disadvantages.
14. Explain the Data Flow Graph and Control Data Flow Graph model in embedded design.
15. What is the difference between Super loop based and OS based embedded firmware design?
16. Explain the sequential program model with an example.
17. Explain the concurrent / communicating program model. Explain its role in 'Real Time' system design.

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Department of Computer Science and Engineering

Question Bank – Module 5

Subject: Microcontroller and Embedded Systems **Sub Code: 18CS44**

1. Explain basics of operating system?
2. Explain types of operating system in embedded systems?
3. Differentiate between soft and hard real time?
4. Explain structure of process?
5. What is RTOS? Explain deferent services of RTOS?
6. Explain in detail task, process and thread?
7. Explain multitasking concept with an example.
8. What is scheduling? Explain the various for scheduling algorithms in RTOS?
9. Explain task communication?
10. Differentiate between thread and process?
11. Explain task synchronization?
12. What is semaphore? Explain various types of semaphores in RTOS?
13. Explain how to choose an RTOS in Embedded system?
14. Explain integration of hardware and firmware design of embedded system.
15. Explain detail Embedded system development environment?

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COURSE CODE: 18CS44

CITY ENGINEERING COLLEGE
FIRST INTERNAL TEST

Program Name: CSE **Date: 21/05/2021**
Course Name : Microcontroller and Embedded Systems **Time: 03:00PM – 04:30PM**
Sem & Sec: IV SEM A, B, C **Max Marks: 50** **Duration: 1 ½ hrs.**

Note: Answer all Questions selecting any ONE FULL question from each part.

Q No.	Sub Q No.	Questions	Marks	BT Levels	CO's
		PART -A			
1	**a**	Explain the architecture of a typical embedded device based on ARM core with neat diagram.	**10**	**BT1, BT2**	**CO1**
		Or			
2	**a**	Explain ARM core data flow model with a neat diagram.	**10**	**BT1, BT2**	**CO1**
		PART -B			
3	**a**	Describe the various modes of operation of ARM processor.	**4**	**BT1,BT2**	**CO1**
	b	Explain the various fields in current program status register	**6**		
		Or			
4	**a**	Explain the programmer's model of ARM processor with complete register sets available.	**10**	**BT1,BT2**	**CO1**
		PART -C			
5	**a**	Discuss the following with diagrams. i) Von – Neumann architecture ii)Harvard architecture with TCM	**10**	**BT1,BT2**	**CO1**
		Or			
6	**a**	Explain briefly the interrupt and vector table.	**10**	**BT1,BT2**	**CO1**
		PART – D			
7	**a**	Compare RISC and CISC.	**5**	**BT1,BT2**	**CO1**
	b	Illustrate ARM7 pipeline concept.	**5**		
		Or			
8	**a**	Define microprocessor and microcontroller.	**2**	**BT1, BT2**	**CO1**
	b	Discuss ARM design philosophy.	**8**		
		PART -E			
9	**a**	Explain the syntax of following instructions with example i) MOV ii) MVN iii) MOVS iv) MOVEQ	**10**	**BT2,BT3**	**CO1**
		Or			
10	**a**	Illustrate different barrel shifter operations.	**10**	**BT2,BT3**	**CO1**

Bloom's Taxonomy Level: BT1-Remembering BT2-Understanding BT3-Applying BT4-Analysing BT5-Evaluating BT6-Creating
Course Outcomes: CO1: Describe the architectural features and instructions of ARM microcontroller

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COURSE CODE: 18CS44

CITY ENGINEERING COLLEGE
SECOND INTERNAL TEST

Program Name: CSE **Date: 29/06/2021**
Course Name : Microcontroller and Embedded Systems **Time: 03:00PM – 04:30PM**
Sem & Sec: IV SEM A, B, C **Max Marks: 50** **Duration: 1 ½ hrs.**

Note: Answer all Questions selecting any ONE FULL question from each part.

Q No.	Sub Q No.	Questions	Marks	BT Levels	CO's
		PART -A			
1	**a** **b**	Discuss the comparison instructions with an example for each. Write a short note on SWAP instruction.	**10**	**BT1, BT2**	**CO1**
		Or			
2	**a** **b**	With suitable example describe branch instructions. Discuss the load store instruction with respect to multiple register transfer.	**10**	**BT1, BT2**	**CO1**
		PART -B			
3	**a**	Write a note on load scheduling by preloading and unrolling	**10**	**BT1**	**CO2**
		Or			
4	**a**	Explain how to convert C function into assembly function with the help of example	**10**	**BT1,BT2**	**CO2**
		PART -C			
5	**a**	List different purposes of embedded system with examples.	**10**	**BT1**	**CO1**
		Or			
6	**a**	Briefly describe the classification of embedded systems.	**10**	**BT1**	**CO1**
		PART – D			
7	**a** **b**	Explain the structure of an ARM assembly language module. Write an ARM assembly program to find the largest among two numbers.	**5** **5**	**BT2,BT3**	**CO2**
		Or			

8	**a**
	b
		Write a note on profiling and cycle counting
		Find the number of cycles required to execute the following instructions
		MOV R1, #40000010
		LDRB R0, [R1]
		ADD R2, R2, R0
			5
			5
				BT2, BT3	**CO2**

		PART -E			
9	**a**	What is an embedded system? Differentiate between general purpose computing and embedded system	**10**	**BT1, BT2**	**CO1**
		Or			
10	**a**	What is Programmable Logic Device (PLD)? What are the different types of PLDs? Explain the role of PLDs in embedded system design.	**10**	**BT1**	**CO1**

Bloom's Taxonomy Level: BT1-Remembering BT2-Understanding BT3-Applying BT4-Analysing BT5-Evaluating BT6-Creating
Course Outcomes: CO1: Describe the architectural features and instructions of ARM microcontroller
CO2: Apply the knowledge gained for Programming ARM for different applications.

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COURSE CODE: 18CS44

CITY ENGINEERING COLLEGE
THIRD INTERNAL TEST

Program Name: CSE **Date: 03/08/2021**
Course Name : Microcontroller and Embedded Systems **Time: 03:00PM – 04:30PM**
Sem & Sec: IV SEM A, B, C **Max Marks: 50** **Duration: 1 ½ hrs.**

Note: Answer all Questions selecting any ONE FULL question from each part.

Q No.	Sub Q No.	Questions	Marks	BT Levels	CO's
		PART -A			
1	**a**	What are the different types of memories used in embedded system design? Explain the role of each	**10**	**BT1**	**CO3**
		Or			
2	**a**	Write a note on i) Watch dog timer ii)Brown-out protection circuit	**5+5**	**BT1**	**CO3**
		PART -B			
3	**a**	What is Relay? What are the different types of relays available? Explain the role of relay in embedded system.	**10**	**BT1**	**CO3**
		Or			
4	**a**	Explain the following i) I2C ii) 1-Wire interface	**5+5**	**BT1**	**CO3**
		PART -C			
5	**a**	Explain the different characteristics of embedded system.	**10**	**BT1**	**CO4**
		Or			
6	**a**	What is hardware software co-design? Explain the fundamental issues in hardware software co-design	**10**	**BT1**	**CO5**
		PART – D			
7	**a**	How source file to object file translation takes place? Explain with a neat diagram.	**5** **5**	**BT1, BT2**	**CO5**
		Or			
8	**a**	Explain the assembly language based embedded firmware development with a diagram and mention its advantages and disadvantages.	**5** **5**	**BT1**	**CO5**
9	**a**	Explain the sequential program model with an example.	**10**	**BT1**	**CO5**
		Or			
10	**a**	Explain the Data Flow Graph and Control Data Flow Graph model in embedded design	**10**	**BT1**	**CO5**

Bloom's Taxonomy Level: BT1-Remembering BT2-Understanding BT3-Applying BT4-Analysing BT5-Evaluating BT6-Creating
Course Outcomes: CO1: Describe the architectural features and instructions of ARM microcontroller CO2: Apply the knowledge gained for Programming ARM for different applications. CO3: Interface external devices and I/O with ARM microcontroller. CO4: Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system. CO5: Develop the hardware /software co-design and firmware design approaches. CO6: Demonstrate the need of real time operating system for embedded system applications

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CIRCULAR

Ref. No: CEC/CSE/DAC/2020-2021/01 **Date: 24/08/2020**

All the members of Department Advisory Committee are informed to attend a meeting which will be held as follows

Date: 26/08/2020
Time: 3:00 PM
Venue: LAB C104

Agenda:

- Conduction of online classes
- Internship and Project for seventh Sem
- Organizing webinar
- Online certification on Selenium

HOD
Dept of Computer Science & Engineering
CITY ENGINEERING COLLEGE
Doddakallasandra [illegible] pura Road
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Department Advisory Committee Meeting

Date: 26-08-2020
Time: 03:00 PM

DAC Members Present:

Sl. No	Member Name	Designation	Role	Sign
1	Mr. Vivekavardhana Reddy	HOD	Convenor	
2	Dr. Nandakumar A N	Professor	Member	
3	Dr. Sowmya Naik P T	Professor	Co-Convenor	
4	Mr. Girish G A	Assistant Professor	Member	
5	Mr. Surendranatha Gowda	Assistant Professor	Member	Surendra
6	Mrs. Ambika P R	Assistant Professor	Member	
7	Mrs. Laxmi M C	Assistant Professor	Member	
8	Mrs. Archana Bhat	Assistant Professor	Member	
9	Mr. Vinodh Kumar S	Assistant Professor	Member	
10	Mr. Vivekraj G K	Technical Product Manager, Sabre India	Industry Expert	
11	Mr. Devraj K	Founder & CEO, EtherScale	Alumni	

The Department Advisory Committee meeting was conducted at Department of CSE, on 26th of August 2020, at 03:00 PM.

Agenda of the meeting:

- Conduction of online classes
- Internship and Project for seventh Sem
- Organizing webinar
- Online certification on Selenium

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Minutes of meeting:

The following points were discussed in the meeting:

- The HOD announced that online classes will commence on September 1st. Various tools for conducting online classes were discussed to enhance their effectiveness.
- It was decided that each subject would have a one-hour contact session where students can seek clarification on doubts. The HOD also informed faculty that students may be allowed to work on lab programs in person, provided they submit a consent form and a negative COVID-19 test report.
- Students are required to form project batches and submit their details via the link provided on the college website by October 9, 2020. The HOD emphasized that all guidelines and instructions related to projects and internships will be available through this link.
- Internal guides will be assigned to students to discuss project details, and together with project coordinators, they will address any conflicts and finalize the project. Once finalized, each batch must submit their synopsis online in the prescribed format, which will be available in the announcement section.
- Internship coordinators were advised to monitor the progress of students' internship work and set deadlines for submission.
- It was also decided to organize a webinar on the importance of internships in engineering education in September.
- The HOD urged the organization of a certification course on the Selenium tool, highlighting its growing significance in the software testing field.

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cc to Principal

Revised Academic Calendar of VTU, Belagavi for ODD Semester of 2020-21 (Tentative)

	I Sem B. E. / B. Tech. / B. Arch./B.Plan	I sem M.Tech./MBA /MCA/M.Arch.	III, V & VII Sem B. E. /B. Tech./B.Plan/ B.Arch & IX Sem B. Arch.	III & V Sem MCA	III Sem MBA	III Sem M. Tech.	III Sem M. Arch.
Commencement of ODD Semester	Will be announced later	Will be announced later	01.09.2020	01.09.2020	01.09.2020	01.09.2020	01.09.2020
Last Working day of ODD Semester			16.01.2021	16.01.2021	16.01.2021	16.01.2021	16.01.2021
Practical Examinations			21.01.2021 To 02.02.2021	21.01.2021 To 27.01.2021	--	21.01.2021 To 27.01.2021	--
Theory Examinations			08.02.2021 To 25.03.2021	28.01.2021 To 10.02.2021	21.01.2021 To 17.02.2021	28.01.2021 To 10.02.2021	21.01.2021 To 06.02.2021
Internship Viva-Voce			--	--	--	11.02.2021 To 18.02.2021	--
Professional training / Organization study			--	--	--	--	--
Commencement of EVEN Semester			26.03.2021	11.02.2021	18.02.2021	19.02.2021	08.02.2021

NOTE

- VII Semester B. E / B. Tech students shall have to undergo Internship as per circular of University **VTU/Aca/2019-20/85, dated 12.05.2020.**
- The classroom sessions for all the higher semesters would be in ONLINE/OFFLINE/BLENDED as per the order issued by UGC/Govt. of Karnataka until further orders.
- The Institute needs to function for six days a week with additional hours (Saturday is a full working day)
- The faculty/staff shall be available to undertake any work assigned by the university.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- Notification regarding Calendar of Events relating to the conduct of University Examinations will be issued by the Registrar (Evaluation) from time to time.
- **Academic Calendar may be modified based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.**
- **Revised Academic Calendar is also applicable for Autonomous Colleges.**

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24-11-2020

REGISTRAR

City Engineering College **Department of Computer Science & Engineering** **Odd Semester of 2020-21**

	September 2020		October 2020		November 2020		December 2020	
DAY	**Date**	**EVENT**	**Date**	**EVENT**	**Date**	**EVENT**	**Date**	**EVENT**
MON	1		5		9	**Technical Talk/ Seminars**	14	
TUE	2		6		10		15	
WED	3		7		11		16	
THU	4		8		12		17	
FRI	5		9		13		18	
SAT	6		10		14		19	
SUN	7		11		15		20	
MON	8		12	**1st Internal Test for 3rd, 5th and 7th Sem**	16		21	**Project Phase – 1 presentation**
TUE	9		13		17		22	
WED	10		14		18		23	
THU	11		15		19		24	
FRI	12		16		20		25	
SAT	13		17		21		26	
SUN	14		18		22		27	
MON	15		19	**Technical Activities**	23		28	
TUE	16		20		24		29	
WED	17		21		25	**2nd Internal Test**	30	
THU	18		22		26		JAN 1	
FRI	19	**Commencement of 3rd, 5th, 7th Semester**	23		27		2	
SAT	20		24		28		3	
SUN	21		25	**Ayudha Pooja**	29		4	
MON	22		26	**Vijaya Dashami**	30		5	
TUE	23		27		**DEC 1**		6	
WED	24		28		2	**Student Seminars**	7	
THU	25		29		3		8	
FRI	26		30	**Eid e Milad**	4		9	
SAT	27		31	**Valmiki Jayanthi**	5		10	
SUN	28		**NOV 1**	**Kannada Rajyotsava**	6		11	
MON	29		2		7		12	**3rd Internal Test**
TUE	30		3		8		13	
WED	31		4		9		14	
THU	May		5		10		15	
FRI	2	**Gandhi Jayanthi**	6		11		16	**Last Working Day**
SAT	3		7		12	**Commencement of 1st Sem**		
SUN	4		8		13			

Practical Exam : 21.1.2021 onwards, Theory exams : 8:2:2021 TO 27:3:2021 Internship for 7th Sem : 29.3.2021 TO 10.4.2021

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ACADEMIC YEAR : 2020 - 2021 (odd)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE PREFERNCE

Name of the Faculty: Laxmi MC

Designation: Assistant Professor

Year / Semester: 2020 - 2021

Sl.No	Course Code and Name	Year/Semester
1.	18CS56 - Unix programming	~~18CS5~~6 2020-21/5th
2.	18CPL17 - C programming Lab	2020-2021/1st
3.	18CS55 - Python	2020-2021/5th

Signature of faculty

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ACADEMIC YEAR : 2020 -2021 (odd)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE PREFERNCE

Name of the Faculty: Girish GA

Designation: Assistant Professor

Year / Semester: 2020 -2021

Sl.No	Course Code and Name	Year/Semester
1.	18CS35 - Software Engineering	2020 -2021 | 3rd
2.	18CS34 - Computer Organization	2020-2021 | 3rd
3.	18CS51 - Management & Entrepreneurship	2020 - 2021 | 5th

Signature of faculty

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ACADEMIC YEAR: 2020 - 2021(Odd)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE ALLOCATION

Sl.No	Name of the Faculty	Course Code and Name	Year/ Semester	Signature
1	Mrs. Sowmya Naik	17CS743 – Information and Network Security	4th / 7th	
2	Dr. Nandakumar A N	18CS51 – Management & Entrepreneurship 17CS754 – Storage Area Network	3rd / 5th 4th / 7th	
3	Mr. Vivekavardhana Reddy	18CS32 – Data Structure and Its Application	2nd / 3rd	
4	Mr. Deepak N R	18CS54 – Automata theory and Computability 18CPS13 – Problem Solving Using C	3rd / 5th 1st / 1st	
5	Mr. Nandish A. C	18CS53 – Database Management System 18CSL58 – DBMS Lab	3rd / 5th	
6	Mr. Girish G A	18CS51 – Management & Entrepreneurship 18CSL38 – Data Structure Lab 17CS72 – Advanced Computer Architecture	3rd / 5th 2nd / 3rd 4th / 7th	
7	Mr. Surendranath Gowda	18CS33 – Analog and Digital Electronics 18CSL37 – Analog and Digital Electronics Lab	2nd / 3rd 2nd / 3rd	Surendra
8	Mr. Vinod Kumar	18CS35 – Software Engineering	2nd / 3rd	
9	Mrs. Sowbhagya M P	17CS71 – Web Technologies	4th / 7th	Sowbhagya
10	Mrs. Ambika P R	18CS34 – Computer Organization 17CS73 – Machine	2nd / 3rd 4th / 7th	

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		Learning 17CSL76 – Machine Learning Lab	4th / 7th	
11	Mrs. Laxmi M C	17CS71 – Web Technologies 18CS52 – Computer Network and Security 18CSL57 – Computer Network Laboratory	4th / 7th 3rd / 5th 3rd / 5th	
12	Mr. B. Ramesh	18CS55 -- Application Development using Python 18CPL17 – C Programming Lab	3rd / 5th 1st / 1st	
13	Mrs. Punitha P	18CS33 – Analog and Digital Electronics 18CSL37 – Analog and Digital Electronics Lab	2nd / 3rd	
14	Mrs. Archana Bhat	18CS53 – Database Management System 18CSL58 – DBMS Lab	3rd / 5th 3rd / 5th	
15	Ms. Deepika R	18CS56 – Unix Programming 17CSL77 – Machine Learning Lab	3rd / 5th 4th / 7th	
16	Mrs. Sriraksha S	18CS55 – Application Development using Python	3rd / 5th	
17	Mrs. Sreevidya G	18CS52 – Computer Network and Security 18CSL57 – Computer Network Laboratory	3rd / 5th	
18	Mrs. Kavyashree Yadav	18CS32 – Data Structure and Its Application 18CSL38 – Data Structure Lab	2nd / 3rd	
19	Ms. Pushpa S	18CSL58 – DBMS Lab with mini project	3rd / 5th	
20	Mr. Rakesh	17CS72 – Advanced Computer Architecture	4th / 7th	
21	Mrs. Nagashree R A	18CPL17 – C programming LAB	1st / 1st	
22	Mr. Gangappa	18CS35 – Software Engineering	2nd / 3rd	

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23	Mr. Suhas	18CS34 – Computer Organization 18CSL37 – Analog and Digital Electronics Lab	2nd / 3rd	Suhas
24	Mrs. Tejaswini B N	18CS54 – Automata theory and Computability 18CSL57 – Computer Network Laboratory	3rd / 5th	
25	Mr. Channabasappa	18CSL37 – Analog and Digital Electronics Lab	2nd / 3rd	
26	Mrs. Sowmya L.D	17CS754 – Storage Area Network	4th / 7th	
27	Mr. Doreswamy	18CSL38 – Data Structure Lab	2nd / 3rd	Doreswamy

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CITY ENGINEERING COLLEGE

Department Of CSE

Sep – Dec 2020

Time Table for III Sem - A Section

DAY	9:15 – 10:00	10:30 – 11:15	11:45 – 12:30	1:00 – 1:45	2:15 – 3:00	3:30 – 4:15
MON	MAT3	CO	DMS	ADE	DSA(T)	DSA(T)
TUE	DSA	SE	ADE	DMS	MAT3	CIP
WED	CO	DSA	MAT3	SE	DMS	
THU	ADE	DMS	CO	MAT3	SE	
FRI	SE	CO	DSA	ADE	DSA LAB	
SAT	ADE LAB					

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18MAT31	Transform Calculus, Fourier Series and Numerical Techniques	MAT-3	Mrs. Gayathri
2	18CS32	Data Structures and Applications	DSA	Mr. Vivekavardhana Reddy
3	18CS33	Analog and Digital Electronics	ADE	Mr. Surendranatha Gowda
4	18CS34	Computer Organization	CO	Mrs. Ambika P R
5	18CS35	Software Engineering	SE	Mr. Vinod Kumar
6	18CS36	Discrete Mathematical Structures	DMS	Mrs. Vanitha
7	18CSL37	Analog and Digital Electronics Laboratory	ADE LAB	Mr. Surendranatha Gowda/ Mrs. Punitha P
8	18CSL38	Data Structures Laboratory	DS LAB	Mr. Vivekavardhana Reddy/ Mr. Girish G A
9	18CPC29	Constitution of India, Professional Ethics and Cyber Law	CIP	Dr. Rajasekhar

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Principal

CITY ENGINEERING COLLEGE

Department Of CSE

Sep – Dec 2020

Time Table for III Sem B Section

DAY	9:15 – 10:00	10:30 – 11:15	11:45 – 12:30	1:00 – 1:45	2:15 – 3:00	3:30 – 4:15
MON	SE	DSA	MAT3	CO	DMS	CIP
TUE	ADE	CO	DSA	MAT3	SE	
WED	MAT3	SE	DMS	ADE	DSA(T)	
THU	DSA	ADE	SE	DMS	CO	ADE
FRI	CO	DMS	MAT3	DSA(T)	ADE LAB	
SAT	DSA LAB					

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18MAT31	Transform Calculus, Fourier Series and Numerical Techniques	MAT-3	Mrs. Gayathri
2	18CS32	Data Structures and Applications	DSA	Mr. Vivekavardhana Reddy
3	18CS33	Analog and Digital Electronics	ADE	Mr. Deepak N R
4	18CS34	Computer Organization	CO	Mrs. Ambika P R
5	18CS35	Software Engineering	SE	Mr. Siddaramappa
6	18CS36	Discrete Mathematical Structures	DMS	Mr. Narendra
7	18CSL37	Analog and Digital Electronics Laboratory	ADE LAB	Mr. Deepak/ Mrs. Punitha P
8	18CSL38	Data Structures Laboratory	DS LAB	Mr. Vivekavardhana Reddy/ Ms. Savitri K
9	18CPC29	Constitution of India, Professional Ethics and Cyber Law	CIP	Dr. Rajasekhar

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CITY ENGINEERING COLLEGE

Department Of CSE

Sep – Dec 2020

Time Table for V Sem A Section

DAY	9:15 – 10:00	10:30 – 11:15	11:45 – 12:30	1:00 – 1:45	2:15 – 3:00	3:30 – 4:15
MON	CNS	ADP	ATC	DBMS	UNIX	ME
TUE	ADP	ME	DBMS	UNIX	CNS(T)	ES
WED	ME	CNS	UNIX	ADP	ATC	DBMS(T)
THU	DBMS	UNIX	ADP	CNS(T)	ME	ES
FRI	ATC	DBMS	CNS	ADP	DBMS LAB	
SAT	CN LAB					

Sl . No	Course Code	Course Name	Course	Faculty Name
1	18CS51	Management, Entrepreneurship for IT Industry	ME	Dr. Nandakumar A N
2	18CS52	Computer Networks and Security	CNS	Mrs. Laxmi M C
3	18CS53	Database Management System	DBMS	Mr. Nandish A C
4	18CS54	Automata Theory and Computability	ATC	Mrs. Tejaswini B N
5	18CS55	Application Development Using Python	ADP	Mr. Ramesh B
6	18CS56	Unix Programming	UNIX	Ms. Deepika R
7	18CSL57	Computer Network Laboratory	CN LAB	Mrs. Laxmi M C/ Mrs. Shrividya
8	18CSL58	DBMS Lab with Mini project	DBMS LAB	MR. Nandish A C/ Mrs. Archana Bhat
9	18CIV59	Environmental Studies	ES	Prof. Sunitha

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Kanakapura Main Road, Bangalore-560061

CITY ENGINEERING COLLEGE

Department Of CSE

Sep – Dec 2020

Time Table for V Sem B Section

DAY	9:15 – 10:00	10:30 – 11:15	11:45 – 12:30	1:00 – 1:45	2:15 – 3:00	3:30 – 4:15
MON	CNS	ADP	ATC	DBMS	UNIX	ME
TUE	ADP	CN	DBMS	UNIX	DBMS LAB	
WED	ME	CNS	UNIX	ADP	ATC	DBMS(T)
THU	DBMS	UNIX	ADP	CNS(T)	ES	ME
FRI	ATC	DBMS	CNS	ES	CN LAB	
SAT	ME	ADP				

Sl. No	Course Code	Course Name	Course	Faculty Name
1	18CS51	Management, Entrepreneurship for IT Industry	ME	Mr. Girish G A
2	18CS52	Computer Networks and Security	CNS	Mrs. Shrividya
3	18CS53	Database Management System	DBMS	Mrs. Archana Bhat
4	18CS54	Automata Theory and Computability	ATC	Mr. Deepak N R
5	18CS55	Application Development Using Python	ADP	Mrs. Shriraksha S
6	18CS56	Unix Programming	UNIX	Ms. Deepika R
7	18CSL57	Computer Network Laboratory	CN LAB	Mrs. Laxmi M C/ Mrs. Shrividya
8	18CSL58	DBMS Lab with Mini project	DBMS LAB	Mrs. Archana Bhat/ Ms.Pushpa
9	18CIV59	Environmental Studies	ES	Prof. Sunitha

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CITY ENGINEERING COLLEGE

Department Of CSE

Sep – Dec 2020

Time Table for VII Sem A Section

DAY	9:15 – 10:00	10:30 – 11:15	11:45 – 12:30	1:00 – 1:45	2:15 – 3:00	3:30 – 4:15
MON	SAN	ML	WEB	ACA	ML LAB	
TUE	INS	WEB	SAN	ML	Project Work	
WED	ML	INS	ACA	SAN	WEB LAB	
THU	WEB	ACA	SAN	INS		
FRI	ACA	ML	INS	WEB		
SAT						

Sl . No	Course Code	Course Name	Course	Faculty Name
1	17CS71	Web Technologies and its applications	WEB	Mrs. Laxmi M C
2	17CS72	Advanced Computer Architectures	ACA	Mr. Girish G A
3	17CS73	Machine Learning	ML	Mrs. Ambika P R
4	17CS743	Information and Network Security	INS	Dr. Sowmya Naik
5	17CS754	Storage Area Network	SAN	Dr. Nandakumar A N
6	17CSL76	Machine Learning Lab	ML Lab	Mrs. Ambika P R/ Mrs. Archana Bhat
7	17CSL77	Web Technologies Laboratory with Mini Project	WEB Lab	Ms. Deepika R
8	17CSP78	Project Work – Phase I + Seminar	Project	Dr. Nandakumar A N/ Dr. Sowmya Naik

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CITY ENGINEERING COLLEGE

Department Of CSE

Sep – Dec 2020

Time Table for VII Sem B Section

DAY	9:15 – 10:00	10:30 – 11:15	11:45 – 12:30	1:00 – 1:45	2:15 – 3:00	3:30 – 4:15
MON	SAN	ML	WEB	ACA	WEB LAB	
TUE	INS	WEB	SAN	ML	Project Work	
WED	ML	INS	ACA	SAN	ML LAB	
THU	WEB	ACA	SAN	INS		
FRI	ACA	ML	INS	WEB		
SAT						

Sl . No	Course Code	Course Name	Course	Faculty Name
1	17CS71	Web Technologies and its applications	WEB	Mrs. Sowbhagya M P
2	17CS72	Advanced Computer Architectures	ACA	Mr. Rakesh R
3	17CS73	Machine Learning	ML	Mrs. Ambika P R
4	17CS743	Information and Network Security	INS	Dr. Sowmya Naik
5	17CS754	Storage Area Network	SAN	Mrs. Sowmya L D
6	17CSL76	Machine Learning Lab	ML Lab	Mrs. Ambika P R / Mrs. Archana Bhat
7	17CSL77	Web Technologies Laboratory with Mini Project	WEB Lab	Mrs. Sowbhagya M P/ Ms. Deepika R
8	17CSP78	Project Work – Phase I + Seminar	Project	Dr. Nandakumar A N/ Dr. Sowmya Naik

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Doddakallasandra, Kanakapura Main Road, Bengaluru - 560061

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Department of Computer Science & Engineering

FACULTY ACADEMIC FILE

NAME	Mrs. Archana Bhat
DESIGNATION	Asst. Professor
SEMESTER	V
SECTION	A & B
SUBJECT NAME	DBMS
SUBJECT CODE	18CS53

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Revised Academic Calendar of VTU, Belagavi for ODD Semester of 2020-21 (Tentative)

	I Sem B. E. / B. Tech. / B. Arch./B.Plan	I sem M.Tech./MBA /MCA/M.Arch.	III, V B. E. /B. Tech./B.Plan/ B.Arch & VII sem BPlan /BArch & IX Sem B. Arch.	VII Sem B. E. /B. Tech	III & V Sem MCA	III Sem MBA	III Sem M. Tech.	III Sem M. Arch.
Commencement of ODD Semester	14.12.2020	Will be announced later	01.09.2020	01.09.2020	01.09.2020	01.09.2020	01.09.2020	01.09.2020
Last Working day of ODD Semester	25.03.2021		16.01.2021	16.01.2021	16.01.2021	16.01.2021	16.01.2021	16.01.2021
Practical Examinations	29.03.2021 Onwards#		21.01.2021 Onwards#	21.01.2021 Onwards#	08.02.2021 Onwards#	--	21.01.2021 Onwards#	--
Theory Examinations	12.04.2021 To 30.04.2021		08.02.2021 To 27.03.2021	08.02.2021 To 27.03.2021	21.01.2021 To 06.02.2021	21.01.2021 To 19.02.2021	28.01.2021 To 13.02.2021	21.01.2021 To 06.02.2021
Internship			---	29.03.2021 To 10.04.2021	---	---	---	---
Internship Viva-Voce			---	---	---	---	15.02.2021 To 22.02.2021	---
Professional training / Organization study			---	---	---	22.02.2021 To 03.04.2021	---	---
Commencement of EVEN Semester	03.05.2021		29.03.2021	12.04.2021	15.02.2021	05.04.2021	23.02.2021	08.02.2021

NOTE:

- VII Semester B. E. / B. Tech. students shall have to undergo **Internship** as per circular of University **VTU/Aca/2019-20/85, dated 12.05.2020**.
- I Semester B. E/ B. Tech / B. Arch Students shall compulsorily undergo **Induction Program** for 01 Weeks.
- The classroom sessions for all the semesters would be in **ONLINE mode/blended mode** until further orders.
- The Institute needs to function for **six days** a week with additional hours (**Saturday is a full working day**).
- The faculty/staff shall be available to undertake any work assigned by the university.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- (#) Notification regarding the Calendar of Events relating to the conduct of **University Examinations** will be issued by the Registrar (Evaluation) from time to time.
- Academic Calendar may be modified based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Revised Academic Calendar is also applicable for **Autonomous Colleges.**
- The MBA students are permitted to carry out **project work** in blended mode (ONLINE/OFFLINE). More emphasis on OFFLINE mode wherever feasible.

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04.12-2020
REGISTRAR

DATABASE MANAGEMENT SYSTEM

(Effective from the academic year 2018 -2019)

SEMESTER – V

Course Code	**18CS53**	**CIE Marks**	40
Number of Contact Hours/Week	3:2:0	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	03

CREDITS –4

Course Learning Objectives: This course (18CS53) will enable students to:

- Provide a strong foundation in database concepts, technology, and practice.
- Practice SQL programming through a variety of database problems.
- Demonstrate the use of concurrency and transactions in database
- Design and build database applications for real world problems.

Module 1	**Contact Hours**
Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. **Overview of Database Languages and Architectures:** Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. **Conceptual Data Modelling using Entities and Relationships:** Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization. **Textbook 1:Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.10** **RBT: L1, L2, L3**	10
Module 2	
Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. **Relational Algebra:** Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. **Mapping Conceptual Design into a Logical Design:** Relational Database Design using ER-to-Relational mapping. **SQL:** SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL. **Textbook 1: Ch4.1 to 4.5, 5.1 to 5.3, 6.1 to 6.5, 8.1; Textbook 2: 3.5** **RBT: L1, L2, L3**	10
Module 3	
SQL : Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. **Database Application Development:** Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop. **Internet Applications:** The three-Tier application architecture, The presentation layer, The Middle Tier **Textbook 1: Ch7.1 to 7.4; Textbook 2: 6.1 to 6.6, 7.5 to 7.7.** **RBT: L1, L2, L3**	10
Module 4	
Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. **Normalization Algorithms:** Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational	10

Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms **Textbook 1: Ch14.1 to 14.7, 15.1 to 15.6** **RBT: L1, L2, L3**	
Module 5	
Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL. **Concurrency Control in Databases:** Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. **Introduction to Database Recovery Protocols:** Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging, Database backup and recovery from catastrophic failures **Textbook 1: 20.1 to 20.6, 21.1 to 21.7, 22.1 to 22.4, 22.7.** **RBT: L1, L2, L3**	10
Course Outcomes: The student will be able to :	
• Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS. • Use Structured Query Language (SQL) for database manipulation. • Design and build simple database systems • Develop application to interact with databases.	
Question Paper Pattern:	
• The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module.	
Textbooks:	
1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson. 2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill	
Reference Books:	
1. Silberschatz Korth and Sudharshan, Database System Concepts, 6th Edition, Mc-GrawHill, 2013. 2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.	

DATABASE MANAGEMENT SYSTEM
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017-2018)
SEMESTER – V

Subject Code	17CS53	IA Marks	40
Number of Lecture Hours/Week	4	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS – 04

Module – 1	**Teaching Hours**
Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. **Overview of Database Languages and Architectures:** Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. **Conceptual Data Modelling using Entities and Relationships:** Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization. **Textbook 1:Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.10**	**10 Hours**
Module – 2	
Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. **Relational Algebra:** Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. **Mapping Conceptual Design into a Logical Design:** Relational Database Design using ER-to-Relational mapping. **SQL:** SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL. **Textbook 1: Ch4.1 to 4.5, 5.1 to 5.3, 6.1 to 6.5, 8.1; Textbook 2: 3.5**	**10 Hours**
Module – 3	
SQL : Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. **Database Application Development:** Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop. **Internet Applications:** The three-Tier application architecture, The presentation layer, The Middle Tier **Textbook 1: Ch7.1 to 7.4; Textbook 2: 6.1 to 6.6, 7.5 to 7.7.**	**10 Hours**
Module – 4	
Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys; Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. **Normalization Algorithms:** Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms	**10 Hours**

Textbook 1: Ch14.1 to 14.7, 15.1 to 15.6	
Module – 5	
Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL. **Concurrency Control in Databases:** Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. **Introduction to Database Recovery Protocols:** Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging, Database backup and recovery from catastrophic failures **Textbook 1: 20.1 to 20.6, 21.1 to 21.7, 22.1 to 22.4, 22.7.**	**10 Hours**

Course outcomes: The students should be able to:

- Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS.
- Use Structured Query Language (SQL) for database manipulation.
- Design simple database systems
- Design code for some application to interact with databases.

Question paper pattern:

The question paper will have TEN questions.
There will be TWO questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer FIVE full questions, selecting ONE full question from each module.

Text Books:

1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

Reference Books:

1. Silberschatz Korth and Sudharshan, Database System Concepts, 6th Edition, Mc-GrawHill, 2013.
2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.

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City Engineering College

Department Of CSE

V Sem – A Section

	USN	**Name**
1	1CE18CS001	ABDUL MANNAN
2	1CE18CS002	ABHISHEK S
3	1CE18CS003	ABIN B VINOD
4	1CE18CS004	ADITHI S
5	1CE18CS005	AISHWARYA H S
6	1CE18CS006	AMULYA K J
7	1CE18CS009	ANUSHA
8	1CE18CS010	AZEEZ MOHAMED FAZRY
9	1CE18CS011	BHAVANA D A
10	1CE18CS012	BHAVANA K
11	1CE18CS013	CHINMAI R
12	1CE18CS014	DARSHAN G
13	1CE18CS015	DEVBRAT MAHASETH
14	1CE18CS016	DHRUTHI K A
15	1CE18CS017	DIVYA G
16	1CE18CS019	DURGADEVI .M.S
17	1CE18CS020	FOUZIYA RAFFAT
18	1CE18CS021	GURURAJ A N
19	1CE18CS023	HAJIRA MOHSINA
20	1CE18CS025	HRITHIK N
21	1CE18CS026	JAHNAVI H B
22	1CE18CS027	JUNAID PASHA
23	1CE18CS028	KARAN A
24	1CE18CS031	KARTHIK K T

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25	1CE18CS033	KAVYA
26	1CE18CS034	KAVYA R S
27	1CE18CS035	KEERTHI SRI
28	1CE18CS036	KEVIN V
29	1CE18CS037	KUSHAL C
30	1CE18CS039	LAVANYA V
31	1CE18CS040	MAHESH R
32	1CE18CS041	MALLIKARJUN H K
33	1CE18CS042	MANI BHARATHI R
34	1CE18CS044	MONIKA B
35	1CE18CS045	MUTHUBHARATHI G
36	1CE18CS046	NAMRATHA S
37	1CE18CS047	NASREEN FATHIMA
38	1CE18CS048	NETHRA SHREE C
39	1CE18CS049	NIHARIKA M
40	1CE18CS050	NIKHIL U
41	1CE18CS052	NISCHITHA A YADAV
42	1CE18CS053	NISHKARSH KUMAR GANJHOO
43	1CE18CS092	USHA N
44	1CE18CS101	VINUTH S
45	1CE17CS017	APOORVA .M
46	1CE17CS025	BINDU M.R
47	1CE17CS034	G.R MAYUR
48	1CE17CS055	MAJID KHAN
49	1CE17CS056	MANOJ B.R
50	1CE17CS060	MEHFOOZ AHMED
51	1CE17CS096	RENUKA SURESH
52	1CE17CS135	TEJAS JAIN
53	1CE16CS113	VIJAY .M
54	1CE17CS151	RAHUL KUMAR PALIWAL
55	1CE19CS400	BHASKAR M.A
56	1CE19CS401	S A SRINIDHI
57	1CE19CS402	SMITHA SAIKUMAR BHANDARY

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City Engineering College

Department Of CSE

V Sem – B Section

Sl No.	USN	Name
1	1CE18CS008	ANJANA RAGHAVENDRA
2	1CE18CS018	DIVYASHREE R
3	1CE18CS022	GV RITWIK
4	1CE18CS030	KARTHIK A N
5	1CE18CS054	NITHISH GUNDAPPA MS
6	1CE18CS055	PARVEEN TAJ
7	1CE18CS056	PRAMOD KUMAR B S
8	1CE18CS057	PRATISHA A S KARANTH
9	1CE18CS058	PRIYA SINGH M
10	1CE18CS059	PRIYANKA R
11	1CE18CS060	PUNEETH P
12	1CE18CS061	R LAKSHMI SAI CHETANA NATH
13	1CE18CS062	RACHANA KARANTH M
14	1CE18CS064	RAKESH V
15	1CE18CS065	RAKSHITHA RAJESH
16	1CE18CS067	SANIYA FARHEEN
17	1CE18CS068	SANIYA SAMREEN
18	1CE18CS069	SARAH BATOOL
19	1CE18CS070	SHASHANK MISHRA
20	1CE18CS071	SHEIK SULAIMAN
21	1CE18CS073	SHIRISHA B
22	1CE18CS075	SHREEDEVI U JOSHI
23	1CE18CS078	SHUSHMA R B
24	1CE18CS079	SHWETHA C
25	1CE18CS080	SINDHU S
26	1CE18CS081	SPURTY BABU NAIK
27	1CE18CS082	SRILAKSHMI C S
28	1CE18CS083	SUPRITHA S

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29	1CE18CS084	SURABHI G R
30	1CE18CS085	SURAJ S
31	1CE18CS086	SURAKSHA HARITHAA
32	1CE18CS087	SURVI KUMARI
33	1CE18CS088	T N SIDDESH
34	1CE18CS089	TEJAS S
35	1CE18CS090	UDANKA AARUN JAIN
36	1CE18CS093	VAINAVI V
37	1CE18CS094	VAISHNAVI P
38	1CE18CS095	VAMSINANDAN BS
39	1CE18CS097	VARSHINI THANMAYA
40	1CE18CS098	VENKATESH GOWDA S P
41	1CE18CS099	VIDYASHREE N V
42	1CE18CS100	VIJAYALAKSHMI V
43	1CE18CS102	VIVEK B B
44	1CE18CS103	MOHAMMED JUNAID

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Dept. of Computer Science & Engineering
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Bangalore 560061

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DEPARTMENT OF CSE

LESSON PLAN FOR EVEN SEMESTER FOR ACADEMIC YEAR 2020 - 2021

Course Title: Database Management System	Course Code : 18CS53
Total contact hours: L:T:P:S :: 4 : 0 : 0: 0	End Term Marks :60
Internal Marks : 40	
Semester : V	Academic year : 2020-21
Lesson plan Author: Mrs. Archana Bhat	Date : 29/08/2020

Course objectives: This course will enable students to

1. Provide a strong foundation in database concepts, technology, and practice.
2. Practice SQL programming through a variety of database problems.
3. Demonstrate the use of concurrency and transactions in database
4. Design and build database applications for real world problems.

Course Outcomes: The students shall able to:

1. Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS.
2. Use Structured Query Language (SQL) for database manipulation
3. Design simple database systems
4. Design code for some application to interact with databases

Module 1

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
1	**Introduction to Databases:** Introduction, Characteristics of database approach	L1, L2	CO1
	Advantages of using the DBMS approach, History of database applications.	L1, L2	CO1
	Overview of Database Languages and Architectures: Data Models, Schemas, and Instances	L1, L2	CO1
	Three schema architecture and data independence, database languages, and interfaces	L1, L2	CO1
2	The Database System environment	L1, L2	CO1
	Conceptual Data Modeling using Entities and Relationships: Entity types, Entity sets, attributes	L1, L2	CO1, CO3
	roles, and structural constraints	L1, L2	CO1, CO3
	Weak entity types	L1, L2	CO1, CO3
3	ER diagrams, examples	L2, L3	CO1, CO3
	Specialization and Generalization	L1, L2	CO1, CO3

Module 2

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
4	**Relational Model**: Relational Model Concepts	L1,L2,L3	CO1
	Relational Model Constraints and relational database schemas	L1,L2,L3	CO1
	Update operations, transactions, and dealing with constraint violations	L1,L2,L3	CO1, CO2
	Relational Algebra: Unary and Binary relational operations	L1,L2,L3	CO1
5	Additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra	L1,L2,L3	CO1
	Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping	L2,L3	CO1, CO3
	SQL: SQL data definition and data types	L1,L2	CO2
	Specifying constraints in SQL	L1,L2	CO2
7	Retrieval queries in SQL,	L2,L3	CO2
	INSERT, DELETE, and UPDATE statements in SQL	L1,L2	CO2
	Additional features of SQL	L1,L2	CO2
8	Additional features of SQL	L1,L2	CO2

Module 3

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
8	**SQL** : Advanced Queries: More complex SQL retrieval queries	L2, L3	CO2
	Specifying constraints as assertions and action triggers	L2, L3	CO2
	Views in SQL, Schema change statements in SQL	L2, L3	CO2
9	**Database Application Development:** Accessing databases from applications	L2, L3	CO4
	An introduction to JDBC, JDBC classes and interfaces	L1, L2	CO4
	SQLJ	L1, L2	CO2, CO4
	Stored procedures	L1, L2	CO2, CO4
10	Case study: The internet Bookshop	L2, L3	CO4
	Internet Applications: The three-Tier application architecture	L1, L2	CO4
	The presentation layer, The Middle Tier	L1, L2	CO4

Module 4

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
11	**Normalization: Database Design Theory** – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema	L2, L3	CO3
	Functional Dependencies, Normal Forms based on Primary Keys	L2, L3	CO3
12	Second and Third Normal Forms, Boyce-Codd Normal Form	L2, L3	CO3
	Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form.	L2, L3	CO3
	Normalization Algorithms: Inference Rules, Equivalence, and Minimal Cover,	L2, L3	CO3
13	Properties of Relational Decompositions	L2, L3	CO3
14	Algorithms for Relational Database Schema Design, Nulls, Dangling tuples and alternate Relational Designs	L2, L3	CO3
	Further discussion of Multivalued dependencies and 4NF	L2, L3	CO3
	Alternate Relational Designs	L2, L3	CO3

Module 5

Week	Contents of Module	Bloom's Taxonomy Level	Course Outcome (CO)
14	**Transaction Processing**: Introduction to Transaction Processing, Transaction and System concepts	L1, L2	CO1, CO4
15	Desirable properties of Transactions, Characterizing schedules based on recoverability	L1, L2	CO1, CO4
	Desirable properties of Transactions, Characterizing schedules based on recoverability	L1, L2	CO1, CO4
	Transaction support in SQL	L1, L2	CO1, CO4
	Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering	L1, L2	CO1, CO4
16	Multi version Concurrency control techniques, Validation Concurrency control techniques	L1, L2	CO1, CO4
	Granularity of Data items and Multiple Granularity Locking	L1, L2	CO1, CO4
	Introduction to Database Recovery Protocols: Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update	L1, L2	CO1, CO4

16	Recovery techniques based on immediate update, Shadow paging	L1, L2	CO1, CO4
17	Database backup and recovery from catastrophic failures	L1, L2	CO1, CO4

RBT Level

L1-Remembering L2-Understanding L3-Applying L4-Analysing L5-Evaluating L6-Creating

Text Books:

1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

Reference Books:

1. Silberschatz Korth and Sudharshan, Database System Concepts, 6th Edition, McGrawHill, 2013.
2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.

Signature of Faculty

Signature of HOD

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PRINCIPAL
CITY ENGINEERING COLLEGE
Kanakapura Main Road, Bangalore-560061

CBCS SCHEME

15CS53

USN

Fifth Semester B.E. Degree Examination, June/July 2019
Database Management System

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Important Note : 1. On completing your answ , compulsorily draw diagonal cross lines on the remaining bl pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define DBMS. Discuss the advantages of DBMS over the traditional file system. (08 Marks)

b. Explain the component modulus of DBMS and their interaction, with the help of a diagram. (08 Marks)

OR

2 a. Define the following with an example :

i) Weak entity type
ii) Participation constraints
ii) Cardinality ratio
iv) Recursive relationship. (08 Marks)

b. Draw an ER diagram of Banking system taking into account atleast five entities, indicate all keys, constraints and assumptions that are made. (08 Marks)

Module-2

3 a. What is meant by Integrity Constraint? Explain the importance of referential integrity constraint. How referential integrity constraint is implemented in SQL? (08 Marks)

b. Consider the following Movie database ;

Movie (Title , director , Myear , Rating)
Actors (Actor , Aage)
Acts (Actor , title)
Directors (Director , dage)

Write the following queries in relational algebra on the database given ;

i) Find movies made by "Hanson" after 1997.
ii) Find all actors and directors.
iii) Find "Coen's" movie with "Mc Dormand".
iv) Find (director , actor) pairs where the director is younger than the actor. (08 Marks)

OR

4 a. Discuss insulation , deletion and modification anomalies. Why are they considered bad? Illustrate with an example. (08 Marks)

b. Write the SQL queries for the following relational schema ;

Sailors (Sid , Sname , Rating, Age)
Boats (Bid , Bname , color)
Reserve (Sid , Bid , Day)

i) Retrieve the Sailor's name who have reserved red and green boat.
ii) Retrieve the no : of boats which are not reserved.
iii) Retrieve the Sailors name who have reserved boat number 103.
iv) Retrieve the Sailors name who have reserved all boats. (08 Marks)

Module-3

5 a. How are triggers and assertions defined in SQL? Explain. (08 Marks)

b. How are views created and dropped? Explain how the views are implemented and updated. (08 Marks)

OR

6 a. Explain the Single – tier and Client – server architecture, with a neat diagram. (08 Marks)

b. Explain the following :
i) Embedded SQL ii) Database stored procedure. (08 Marks)

Module-4

7 a. Which Normal form is based on the concept of transitive functional dependency? Explain the same with an example. (08 Marks)

b. What is the need for normalization? Consider the relation :
Emp – proj = {SSn , Pnumber , Hours , Ename , Pname , Plocation}.
Assume {SSn , Pnumber} as primary key.
The dependencies are ;
{SSn , Pnumber} → Hours
SSn → Ename
Pnumber → {Pname , Plocation}
Normalize the above relation to 3NF. (08 Marks)

OR

8 a. What is Functional Dependency? Find the minimal cover using the minimal cover algorithm for the following functional dependency.
$F = \{AB \rightarrow D, B \rightarrow C, AE \rightarrow B, A \rightarrow D, D \rightarrow EF\}$. (08 Marks)

b. Consider two sets of functional dependency.
$F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$.
Are they equivalent? (08 Marks)

Module-5

9 a. Discuss the ACID properties of a database transaction. (04 Marks)

b. Why Concurrency control is needed? Demonstrate with an example. (12 Marks)

OR

10 a. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)

b. Discuss the time – stamp ordering protocol for concurrency control. (05 Marks)

c. Explain how shadow paging helps to recover from transaction failure. (05 Marks)

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CBCS Scheme

USN ☐☐☐☐☐☐☐☐☐☐ **15CS53**

Fifth Semester B.E. Degree Examination, June/July 2018
Database Management Systems

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing one full question from each module.*

Module-1

1 a. Discuss the main characteristics of the database approach and how it differs from traditional file systems. **(04 Marks)**

b. Describe the three – schema architecture. Why do we need mappings among schema levels? **(04 Marks)**

c. Discuss various components of a DBMS, with a neat diagram. **(08 Marks)**

OR

2 a. Define an Entity and Attribute. Explain the different types of attributes that occur in an ER – diagram model, with an example. **(06 Marks)**

b. Draw an ER – diagram of an Airline reservation system, taking into account at least five entities. Indicate all keys, constraints and assumptions that are made. **(10 Marks)**

Module-2

3 a. Explain the data types available for attribute specification in SQL. **(04 Marks)**

b. Explain briefly violations in entity integrity constraint, key and referential integrity constraints, with example. **(06 Marks)**

c. Consider the following RESORT database,
RESORT (resortno, resortname, resorttype, resortaddr, resortcity, numsuite)
SUITE(suiteno, resortno, suiteprice)
RESERVATION (reservationno, resortno, visitorno, checkin, checkout, totalvisitor, suiteno)
VISITOR (visitorno, firstname, lastname, visitoraddr)
i) Write the SQL to list full details of all the resorts on Los Angeles.
ii) Write the SQL to list full details of all the resorts having number of suites more than 30.
iii) Write the SQL to list visitors in ascending order by firstname. **(06 Marks)**

OR

4 a. Explain how constraints are specified in SQL during table creation, with suitable example. **(04 Marks)**

b. Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course : **(06 Marks)**
STUDENT (SSn, Name, Major, bdate)
COURSE (Courseno, Cname, dept)
ENROLL (SSn, Courseno, Quarter, grade)
BOOK_ADOPTION (Courseno, Quarter, book_isbn)
TEXT (book_isbn, book_title, Publisher, Author)
Write the following queries in relational algebra on the database schema :
i) List the number of courses taken by all students named John Smith in winter 2009 (i.e. Quarter = WO9).
ii) Produce a list of text books (include courseno, book_isbn, book_title) for courses offered by the 'CS' department that have used more than two books.
iii) List any department that has all its adopted books published by 'Pearson' publishing.

c. Give an example of mapping of generalization or specialization into relation schemas. **(06 Marks)**

Module-3

5 a. Discuss how each of the following constructs is used in SQL and discuss the various options for each construct : **(06 Marks)**
i) Nested Queries ii) Aggregate functions iii) Triggers iv) Views and their updatability v) Schema change statements vi) Group by and having clause.

b. Draw and explain 3 – tier Architecture and technology relevant to each tier. Write the advantages of 3 – tier architecture. **(06 Marks)**

c. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts? **(04 Marks)**

OR

6 a. What is Dynamic SQL and how is it different from Embedded SQL? **(04 Marks)**

b. What is SQL J and how is it different from JDBC? **(04 Marks)**

c. Consider the following company database :
EMP (Name, Ssn , Salary, Superssn, dno)
DEPT (dnum, dname, mgrssn)
DEPT LOC (dnum, dlocation)
PROJECT (Pname, Pnumber, Plocation, dnum)
WORKS ON (Essn, Pno, Hours)
DEPENDENT (Essn, dept_name, sex)
Write SQL queries for the following :
i) Retrieve the names of all employees who work in the department that has the employee with the highest salary among all employees.
ii) Retrieve the names of employees who make atleast 10,000 more than the employee who is paid the least in the company.
iii) A view that has the employee name, supervisor name and employee salary for each employee who works in the 'Research' department.
iv) A view that has the project name, controlling department name, number of employees and total hours worked per week on the project for each project with more than one employee working on it. **(08 Marks)**

Module-4

7 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. **(04 Marks)**

b. Define Multivalued dependency. Explain fourth normal form, with an example. **(06 Marks)**

c. Consider the Universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$. What is key of R? Decompose R into 2NF and then 3NF relations. **(06 Marks)**

OR

8 a. Define Non – additive join property of a decomposition and write an algorithm of testing for non – additive join property. **(04 Marks)**

b. A relation R(A, C, D, E, H) satisfies the following FDs : $A \rightarrow C$, $AC \rightarrow D$, $E \rightarrow AD$, $E \rightarrow H$
Find the Canonical cover for this set of FD's. **(06 Marks)**

c. Consider two set of functional dependencies :
$F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$.
Are they equivalent? **(06 Marks)**

Module-5

9 a. Discuss ACID properties of a database transaction. (04 Marks)
b. Explain transaction support in SQL. (06 Marks)
c. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)

OR

10 a. What is two – phase locking protocol? How does it guarantee serializability? (04 Marks)
b. What is Serializability? How can serializability be ensured? Do you need to restrict concurrent execution of transaction to ensure serializability? Justify your answer. (06 Marks)
c. Discuss the time – stamp ordering protocol for concurrency control. (06 Marks)

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CBCS Scheme

USN ☐☐☐☐☐☐☐☐☐☐ **15CS53**

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Database Management Systems

Time: 3 hrs. Max. Marks: 80

Note: *Answer FIVE full questions, choosing one full question from each module.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain the main characteristics of the database approach versus the file processing approach. **(08 Marks)**

b. Explain the three – schema architecture with neat diagram. Why do we need mappings among schema levels? How do different schema definition languages support this architecture? **(08 Marks)**

OR

2 a. Discuss with examples, different types of attributes. **(07 Marks)**

b. Draw an ER diagram for a BANK database schema with atleast five entity types. Also specify primary key and structural constraints. **(09 Marks)**

Module-2

3 a. Describe the characteristics of relations with suitable example for each. **(08 Marks)**

b. What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraint violations. **(08 Marks)**

OR

4 a. Describe the steps of an algorithm for ER – to – relational mapping. **(10 Marks)**

b. In SQL which command is used for table creation? Explain how constraints are specified in SQL during table creation with suitable example. **(06 Marks)**

Module-3

5 Consider the COMPANY DATABASE
EMPLOYEE (Fname, Minit, Lname, Ssn, Bdate, Address, Sex, Salary, super-ssn, Dno)
DEPARTMENT (Dname, Dnumber, Mgr_ssn, Mgr_st_date)
DEPART_LOCATIONS(Dnumber, Dlocation)
PROJECT (Pname, Pnumber, Plocation, Dnum)
WORKS_ON(Essn, Pno, Hours)
DEPENDENT (Essn, Dependent_name, Sex, Bdate, Relationship).

Specify the following queries in SQL on the database schema given above :

a. For every project located in Stafford, list the project number the controlling department number and the department manager's last name, address and birth date. **(04 Marks)**

b. List the names of all employees who have a dependent with the same first name as themselves. **(02 Marks)**

c. For each project, list the project name and the total hours per week (by all employees) spent on that project. **(04 Marks)**

d Retrieve the name of each employee who works on all the projects controlled by 'Research' department. **(06 Marks)**

OR

6 a. Define Stored Procedure. Explain the creating and calling of stored procedure with suitable example. (08 Marks)

b. Explain the Single – tier and Client – server architecture, with neat diagram. (08 Marks)

Module-4

7 a. Explain the informal design guidelines used as measures to determine the quality of relation schema design. (08 Marks)

b. Define Normal form. Explain 1NF, 2NF and 3NF with suitable examples for each. (08 Marks)

OR

8 a. Define Minimal cover. Write an algorithm for finding a minimal cover F for a set of functional dependencies E. Find the minimal cover for the given set of FDs be $E : \{B \rightarrow A, D \rightarrow A, AB \rightarrow D\}$. (08 Marks)

b. Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$. Determine whether each decomposition has the lossless join property with respect to F. (08 Marks)
$D_1 = \{R_1, R_2, R_3\}$; $R_1 = \{A, B, C, D, E\}$; $R_2 = \{B, F, G, H\}$; $R_3 = \{D, I, J\}$.

Module-5

9 a. Why Concurrency control is needed demonstrate with example? (12 Marks)

b. Discuss the desirable properties of transactions. (04 Marks)

OR

10 a. When deadlock and starvation problems occurs? Explain how these problems can be resolved. (09 Marks)

b. Explain how shadow paging helps to recover from transaction failure. (07 Marks)

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10CS54

Fifth Semester B.E. Degree Examination, June/July 2017
Database Management Systems

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Discuss the main characteristics of the database approach. How does it differ from traditional file system? **(08 Marks)**
b. With a neat diagram, explain the component modules of DBMS and their interactions. **(08 Marks)**
c. Define i) Snapshot ii) Metadata iii) Intention iv) Database. **(04 Marks)**

2 a. Design an ER diagram for an employee database with atleast four entities considering all the constraints. **(08 Marks)**
b. What are the structural constraints on a relationship type? Explain with examples. **(04 Marks)**
c. Define i) Primary key ii) Weak entity type iii) Candidate key iv) Recursive relationship with an example. **(08 Marks)**

3 a. Explain Explicit or Schema based constraint on relational model. **(06 Marks)**
b. Discuss any 4 relational algebra operations with examples. **(08 Marks)**
c. Consider the following schema :
Sailors (Sid, Sname, rating, age)
Boats (bid, bname, color)
Reserves (Sid, bid, day)
Write the queries in relational algebra.
i) Find the names of sailors who have reserved boat no '103'.
ii) Names of Sailors who have reserved red and green boat. **(06 Marks)**

4 a. Explain the different constraints that can be applied during table creation in SQL with example. **(06 Marks)**
b. Explain how group by clause works. What is the difference between where and having clause. **(04 Marks)**
c. Consider the following schema and write the SQL queries :
Emp (SSN, name, Addr, Sal, Sex, Dno)
Dep (Dno, Dname, Mgrssn)
DeptLOCN(Dno, DLocn)
Proj (Pno, Pname, Plocn, Dno)
Workson (SSN, Pno, Nohrs)
Dependent (SSN, Deptname, Depntsex, Depnt Relationship)
i) Retrieve the managemame with atleast one dependent.
ii) Retrieve the Pno, Pname, no of hrs works done on each project.
iii) Retrieve the Pname which are controlled by 'Research' dept.
iv) Retrieve employee name who works for dept no 10 and have a daughter.
v) Retrieve the employee name who work on any project that Kumar works. **(10 Marks)**

PART – B

5 a. How is view created and dropped? What problems are associated with updating views? (08 Marks)
b. How are triggers and assertions defined in SQL? Explain. (06 Marks)
c. Explain the concept of Stored procedure in brief. (06 Marks)

6 a. State the informal guidelines for relational schema design. (06 Marks)
b. Define First, Second and Third normal forms by taking an example. (08 Marks)
c. What are the inference rules on FDs? How they are useful? Explain with examples. (06 Marks)

7 a. Explain the properties of Relational Decomposition. (06 Marks)
b. Define Multivalued dependency. Explain 4NF with an example. (08 Marks)
c. Consider R = {A, B, C, D, E, F}
FDS { AB → CD ; D → CF , B → F , BYD → [illegible] D → F , DE → F}
What is the key of R? Find an irreducible cover for this set of FD's. (06 Marks)

8 a. What are ACID properties? Explain with example. (06 Marks)
b. Briefly discuss the two phase locking protocol used in concurrency control. (08 Marks)
c. Briefly explain the recovery process. (06 Marks)

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10CS54

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Database Management Systems

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Explain with a neat diagram, the component modules of DBMS. **(10 Marks)**
b. Define DBMS. Discuss the advantages of DBMS over traditional file system. **(06 Marks)**
c. Explain additional implications of using database approach. **(04 Marks)**

2 a. Discuss the concepts related to structural constraints of relationship type with suitable examples. **(10 Marks)**
b. Write an ER diagram for hospital management considering at least four entities. **(10 Marks)**

3 a. List any five relational algebra operators along with their syntax and purpose. **(10 Marks)**
b. Consider the following COMPANY database:
EMP (Name, SSN, Salary, SuperSSN, Dno)
DEPT (Dnum, Dname, MgrSSN)
DEPT_LOC (Dnum, Dlocation)
Works_ON (ESSN, Pno, Hours)
Dependent (ESSN, Dep_name, Sex)
Write the relational algebra queries for the following:
(i) Retrieve the name of the employee who works in the same department as that of "Ravi".
(ii) Retrieve the number of dependents for an employee named "Ravi".
(iii) Retrieve the name of managers working in location "DELHI" who has no female dependents. **(10 Marks)**

4 a. Explain with suitable example, how can you retrieve information from multiple tables. **(08 Marks)**
b. Referring to the COMPANY database above, write SQL queries for the following:
(i) Retrieve the name of employees whose salary is greater than all employees working in department 5.
(ii) For each department that has more than four employees, retrieve the department number and the number of its employees who have more than 4000 salary.
(iii) Retrieve name of an employee who gets second highest salary. **(12 Marks)**

PART – B

5 a. Explain with example, how assertions are defined. **(05 Marks)**
b. What is a view? Explain how views are created and dropped. **(05 Marks)**
c. What is a cursor? Explain with example, retrieving multiple tuples with embedded SQL. **(10 Marks)**

6 a. Explain update anomalies with examples. (05 Marks)
b. What is a functional dependency? List the conditions for a set of functional dependencies to be minimal. (05 Marks)
c. Consider the relation R(A, B, C, D, E, F) and the functional dependencies $A \rightarrow B$, $C \rightarrow DF$, $AC \rightarrow E$, $D \rightarrow F$. What is the primary key of this relation R? What is its highest normal form? Preserving the dependency, decompose R into third normal form. (10 Marks)

7 a. Explain properties of relational decomposition. (05 Marks)
b. Which normal form specifies multivalued functional dependency? Explain it with examples. (10 Marks)
c. Define inclusion dependency, and write the inference rules for it. (05 Marks)

8 a. Explain transition diagram of a transaction. (06 Marks)
b. Explain the principles used behind ARIES algorithm. (06 Marks)
c. What is a schedule? Explain conflict serializable schedule with example. (08 Marks)

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CITY ENGINEERING COLLEGE

Department of Computer Science and Engineering

Question Bank – Module 1

Subject: Database Management Systems **Sub Code: 17CS53**

1. Define DBMS. Discuss the advantages of DBMS over the traditional file system.
2. Explain the component modules of DBMS and their interaction with the help of a diagram.
3. Define the following with an example: Weak entity type, Participation constraints, Cardinality ratio, and Recursive relationship with example.
4. Draw an ER diagram of Banking System taking into account at least five entities; indicate all keys, constraints and assumptions that are made.
5. Discuss the main characteristics of the database approach and how it differs from traditional file systems.
6. Describe three schema architecture. Why do we need mappings among schema levels?
7. Define an Entity and attribute. Explain the different types of attributes that occur in ER diagram model, with an example.
8. Draw an ER diagram of an airline reservation system, taking into account at least five entities. Indicate all keys, constraints and assumptions that are made.
9. Define snapshot, metadata, intention and database.
10. Design an ER diagram for an employee database with at least four entities considering all the constraints.
11. What are the structural constraints on a relationship type? Explain with examples.
12. Explain additional implications of using database approach.
13. Write an ER diagram for hospital management considering at least four entities.
14. What are the responsibilities of the DBA and Database Designer?
15. Discuss the different types of user friendly interfaces and the types of user who typically use each.
16. Explain with block diagram the different phases of database design.
17. Draw an ER diagram of movie database. Assume your own entities attributes and relationships.

CITY ENGINEERING COLLEGE

Department of Computer Science and Engineering

Question Bank – Module 2

Sub Code: 17CS53

Subject: Database Management System

1. What is NULL? What is its importance? How are these values handled in relational model?
2. Discuss in detail the operators SELECT, PROJECT, UNION with suitable example?
3. Explain about different DML operations.
4. By considering an example describe various data update operations in SQL
5. Explain in detail about various key constraints used in database system.
6. What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraint violation.
7. Explain briefly violation in entity integrity constraint, key and referential integrity constraints, with example.
8. In SQL which command is used for table creation? Explain how constraints are specified in SQL during table creation with suitable example.
9. Describe the steps of an algorithm for ER to Relational mapping.
10. Explain the data types available for attribute specification in SQL.
11. Give an example of mapping of generalization or specialization into relational schema.
12. Consider the following tables:
    works (Pname, Cname, Salary)
    lives (Pname, Street, City)
    located-In (Cname, City)

    Write the following queries in SQL:

    i) List the names of the people who work for the company 'Wipro' along with the cities they live in.

    ii) Find the names of the persons who do not work for 'Infosys'.

    iii) Find the people whose salaries are more than that of all of the 'oracle' employees.

    iv) Find the persons who work and lives in the same city
13. Define the following:

    i) Relation state ii) Relation schema iii) Arity iv) Domain

14. Write SQL Queries for following set of tables:

EMPLOYEE (EmpNo, Name, DoB, Address, Gender, Salary, DNumber)
DEPARTMENT (DNumber, Dname, ManagerEmpNo, MnagerStartDate).

i) Display the Age of 'male' employees.
ii) Display all employees in Department named 'Marketing'.
iii) Display the name of highest salary paid 'female' employee.
iv) Which employee is oldest manger in company?
v) Display the name of department of the employee 'SMITH'.

15. Consider the following database schema to write queries in SQL

Sailor(sid, sname, age, rating)
Boats(bid, bname, bcolor)
Reserves(sid, bid, day)

Find the sailors who have reserved a red boat
ii) Find the names of the sailors who have reserved at least two boats
iii) Find the colors of the boats reserved by 'Mohan'.

16. Consider the following Schema:

Emp(name, id, age, salary)
Works_for(pid,eid, #hrs)
Proj(pid, name)

Write the relational algebra for the following?

i. Retrieve employee name and employee id who works for all the projects.
ii. Retrieve employee name and age whose salary > 1000
iii. For each employee, get the number of projects and number of hours worked on projects
iv. Retrieve the employee name who is working for "CSE" project

CITY ENGINEERING COLLEGE

Department of Computer Science and Engineering

Question Bank – Module 3

Subject: Database Management Systems **Sub Code: 17CS53**

1. How triggers and assertions defined in SQL? Explain.
2. How are views created and dropped? Explain how the views are implemented and updated.
3. Explain the single tier and client server architecture with a neat diagram.
4. With the program segment, explain retrieving of tuples with embedded SQL in C.
5. Discuss how each of the following constructs is used in SQL and discuss the various options for each construct:

   Nested queries ii) aggregate functions iii) Schema change statements iv) Group by and Having clause
6. Draw and explain 3-tier architecture and technology relevant to each tier. Write the advantages 3-tier architecture.
7. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts?
8. What is Dynamic SQL and how it is different from Embedded SQL?
9. What is SQLJ and how is it different from JDBC?
10. Define stored procedure. Explain the creating and calling of stored procedure with suitable example.
11. What is cursor? Explain with example, retrieving multiple tuples with embedded SQL.

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Department of Computer Science and Engineering

Question Bank – Module 4

Subject: DBMS **Sub Code: 17CS53**

1. Define normal form. Explain 1NF, 2NF and 3NF with suitable examples for each.
2. Which normal form is based on the concept of transitive functional dependency? Explain the same with an example.
3. What is the need for normalization?
4. What is Functional Dependency?
5. Define Multivalued dependency. Explain fourth normal form, with an example.
6. Define non-additive join property of decomposition and write an algorithm of testing for non-additive join property.
7. Explain the informal guidelines used as measures to determine the quality of relation schema design.
8. Define minimal cover. Write an algorithm for finding a minimal cover F for a set of functional dependencies E.
9. What is functional dependency? List the conditions for a set of functional dependencies to be minimal.
10. Which normal form specifies multivalued functional dependency? Explain it with examples.
11. Consider the relation:
    EMP_PROJ={SSN, Pnumber, Hours, Ename, Pname, Plocation}
    Assume {SSN, Pnumber} as primary key.
    The dependencies are:
    {SSN, Pnumber} -> Hours
    SSN->Ename
    Pnumber->{Pname, Plocation}
    Normalize the above relation to 3NF.
12. Find the minimal cover for the following dependency.F={AB->D, B->C, AE->B, A ->D, D->EF}
13. Consider two sets of functional dependency:
    F={A->C, AC->D, E->AD, E->H} and G={A->CD, E->AH}
    Are they equivalent?
14. Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F={{A,B}->{C}, {A}->{D,E}, {B} ->{F}, {F} -> {G,H}, {D} ->{I,J}}
    a. What is key of R? Decompose R into 2NF and then 3NF relations.
    b. Determine whether the decomposition has the lossless join property with respect to F.
       D1={R1,R2,R3}; R1=(A,B,C,D,E); R2=(B,F,G,H); R3=(D,I,J)

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15. A relation R(A,C,D,E,H) satisfies the following FDs: A->C, AC->D, E->AD, E->H. Find the canonical cover for this set of FD's.
16. Consider two set of functional dependencies:
    F={A->C, AC->D, E->AD, E->H} and G={A->CD, E->AH}
    Are they equivalent?
17. Find the minimal cover for the given set of FDs be E:{B->A, D->A, AB->D}.
18. Explain the properties of Relational Decomposition.
19. Consider R=(A,B,C,D,E,F)
    FDS: {AB->CD; D->CF; B->F; BD->F, D->F, DE->F)
    What is the key of R? Find the minimal cover for this set of FDs.
20. Consider the relation R(A, B, C, D, E, F) and the functional dependencies A->B, C->DF, AC->E, D->F. What is its highest normal form? Preserving the dependency, decompose R into third normal form.

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Department of Computer Science and Engineering

Question Bank – Module 5

Subject: Database Management Systems **Sub Code: 17CS53**

1. Discuss the ACID properties of a database transaction. Or Discuss the desirable properties of transaction.
2. Why concurrency control is needed? Demonstrate with an example.
3. Discuss the UNDO and REDO operations and the recovery techniques that use each.
4. Discuss the time stamp ordering protocol for concurrency control.
5. Explain how shadow paging helps to recover from transaction failure.
6. Explain the transaction support in SQL.
7. What is two-phase locking protocol? How does it guarantee serializability?
8. What is serializability? How can serializability be ensured? Do you need to restrict concurrent execution of transaction to ensure serializability? Justify your answer.
9. When deadlock and starvation problem occurs? Explain how these problems can be resolved.
10. Briefly explain the recovery process.
11. Explain transition diagram of a transaction.
12. Explain the principles used in ARIES algorithm.
13. What is a schedule? Explain conflict serializable schedule with example.

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COURSE CODE: **17/18CS53**

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Kanakapura Road, Doddakallasandra, Bengaluru - 560062
FIRST INTERNAL TEST

Programme : Computer Science & Engineering
Course Name: Database Management System
Semester : V
Duration : 1 ½Hrs

Date: 28/10/2020
Time: 10-11:30AM
MAX MARKS: 50

Note: Answer any FIVE questions choosing at least ONE from each Part.

			CO'S	BT'S
	Part – A			
1.	Discuss the main characteristics of the database approach and how it differs from traditional file systems.	**10**	**CO1**	**BT1,** **BT2**
	Or			
2.	Discuss the various components of a DBMS with a neat diagram.	**10**	**CO1**	**BT1,** **BT2**
	Part – B			
3.	Explain with block diagram different phases of database design.	**10**	**CO1**	**BT1**
	Or			
4.	Discuss the concepts related to structural constraints of relationship type with suitable examples.	**10**	**CO1**	**BT1,** **BT2**
	Part-C			
5.	Consider a BANK database having customer, loan, account, employee and branch as entity types. Each branch of bank allows customers to open accounts and borrow loans. A customer can open more than one account, and one account may also belong to one or more customers. Similarly, a customer can take out more than one loan and a loan may be held by more than one customer. The bank has a number of employees working in different branches of the bank. Add appropriate attributes for each entity type. Represent the key attribute, weak entity types (if any) and cardinality ratios. Design an ER diagram for this Bank database.	**10**	**CO1**	**BT2,** **BT3,** **BT4**
	Or			
6.	Draw an ER diagram to represent the election information system based on the following description: In the Indian national election, a state is divided into a number of constituencies depending upon the population of the state. Several candidates contest elections in each constituency. Candidates may be from some party or independent. The election information system must record the number of votes obtained by each candidate. The system also maintains the voter list and a voter normally belongs to a particular constituency. The party details must also be taken care in the design.	**10**	**CO1**	**BT2,** **BT3,** **BT4**
	Part-D			
7.	What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraint violation	**10**	**CO1**	**BT1,** **BT2**
	Or			

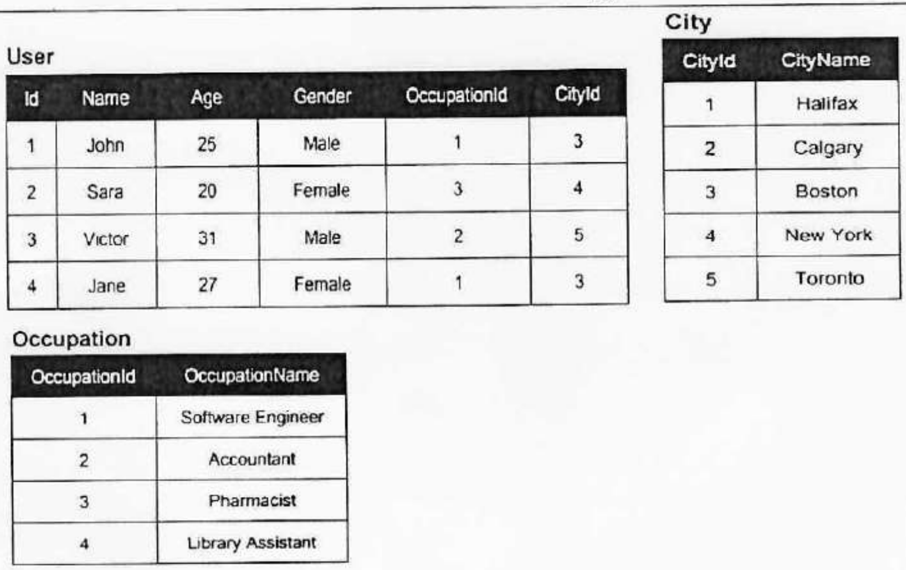
8.	Define the following terms and give an example for each. i) Key ii) Super key iii) Candidate key iv) Primary Key v) Foreign key	10	CO1	BT1, BT2

Part-E

9.	Consider the following schema for a company database: EMPLOYEE(Name, SSN, Address, Sex, DNo, SuperSSN, Salary) DEPARTMENT(DName, DNo, MgrSSN, Mgr_Start_Date) PROJECT(PName, PNo, PLocation, DNo) WORKSON(SSN, PNo, Hours) DEPENDENT(SSN, Dependent_Name, Sex, Bdate, Relationship) Write the following queries in relational algebra. i) Retrieve all employees who either work in department 4 and make over 25000 per year or work in department 5 and make over 30000. ii) List all the projects on which employee 'Smith' is working. iii) Retrieve the name of employee with their supervisor's name. iv) Find the name of employees who work on all the projects controlled by department 5. v) Retrieve the number of dependents for an employee named "Ram".	10	CO1	BT2, BT3

Or

10



User

Id	Name	Age	Gender	OccupationId	CityId
1	John	25	Male	1	3
2	Sara	20	Female	3	4
3	Victor	31	Male	2	5
4	Jane	27	Female	1	3

City

CityId	CityName
1	Halifax
2	Calgary
3	Boston
4	New York
5	Toronto

Occupation

OccupationId	OccupationName
1	Software Engineer
2	Accountant
3	Pharmacist
4	Library Assistant

Solve the following relational expressions for the above relations.

a. $P_{Name}(R_{Age>25}(User))$

b. $R_{Id>2 \vee Age!=31}(User)$

c. $R_{User.OccupationId=Occupation.OccupationId}(User\ X\ Occupation)$

d. $User \bowtie Occupation \bowtie City$

e. $P_{Name,Gender}(R_{CityName='Boston'}(User \bowtie City))$

10	CO1	BT2, BT3

Blooms Taxonomy Levels (BTL): **BT1**-Remembering **BT2**- Understanding **BT3**-Applying **BT4**-Analysing
Course Outcomes (CO's): CO1: Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.

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Scheme of Valuation.

Sem : V A, B   Internal Test - I   Date: 28-10-2020

Part - A.

1. Characteristics of DBMS
   - ↳ Self describing nature
   - ↳ Insulation between programs & Database
   - ↳ Support of multiple views
   - ↳ Sharing of data & multiuser transaction processing

   } 2½×4 = 10M.

2. Component modules of DBMS
   - Diagram - 6 M
   - Explanation - 4 M

Part - B

3. Phases of database design
   - requirements collection & analysis
   - conceptual design
   - logical design
   - physical design

   } 4×1 = 4 M

   Diagram ——— 6M

4. Structural constraints
   - participation constraints < Partial, Full - 5M
   - Cardinality < One to one, One to Many, Many to Many - 5M

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Part - C.

5. Identifying Entities & attributes - 5 M
Relationships - 3 M
participation constraints - 2 M

6. Minimum 5 entities , corresponding attributes - 5M
Relationships - 3 M
constraints - 2 M

Part - D.

7. Basic operations changes the states of relations
- Insert
- Delete
- Update

} - 5 M

Demonstration of constraints violation - 5 M

8. Definition of key, Super key, candidate key, primary key, Foreign key with proper example - 2 marks each - 2x5 = 10 M

Part E.

9.

i) Retrieve employees who work in dept 4 & make over 25000 per year or work in dept 5 and make over 30000

Ⓑ $\pi_{name}\left(\sigma^{EMPLOYEE}_{Dno=4 \text{ and } salary>25000}\right) \bowtie$

$\pi_{name}\left(\sigma^{EMPLOYEE}_{Dno=5 \text{ and } Salary>30000}\right)$

- 2M

ii) $\Pi_{Pnname}\left(\sigma_{pName}\ (\text{Worksfor} * \text{Pro})\right)$ – 2M

iii) $R \leftarrow (\Pi_{pid,\,eid}\ (\text{works\_for}) \div \Pi_{pid}\ (\text{Proj})$ – 2M

iv) $_{eid}\exists_{\text{count pid sum \#hrs}}\ (\text{works\_for})$ – 2M

IV) $\Pi_{name}\left(\ \sigma\ (\text{Employee}) * \sigma\ (\text{Works\_for}) * \sigma\ (\text{Department})\right)$ – 2M

10) a)

	Name	age	gender	occupation	cityid
	victor	31	Male	2	5
1	Jame	27	female	1	3

– 2M

b)

Id	name	Age	gender	Occupation	city id
4	Jane	27	female	1	3

– 2M

c)

1	John	25	Male	1	3	Software Engineer
2	Sara	20	female	3	4	Pharmacist
3	Victor	31	Male	2	5	Accountant
4	Jane	27	female	1	3	Software Engineer.

– 2M

d)

cityid	occupationid	id	name	Age	gender	Occupation
3	1	1	John	25	Male	SE
4	3	2	Sara	20	Female	Pharama
5	2	3	Victor	31	Male	Accountant.
3	1	4	Jane	27	Female	S/w E

– 2M

e)

Name	Gender
John	male
Jane	Female

– 2M

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COURSE CODE: **17/18CS53**

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SECOND INTERNAL TEST

Programme : Computer Science & Engineering
Course Name: Database Management System
Semester : V
Duration : 1 ½Hrs

Date: 18/12/2020
Time: 10-11:30AM
MAX MARKS: 50

Note: Answer any FIVE questions choosing at least ONE from each Part.

			CO'S	BT'S
	Part – A			
1.	Explain with examples, the basic constraints that can be specified when a database table is created in SQL.	10	CO1, CO2	BT1 BT2
	Or			
2.	What are assertions and triggers in SQL? Write a program to create an assertion to specify the constraint that the salary of an employee must not be greater than the salary of the department by considering works_for relation in COMPANY database.	10	CO2	BT2 BT3 BT4
	Part – B			
3.	Write a program to display the rows of a customer table created in Oracle having <custid, custname, balance> columns with embedded SQL.	10	CO2	BT3 BT4
	Or			
4.	What is dynamic SQL and how is it different from Embedded SQL. Explain with a program.	10	CO2	BT1, BT2
	Part-C			
5.	Describe the steps of an algorithm for ER to relational mapping.	10	CO1	BT2 BT3
	Or			
6.	Explain the various clauses of retrieval query in SQL with example.	10	CO2	BT2
	Part-D			
7.	Discuss how each of the following constructs is used in SQL i) EXISTS ii) CASE iii) Correlated queries iv) Schema change statements	10	CO2	BT1, BT2
	Or			

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8.	How are views created and dropped? Explain how the views are implemented and updated.	**10**	CO2	BT1, BT2
	Part-E			
9.	Consider the STUDENT database given below: STUDENT(Name, StudentNumber, Class, Major) COURSE(Cname, Cno, Credit, Dept) SECTION(Sid, Cno, Sem, Year, Instructor) GRADEREPORT(Sno, Sid, Grade) PREREQUISITE(Cno, Pno) Specify the following in SQL i) Retrieve the names of all senior students (above class 7) majoring in 'CS' ii) Retrieve the names of all course taught by professor Keny in 1998 and 1999. iii) For each section taught by Professor Keng, retrieve the course no, credit hours, course name, semester, year and the no. of students who took the section. iv) List name of students enrolled for the course 'CS-53' and have received 'A' grade.	**10**	CO2	BT3 BT4
	Or			
10	Consider the following schema: STUDENT(SNO, SName) ASSIGNED(SNO, PNO) PROJECT(PNO, AREA) Write queries in SQL i) Retrieve the student number and name of all those who are working in database projects. (use join operation) ii) Retrieve the student number and name of all those who are working on both the projects having project numbers P-75 and P-81. iii) List the name of the students who do not work on the project P-68. *iv)* Retrieve the name of all the students other than the student with number 54 who work on at least one project.	**10**	CO2	BT3 BT4

Blooms Taxonomy Levels (BTL): BT1-Remembering **BT2**- Understanding **BT3**-Applying **BT4**-Analysing

Course Outcomes (CO's):

CO1: Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.

CO2: Use Structured Query Language (SQL) for database manipulation

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Dept of CSE

Scheme of evaluation

Sem: V A, B   Internal Test - II   Date: 18/12/2020

Part - A.

1. Key constraints
Not null
UNIQUE
DEFAULT
with examples - 10 M

2. Explanation - Assertion - 2M
Triggers - 2 M
program for assertion - 3 M
Triggers - 3 M

Part - B.

3. Program to display the rows of a customer table created in oracle. with embedded SQL
- Defining cursor - 2M
- Opening cursor - 2M
- fetch - 3M
- Syntax - 3 M

~~Q~~

4. Dynamic SQL definition - 2M
Difference between Dynamic SQL & Embedded SQL - ~~3~~ 4M
Program - 4M

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Part-C

5. ER to relational Mapping

- Mapping strong entity
- " weak entity
- binary relationship with 1:1 cardinality
- Mapping binary relationship with 1:M
- Mapping n-ary relationship

} 10M

6. Select
From
where
group by
having
order by

} with example
5×2 = 10M

Part-D.

7. Explanation with example
↳ EXISTS — 2½
↳ CASE — 2½
↳ Correlated Queries — 2½
↳ Schema change Statements — 2½
Alter / drop

} 10M

8. Create view - Syntax with example - 2½
Drop View - Syntax with example 2½

View Implementation
↳ Inline view
↳ Materialized view
} 5M

Part - E.

9. i)
```
Select Name from student where class>=7,and
                                  Major =CS;
```

ii)
```
Select cname from course where CNO=
                     In ( select cno from section
                          where instructor =keny);
```

iii)
```
select cname, credit from course
   where cno= (select cno from section
                 where instructor = 'professor keng");
```

iv)
```
Select Name from student
where sid = ( select sid from section
               where cno= CS-53 and sid= (select sid
                                            from gradereport
                                            where Grade='A'))
```

$2\frac{1}{2} \times 4 = 10M.$

---

10. i)
```
Select Sno from (student natural join Assigned)
                 natural join Project ;
```
– 2½ M

ii)
```
Select Sno from student, assigned
          where student sno= Assigned.sno
          and pno = P-75 or pno=P-81 ;
```
– 2½ M

iii)
```
Select Sno from Student natural join Assigned
        where NOT EXISTS (select Sno from
                           Student natural join
                           Assigned
                           where Pno=P-68);
```
– 2½ M

iv)
```
(Select Sname from students join Assigned)
   Minus
( select Sname from students join assigned
          where pno= 54) ;
```
– 2½ M

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COURSE CODE: **17/18CS53**

CITY
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Kanakapura Road, Doddakallasandra, Bengaluru - 560062
THIRD INTERNAL TEST

Programme : Computer Science & Engineering
Course Name: Database Management System
Semester : V
Duration : 1 ½Hrs

Date: 08/01/2021
Time: 10-11:30AM
MAX MARKS: 50

Note: Answer any FIVE questions choosing at least ONE from each Part.

			CO'S	BT'S
	Part – A			
1.	Explain single-tier and client-server architecture with neat diagram.	10	CO3	BT1 BT2
	Or			
2.	Define stored procedure. Explain the creating and calling of stored procedure with suitable example.	10	CO2	BT2 BT3
	Part – B			
3.	Explain the informal guidelines used as measures to determine the quality of relation schema design.	10	CO3	BT2
	Or			
4.	Write a short note on a) HTML forms b) Java scripts c) CGI d) Application servers e) Servlets.	10	CO4	BT2
	Part-C			
5.	Define normal form. Explain 1NF, 2NF, 3NF with suitable example for each.	10	CO3	BT2 BT3
	Or			
6.	Normalize the below relation up to 3NF.	10	CO3	BT3 BT4
	Part-D			
7.	Why concurrency control is needed? Demonstrate with example.	10	CO4	BT2 BT3
	Or			

Relation for question 6:

Module	Dept	Lecturer	Text
M1	D1	L1	T1
M1	D1	L1	T2
M2	D1	L1	T1
M2	D1	L1	T3
M3	D1	L2	T4
M4	D2	L3	T1
M4	D2	L3	T5
M5	D2	L4	T6

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8.	a. How do you detect a deadlock during concurrent transaction execution? b. Explain the various database recovery techniques, with example.	5 5	CO4	BT1 BT2
	Part-E			
9.	a. What is two phase locking? Describe with an example. b. Discuss UNDO-REDO operations and the recovery techniques that use each.	5 5	CO4	BT2 BT3
	Or			
10	a. Discuss the time stamp ordering protocol for concurrency control. b. Explain how shadow paging help to recover from transaction failure.	5 5	CO4	BT2 BT3

Blooms Taxonomy Levels (BTL): BT1-Remembering **BT2**- Understanding **BT3**-Applying **BT4**-Analysing

Course Outcomes (CO's):
CO1: Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.
CO2: Use Structured Query Language (SQL) for database manipulation
CO3: Design and build simple database systems
CO4: Develop application to interact with databases.

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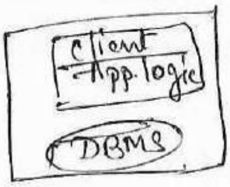
Scheme of Valuation

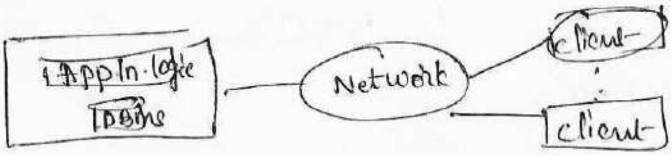
Sem: V A, B Internal Test - III Date: 08/01/2021

Part - A.

1. - Single tier architecture - 5M



- Client Server Architecture - 5M



2. Definition of stored procedure - 2M
creating a procedure - 3M
Calling stored procedure - 3M
Proper Syntax - 2M

Part - B.

3. Informal guidelines
   - attribute semantics should be clear
   - Reduce redundancy in the table
   - Reduce Null values
   - Avoid generation of spurious tuples

   } 4×2½

4. Explanation about
HTML form, Java scripts, CGI, Application servers
Servlets - 5×2 = 10M.

Part - C

5. Normal forms - definition & Explanation - 1M
1 NF - 3M
2 NF - 3M
3 NF - 3M

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Part - D.

7. Concurrency control - Requirement
Explanation with Justification
Lost update
Dirty read
Incorrect Summary
Upredictable read
4x2½

8. Immediate update
Shadow paging
Transaction log backup
Data base backup
4x2½

Part E

9. Two phase locking protocol
↳ Immediate update
↳ Deferred update
Explanation with example
2x5=10M

10. Time stamp ordering
- Definition of time stamp
- Explanation
5 M.

Shadow paging.
- recovery technique
- does not require log
- transactions executed in DBMS cache
- After execution, entire memory is copied back to the Database.
5M

V - Sem 'A'

DBMS (18CS53)

ATTENDANCE

SSESSMENT

Sl. No.	Reg.No.	Name	1/9 1	2/9 2	3/9 3	7/9 4	8/9 5	9/9 6	10/9 7	14/9 8	15/9 9	16/9 10	17/9 11	21/9 12	22/9 13	23/9 14	% of Attendance	Test Marks 1 50	Test Marks 2 50	Test Marks 3 50	Avg 30	Assg (10)	Sessional Marks 40 25	Remarks
1	ICE18CS001	ABDUL MANNAN	A	A	1	2	3	4	5	6	7	8	9	A	10	11		41	45	44	26	9	35	
2	ICE18CS002	ABHISHEK S	1	2	3	4	5	6	7	8	9	10	11	12	13	14		45	48	48	29	10	39	
3	ICE18CS003	ABIN B VINOD	A	A	1	2	3	4	5	A	6	7	8	9	10	11		33	40	42	23	8	31	
4	ICE18CS004	ADITHI S	1	2	3	4	A	A	5	6	7	8	9	10	11	12		31	35	38	21	9	30	
5	ICE18CS005	AISHWARYA H S	1	2	3	4	5	6	7	8	9	10	11	12	13	14		46	44	47	28	10	38	
6	ICE18CS006	AMULYA K J	1	2	3	4	5	6	7	8	A	9	10	11	12	13		41	47	47	27	9	36	
7	ICE18CS009	ANUSHA	A	1	2	3	4	5	A	6	7	A	8	9	10	11		46	48	43	28	9	37	
8	ICE18CS010	AZEEZ	1	2	3	4	5	6	7	8	9	10	11	12	13	14		42	47	47	28	10	38	
9	ICE18CS011	BHAVANA D A	1	2	3	4	5	6	7	8	9	A	10	11	A	12		46	47	46	28	10	38	
10	ICE18CS012	BHAVANA K	1	2	A	3	4	A	5	6	7	8	9	10	11	12		37	46	44	26	8	34	
11	ICE18CS013	CHINMAYI R	A	A	1	2	3	4	5	6	7	8	9	A	10	11		40	40	48	26	8	34	
12	ICE18CS014	DARSHAN	A	1	A	2	3	4	A	A	A	5	6	7	8	9		41	38	44	25	8	33	
13	ICE18CS015	DEVBRAT MAHASETH	A	A	1	2	3	4	A	5	A	6	7	8	9	10		36	47	45	26	8	34	
14	ICE18CS016	DHRUTHI KA	1	2	3	4	5	6	7	8	9	10	11	12	13	14		44	47	48	28	10	38	
15	ICE18CS017	DIVYA G	1	2	3	A	4	5	6	7	8	9	10	11	12	13		43	48	48	28	10	38	
16	ICE18CS019	DURGADEVI M S	A	1	2	3	4	5	6	7	8	9	10	11	12	13		46	48	48	29	10	39	
17	ICE18CS020	FOUZIYA RAFFAT	1	2	3	4	5	6	7	8	9	10	11	12	13	14		44	38	46	26	9	37	
18	ICE18CS021	GURURAJ AN	A	1	2	3	4	5	6	A	A	A	7	8	9	10		40	40	44	25	8	33	
19	ICE18CS023	HAJIRA MOHSINA	A	A	1	2	3	4	5	6	7	8	9	10	11	12		43	45	47	27	9	36	
20	ICE18CS025	HRITHIK N	A	A	1	A	2	3	A	4	5	6	7	8	9	A		40	44	46	26	8	34	
21	ICE18CS026	JAHNAVI H B	1	A	2	3	A	4	5	6	7	8	9	10	11	12		43	46	46	27	8	35	
22	ICE18CS027	JUNAID PASHA	A	1	2	3	4	5	A	6	7	8	9	10	11	12		43	45	46	27	8	35	
23	ICE18CS028	KARAN A	A	A	1	2	3	A	4	A	A	5	6	7	8	9		40	38	36	23	05	28	
24	ICE18CS031	KARTHIK K T	A	A	1	2	3	4	A	5	6	7	8	9	10	11		33	38	42	22	06	28	
25	ICE18CS033	KAVYA	A	1	2	3	4	5	6	7	8	9	10	11	12	13		45	47	47	28	10	38	
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V. CS. 'A'

ATTENDANCE

SSESSMENT DBMS (18CS53)

Sl. No.	Reg.No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	% of Attendance	Test Marks 1	Test Marks 2	Test Marks 3	Avg	Assignment	Sessional Marks 40	Remarks
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26	ICE18CS034	KAVYA R S	A	1	2	3	4	5	6	7	8	9	10	A	11	12		41	44	48	27	9	36	
27	ICE18CS035	KEERTHI SRI	1	A	2	3	A	4	5	6	7	8	9	10	11	12		45	47	47	28	8	36	
28	ICE18CS036	KEVIN V	1	2	A	3	A	4	A	A	5	6	7	8	9	10		40	46	44	26	8	34	
29	ICE18CS037	KUSHAL C	A	1	2	3	4	A	5	6	A	7	8	9	10	11		40	45	46	27	8	35	
30	ICE18CS039	LAVANYA V	1	A	2	A	3	4	5	6	7	8	9	A	10	11		46	48	46	28	9	37	
31	ICE18CS040	MAHESH R	1	2	3	4	5	6	A	7	8	9	10	11	12	A		40	46	47	27	8	35	
32	ICE18CS041	MALLIKARJUN H K	A	1	2	3	A	4	5	6	7	8	A	9	10	11		40	38	44	25	8	33	
33	ICE18CS042	MANI BHARATHI R	A	1	A	2	3	4	5	A	6	7	8	9	10	11		40	48	46	27	8	35	
34	ICE18CS044	MONIKA B	1	2	3	4	A	A	A	5	6	7	8	9	A	10		46	46	47	28	8	36	
35	ICE18CS045	MUTHUBHARATHI G	A	1	2	3	A	4	5	6	7	A	8	9	10	11		42	48	48	28	10	38	
36	ICE18CS046	NAMRATHA S	1	2	3	4	5	6	7	8	9	10	11	12	13	A		42	48	48	28	10	38	
37	ICE18CS047	NASREEN FATHIMA	A	1	2	3	4	5	6	7	8	9	10	A	11	12		40	47	48	27	8	35	
38	ICE18CS048	NETHRA SHREE C	1	2	3	4	5	6	7	8	9	10	11	12	A	A		43	47	48	28	8	36	
39	ICE18CS049	NIHARIKA M	1	2	A	3	4	5	6	7	8	9	10	11	12	13		43	48	48	28	9	37	
40	ICE18CS050	NIKHIL U	A	1	2	3	4	5	A	6	7	8	9	10	11	A		40	38	38	24	06	30	
41	ICE18CS052	NISCHITHA YADAV	A	A	1	2	3	A	4	5	6	7	8	9	10	11		42	44	40	26	7	33	
42	ICE18CS053	NISHKARSH GANJHOO	A	A	1	2	3	A	4	5	A	6	7	8	9	10		40	37	44	25	8	33	
43	ICE18CS092	USHA N	1	2	3	4	5	A	6	7	8	9	10	11	12	13		43	47	47	28	10	38	
44	ICE18CS101	VINUTH S	A	A	1	2	3	4	5	6	7	8	9	10	11	12		42	45	46	27	8	35	
45	ICE17CS017	APOORVA M	1	2	3	4	5	6	7	A	8	9	10	A	11	A		38	30	46	23	8	31	
46	ICE17CS025	BINDU M R	A	1	2	3	4	5	A	6	7	8	9	10	11	12		40	45	44	26	8	34	
47	ICE17CS034	G.R. MAYUR	A	A	1	2	3	4	5	6	7	8	9	10	11	12		44	45	46	27	8	35	
48	ICE17CS055	MAJID KHAN	1	2	3	4	5	6	7	8	9	10	A	A	A	11		37	44	37	24	8	32	
49	ICE17CS056	MANOJ B R	A	A	A	A	A	1	2	3	4	5	6	7	8	9		33	40	40	22	06	28	
50	ICE17CS060	MEHFOOZ AHMED	A	1	2	3	A	A	A	4	5	6	7	8	9	10		42	38	36	24	8	32	
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V- CS -'A'
DBMS (18CS53)

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51	ICE17CS096	RENUKA SURESH	A	A	1	2	3	4	5	6	7	8	9	A	10	11		42	46	47	27	8	35	
52	ICE17CS135	TEJAS JAIN	1	2	3	4	5	6	A	7	A	8	9	10	A	A		38	40	40	24	8	32	
53	ICE16CS113	VIJAY M	A	1	2	3	4	5	6	7	8	9	A	10	A	11		38	42	45	25	8	33	
54	ICE17CS151	RAHUL KUMAR PALIWAL	1	2	A	3	4	A	5	A	6	7	8	9	10	11		36	44	44	25	8	33	
55	ICE19CS400	BHASKAR M	A	A	A	1	2	3	4	5	6	A	7	8	9	10		37	46	40	25	8	33	
56	ICE19CS401	S A SRINIDHI	1	2	A	A	3	4	A	5	6	7	8	A	9	A		42	44	46	27	8	35	
57	ICE19CS402	SMITHA S BHANDARY	A	1	2	3	4	5	A	6	7	8	9	10	11	12		32	40	42	23	9	32	
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V - Sem 'B'

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SSESSMENT DBMS -(18CS53)

Sl. No.	Reg.No.	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14,	% of Attendance	Test Marks					Sessional Marks	Remarks
																		1 50	2 50	3 50	Avg 30	Assignment	25 40	
1	1CE18CS008	ANJANA RAGHAVENDRA	1	2	3	4	5	6	7	8	9	10	11	A	12	A		34	40	36	22	10	32	
2	1CE18CS018	DIVYASHREE R	A	A	1	2	3	4	5	6	7	8	9	10	A	11		44	46	44	27	9.	36	
3	1CE18CS022	G V RITWIK	A	1	2	A	3	4	A	5	6	7	8	9	10	11		42	46	47	27	8	35	
4	1CE18CS030	KARTHIK A N	1	2	3	4	5	6	7	A	8	9	10	11	12	13		45	46	48	28	10	38	
5	1CE18CS054	NITHISH GUNDAPPA	1	2	3	4	5	6	7	8	9	10	A	11	12	13		45	47	48	28	10	38	
6	1CE18CS055	PARVEEN TAJ	1	2	3	4	5	6	7	8	9	10	11	12	13	14		42	40	47	26	10	36	
7	1CE18CS056	PRAMOD KUMAR B S	1	2	3	4	5	6	7	8	9	10	A	11	12	13		47	48	47	29	10	39	
8	1CE18CS057	PRATISHA KARANTH	A	1	2	3	4	5	6	7	A	8	9	10	11	12		41	44	46	27	9	36	
9	1CE18CS058	PRIYA SINGH	1	A	2	3	4	A	5	6	7	8	9	10	11	A		46	48	48	29	10	39	
10	1CE18CS059	PRIYANKA R	A	1	2	A	3	4	5	6	A	7	8	9	10	11		46	48	48	29	10	39	
11	1CE18CS060	PUNEETH P	1	2	3	4	5	6	7	8	9	A	10	11	12	A		44	48	47	28	10	38	
12	1CE18CS061	R LAKSHMI SAI CHETANA NATH	A	1	2	A	3	4	5	6	7	8	9	A	10	11		44	47	48	28	10	38	
13	1CE18CS062	RACHANA KARANTH	A	1	2	3	4	5	A	6	7	8	9	10	11	12		46	45	48	28	10	38	
14	1CE18CS064	RAKESH	A	1	2	3	4	5	6	7	8	9	10	11	12	13		39	44	46	26	9	35	
15	1CE18CS065	RAKSHITHA RAJESH	1	2	3	4	5	6	7	8	9	10	A	11	12	13		47	48	48	29	10	39	
16	1CE18CS067	SANIYA FARHEEN	A	1	2	3	4	5	A	6	7	8	A	9	10	A		40	45	47	27	8	35	
17	1CE18CS068	SANIYA SAMREEN	A	A	1	2	3	4	5	6	7	8	A	9	10	11		42	46	48	28	8	36	
18	1CE18CS069	SARAH BATOOL	1	2	3	4	5	6	7	A	8	9	10	11	12	13		44	44	38	26	9	35	
19	1CE18CS070	SHASHANK MISHRA	1	2	3	4	5	A	6	7	8	9	10	11	12	13		40	45	47	27	8	35	
20	1CE18CS071	SHEIK SULAIMAN	A	1	2	3	4	5	6	7	8	9	10	11	12	13		40	44	46	26	8	34	
21	1CE18CS073	SHIRISHA B	1	2	3	4	5	6	7	8	9	10	11	12	13	14		44	47	47	28	10	38	
22	1CE18CS075	SHREEDEVI JOSHI	A	1	2	3	A	4	5	6	7	8	A	9	10	11		29	45	46	24	8	32	
23	1CE18CS078	SHUSHMA R B	1	2	3	4	5	6	7	A	8	9	10	11	12	13		40	46	48	27	9	36.	
24	1CE18CS079	SHWETHA C	1	2	3	4	5	6	7	8	9	10	11	12	13	14		44	47	48	28	9	37	
25	1CE18CS080	SINDHU S	1	2	3	4	5	6	7	A	8	9	10	11	12	13		44	47	38	26	9	35	
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V - CS 'B'

DBMS (18CS53)

ATTENDANCE

SSESSMENT

Sl. No.	Reg.No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	% of Attendance	Test Marks 1	Test Marks 2	Test Marks 3	AVG	Assignment	Sessional Marks	Remarks
																		50	50	50	30		25	
26	1CE18CS081	SPURTY BABU NAIK	1	2	3	4	5	6	7	8	A	A	9	10	11	12		43	46	47	28	8	36	
27	1CE18CS082	SRILAKSHMI CS	1	2	3	4	5	6	A	7	8	9	10	11	12	13		41	48	48	28	10	38	
28	1CE18CS083	SUPRITHA S	1	2	3	4	5	6	7	8	9	10	11	12	13	14		42	44	46	27	·	—	
29	1CE18CS084	SURABHI G R	1	2	3	4	5	6	7	8	9	10	11	12	13	14		48	48	48	29	09	38	
30	1CE18CS085	SURAJ S	1	2	3	4	5	6	7	8	9	10	11	12	13	14		45	47	48	28	9	37	
31	1CE18CS086	SURAKSHA HARITHA	1	2	3	4	5	6	7	8	9	10	11	12	13	14		32	45	46	25	10	35	
32	1CE18CS087	SURVI KUMARI	A	A	1	2	3	4	5	A	6	7	8	9	10	11		45	45	46	28	8	36	
33	1CE18CS088	T · N · SIDDESH	A	A	A	1	2	3	A	4	5	6	7	8	A	9		32	44	46	25	8	33	
34	1CE18CS089	TEJAS S	A	1	2	3	4	A	5	6	7	8	9	10	11	12		41	46	44	27	8	35	
35	1CE18CS090	UDANKA JAIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14		44	45	47	28	10	38	
36	1CE18CS093	VAINAVI V	1	2	3	4	5	6	7	8	9	10	11	12	13	14		40	45	47	27	08	35	
37	1CE18CS094	VAISHNAVI P	1	2	3	A	4	5	6	7	8	9	10	11	12	13		47	44	48	28	09	37	
38	1CE18CS095	VAMSINANDAN	1	2	3	4	5	6	7	8	9	10	11	12	13	14		48	47	48	29	10	39	
39	1CE18CS097	VARSHINI THANMAYA	1	2	3	4	5	6	7	A	8	9	10	11	12	13		48	47	48	29	08	37	
40	1CE18CS098	VENKATESH GOWDA	1	2	3	4	5	6	7	8	9	10	11	12	13	14		46	45	47	28	08	36	
41	1CE18CS099	VIDYASHREE	A	1	2	3	4	5	6	7	8	9	10	11	12	13		42	40	46	26	08	34	
42	1CE18CS100	VIJAYALAKSHMI	1	2	3	4	5	6	7	8	A	9	10	11	12	13		15	46	47	22	08	30	
43	1CE18CS102	VIVEK B B	A	1	2	3	4	5	A	6	7	8	9	10	11	12			46	44	·		25	
44	1CE18CS103	MOHAMMED JUNAID	1	2	3	4	5	6	7	8	9	A	10	11	12	A		40	45	44	26	08	34	
45	[illegible]	'17 - Scheme'																						
46	1CE16CS021	BHOOMIKA D K	A	1	2	3	4	5	A	6	7	8	9	10	11	A		46	38	45	26	09	35	
47	1CE16CS040	JAYA SHANKAR	1	2	3	4	5	6	7	8	9	10	A	11	12	13		29	38	45	23	09	31	
48	1CE16CS096	SUHAS S	1	2	3	4	5	6	7	8	9	10	11	12	13	14		38	40	40	24	09	33	
49	1CE16CS103	TEJAS K S	A	1	2	3	4	5	6	7	8	9	10	11	12	13		30						
50	1CE17CS019	NITIN PRASAD	1	2	A	3	4	5	6	7	8	9	10	11	12	13		43	44	45	27	08	35	
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V- Sem 'B'

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ATTENDANCE

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51	1CE17CS021	BHARATH KUMAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14		31	45	46	24	08	32	
52	1CE17CS040	HARSHITH S	A	1	2	3	4	5	6	7	8	9	10	11	12	13		43	46	40	26	08	34	
53	1CE17CS072	NANDIKA M J	1	2	3	A	4	5	6	7	8	9	10	11	12	13		45	46	48	28	08	36	
54	1CE17CS082	POKALA SAI POOJA	1	2	3	4	5	6	7	8	9	10	11	12	13	14		33	45	36	23	08	31	
55	1CE17CS088	PRASHANTH KUMAR	A	A	1	2	3	4	5	6	A	7	8	9	10	A		40	46	46	27	08	35	
56	1CE17CS102	SAHANA M R	A	1	2	3	A	4	5	6	7	8	9	10	11	12		43	46	46	27	08	35	
57		'15- Scheme'																						
58	1CE15CS074	MAYUR C K	1	2	A	3	4	5	6	A	7	8	9	10	11	12		-	35	40	13/15	04/05	16/20	
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CITY
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CIRCULAR

Ref. No: CEC/ECE/DAC/2020-2021/02 **Date: 15-04-2021**

All the members of Department Advisory Committee are informed to attend a meeting which will be held as follows

Date: 16-04-21
Time: 03.30 PM
Venue: **Virtual Meeting**

Agenda:

- Certification course for 3rd year
- Organizing workshop for final year
- Conduction of Project Exhibition
- Conduction of guest lectures/ workshops

G.S. mallikarjuna

Prof. Mallikarjuna G S

HOD

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CITY ENGINEERING COLLEGE
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CITY
ENGINEERING COLLEGE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Department Advisory Committee Meeting

Date: 16-04-2021
Time: 03.30 PM
Venue: Virtual Meeting

DAC Members Present:

Sl. No	Member Name	Designation	Role	Signature
1	Prof. Mallikarjuna G S	HOD	Convenor	G.S. Mallikarjun
2	Dr. Shalini Prasad	Professor	Co-Convenor	S. Prasad.
3	Prof. Shylaja K	Assistant Professor	Member	
4	Prof. Ravindra S	Assistant Professor	Member	
5	Prof. Aurobindo Koti	Assistant Professor	Member	Koti
6	Prof. SKL Narayana	Assistant Professor	Member	SKLn

The Department Advisory Committee meeting was conducted at Department of ECE, on 16TH April 2021, at 03:30 PM.

Agenda of the Meeting:

- Conducting Certification courses
- Organizing workshop for final year
- Conduction of Project Exhibition
- Faculty development program
- Conduction of guest lectures/ workshops

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Minutes of Meeting:

In the Department Advisory Committee meeting held online, an overview of the department was presented, emphasizing student achievements, result analysis, and faculty accomplishments. The members discussed various suggestions for improvement and reviewed the meeting agenda and SOP to be followed.

The Committee proposed the following items for inclusion in the agenda:

- The HOD emphasized on SOP to be followed for students as well as faculties.
- Second-year students are encouraged to participate in technical activities and to attend guest lectures or seminars to broaden their knowledge.
- A project exhibition has been proposed, offering final-year students a platform to showcase their work.
- To keep students and faculty updated with current technologies, the committee suggested organizing workshops, guest lectures, and hands-on sessions.

G.S. Mallikarjuna

Prof. Mallikarjuna G S

HOD

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ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ವಿಟಿಯು ಅಧಿನಿಯಮ ೧೯೯೪"ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ಜ್ಞಾನ ಸಂಗಮ", ಬೆಳಗಾವಿ-೫೯೦೦೧೮, ಕರ್ನಾಟಕ, ಭಾರತ

Visvesvaraya Technological University
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama" Belagavi-590018, Karnataka, India
Phone: (0831) 2498100, Fax: (0831) 2405467, Website: vtu.ac.in

Dr. A. S. Deshpande B.E., M.Tech., Ph.D.
Registrar

Phone: (0831) 2498100
Fax: (0831) 2405467

Ref: VTU/BGM/BOS/A9/2020-21 / 345

Date: 21 APR 2021

Revised - CIRCULAR

Subject: Commencement of EVEN semesters of UG programs for the year 2020-21 regarding...

Reference: Hon'ble Vice-Chancellor Approval dated 21.04.2021

Concerning the subject cited above, the revised - academic calendar related to the EVEN semester/s of B.E./B.Tech./B.Plan./B.Arch. programmes is notified as attached.

The Principals of Affiliated, Constituent, and Autonomous Engineering Colleges are hereby informed to bring the contents of this circular to the notice of all the concerned.

Sd/-
REGISTRAR

Encl: As mentioned above.

To,

1. The Principals of all affiliated/ constituent /Autonomous Engineering Colleges under the ambit of VTU Belagavi.
2. The Chairpersons of all Departments, Centres for PG Studies in Belagavi, Kalaburgi, Muddenahalli, and Mysore.

Copy to.

1. To the Hon'ble Vice-Chancellor through the secretary to VC, VTU Belagavi for information
2. The Registrar (Evaluation), VTU Belagavi for information.
3. The Regional Directors (I/c) of all the regional offices of VTU for circulation.
4. The Special Officer CNC VTU Belagavi for uploading on VTU website
5. PS to Registrar VTU Belagavi
6. All the concerned Special Officer/s and Caseworker/s of the academic section, VTU, Belagavi

21.4.2021
REGISTRAR

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CITY ENGINEERING COLLEGE
Kanakapura Main Road, Bangalore-560061

Revised-Academic Calendar of EVEN semesters of UG Programmes for 2020-2021

Semesters EVENTS	IV semester B.E./B.Tech.	IV semester B.Arch./ B.Plan.	VI semester B.E./B.Tech.	VI semester B.Plan./B.Arch	VIII semester B.E./B.Tech.	VIII semester B.Plan.	VIII semester B.Arch
Commencement of EVEN Semester	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021
Last Working day of EVEN Semester	07.08.2021	07.08.2021	07.08.2021	07.08.2021	#20.07.2021	#20.07.2021	07.08.2021
Practical Examinations	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	---	---	---	---
Theory Examinations	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	10.08.2021 To 31.08.2021	22.07.2021 To 30.07.2021	22.07.2021 To 30.07.2021	10.08.2021 To 17.08.2021
Internship	---	---	---	---	---	---	---
Internship Viva-Voce/ Project Viva-Voce	---	---	---	---	02.08.2021 To 06.08.2021	---	---
Professional training / Organization study	---	---	---	---	---	---	---
Commencement of ODD Semester	13.09.2021	13.09.2021	13.09.2021	13.09.2021	---	---	23.08.2021

- The classroom sessions for even the semester should commence from the dates mentioned above.
- The Institute needs to function for **six days** a week with additional hours **(Saturday is a full working day).** #if required the college can plan to have extra classes even on Sundays also.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- Notification regarding the Calendar of Events relating to the conduct of **University Examinations** will be issued by the Registrar (Evaluation) from time to time.
- The faculty/staff shall be available to undertake any work assigned by the university.
- Academic Calendar may be modified based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Revised Academic Calendar is also applicable for **Autonomous Colleges.** In case if any changes are to be affected by Autonomous Colleges in the academic terms and examination schedule, they could do so with the approval of the University.

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21.04.2021.

REGISTRAR

CITY ENGINEERING COLLEGE ACADEMIC
CALENDER 2020-2021(EVEN SEM)

	May-21		Jun-21		Jul-21		Aug-21	
DAY	DATE	EVENT	DATE	EVENT	DATE	EVENT	DATE	EVENT
SAT	1							
SUN	2						1	
MON	3						2	
TUE	4		1	7th day orientation			3	
WED	5		2	8th day orientation			4	
THU	6		3	9th day orientation	1		5	
FRI	7		4	10 day orientation	2		6	
SAT	8	2nd satuarday holiday	5		3		7	
SUN	9		6		4		8	
MON	10		7		5		9	last working day of 2nd,4th,and6th sems
TUE	11		8		6		10	
WED	12		9		7		11	
THU	13		10		8		12	
FRI	14	**ramzan**	11		9		13	
SAT	15		12	2nd satuarday holiday	10	2nd satuarday holiday	14	2nd satuarday holiday
SUN	16		13		11		15	**Independence day**
MON	17		14		12		16	
TUE	18		15		13		17	
WED	19	MoM CURRICULAM ENRICHMENT	16		14		18	
THU	20		17		15		19	
FRI	21	starting day of 2nd,4th,and6th	18		16		20	
SAT	22	4th satuarday holiday	19		17		21	
SUN	23		20		18		22	
MON	24	statrs 2nd phase induction (online)	21		19		23	
TUE	25	2nd day orientation	22		20		24	
WED	26	**budda poornima**	23		21	bakrid	25	
THU	27	3rd day orientation	24		22		26	
FRI	28	4th day orientation	25		23		27	
SAT	29	5th day orientation	26	4th satuarday holiday	24	4th satuarday holiday	28	4th satuarday holiday
SUN	30		27		25		29	
MON	31	6 th day orientation	28		26		30	
TUE			29		27		31	
WED			30		28			
THU					29			
FRI					30			
SAT					31			

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CITY ENGINEERING COLLEGE ACADEMIC CALENDER 2020-2021(EVEN SEM)

DEPT OF ECE

	May-21		Jun-21		Jul-21		Aug-21	
DAY	DATE	EVENT	DATE	EVENT	DATE	EVENT	DATE	EVENT
SAT	1							
SUN	2						1	
MON	3						2	
TUE	4		1	7th day orientation			3	
WED	5		2	8th day orientation			4	
THU	6		3	9th day orientation	1		5	
FRI	7		4	10 day orientation	2		6	
SAT	8	2nd satuarday holiday	5		3		7	
SUN	9		6		4		8	
MON	10		7	*GUEST LECTURE 1*	5		9	last working day of 2nd,4th,and6th sems
TUE	11		8		6		10	
WED	12		9		7		11	
THU	13		10		8		12	
FRI	14	**ramzan**	11		9		13	
SAT	15		12	2nd satuarday holiday	10	2nd satuarday holiday	14	2nd satuarday holiday
SUN	16		13		11		15	**Independence day**
MON	17		14		12		16	
TUE	18		15		13		17	
WED	19	MoM CURRICULAM ENRICHMENT	16	*INDUSTRIAL VISIT*	14	*GUEST LECTURE 2*	18	
THU	20		17		15		19	
FRI	21	starting day of 2nd,4th,and6th	18		16		20	
SAT	22	4th satuarday holiday	19		17		21	
SUN	23		20		18		22	
MON	24	statrs 2nd phase induction (online)	21		19		23	
TUE	25	2nd day orientation	22		20		24	
WED	26	**budda poornima**	23		21	bakrid	25	
THU	27	3rd day orientation	24		22		26	
FRI	28	4th day orientation	25		23		27	
SAT	29	5th day orientation	26	4th satuarday holiday	24	4th satuarday holiday	28	4th satuarday holiday
SUN	30		27		25		29	
MON	31	6 th day orientation	28		26		30	
TUE			29		27		31	
WED			30		28			
THU					29			
FRI					30			
SAT					31			

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CITY
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Department of Electronics and Communication Engineering

COURSE ALLOCATION ACY: 2020-21 (even)

Sl No	Name of the Faculty	Course code and Name	Year& Semester	Signature
01.	Prof. Mallikarjuna. G.S	18ELE23 Basic Electrical 18ELEL27. Electrical Lab	I / II I / II	
02.	Dr. Shalini Prasad	17EC62/ 18EC62/ Arm Controller, 18ELEL27	III / VI I / II	S. Prasad
03.	Prof. Ravindra. S	18EC45 SS 17EC64 CCN	II / IV III / V	
04.	Prof. Shylaja. K	17EC63 VLSI 17EC835 NS 18ECL48 AC Lab	III / VI IV / VIII II / IV	
05.	Prof. Madhavi. J. Kulakarni	18EC42 AC 18ECL47 MC Lab	II / IV II / IV	MJK
06.	Prof. Gopikishan. J	17EC61 DC 18EC61 DC 17EC654 DSS 17ECL68 ED Lab	III / VI III / VI III / VI III / VI	
07.	Prof. Vishwakiran. R.C	17EC663 DSDV 18ECL47 MC Lab	III / VI II / IV	
08.	Prof. Aurbindo Koti	18ELN24 Basic Electronics 18ECL66 ED Lab	I / II III / VI	A.Koti

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CITY
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Department of Electronics and Communication Engineering

COURSE ALLOCATION ACY: 2020-21 [EVEN]

Sl No	Name of the Faculty	Course code and Name	Year& Semester	Signature
09.	Prof. Krishna. K.S	17EC82 FON 18ELEL27 B.E Lab	IV/VIII I/II	KS
10.	Prof. Deepa Mathew. K	18ELN24 B.E-S 18ECL67 C.N Lab	I/II III/VI	DP
11.	Prof. S.K.L. Narayan	18EC63 Microwave 18ECL47 MC Lab	III/VI II/IV	
12.	Prof. Sravanthi K. Ravi	18EC43 CS 17ECL67 Arm Lab	II/IV III/VI	S
13.	Prof. Ranganath S.L	18EC641 OS 18ECL48 AC Lab	III/VI II/IV	
14.	Prof Geethanjali	17EC81 WC 18ECL67 Comm Lab	IV/VIII III/VI	Geethaji
15.	Prof. Radhika T.S	18ME653 SCM 17ECL67 Arm.Lab	III/VI III/VI	Radhika
16.	Prof. Sheetal Patted	18EC46 MC 18ECL67 Com Lab	II/IV III/VI	Sheetal P

C.S. Mallikarjun
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CITY
ENGINEERING COLLEGE

Department of Electronics and Communication Engineering

COURSE PREFERENCE **ACY:** 2020 -21 (EVEN)

Name of the Faculty: GOPIKISHAN. J

Designation: Asst. Professor

Sl No	Course code and name	Year/Semester
01.	17EC61 DC 18EC61 DC	III / VI
02.	17EC654 DSS	III / VI
03.	17ECL68 ED Lab	III / VI
04.	18ECL48 AC Lab	II / IV
05.	18ELN24 Basic Electronics	I / II

Faculty

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CITY ENGINEERING COLLEGE

WEF: 19TH APRIL 2021

6TH A SEM

Dept. of E&CE

A106

	1 9:00 10:00	2 10:00 11:00	TEA BREAK 11:00 11:15	3 11:15 12:15	4 12:15 13:15	LUNCH BREAK 13:15 14:00	5 14:00 15:00	6 15:00 16:00	7 16:00 17:00
Mo	18EC641 Ranga	18EC61 GK	TEA BREAK	18EC62 Shalini	18ME653 Radhika	LUNCH BREAK	18EC63 SKLN	18ME653 Radhika	
Tu	18EC63 SKLN	18EC641 Ranga		18EC62 Shalini	18ME653 Radhika		18EC61 GK	18EC62 Shalini	
We	18ME653 Radhika	18EC61 GK		18EC641 Ranga	18EC63 SKLN		18ECL67 Batch 1 Deepa / Geetha 18ECL66 Batch 2 SRK / Koti		
Th	18EC63 SKLN	18EC61 GK		18EC641 Ranga	18EC62 Shalini		18ECL66 Batch 1 VK / GK 18ECL67 Batch 2 Deepa / Sheetal		
Fr	18EC641 Ranga	18ME653 Radhika		18EC62 Shalini	18EC63 SKLN		Dept./Club/EduSat Act		
Sa	18EC62 Shalini	18EC63 SKLN		18EC61 GK	18ME653 Radhika				

Timetable generated:30-08-2024

aSc Timetables

G.S.mallikarjun

Professor & Head
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City Engineering College,
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Year : 2020 - 2021

Semester : Odd / [✓ Even]

Name of the Teacher : Shylaja K

Designation : Assistant Professor

Department : Electronics & Communication Engineering

Sem/Branch	Subject Code	Subject
1. VI / ECE	17EC63	VLSI Design
2.		
3.		

	Initials at the End of the			
	1st Month	2nd Month	3rd Month	Semester
Staff				
HOD				
Principal				

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CITY ENGINEERING COLLEGE			
DEPT. OF ELECTRONICS & COMMUNICATION ENGINEERING			
EVEN 2020-21	6TH B SEM EC	STUDENT LIST	
SL.NO.	SCHEME	USN	NAME
1	2017	1CE16EC020	MADAN HALAKATTI
2	2017	1CE16EC045	T U SOUMYA
3	2017	1CE17EC018	CHANDANA R
4	2017	1CE17EC023	DIVAKAR S D
5	2017	1CE17EC025	GOVARDHAN KN
6	2017	1CE17EC053	SANJAY H
7	2017	1CE17EC060	SHESHADRI
8	2017	1CE17EC061	SHYAM SUNDAR M G
9	2017	1CE17EC068	TEJASWINI ANANTH JANTHALI
10	2017	1CE17EC069	THANUSHREE R
11	2015	1CE16EC017	KAUSHIK A
12	2015	1CE16EC053	SAEEDA SHAMAEL
13	2015	1CE16EC401	AKSHAY HEGDE

G.S. Mallikarjun

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VLSI DESIGN

B.E., VI Semester, Electronics & Communication Engineering
[As per Choice Based Credit System (CBCS) Scheme]

Course Code	**17EC63**	**CIE Marks**	**40**
Number of Lecture Hours/Week	**04**	**SEE Marks**	**60**
Total Number of Lecture Hours	**50 (10 Hours / Module)**	**Exam Hours**	**03**

CREDITS – 04

Course Objectives: The objectives of the course is to enable students to:

- Impart knowledge of MOS transistor theory and CMOS technologies
- Impart knowledge on architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology
- Cultivate the concepts of subsystem design processes
- Demonstrate the concepts of CMOS testing

Module-1

Introduction: A Brief History, MOS Transistors, MOS Transistor Theory, Ideal I-V Characteristics, Non-ideal I-V Effects, DC Transfer Characteristics (1.1, 1.3, 2.1, 2.2, 2.4, 2.5 of TEXT2).

Fabrication: nMOS Fabrication, CMOS Fabrication [P-well process, N-well process, Twin tub process], BiCMOS Technology (1.7, 1.8,1.10 of TEXT1). **L1, L2**

Module-2

MOS and BiCMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout.

Basic Circuit Concepts: Sheet Resistance, Area Capacitances of Layers, Standard Unit of Capacitance, Some Area Capacitance Calculations, Delay Unit, Inverter Delays, Driving Large Capacitive Loads (3.1 to 3.3, 4.1, 4.3 to 4.8 of TEXT1).
L1, L2, L3

Module-3

Scaling of MOS Circuits: Scaling Models & Scaling Factors for Device Parameters

Subsystem Design Processes: Some General considerations, An illustration of Design Processes, **Illustration of the Design Processes**- Regularity, Design of an ALU Subsystem, The Manchester Carry-chain and Adder Enhancement Techniques(5.1, 5.2, 7.1, 7.2, 8.2, 8.3, 8.4.1, 8.4.2 of TEXT1). **L1, L2, L3**

Module-4

Subsystem Design: Some Architectural Issues, Switch Logic, Gate(restoring) Logic, Parity Generators, Multiplexers, The Programmable Logic Array (PLA) (6.1to 6.3, 6.4.1, 6.4.3, 6.4.6 of TEXT1).

FPGA Based Systems: Introduction, Basic concepts, Digital design and FPGA's, FPGA based System design, FPGA architecture, Physical design for FPGA's (1.1 to 1.4, 3.2, 4.8 of TEXT3). **L1, L2, L3**

Module-5

Memory, Registers and Aspects of system Timing- System Timing Considerations, Some commonly used Storage/Memory elements (9.1, 9.2 of TEXT1).

Testing and Verification: Introduction, Logic Verification, Logic Verification Principles, Manufacturing Test Principles, Design for testability (12.1, 12.1.1, 12.3, 12.5, 12.6 of TEXT 2). **L1, L2, L3**

Course outcomes: At the end of the course, the students will be able to:

- Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
- Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
- Interpret Memory elements along with timing considerations
- Demonstrate knowledge of FPGA based system design
- Interpret testing and testability issues in VLSI Design
- Analyze CMOS subsystems and architectural issues with the design constraints.

Text Books:

1. **“Basic VLSI Design”**- Douglas A. Pucknell& Kamran Eshraghian, PHI 3rd Edition (original Edition – 1994).
2. **“CMOS VLSI Design- A Circuits and Systems Perspective”-** Neil H.E. Weste, David Harris, Ayan Banerjee, 3rd Edition, Pearson Education.
3. **“FPGA Based System Design”-** Wayne Wolf, Pearson Education, 2004, Technology and Engineering.

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Course Title: VLSI Design	Course Code: 17EC63
Total contact hours: L:T:P:S :4:0:1:0	CREDITS – 04
CIE Marks: 40	SEE Marks: 60
Semester : VI	Academic year : 2020-21
Lesson plan Author: SHYLAJA.K	Date : 19/04/2021

Course Objectives: This Course will enable students to:

1. Impart knowledge of MOS transistor theory and CMOS technologies
2. Learn the operation principles and analysis of inverter circuits
3. Design combinational, sequential and dynamic logic circuits
4. Infer the operation of semiconductor memories
5. Demonstrate the concept of testing

Course Outcomes:

At the end of the course, students should be able to:

1.Demonstrate understanding of MOS transistor theory, CMOS fab flow and scaling

2.Draw the basic gates using stick diagrams and layouts

3.Demonstrate knowledge of FPGA based system design

4.Interpret memory elements with timing considerations

5.Interpret testing and testability issues in vlsi design

6. Analyze CMOS subsystems and architectural issues with the design constraints.

Week	Module/UNIT	Main Topics	Sub Topics	Bloom's Taxonomy Level(L)	Course Outcome (CO)
1	1	introduction	a brief history	L1, L2	CO1
			mos transistors	L1, L2	CO1
			cmos logic	L1, L2	CO1
			examples	L1, L2	CO1
2	1	mos transistor theory	introduction,long channel i-v characteristics	L1, L2	CO1
			non-ideal i-v effects	L1, L2	CO1
			contd…	L1, L2	CO1
			dc transfer characteristics	L1, L2	CO1
3	1	fabrication	mos fab and layout	L1, L2	CO1
			stick diagrams	L1, L2	CO2
			design rules and layout.	L1, L2	CO2
			Problems on stick diagrams	L1,L2	CO2

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4	2	MOS and BiCMOS Circuit Design Processes	VLSI design flow	L1, L2	CO1
			Introduction	L1, L2	CO1
			CMOS technologies	L1, L2	CO1
			Layout design rules	L1, L2	CO1
5	2	Basic Circuit Concepts	Sheet Resistance, Area Capacitances of Layers	L1, L2	CO1
			Standard Unit of Capacitance, Some Area Capacitance Calculations	L1, L2	CO1
			Delay Unit, Inverter Delays	L1, L2	CO1
6	2/3	Scaling of MOS Circuits Subsystem Design Processes	Driving Large Capacitive Loads	L1, L2, L3	C02
			examples	L1, L2, L3	C02
			Scaling Models & Scaling Factors for Device Parameters	L1, L2, L3	C02
			Some General considerations, An illustration of Design Processes	L1, L2, L3	C02
7	3	Illustration of the Design Processes	Regularity, Design of an ALU Subsystem	L1, L2, L3	C03
			The Manchester Carry-chain	L1, L2, L3	C03
			Adder Enhancement Techniques	L1, L2, L3	C03
			examples	L1, L2, L3	CO3
8	4	Subsystem Design	Continued with more examples	L1, L2, L3	CO3
			Some Architectural Issues, Switch Logic	L1, L2, L3	CO6
			Gate(restoring) Logic, Parity Generators	L1, L2, L3	CO6
			Multiplexers, The Programmable Logic Array (PLA)	L1, L2, L3	CO6
9	4	FPGA Based Systems	Introduction, Basic concepts	L1, L2, L3	CO3
			Digital design and FPGA's	L1, L2, L3	CO3
			FPGA based System design	L1, L2, L3	CO3
			FPGA architecture	L1, L2, L3	CO3
10	4	FPGA Based Systems	Physical design for FPGA's	L1, L2	CO3
			Contd..	L1, L2	CO3
			Few examples	L1, L2	CO3
			revision	L1, L2,L3	CO3
11	5	Memory, Registers and Aspects of	System Timing Considerations	L1, L2,L3	CO4

		system Timing	Some commonly used Storage/Memory elements	L1, L2,L3	CO4
12	5	Memory, Registers and Aspects of system Timing Testing and Verification	Continuation	L1, L2,L3	CO5
			Testing and Verification: Introduction	L1, L2,L3	CO5
			Logic Verification	L1, L2,L3	CO5
			Logic Verification Principles	L1, L2,L3	CO5
13	5	testing and verification	Logic Verification Principles	L1, L2,L3	CO5
			Manufacturing Test Principles	L1, L2,L3	CO5
			Manufacturing Test Principles	L1, L2,L3	CO5
			Design for testability	L1, L2,L3	CO5
14	5	testing and verification	Design for testability	L1, L2,L3	CO5
			Doubt clearing session		
			Revision		

Bloom's Taxonomy Level (L)

L1-Remembering L2-Understanding L3-Applying

Text Books:

1. "Basic VLSI Design"- Douglas A. Pucknell& Kamran Eshraghian, PHI 3rd Edition (original Edition – 1994).
2. "CMOS VLSI Design- A Circuits and Systems Perspective"- Neil H.E. Weste, David Harris, Ayan Banerjee, 3rd Edition, Pearson Education.
3. "FPGA Based System Design"- Wayne Wolf, Pearson Education, 2004, Technology and Engineering

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USN	1	C	E						

SUB CODE:17EC63

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FIRST INTERNAL TEST

Branch: E&C — **Date: 21-05-2021**
Sub Name: VLSI Design — **Time: 10:30AM-12:00PM**
Sem : VI — **Max Marks: 50**
Duration: 1 ½ hrs.

Note: Answer all Questions selecting any ONE FULL questions from each part.

Q No.	Sub Q No.	Questions	Marks	CO's	BT'S
		PART-A			
1		Define Accumulation, Depletion and Inversion with respect to MOS structure. Draw necessary diagrams.	10	CO1	L1, L2
		OR			
2		With a neat schematic, explain nMOS transistor demonstrating cutoff, Linear and Saturation regions of operation.	10	CO1	L1, L2
		PART-B			
3		Derive an expression of Ids in three regions of operation of a MOS transistor.	10	CO1	L1, L2
		OR			
4		Explain Channel length modulation and Beta Ratio effect.	10	CO1	L1, L2
		PART-C			
5		Explain CMOS inverter DC characteristics with necessary graphs and relate voltages for the three regions of operation.	10	CO1	L1, L2
		OR			
6		Explain nMOS Fabrication process with a neat diagram.	10	CO1	L1, L2
		PART-D			
7		What are typical processing steps in CMOS p-well process with a neat diagram.	10	CO1	L1, L2
		OR			
8		Explain Bi-CMOS fabrication in an n-well process with a neat diagram.	10	CO1	L1, L2
		PART-E			
9		Explain Twin-Tub process with a neat diagram.	10	CO1	L1, L2
		OR			
10		Distinguish between CMOS Technology and BiCMOS technology.	10	CO1	L1, L2

Bloom's Taxonomy: L1: Remembering L2: Understanding

Course Outcomes: CO1: understanding MOS transistor theory and CMOS fabrication flow.

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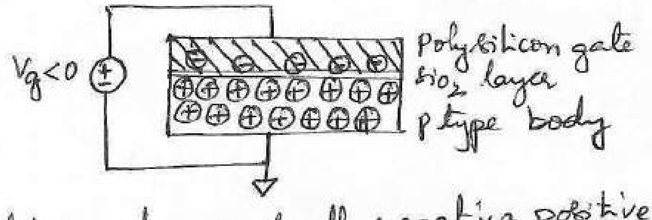
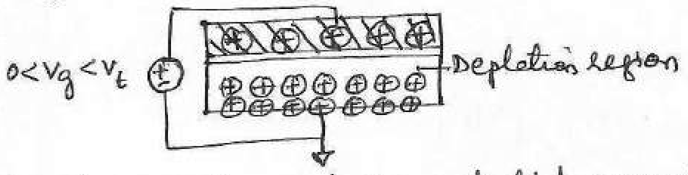
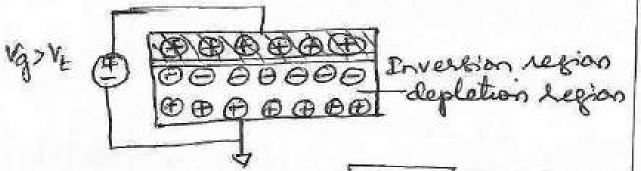
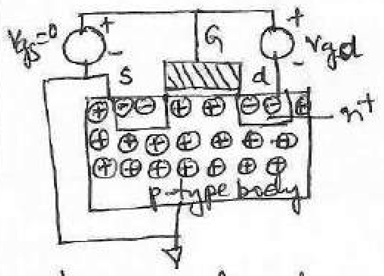
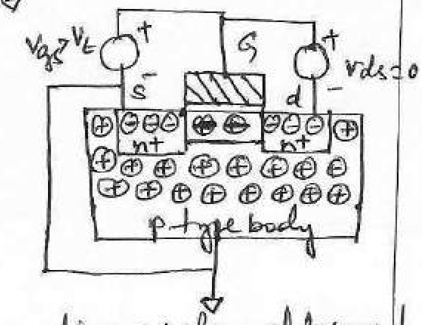
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF VALUATION

ACY:2020-21 EVEN

Sem:6th Sub: VLSI Design Test : 01

Q. No	Details of the answer	Marks distribution	Total marks
1	Accumulation: This mode occurs when a negative voltage is applied to the gate, the positively charged holes are attracted to the region beneath the gate. 	3	
	Depletion: when a small ~~negative~~ positive voltage is applied to the gate, the positive charge on the gate repels the holes resulting in a depletion region beneath the gate. 	3	
	Inversion: when a higher potential exceeding a critical threshold voltage is applied, holes are repelled further & some free electrons in the body are attracted to the region beneath the gate. A layer of electrons in the p-type body is inversion layer. 	4	10
2	 cutoff: No channel $I_{ds}=0$.  linear: channel formed I_{ds} increases with V_{ds}		

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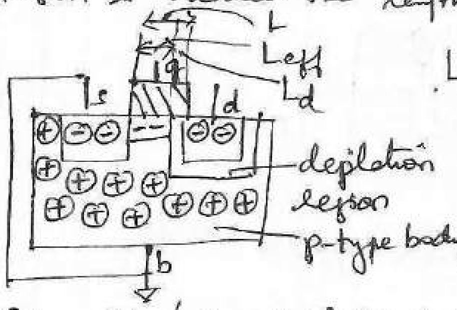
<table>
<tr><th>Q. No</th><th>Details of the answer</th><th>Marks distribution</th><th>Total marks</th></tr>
<tr><td>4</td><td>

channel length modulation: when V_{ds} is increased, a barrier is build near the drain due to depletion region ~~x~~ reduces the length of the channel.

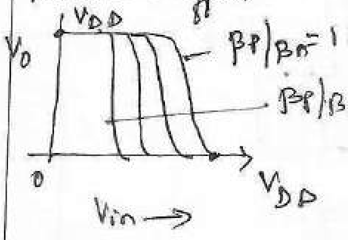


$L_{eff} = L - L_d$.

channel length modulation is important in analog design not in digital.

$I_{ds} = \beta/2 (V_{gs}-V_t)^2 (1+\lambda V_{ds})$; λ = empeerical channel length modn factor

Beta ratio effect:



Skewed Inverter

If $\frac{\beta p}{\beta n} > 1$, Hi-skewed (stronger pMOS)

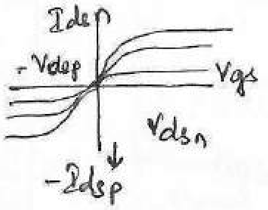
$\beta p/\beta n < 1$, Lo-skewed (weaker pMOS)

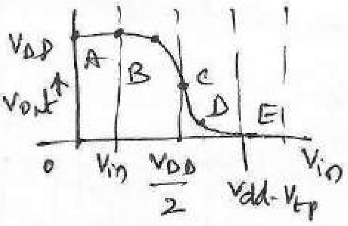
$\beta p/\beta n = 1$, normal skewed.

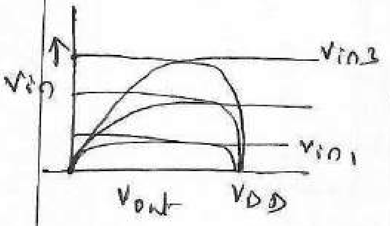
</td><td>5

5</td><td>10</td></tr>
<tr><td>5</td><td>

CMOS Inverter DC characteristics:







C = cutoff, L = linear
S = Saturation

<table>
<tr><th>Region</th><th>condn</th><th>p</th><th>n</th><th>o/p</th></tr>
<tr><td>A</td><td>$0 < V_{in} < V_{tn}$</td><td>L</td><td>C</td><td>$V_{out} = V_{DD}$</td></tr>
<tr><td>B</td><td>$V_{tn} < V_{in} < \frac{V_{DD}}{2}$</td><td>L</td><td>S</td><td>$V_{out} > \frac{V_{DD}}{2}$</td></tr>
<tr><td>C</td><td>$V_{in} = \frac{V_{DD}}{2}$</td><td>S</td><td>S</td><td>Vout drops</td></tr>
<tr><td>D</td><td>$\frac{V_{DD}}{2} < V_{in} < V_{DD} - V_{tp}$</td><td>S</td><td>L</td><td>$V_{out} < \frac{V_{DD}}{2}$</td></tr>
<tr><td>E</td><td>$V_{in} > V_{DD} - V_{tp}$</td><td>C</td><td>L</td><td>$V_{out} = 0$</td></tr>
</table>

</td><td>figures 3
Table 5
expln 2</td><td>10</td></tr>
</table>

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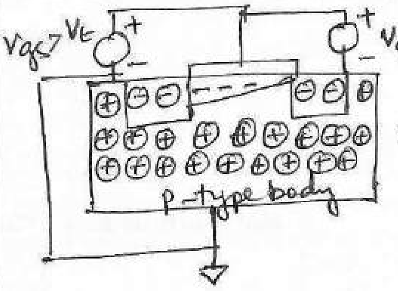
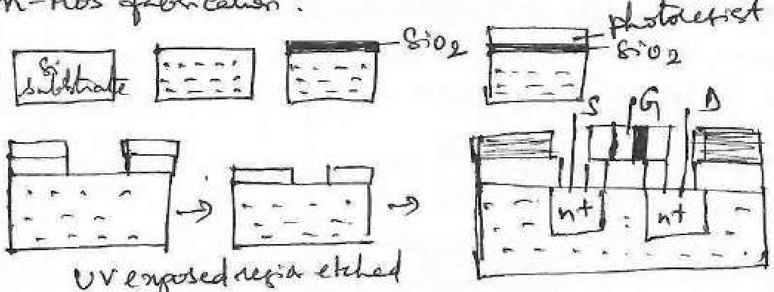
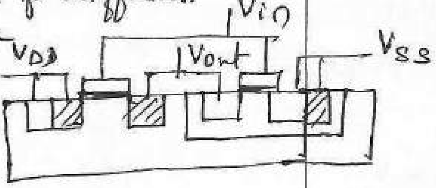
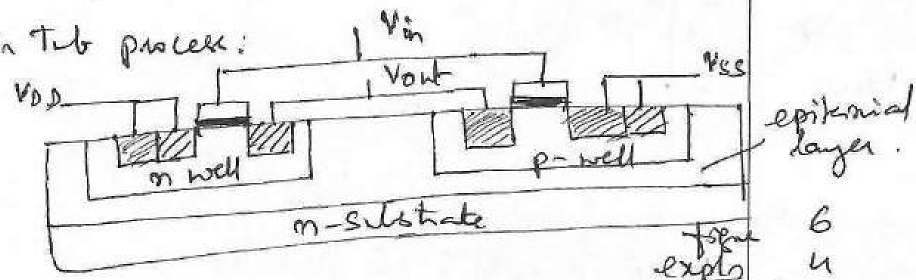
Q. No	Details of the answer	Marks distribution	Total marks
			
	Saturation; channel pinched off. Ids independent of Vds.		
	figures.	6	10
	explanation	4	
3	Expression for Ids in three regions:		
	Let $C_g = \frac{\epsilon_{ox} W L}{t_{ox}}$, charge induced in channel due to gate voltage is given by.	1	
	$V_c = \frac{V_s + V_d}{2}$; To form channel, $V_s = V_{gs} - V_t$	1	
	& $V_d = (V_{gs} - V_t) - V_{ds}$. $\therefore V_c = (V_{gs} - V_t) - \frac{V_{ds}}{2}$	1	
	WKT, $v = \mu E$, $E = \frac{V_{ds}}{L}$		
	$\therefore I_{ds} =$ total charge/time to cross channel $= \frac{Q}{\frac{L}{v}}$		
	$= \frac{C_{ox} W L \left[(V_{gs} - V_t) - \frac{V_{ds}}{2}\right] \mu \left(\frac{V_{ds}}{L}\right)}{L}$		
	$= \mu C_{ox} \frac{W}{L}\left[(V_{gs} - V_t) - \frac{V_{ds}}{2}\right] V_{ds}$.		
	$I_{ds} = \beta\left[(V_{gs} - V_t) - \frac{V_{ds}}{2}\right] V_{ds}$ (Linear region)	3	
	For saturation, $I_{ds} = \mu C_{ox} \frac{W}{L}\left[(V_{gs} - V_t) - \frac{(V_{gs} - V_t)}{2}\right](V_{gs} - V_t)$		
	$I_{ds} = \frac{\beta}{2}(V_{gs} - V_t)^2$		
	$\therefore$ For cutoff : $V_{gs} < V_t$, $I_{ds} = 0$.		
	linear region: $V_{ds} < (V_{gs} - V_t)$; $I_{ds} = \beta\left[(V_{gs} - V_t) - \frac{V_{ds}}{2}\right] V_{ds}$		
	saturation : $V_{ds} > (V_{gs} - V_t)$; $I_{ds} = \beta\left[(V_{gs} - V_t) - \frac{V_{ds}}{2}\right] V_{ds}$.	4	10

Q. No	Details of the answer	Marks distribution	Total marks
6	n-Mos fabrication :  	1×10	10
7	C-MOS p-well process steps: Mask1 – defines areas in which deep p-well diffusion take place Mask2 – defines thin SiO2 Mask3 – patterning poly Mask 4 – p+ is used to define p-diffusion Mask5 – -ve form of p+ mask mask 6 – contact cuts mask 7 — Metal layer mask 8 – passivation  		10
8	BiCMOS fabrication steps: Formation of n-well regions → nMos & pMos areas → field & gate oxidation → Form & pattern polysilicon → p+ diffusion → n+ diffusion → cuts → pattern → pads.		10
9	Twin Tub process:  	figure 6 expln 4	10
10	CMOS Technology - Bidirectional capability - low static power dissipation - Zin ↑ - Packing density is high - gain is low - High delay sensitivity to load Bi-CMOS Technology - Essentially unidirectional - High power dissipation - Zin is low - low packing density - high gain - low delay sensitivity to load.	2×5	10

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VLSI CHANDANA C

1st Internals

PART - E

10)

CMOS Technology	BiCMOS technology
-> low static power dissipation	-> High power dissipation
-> High input impedance	-> low input impedance
-> scalable threshold voltage	-> low voltage swing logic
-> High package density	-> low packing density
-> High density sensitivity to load	-> low delay sensitivity to load
-> low output drive current	-> high output drive current
-> low gm (gm x vin)	-> high gm (gm ∝ vin)
-> Bidirectional capability	-> Essentially unidirectional
-> low transconductance (gm)	-> High transconductance (gm)

① A negative voltage in applied to the gate so there is negative charge on the gate. The mobile positively charged holes are attracted to the regions beneath the gate This is called the accumulator mode.

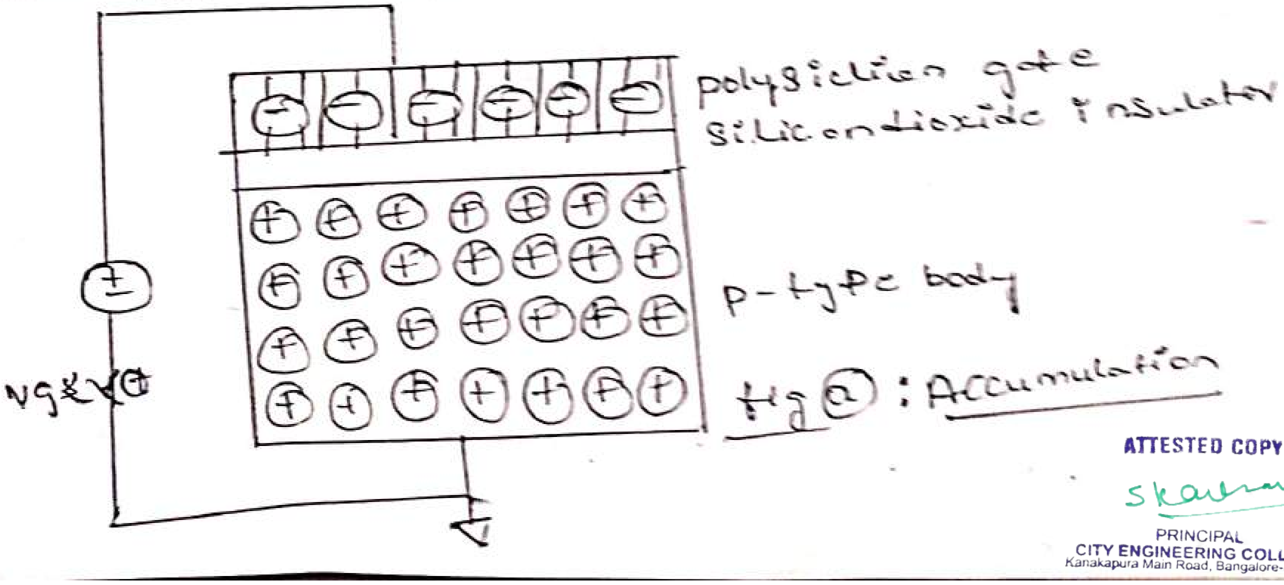


Fig (a): Accumulation

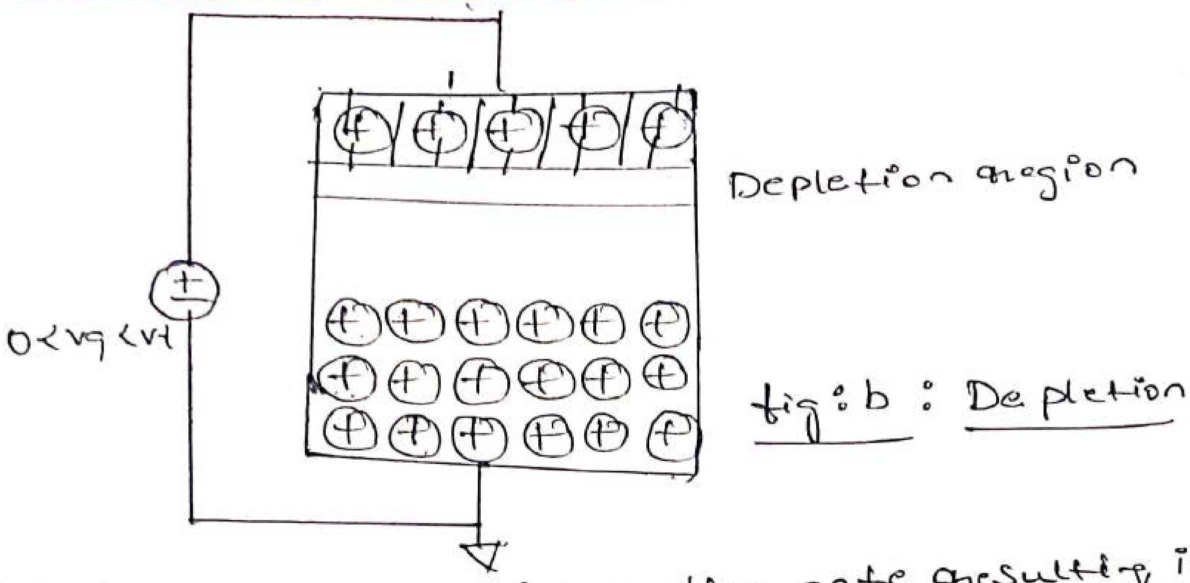
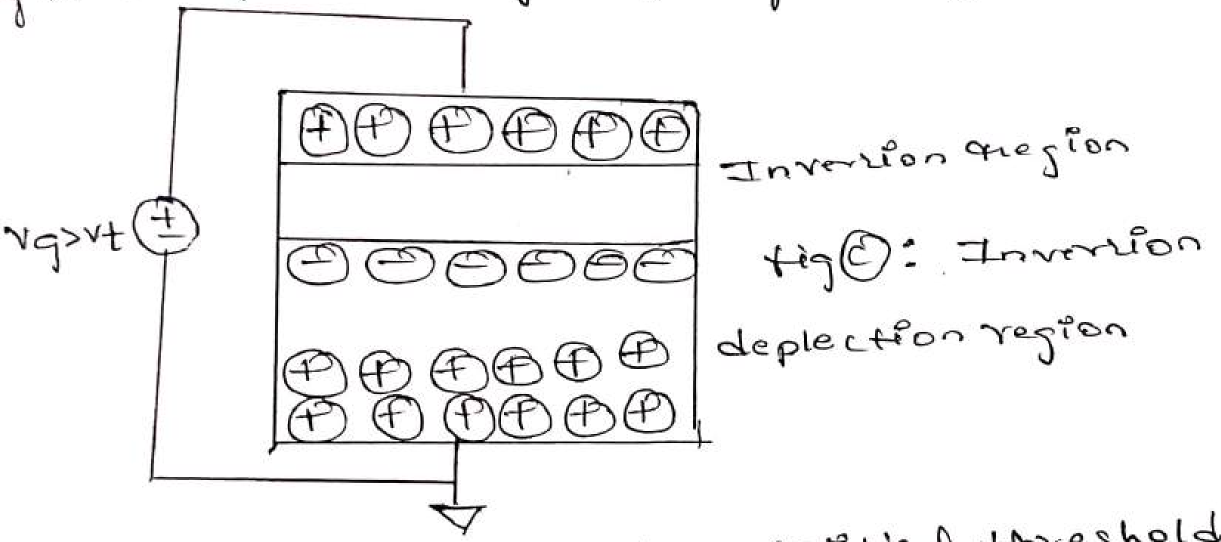


fig:b : Depletion

A low '+ve' voltage in applied to the gate resulting in Some positive Charge on the gate - This holes in the body are repelled from the region directly beneatire the gate, resulting in a deplection region foming below gate



fig(c): Inversion

A higher '+ve' potential excuding a critical threshold voltage vt is applied attracting more positive charge to the gate. This Conductive layer of Electrons in the p-type body is called the inversion layer.

④ Channel length modulation.

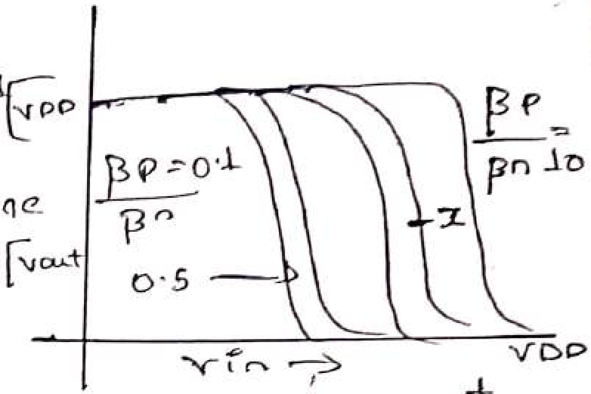
Ideally Ids is independent of Vds for a transistor in Saturation, making the transistor a prefact current Source The revereversed baised in junction b/w drain & Source a depletion region Effectively shorter the channel length to left = L - Id

↑Vds ↓ the effective channel length. Shorter Channel length results in higher current ∴ Ids ↑ with Vds in Saturation

$$I_{ds} = \beta \frac{(V_r - V_t)^2}{2} [1 + dV_{ds})$$

The parameter d is an Empirical channel length modulation factor.

Beta Ratio Effects :



If βP = βn the inverter threshold voltage Vin is VDD/2 This may be desirable because it maximize noise margis and allows a capacitive load to Charge and discharge in times by providing Equal current Source and Sink Capabilities. Invertera with different beta rations write differents beta ratio βP|βn are called Srewed inverter.

⑥ nMos fabriction

→ processing is Carried out on a thin wafer cut form a single crystal of silicon of high purity into which a single the are is introduced as the crystal of silicon is grown such are typically 75 to 150mm is diameter and 0.4mm thick are doped with say boron to impurity concentration of $10^{15}/cm^3$ to $10^{16}/cm^3$ giving resistivity in approximate range 2Kohm cm to 20KmCm.

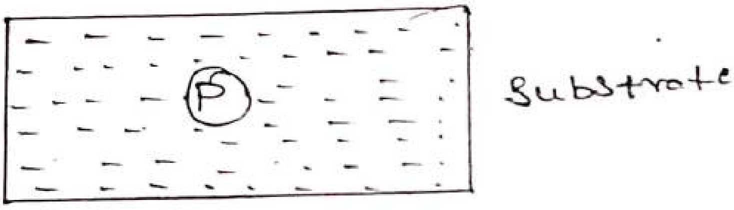
→ A layer of silicon dioxide (SiO2) typically 1μm thick is grown all over the surface of the wafer to procect the surface act as a barrows to deposits during processing and provide insulting Substracters onto which other layther may be deposited and pattervened

-> The Surface is now coverred with photooverist which is deposited onto the wafer & spin to acheive an even distuibution of the repuired thickness

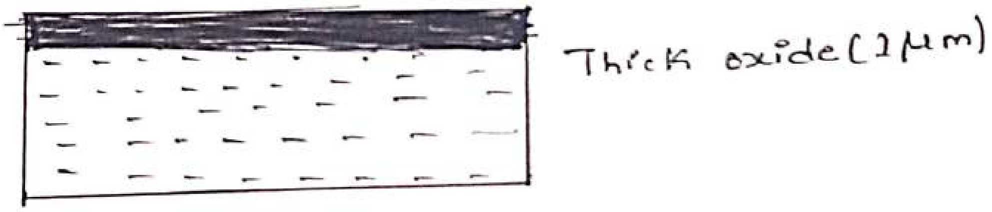
-> The photoresilt layer is then exposed to UV light through a mask which defness those region into which diffusion is to take place with trenlictor channel(s).

-> The remaining photoresilt is removed & a thin layer of SiO_2 (0.1 μm typical) is grown over the entire chip Surface and then polysilicon is deposited on top of these to form the gate structure. The Layer consists of heavy doped polysilicon by chemical vapour deposition.

1.



2.



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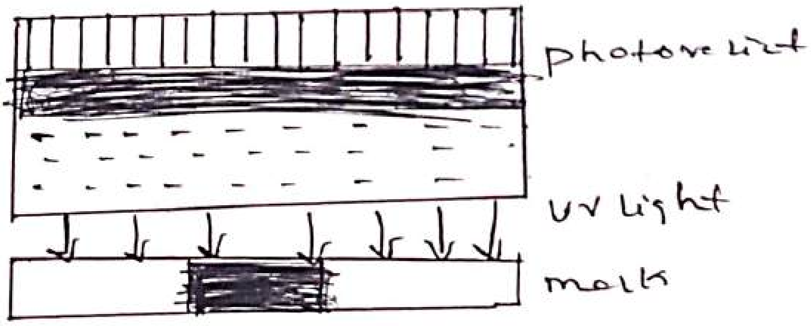
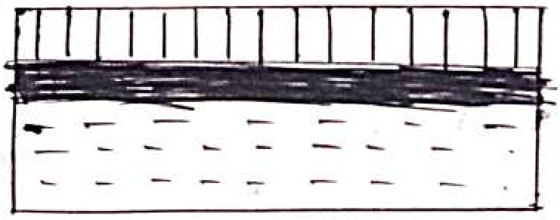
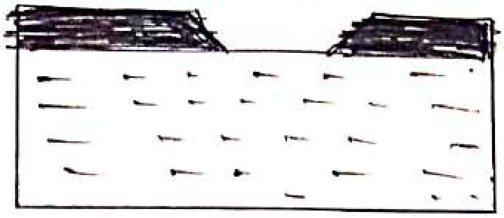


4.



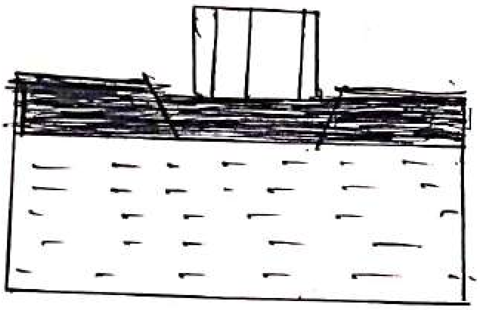
5.



windowin oxide

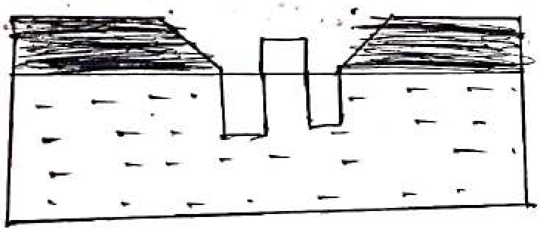
-> further photoresist coating & masking allows the polysilicon to be patterned and then the thin oxide is removed to expose area into which n-type impuritin are to be diffused to form source and drain a shawn diffusion is obessered by heating the wafers to high temp & paping a gas containing n-type impurity.

6.



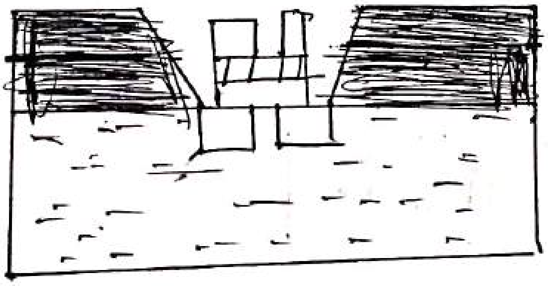
patterned poly (1-2μm) on the oxide (800-1000A°)

7.



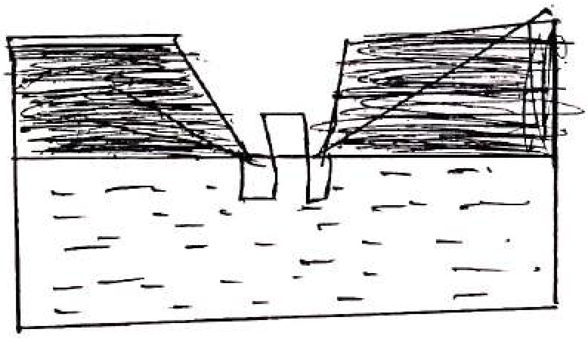
n+ diffusion (1μm deep)

8.



contact holes (cut)

9.



patterned metalization (aluminium 1 μm)

⑧ n-well

formation of n-well regions

↓

Define nmos & pmos active areas.

↓

field & gate oxidations

↓

form a pattern of polysilicon

↓

p+ diffusion

↓

n+ diffusion

↓

Contactcuts

↓

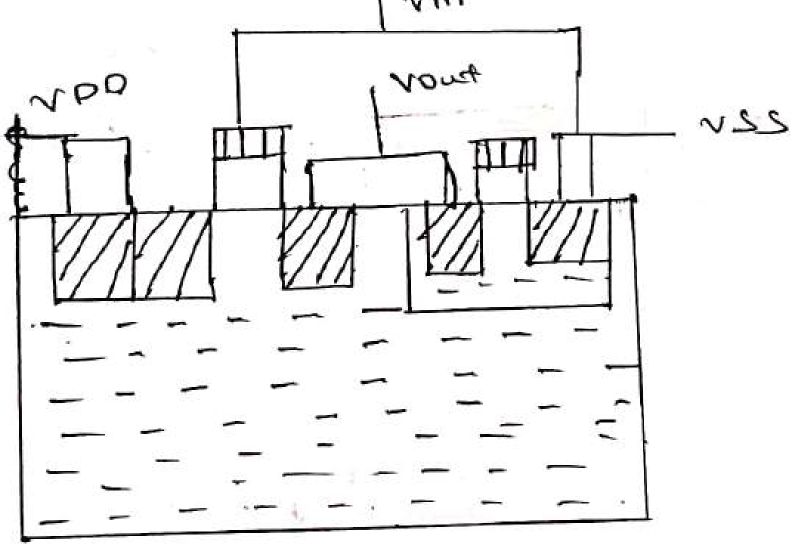
deposite & pattern metalization

↓

Over gass with cutr bonding pads.

↓

main steps in a typical n-well



1	C	E							

SUB CODE:17EC63

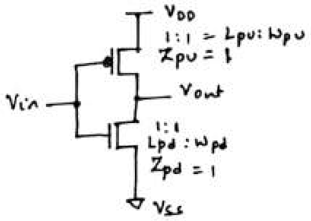
CITY ENGINEERING COLLEGE
SECOND INTERNAL TEST (ONLINE)

Branch: **E&C** **Date: 29-06-2021**
Sub Name: **VLSI Design** **Time: 10:30AM-12:00 PM**
Sem: **VI** **Max Marks: 50**
Duration: **1 ½hrs.**

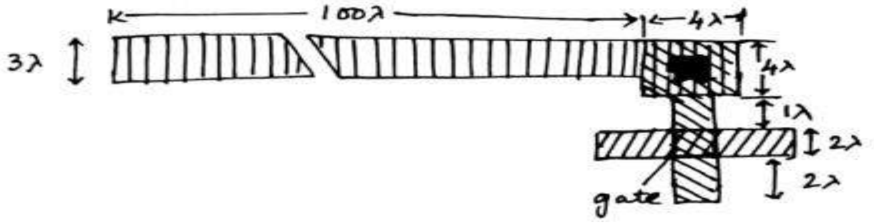
Note: Answer all Questions selecting any ONE FULL question from each part.

Q No.	Sub Q No.	Question	Marks	CO's	BT'S

PART-A

1		Explain sheet resistance concept applied to MOS transistor and inverters.	10	CO2	L1, L2, L3
		OR			
2	a	Calculate the ON resistance of 1:1 CMOS inverter with R_{sn}=10KΩ.Find the total power dissipation when VDD=5v. 	05	CO2	L1, L2, L3
	b	write a note on area capacitance of layers & standard unit of capacitance.	05		

PART-B

3	a	Calculate the area capacitance of the multilayer structure shown below. 	05	CO2	L1, L2, L3
	b	Explain delay unit, nMOS inverter delay.	05		
		OR			

G.S.mallikarjun

4		Explain CMOS inverter delay.	10	CO2	L1, L2, L3

PART-C

5	a	Explain rise time and fall time estimation.	05	CO2	L1, L2, L3
	b	Derive an expression for delay of cascaded inverters and N-nMOS inverters.	05		
OR					
6		What are the two scaling models? Write the scaling factors for all the device parameters.	10	CO2	L1, L2, L3

PART-D

7	a	With the sequence, Explain One-Bus, two-Bus and Three- Bus architectures.	05	CO2	L1, L2, L3
	b	What do you understand by floorplan? Write the tentative floorplan for 4-bit Data path.	05		
OR					
8		Explain 4x4 barrel shifter with a neat diagram.	05	CO2	L1, L2, L3

PART-E

9	a	Explain Implementation of ALU functions with an Adder.	05	CO2	L1, L2, L3
	b	What are propagate and Generate signals? Explain Manchester carry chain.	05		
OR					
10	a	Write the structure of 24-bit carry skip Adder and worst-case carry propagate for Carry Skip Adder and explain with necessary equations.	05	CO2	L1, L2, L3
	b	Explain Carry Look Ahead Adder in detail.	05		

Bloom's Taxonomy: L1: Remembering L2: Understanding L3: Analyse
Course Outcomes: CO2: Knowledge of physical design aspects

"Education is the passport *to the future, for tomorrow belongs to* those *who prepare for it today."*

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Sub Code : 17EC63
VLSI Design

II nd Internals

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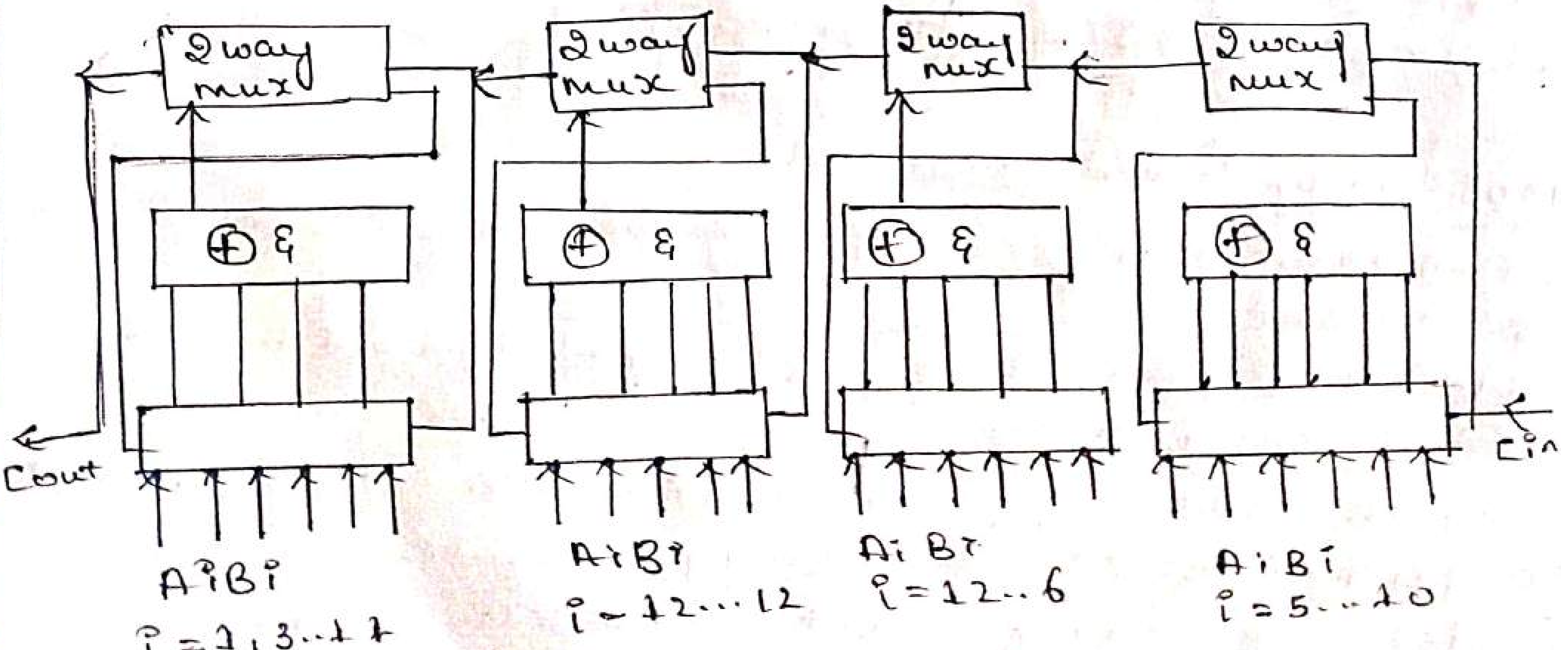
CHANDANA.R

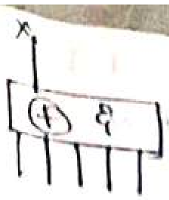
10a] In a Ripple carry adder, if the input bits Ai and Bi are different for all position i, there the carry Signal is propogated at all positions, and the additional is completed when the carry Signal has propogated through the whole adder.

-> In this Case, the ripple carry adder is as Slow as it is Large Actualy Ripple carry address are part only for. Some configuration of the input words, where carry signals are generated at some positions.

-> carry skip address take advantages both the generation or the propogation of the carry Signals.

-> If in the block if A and B bits often differ then the output i.e block propogation Signal = 1. If it is 1 then carry Entering the block can by pass and transmit the carry to the block through multiplexer.

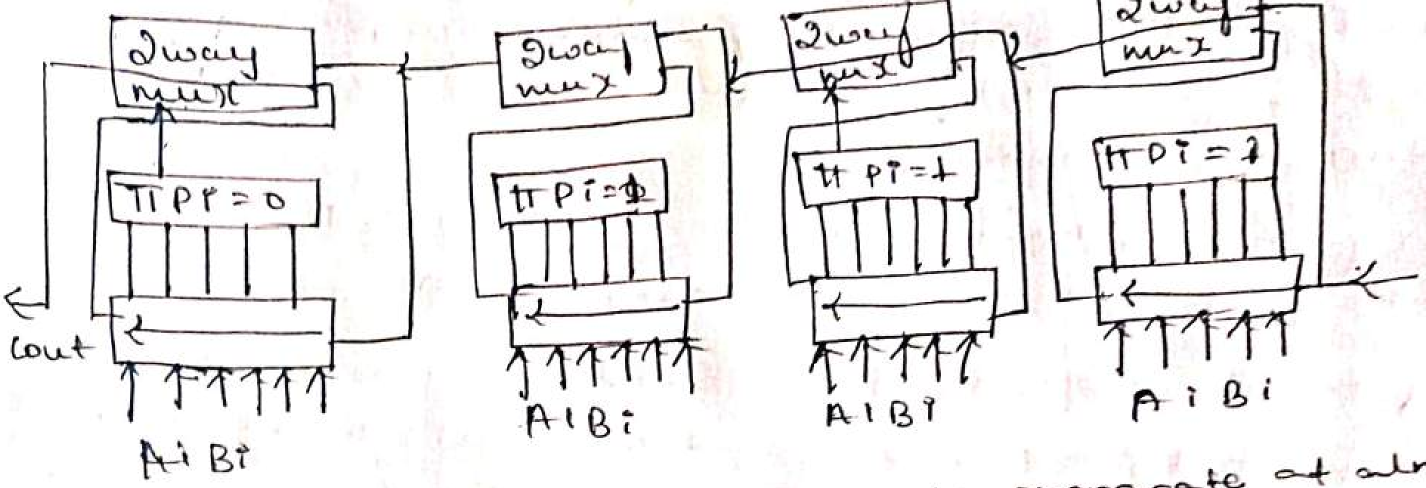




This block complex $(A5 \oplus Bn)(A4 \oplus B4) \cdots (A5 \oplus A6) = \Pi P_i$ in each 6-bit block

→ Worst-case carry propagation for carry skip adder

The configuration of the input words for the worst case is such that a carry signal is generated at the beginning of the first block. This carry signal is propagated by the succeeding adder case but the last which generate another carry signal.



→ In those blocks the carry signals propagate at almost simultaneously

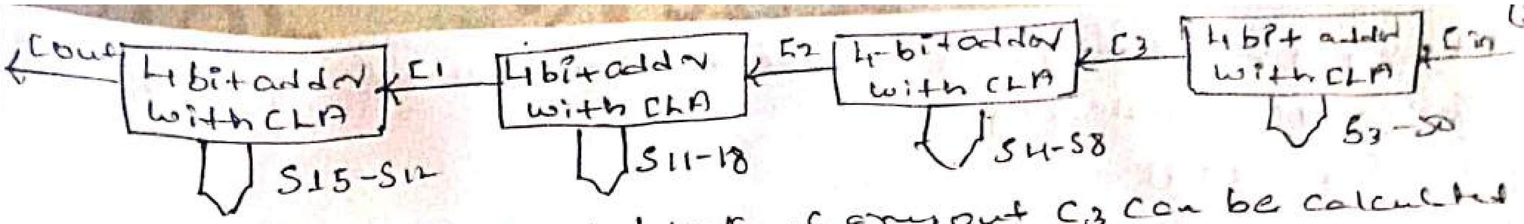
→ for the above condition the time to compute addition is given by $\boxed{T = 2(p-1)K1 + (m-2)K2}$

(10b) Carry look ahead adder

→ This is another method to improve the throughout time of adder

→ Here the prediction of carry is done and based on the designing is done

→ with the carry generate $GK = AKBK$ and carry propagate $PK = (AK \text{ XOR } BK)$ Cin the carry propagation can be avoided and carry output can be calculated.



→ Considering the first block, carryout C3 can be calculated as follow $C_{out} = G_i + P_i C_{in}$

Thus for the first bit in first adder block is given by

$C_0 = G_0 + P_0 C_{in}$

IIly for 2nd bit is given by

$C_1 = G + P_1 G_0$ using C_0 in the Equation for C_1

$C_1 = G_1 + P_1 G_0 + P_1 P_0 C_{in}$

3rd bit it is given by

$C_2 = G_2 + P_2 C_1$ using Equation for C_1

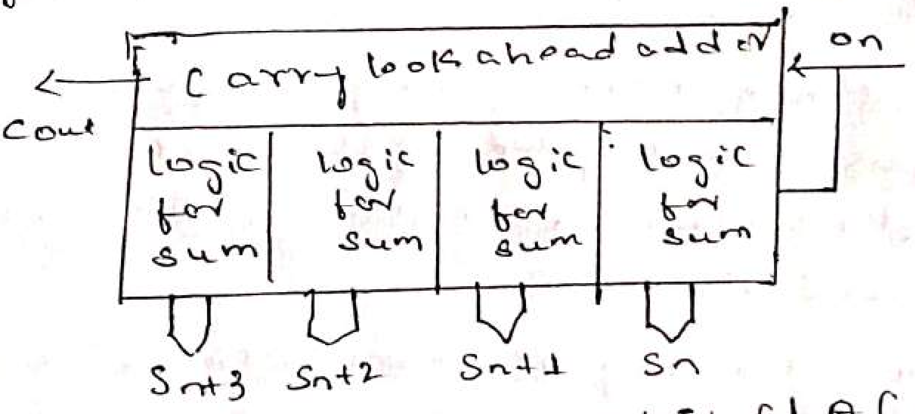
$C_2 = G_2 + P_2 C_{in} + P_2 P_1 G_0 + P_2 P_1 P_0 C_{in}$

for 4th bit it is given by.

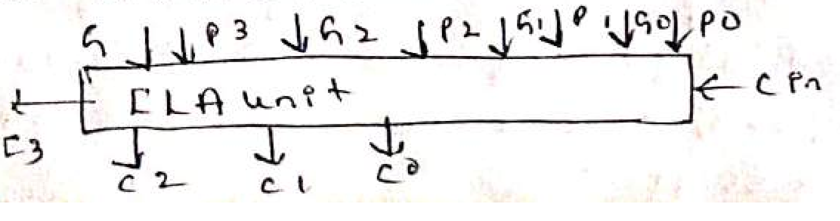
$C_3 = G_3 + P_3 C_2$ using C_2 Eqn for C_3 $+ P_3 P_2 P_1 P_0 C_{in}$

$C_3 = G_3 + P_3 G_2 + P_3 P_2 G_1 + P_3 P_2 P_1 G_0 +$

→ from the above Equation we see that carryout C3 can be calculated in prior without the need of need of carry being propogated through the adder cells



→ Each adder block has a 4 bit CLA (carry look ahead) unit and is shown below



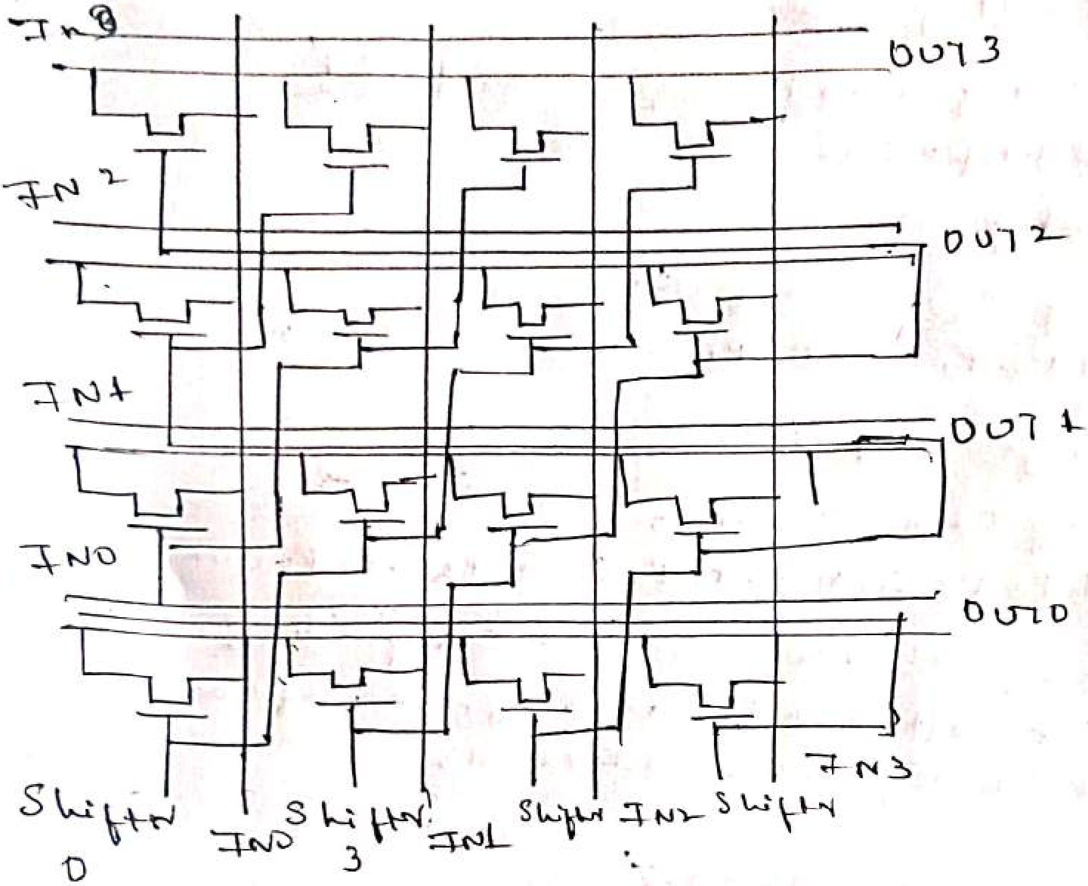
→ Thus to increase the speed, the Expression for C_3 can be written as

$$C_3 = \gamma + \pi$$

Where $\pi = P_3 P_2 P_1 P_0 C_{in}$ and

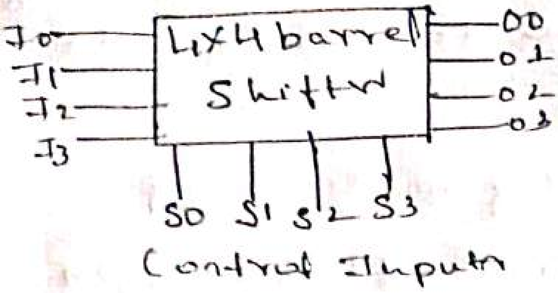
$$\gamma = G_3 + P_3 G_2 + P_3 P_2 G_1 + P_3 P_2 P_1 G_0$$

⑧ 4X4 barrel Shifter :-



→ The inter bus switches have their gate inputs connected in a stair case fashion in group of the four and there are now four Shifter control inputs which must be mutually Exclusive in the active state.

→ CMOS transmission gates may be used inplace of the simple pass transistor switches if appropriate Barrel shifter connects the Input lines representing a word to a group of output line with the required shift determined by its Control Inputs (sh0, sh1, sh2, sh3) control I/P also determines the direction of the Shifter.



SH0	SH1	SH2	SH3	SH4
O0	O1	O2	O3	O0
O1	O2	O3	O2	O1
O2	O3	O0	O1	O2
O3	O0	O1	O0	O3

⑥ The two Scaling factors $1/\alpha$ and $1/\beta$

- $1/\beta$ is chosen as the Scaling factor for supply voltage VDD and gate oxide thickness D.
- $1/\alpha$ is used as Scaling factors the other linear dimension.

Scaling factors for all the device parameters.

- Gate area (Ag)
- Gate capacitance per unit Area Co or Cox
- gate capacitance Cg
- parasitic Capacitance Cx
- carrier density in channel Qon
- Channel Resistance Ron
- gate delay Td
- maximum operating frequency fo
- saturation Current Idss
- Current density J
- Switching Energy per gate Eg
- power dissipation per gate pg
- power dissipation per unit pa
- power-speed product PT.

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① Sheet resistance concept applied to MOS transistor and inverters.

Consider a uniform slate of conducting material of resistivity 'ρ', of width 'W', thickness 't' and length between faces L. The arrangement is show in fig bellow

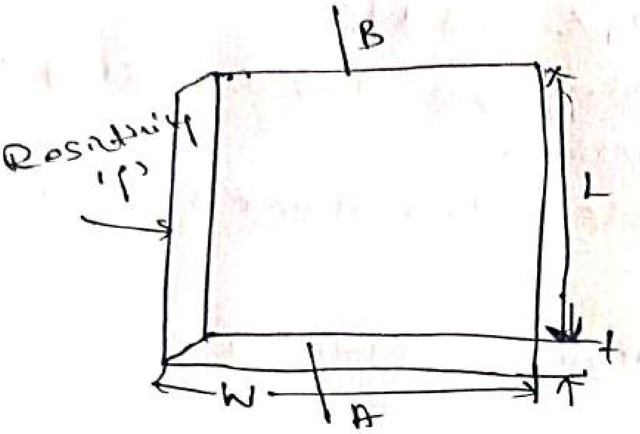


fig: Sheet resistance model

→ Consider the resistance RAB between two opposite faces

W.K.T $R_{AB} = \frac{\rho L}{A}$ Ω

where A → Cross-section area = t*W

Thus $R_{AB} = \frac{\rho L}{tW}$ Ω → ①

→ Consider a sequence of resistive material in which L = W, then

$R_{AB} = \frac{\rho}{t} = R_S$

Thus $\boxed{R_S = \frac{\rho}{t}}$ Ω per square

where Rs = Sheet resistance / ohm per square.

∴ Eqn ① can be rewritten as $\boxed{R_{AB} = R_S \frac{L}{W}}$

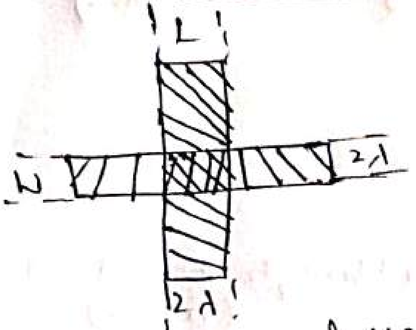
→ Thus, RS is completely independent of the area of the square material and the actual values associated with layer in cMOS ckt depend on the thickness of the layer and the resistivity of the material forming the layer

→ Typical values of sheet resistance for 5μm technology is listed below is table.

Layer	Rs (ohm per square) 5 µm technology
① Metal	0.03
② Diffusion (n+) [For p+ = 2.5 mΩ]	10 → 50
③ Poly silicon	15 → 100
④ n-Channel transistor	10^4
⑤ p-Channel transistor	2.5×10^4

Sheet resistance concept applied to MOS transistor &

Inverter :



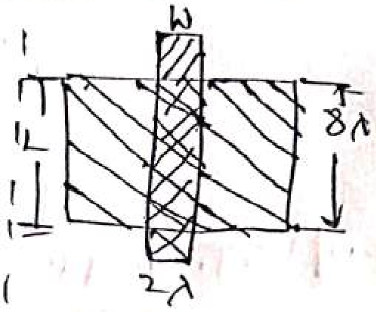
n-Channel MOSFET

$R = R.S \frac{L}{W}$

$= 10^4 \frac{\Omega}{\text{Square}} * \frac{2\lambda}{2\lambda}$ (Rs = $10^4 \Omega$ from table)

$= 10^4 \Omega$

$\boxed{R = 10 k\Omega}$



Z → aspect ratio

$\boxed{Z = \frac{L}{W}}$

$R = Rs * \frac{L}{W} = Rs * Z$

$= 10^4 \frac{\Omega}{\text{sqr}} * 4$ $\quad Z = \frac{L}{W} = \frac{8\lambda}{2\lambda} = 4$

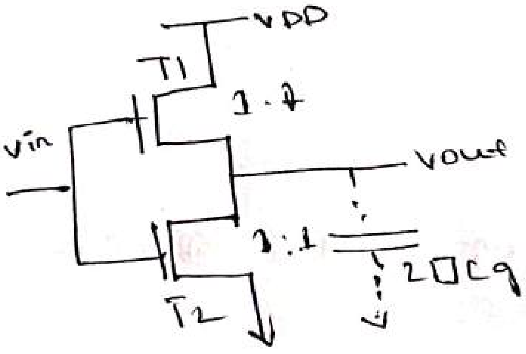
$\boxed{R = 4\times10^4 \Omega}$

(or)

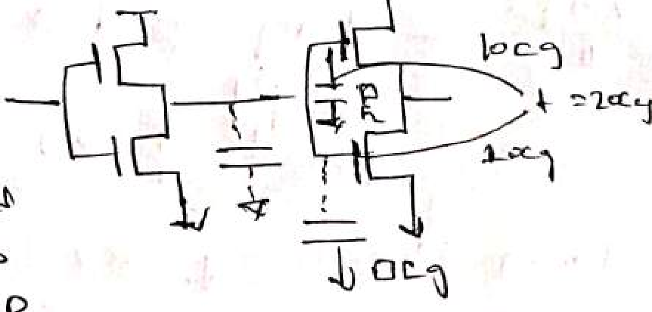
40kΩ

④ CMOS inverter delay :

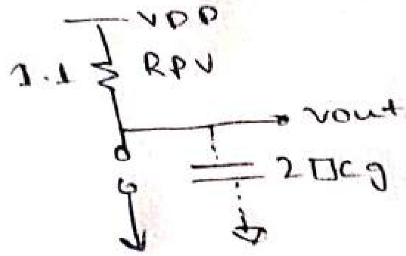
Consider the basic 1:1 CMOS inverter as shown below



(∵ Assuming the o/p is connected to another CMOS inverter, since o/p is connected to '2' gate input, we get 2□Cg as capacitance also)



Case 1: $\boxed{V_{in} = 0V}$ → T1 → on, T2 → off ∴ Equivalent ckt



∴ The Capacitance charge, through pull-up (pmos)

The charging time is found as follow

$$T_{charge} = R_{pu} * 2\square C_g$$

$$= R_s * \frac{L_{pu}}{W_{pw}} * 2\square C_g$$

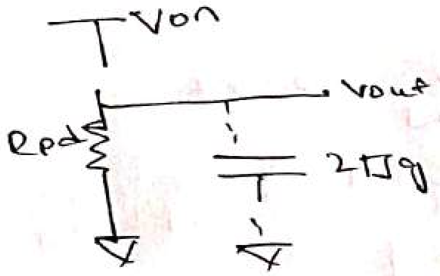
$$= 2.5 R_s * \frac{1}{1} * 2\square C_g \quad (R_s \text{ of pmos} = 2.5 R_s \text{ of nmos})$$

$$= 2.5 R_s * \frac{1}{1} * 2\square C_g$$

$$= 5 \underbrace{R_s \square C_g}_{\tau}$$

$$\boxed{T_{charge} = 5\tau}$$

Case 2: $\boxed{V_{in} = V_{DD}}$ → T1 → off & T2 → ON



The capacitance discharge, through pulldown (n mos)

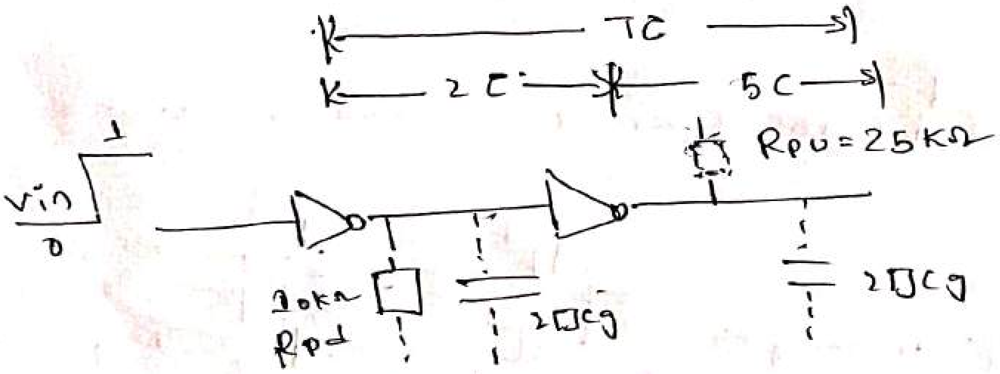
$$T_{discharge} = R_{pd} * 2\square C_g$$

$$= R_s * \frac{L_{pd}}{W_{pd}} * 2\square C_g = R_s \frac{1}{1} 2\square C_g$$

$$= 2 \underbrace{R_s \square C_g}_{\tau}$$

$$\boxed{T_{discharge} = 2\tau}$$

→ Consider min size CMOS inverter pair delay



Thus the delay over the pair of CMOS inverter is (7τ) irrespective of the input.

1	C	E							

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THIRD INTERNAL TEST (ONLINE)

Branch: **E&C** **Date: 03-08-2021**
Sub Name: VLSI Design **Time: 10:30AM-12:00 PM**
Sem: **VI** **Max Marks: 50**
Duration: **1 ½hrs.**

Note: Answer all Questions selecting any ONE FULL question from each part.

Q No.	**Sub Q No.**	**Question**	**Marks**	**CO's**	**BT'S**

PART-A

1		List the various steps in designing VLSI subsystems.	**10**	**CO6**	**L1, L2, L3**
		OR			
2		Explain Parity Generator in detail with relevant figures and stick diagram.	**10**	**CO6**	**L1, L2, L3**

PART-B

3	**a**	Explain Pseudo-nMOS Logic with figures.	**05**	**CO6**	**L1, L2, L3**
	b	Explain Dynamic CMOS logic with figures.	**05**		
		OR			
4		Explain Clocked CMOS logic and CMOS Domino logic with relevant figures.	**10**	**CO6**	**L1, L2, L3**

PART-C

5	**a**	Explain the role of FPGA.	**05**	**CO4**	**L1, L2, L3**
	b	What are the goals and techniques of FPGA based design system?	**05**		
		OR			
6		Write FPGA Fabric and explain the architecture.	**10**	**CO4**	**L1, L2, L3**

PART-D

7		Explain the Placement phase of Physical design for FPGAs.	**10**	**CO4**	**L1, L2, L3**
		OR			

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8		Explain the Routing phase of Physical design for FPGAs.	**10**	**CO4**	**L1, L2, L3**

PART-E

9		List system Timing considerations. What are the factors considered for assessing memory elements?	**10**	**CO3**	**L1, L2, L3**
		OR			
10	a	Explain three transistors dynamic RAM cell.	**05**	**CO3** **CO5**	**L1, L2,L3**
	b	Explain various manufacturing test principles.	**05**		

Bloom's Taxonomy:L1: Remembering L2: Understanding L3: Analyse

Course Outcomes: CO3: Interpret Memory elements along with timing considerations

CO4: Demonstrate knowledge of FPGA based system design

CO5: Interpret testing and testability issues in VLSI design

CO6: CMOS subsystems and architectural issues

ALL THE BEST

A strong, positive self –image is the best possible preparation for success

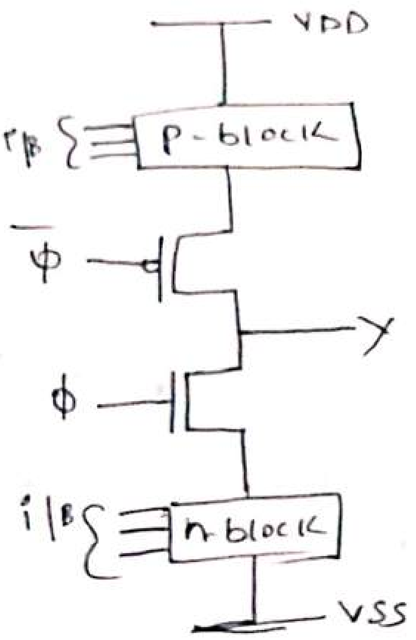
Sub Code: 17EC63 1CE17EC018

VLSI CHANDANA.R

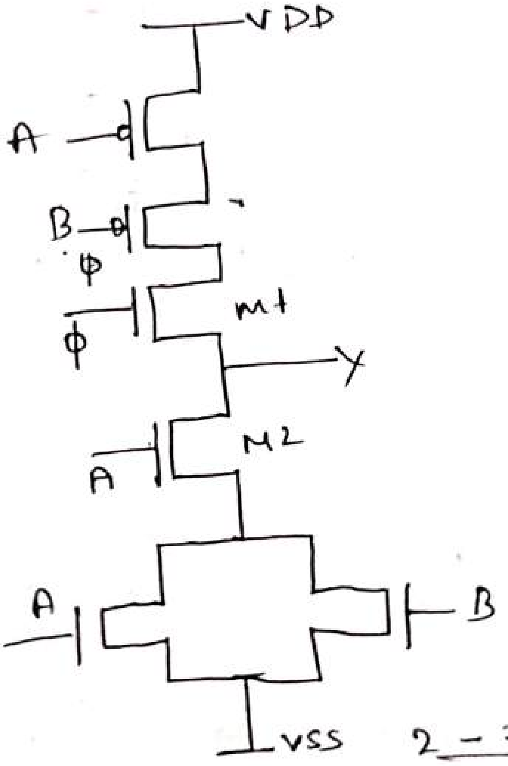
IIIrd Internals

④ CLOCKED CMOS (C²MOS) logic:

-> The logic is implemented in both n- and p-transistors in the form of a pull up p-block and a complementary n-block pull-down structure. Two additional transistors M1 (pMOS) and, M2 (nMOS) are introduced as shown.



general schematic



2-i/p NOR gate

-> The gates of the transistors M1 & M2 are connected to $\bar{\phi}$ and ϕ respectively. The transistors M1 & M2 will be either ON and OFF simultaneously.

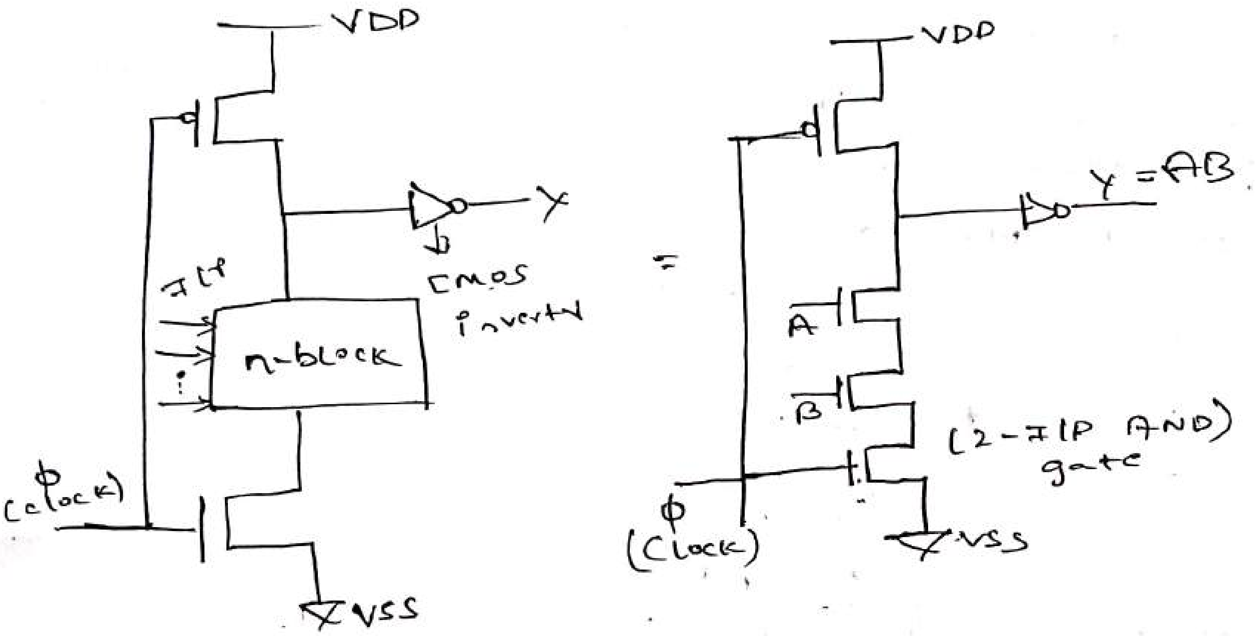
-> The logic is evaluated during the ON period of the clock.

-> During the OFF period the clock, both the transistors M1 & M2 are OFF and the o/p from the CMOS logic is connected to the output. Therefore the o/p is tristate load capacitive pervious value.

-> The additional transiton in service with the o/p causes the rise times and fall time to increase more delay.

CMOS DOMINO LOGIC:

-> The logic is an extension of dynamic CMOS logic. The o/p is connected through an inverter as show in fig.



-> This modified arrangement allows for the cascading of logic structure using a single phase clock.

-> When φ=0, the output node of the dynamic CMOS stage is precharged to a high logic level and the o/p of the CMOS inverter becomes low

-> When φ=1 i.e when the clock signal rise at the beginning of the evaluation phase, there are 2 probabilities; the o/p node of the dynamic CMOS stage is either discharged (1->0) to a low level through the nMOS circuitry (n-block) or it remain high.

-> Domino CMOS logic gates allows a significant reduction in the number of transistors and they have smaller area than CMOS logic.

④ System timming consideration and are the factors ③
considered for assessing memory Elements.

System Timing considerations

-> A two-phase non-overlapping clock signal is assumed
to be available, and this clock will be used throughout
the system

-> clock phases are identified as ϕ_1 & ϕ_2 where ϕ_1 is
assumed to lead ϕ_2.

-> Bits or data to be stored are written to registers,
storage Elements on ϕ_1 of the clock, i.e write signals
(WR) are AND with ϕ_1

-> Bits or data written into storage Elements may be
assumed to have settled before the immediately following
ϕ_2 signal ϕ_2 signals may be used to refresh stored
data where appropriate.

-> Delays through data paths, combinational logic, are
assumed to be less than the interval b/w the rising edge
of ϕ_1 and during Edge of ϕ_2 signal

-> Bits or data may be read from storage Elements on the
ϕ_1 of the clock. Read signals (RD) are ANDed with ϕ_1
RD and WR are mutually exclusive.

-> for system stability, there must be atleast one clocked
storage Elements in series with every closed loop signal path

④

Some commonly used Storage / memory Elements

The Storage Elements are compared based on three parameters

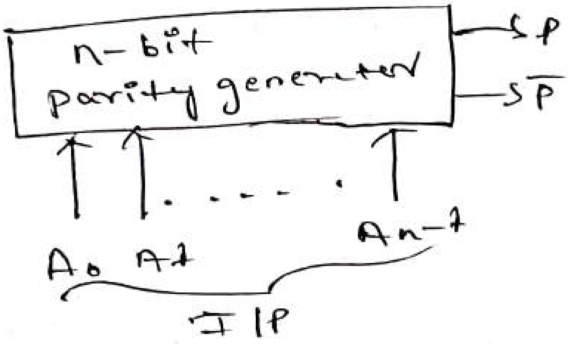
① Area requirment
② Estimated dissipation per bit Stored
③ volatility.

② parity Generator :

→ parity indicates the number of 1's in a given input data

→ The design of a parity generator for an n-bit I/P data is presented.

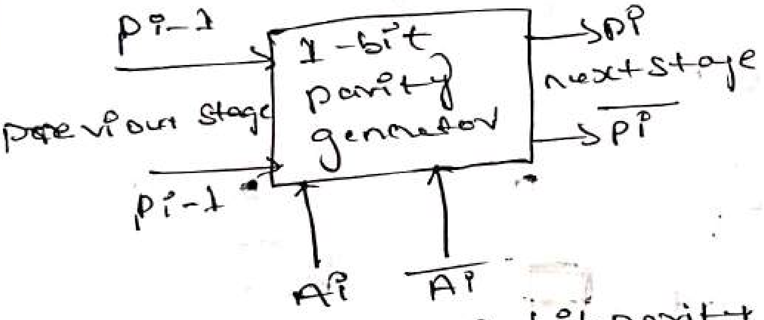
→ The basic block diagram of an n-bit parity generator is as shown



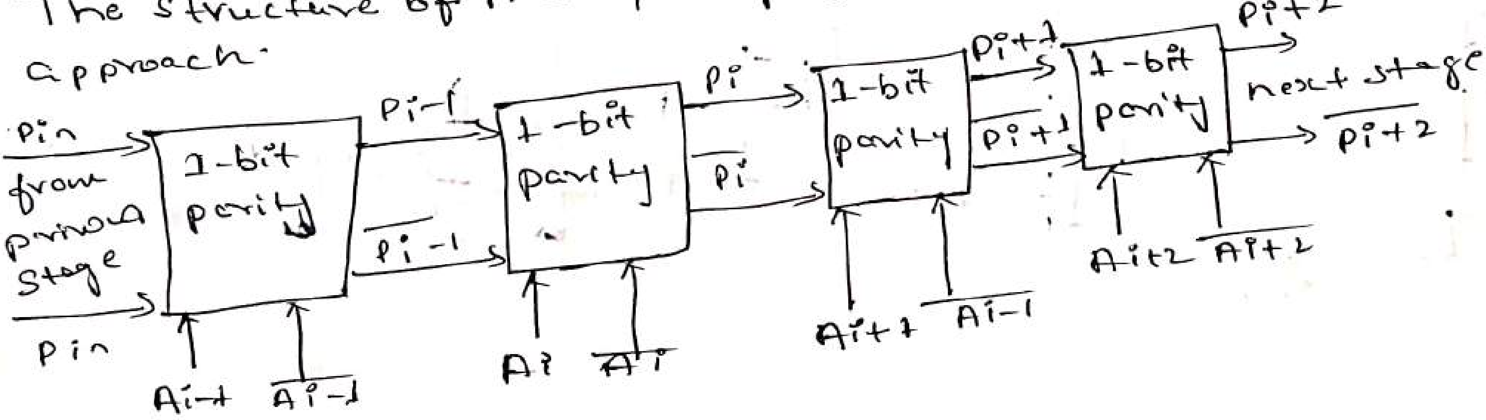
P = 1, even number of 1's at I/P

P = 0, odd number of 1's at I/P

→ The n-bit parity generator is realized using 'n' numbers of standard basic one-bit cell, such a cell is shown below



The structure of n-bit parity generator - structural design approach.



Pin = 1 → to set Even parity.

Pin = 0 → to set odd parity.

→ The parity information is passed from one cell to the next cell.

→ The parity is modified depending on the state of the I/P lines Ai & Ai

→ The function table of the parity generator can be written as follows.

Pi-1	Status	Ai	Pi	parity
0	previously odd parity recognized	0	0	odd
0		1	1	even
1	previously even parity recognized	0	1	even
1		1	0	odd

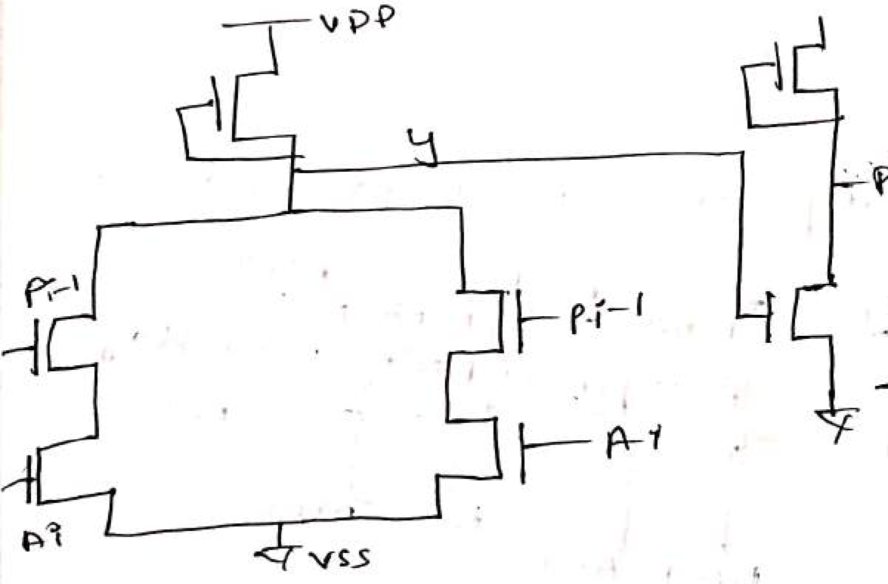
⇒

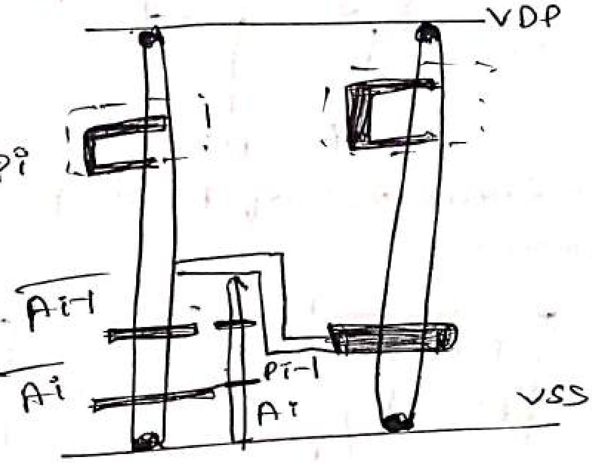
PAi-1	Ai	Pi
0	0	0
0	1	1
1	0	1
1	1	0

→ The expression for $P_i = \overline{P_{i-1}} A_i + P_{i-1} \overline{A_i}$, which is an XOR expression

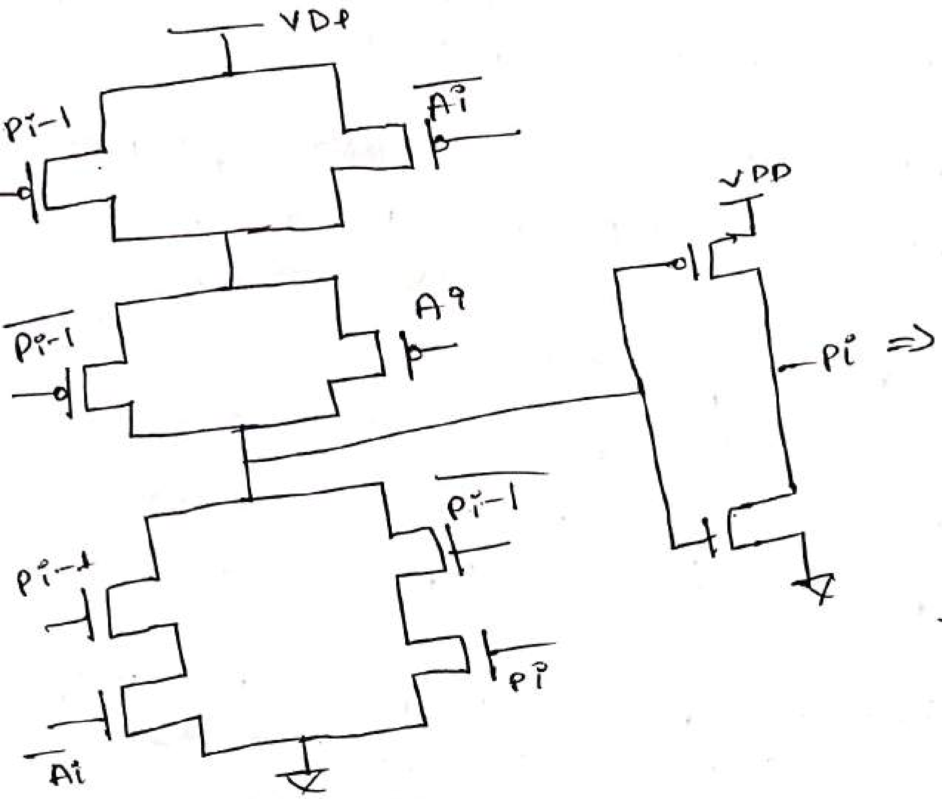
nMOS ckt realization and stick diagram for 'Pi'

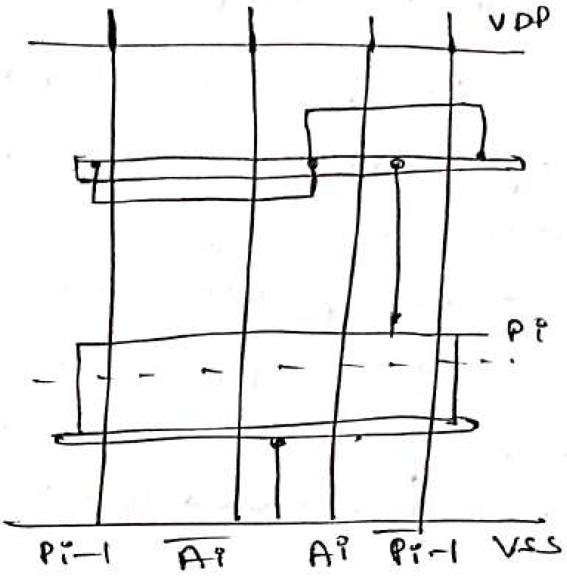
$P_i = \overline{P_{i-1}} A_i + P_{i-1} \overline{A_i} = P_{i-1} \oplus A_i$





CMOS Ckt realization & stick digm for pi





5a) The role of FPGA :

-> field-programmable gate arrays (FPGAS) fill a need in the design of digital Systems, complementary to the roled played by microprocessor.

-> microprocessors can be used in variety of Environments by connecting them together in order to implement functions. The combination of logic & interconnect in a regular structure known as a fabric because it possessed design tools that that can be efficiently utilized by map the desired logic onto the FPGA.

-> The FPGAS program in interwoven into the logic structure of the FPGA.

-> An FPGA does not fetch instructions. The FPGAS programming directly implements logic functions & interconnections.

(8)

(5b) Performance : logic must run at required rate. It is measured in many ways, such as throughput and latency. Clock rate is often used as measure of performance.

Power/Energy : The chip must run within an energy or power budget. Energy consumption is critical in battery powered systems. Even if the system is to run off the power grid, heat dissipation costs money and must be controlled.

Design time : FPGAs have standard parts and have several advantages in design time. They can be used as prototypes, can be programmed quickly and can used as part in final design.

Design cost : design time is one important components in design cost, but other factors such as required support tools may be considered. FPGA tools are less expensive than custom VLSI tools.

Manufacturing cost : It is the cost of replicating the system many times. FPGAs are generally more expensive than ASICs due to overhead of programming. But the fact that they are standard parts helps to reduce their cost.

(8) Routing selects paths for the connection that must be made b/w the logic elements and to the I/O pads. In an FPGA interconnection resources are predetermined by the architecture of the FPGA fabric.

Routing is generally into two phases :

(i) Global routing : Selects the general path through the chip but does not determine the wire segments to be used.

(ii) Detailed routing : Selects the exact set of wires to be used for each connection.

-> Routing has two major cost metrics : wire length and delay.

-> wire length approximates the utilisation of routing resources. It is good to avoid using more routing resource than are necessary for the wires, since we may want to use those routing resources later for other parts of the design.

-> main job during global routing of FPGA is to balance the requirements of various nets.

-> Nets are routed one at a time, so the order in which nets are routed affects the final result.

-> A net may have one of two problems

* It may not be routable at all because there is no room available to make the connection
* It may take a path that incurs too much delay.

CITY ENGINEERING COLLEGE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

First Assignment

VLSI Design (17EC63)

Sem:6th Sec:B

1.With Cross-sections and symbols, explain nMOS and pMOS transistors.

2.Explain Accumulation, Depletion and Inversion layers with respect to MOS Transistor with neat figures.

3. With Suitable diagrams explain the three regions of operation of Enhancement mode NMOS transistor.

4. Derive a first order expression $\mathbf{I_{ds}}$ relating the current and voltage (I-V) for an NMOS transistor in Linear region and saturation region.

5.Explain the following: a) Channel length modulation b) Beta Ratio Effects

6. Derive the CMOS inverter DC characteristics graphically from p device and n device characteristics and show all operating regions.

7. Explain nMOS fabrication.

8. Explain the fabrication steps of CMOS p-well process with neat diagram and write the mask sequence

9. Explain the fabrication steps of CMOS n-well process with neat diagram and write the mask sequence

10. Write a note on Twin-Tub process

11. Write the Cross section of BiCMOS process and explain

12.Distinguish between CMOS Technology and BiCMOS technology.

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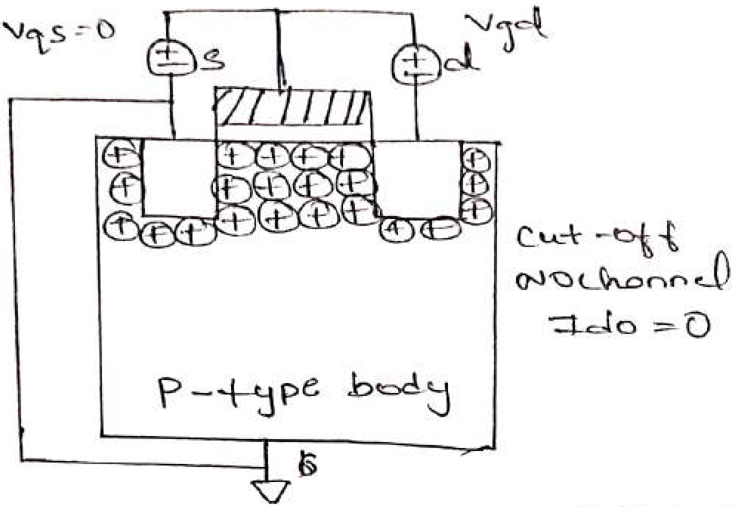
VLSI 1CE17EC018

Assignment - 1 Chandana.R

① Write cross-Sectional aud Symbols, Explain nMos and PMos trasistors ?

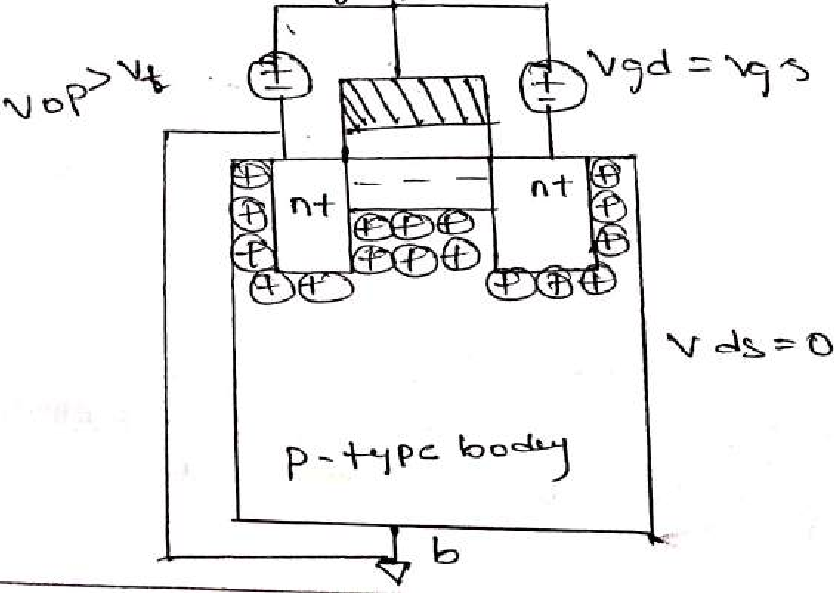
-> fig Shows an nMos transiztors with granded Source & p-type body. The transistor consists of Mos stack b/w the 2 '-ve' regions called the Source and drain

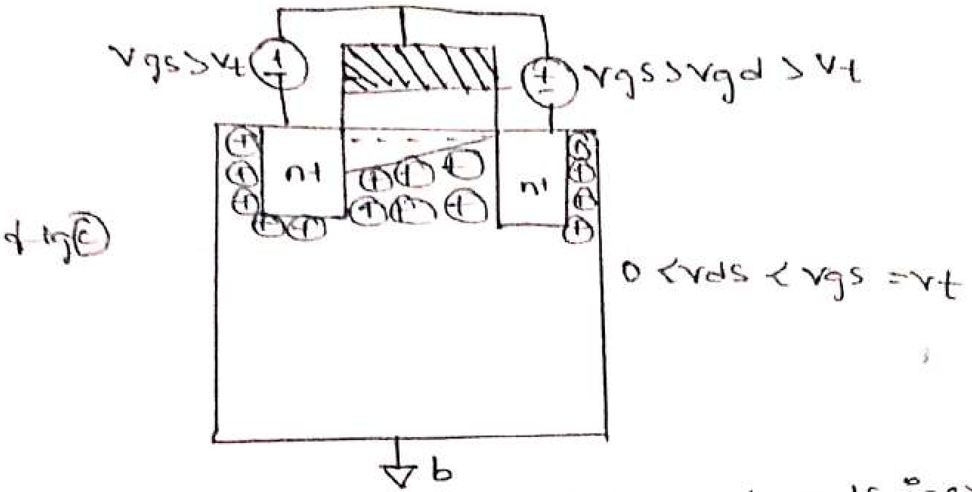
fig ⓐ



In fig ⓐ the gate to source voltage Vgs is less than thereshol voltage. The source & drain have free Electrons. The body ha free holes but no free Electrons The function b/w body & the Source or drain are reverse biased, so almost zero current flows. This mode of operations is called Cut-Off.

fig ⓑ

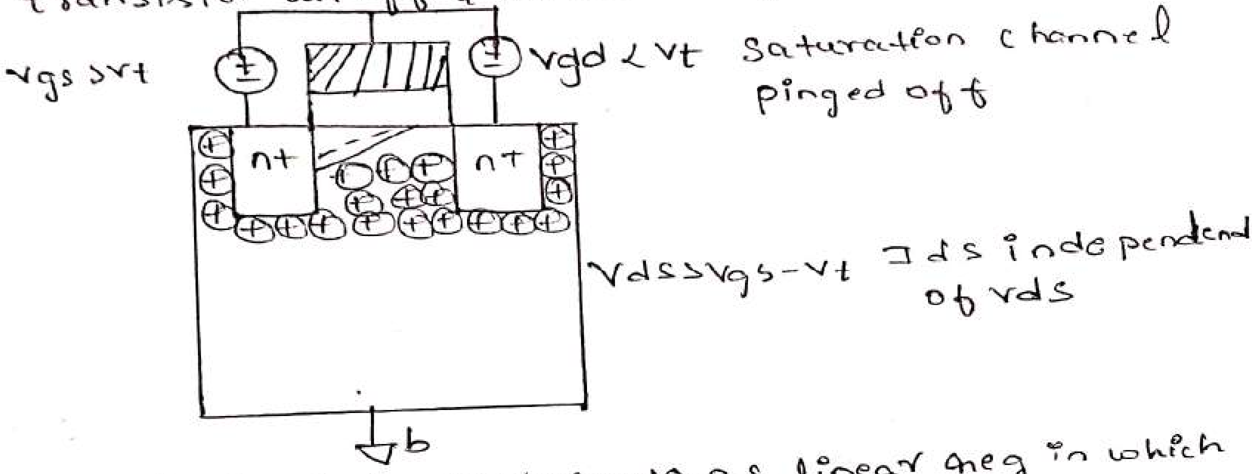




This both fig has Linear channel formed I_{ds} increases with V_{ds}

nMOS transistor has 3 modes of operations

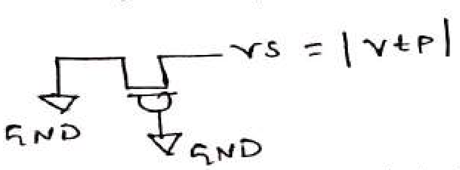
i) $V_{gs} < V_t$: transistor cut off & no current flows.



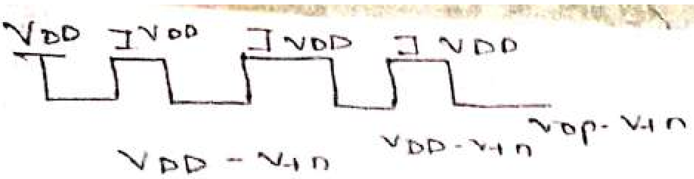
ii) $V_{gs} > V_t$ & V_{ds} is Small transistor acts as Linear reg in which current flows in proportional to V_{ds}

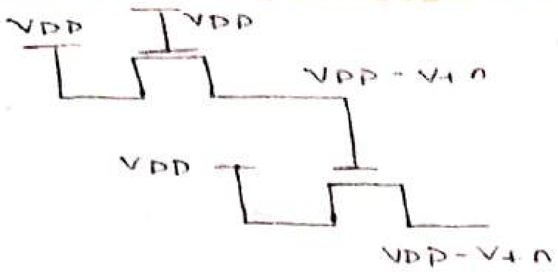
iii) $V_{gs} > V_t$ & V_{ds} is large in transistor acts as a current Source in which the current flow becomes independent of V_{ds}.

=> pMOS transistor

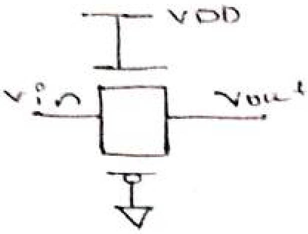


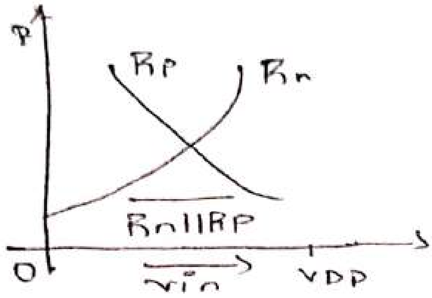
pMOS transistor pass '1' s well but '0's poorly of the pMOS Source drops below $|V_{tp}|$ the transistor cut off. Hence pMOS transistor only pull down to with in a threshold above gnd.





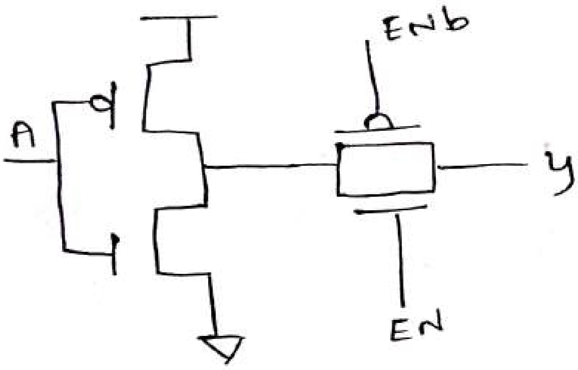
Transmission gate

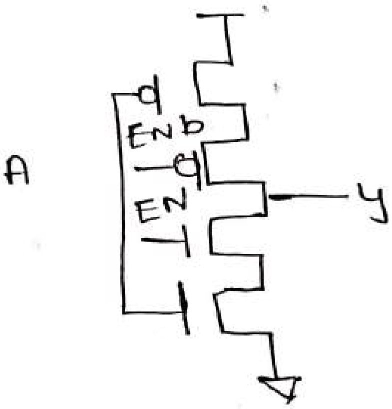




Transmision gate consists of an nmos transistors and a PMOS transistor in parallel with gates Controlled by complemen-tary signals when the transmission gate is ON, at least one of the two transistor is ON for any output voltage and hence the transmission gate passes both '0's & '1's the transmission gate acts as a voltage controlled resistor connecting the input and the output.

Tristate inverter





② Explain Accmulation deplection and imussion layer wit respect to Mos transistor with neat fig

-> A negative voltage is applied to the gate so there is -ve charge on the gate. The mobile positively charged hole are attracted to the regions beneath the gate This is calle the accumulater mode.

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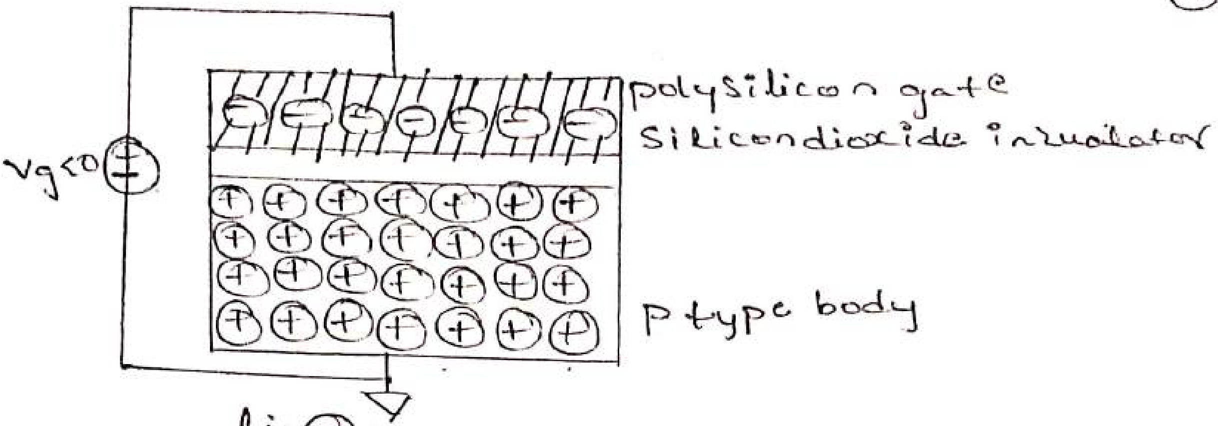


fig ⓐ: Accumulator

A low '+ve' voltage is applied to the gate, resulting in some positive charge on the gate. The holes in the body are repelled from the region directly beneative the gate, resulting in a depletion region forming below gate.

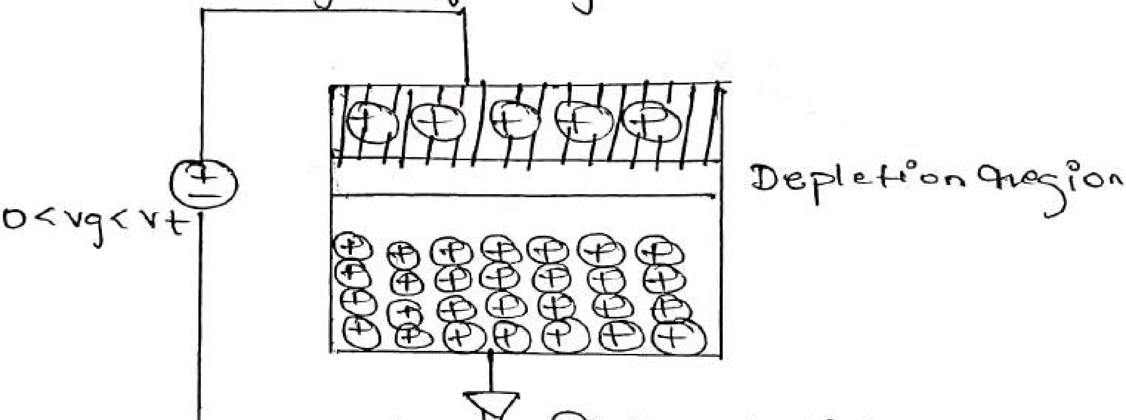


fig ⓑ: Deplection

A higher '+ve' potential exceeding a critical threshold voltage Vt is applied, attracting more positive charge to the gate. This conductive layer of electrons in the ptype body is called the inversion layer

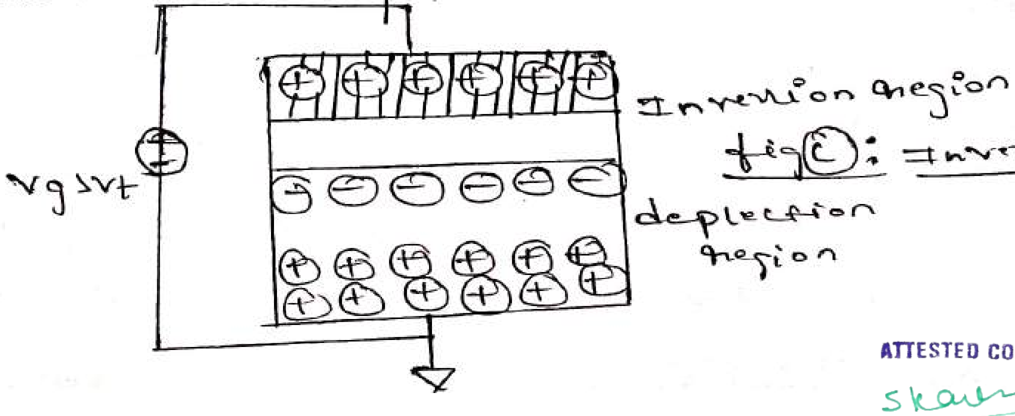
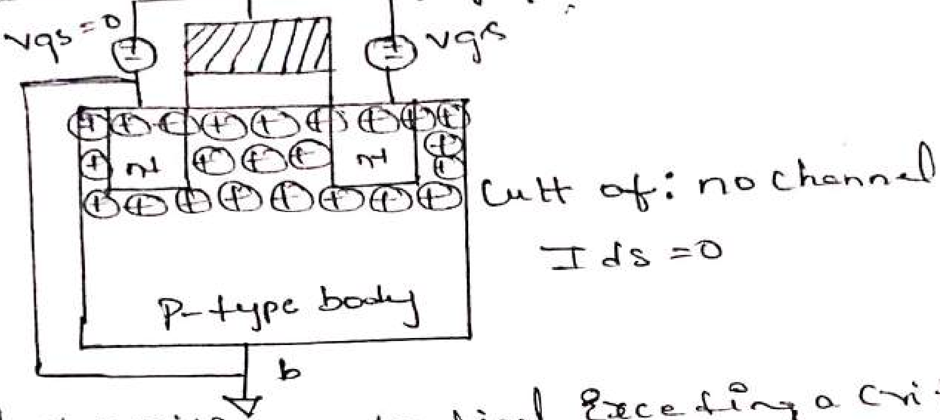


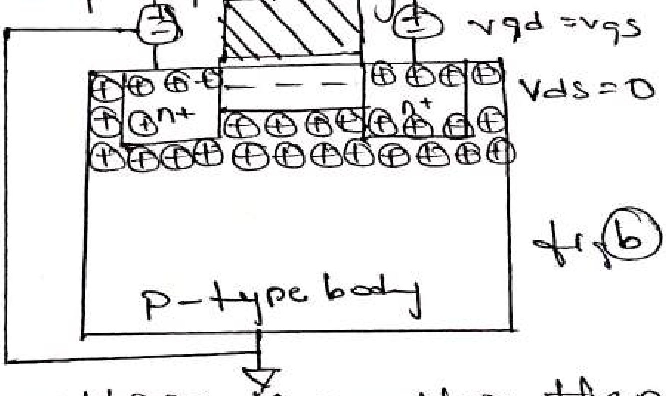
fig ⓒ: Inversion

③ Write Suitable diagrame Explain the three regions Operation of Enhancement mode NMOS transistors?

-> When gate-to-source voltage Vgs is less than threshold voltage and if source is grended, then the junction b/w the body and the source or drain are Sero-biased of reverse-biased and no current flows we say the transistor is off and this mode of operation is called cut off. This is shown in below fig.



when a higher positive potential Exceding a critical: threshold voltage vt is applied. the holes are replaced further and some free Electrons in the body are attracted to the region beneeative the gate. This results a layer of Electrons in the p-type body is called the Inversion layer.



fig(b)

when the gate voltage is greather than the threshold voltage an inversion region of Electrons Called the Channel connects the source and drain creating a conductive path and turning the transistor ON as shown in fig(b) The number of carrier and the conductivity increases with the gate voltage. The potential difference b/w drain and source is Vds = Vgs-Vgd If Vds=0, there is no elective field trending to pull current from drain to Source

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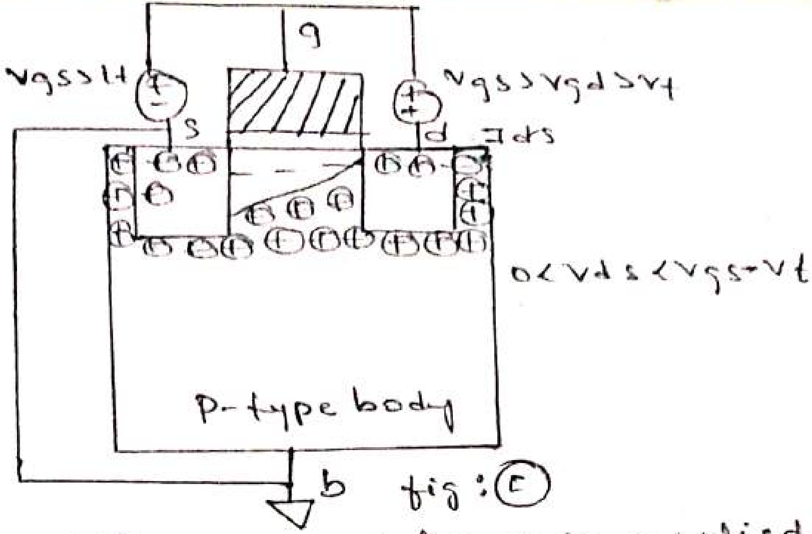


fig: Ⓔ

When a small positive potential Vds is applied to the drain current Ids flow through the Channel from drain to Source. This mode of operation is termed Linear, resistance, triode, nonsaturated, or insaturated mode as shown

⑪ Derive a first order Expression Ids relating the current and voltage (I-V) for an NMOS transistor in Linear region and saturation region.

→ In cut-off region ($V_{gs}<V_t$). There is no Channel and almost zero Current flows from drain to Source. In the other region, the gate attracts carrier to form a channel. The e⁻ drift from Source to drain at a rate proportional to the Electric field b/n these region.

$$Q = CV$$

charge in the Channel i.e $Q_{channel} = C_g(V_{gc}-V_t)$

where C_g → capacitance of gate of a channel

$V_{gc}-V_t$ → amt of voltage attracting charge to the Channel beyond the min required to invert from p to n

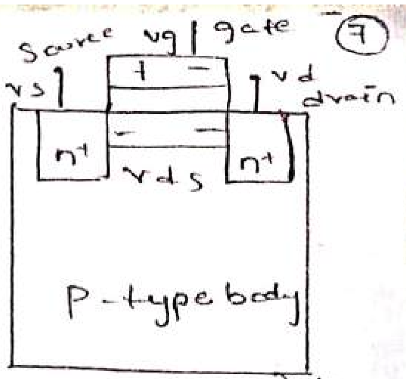
Gate voltage is not graded. If source is at V_s & drain is at V_d

$$V_c = \frac{V_s+V_d}{2} = V_s + V_{ds}/2$$

The mean diff b/w the gate & channel potential V_{gc} is

$$V_{gc} = V_{gs} - V_{ds}/2$$

We can model gate as a ||el plate capacitor with capacitance proportional to area over thickness. If the gate has length 'L' & width 'w' & the oxide thickness is tox



$$C_g = E_{ox}\frac{wL}{t_{ox}} \quad \text{where} \quad \frac{E_{ox}}{t_{ox}} = C_{ox}$$

$$V_{gc} = (V_{gs} + V_{gd})/2$$

$$V_{gc} = V_{gs} - V_{ds}/2$$

Such carrier in the channel is accelerate to an average velocity proportional to the lateral electric field in field b/w source & drain. Mobility (μ) → constant of proportionality

$$V = \mu E$$

where E → electric field is voltage diff b/w drain & source Vds divided by length i.e

$$E = \frac{V_{ds}}{L}$$

$\text{Time} = \frac{L}{V}$ So: Current b/w S & D is total a net of charge in the channel div by time required to cross

$$I_{ds} = \frac{Q}{t} \Rightarrow I_{ds} = \frac{Q_{channel}}{L/V}$$

$$= \frac{C_g(V_{gc} - V_t)\cdot V}{L}$$

$$= \frac{E_{ox}\cdot wL}{t_{ox}\cdot \cancel{L}}\left(V_{gs} - \frac{V_{ds}}{2} - V_t\right)\mu E$$

$$= \mu C_{ox} W \left\{V_{gs} - V_t - \frac{V_{ds}}{2}\right)\frac{V_{ds}}{L}$$

$$= \mu C_{ox}\frac{W}{L}\left(V_{gs} - V_t - \frac{V_{ds}}{2}\right)V_{ds}$$

$$= \beta\left(V_{gs} - V_t \cdot \frac{V_{ds}}{2}\right)V_{ds} \; ; \text{ where } \beta = C_{ox}\cdot\frac{W}{L}\mu$$

$$\boxed{I_{ds} = \beta\left\{(V_{gs} - V_t)V_{ds} - \frac{V_{ds}^2}{2}\right\}} \rightarrow Ⓐ$$

$$K' = \mu C_{ox}$$

Eqn Ⓐ is for linear region

However, if Vds > Vds at ≃ Vgs − Vt, the channel is no longer inverted in the vicinity of the drain

Substituting vds = vgs − vt in Equn (A) we get

$$I_{ds} = \beta\left\{(v_{gs}-v_t)(v_{gs}-v_t) - \frac{(v_r - v_t)^2}{2}\right\}$$

$$\boxed{I_{ds} = \frac{\beta}{2}(v_{gs}-v_t)^2} \rightarrow (b)$$

Equn (b) in for saturation region.

⑤ Explain the following (a) Channel length modulation
(b) Beta Ratio Effects.

→ (a) Channel length modulation:

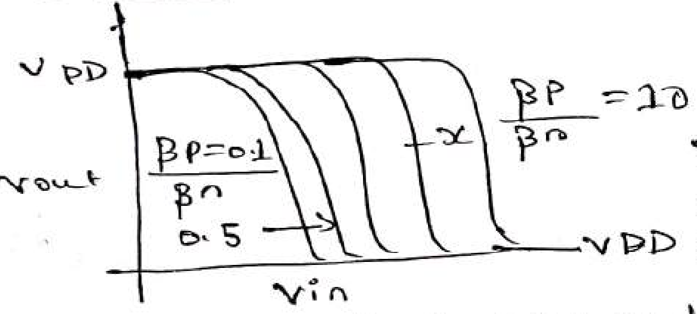
Ideally. Ids in independent of vds for a transistor in saturation, making the transistor a prefect current source The reversed baised in junction b/w drain & source a depletion region Effectively shorter the Channel length to $L_{eff} = L - I_d$

↑vds ↓ the Effective channel length. shorter channel length results in higher current ∴ Ids ↑ with vds in saturation.

$$I_{ds} = \frac{\beta(v_r - v_t)^2}{2}(1+d v_{ds})$$

The parameter d in an empirical channel length modulation factor.

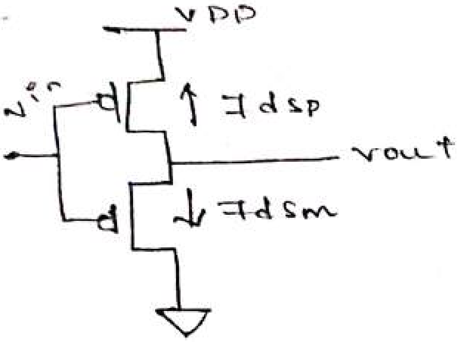
(b) Beta Ratio Effects:



If βp = βn the inverter threshold voltage vin is VDD/2 This may be desirable because it maximize noise margins and allows a capacitive load to charge and discharge in times by providing equal current source and sink capabilities. Inverters with different beta rations write differents beta ratios βp/βn are called skewed inverter.

⑥ Derive the CMOS inverter DC characteristics graphically from p deeive and n device characteristics and show all operating system?

→ CMOS shown in the below figure. The table outtimes various regions of operations of operations for the n- & p transistors.



V_{tn} - threshold voltage of n-channel device

V_{tp} - threshold voltage of p-channel device

$V_{gsn} = V_{in}$ $V_{dsn} = V_{out}$

$V_{gsp} = V_{in} - V_{DD}$ $V_{dsp} = V_{out} - V_{DD}$

CMOS transistor:

	Cut off	Linear	Saturated
① nMOS	$V_{gsn} < V_{tn}$ $V_{in} < V_{tn}$.	$V_{gsn} > V_{tn}$ $V_{in} > V_{tn}$ $V_{dsn} < V_{gsn} - V_{tn}$ $V_{out} < V_{in} - V_{tn}$	$V_{gsn} > V_{tn}$ $V_{in} > V_{tn}$ $V_{dsn} > V_{gsn} - V_{tn}$ $V_{out} > V_{in} - V_{tn}$
(ii) pMOS	$V_{gsp} > V_{tp}$ $V_{in} > V_{tp} + V_{DD}$	$V_{gsp} < V_{tp}$ $V_{in} < V_{tp} + V_{DD}$ $V_{dsp} > V_{gsp} - V_{tp}$ $V_{out} > V_{in} - V_{tp}$	$V_{gsp} < V_{tp}$ $V_{in} < V_{tp} + V_{DD}$ $V_{dsp} < V_{gsp} - V_{tp}$ $V_{out} < V_{in} - V_{tp}$

assuming $V_{tp} = -V_{tn}$ & pMOS transistor is 2-3 times as wide as the nMOS transistor so $\beta n = \beta p$.

The operation of CMOS inverter can be divided into 5 regions indicated on below table (2).

→ In region A, the nMOS transistor is OFF so the pMOS pulls outputs to V_{DD}.

→ In region B, the nMOS transistor starts to turn ON pulling the output down.

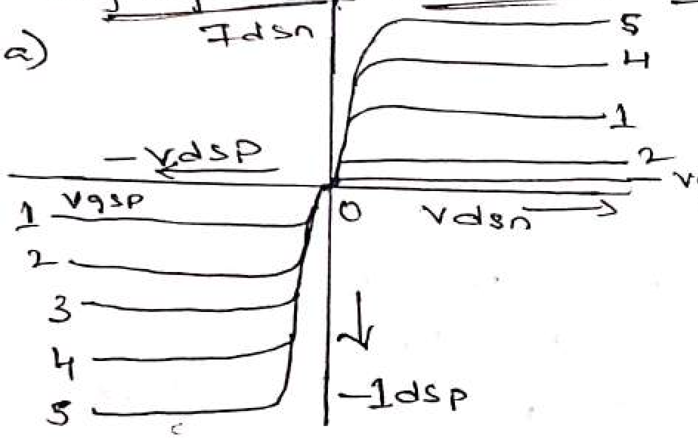
-> In region C, both transistor are in Saturation

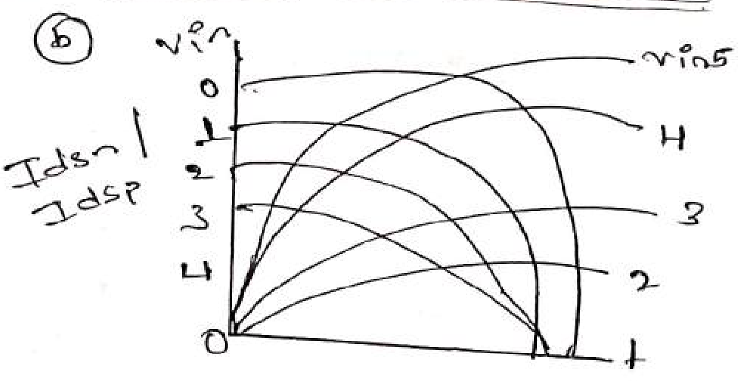
-> In region D, the PMOS transistor in partially ON

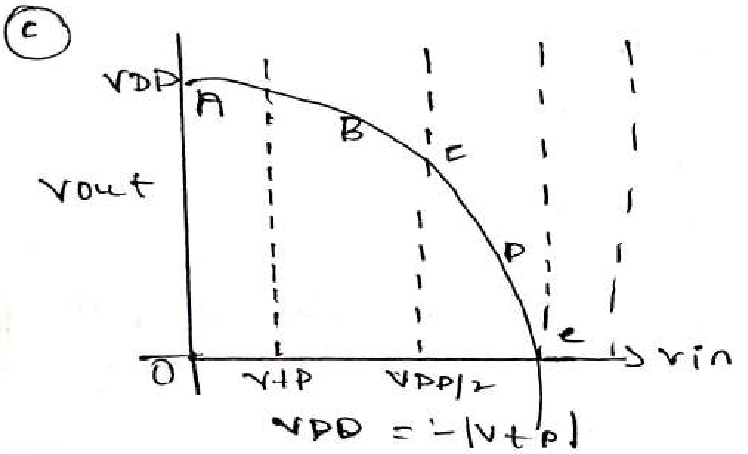
-> In region E, PMOS in completely OFF, leaving then NMOS transistor to pull the O/P down the GND.

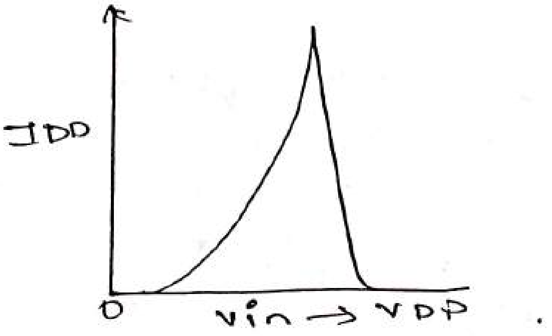
Region	condition	P-deivce	n-device	output
A	$0 \le V_{in} < V_{tn}$	Linear	Cut off	$V_{out} = V_{DD}$
B	$V_{tn} \le V_{in} < V_{DD}/2$	Linear	Saturated	$V_{out} > V_{DD}/2$
C	$V_{in} = V_{DD}/2$	Saturated	Saturated	Vout drops sharply.
D	$V_{DD}/2 < V_{in} = V_{DD} + V_{tp}\|$	saturated	Linear	$V_{out} < \frac{V_{DD}}{2}$
E	$V_{in} > V_{DD} - \|V_{tp}\|$	Cut off	Linear	$V_{out} = 0$

-> Graphical derivation of CMOS Inverter DC Charateristics

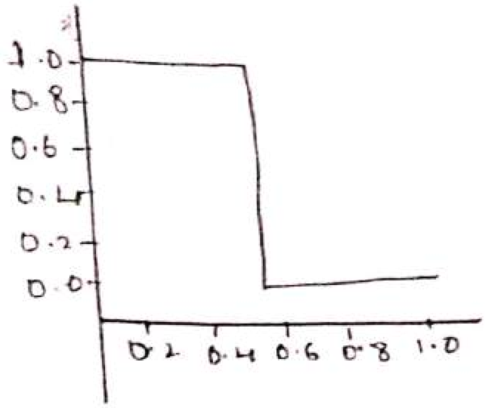








CMOS inverter DC Characteristics



⑨ Explain nMOS fabrication?

-> nMOS process in illustrated as follows.

* processing is carried out on a thin wafer cut from a single creptal of silicon of high purity into which the are introduced as the crystal of silicon is grown Such are typically 75 to 150mm in diameter & 0.4mm thick are doped with say borwn to impurity concentration of $10^{15}/cm^2$ to $10^{16}/cm^3$ giving resistivity in approximate range 2K ohm cm to 20Km cm.

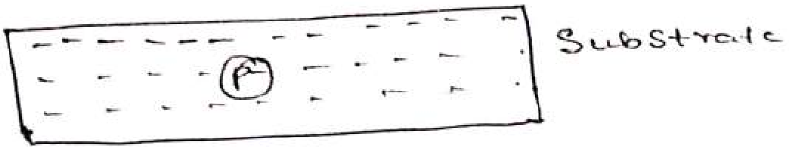
* A layer of silicon dioxide (SiO_2) typically 1 μm thick is grown all over the surface of the wafer to protect the surface act as a barows to depants during processing & provide insulting subtracted onto which other laythar may be deposited & patterened.

* The surface is now covered with photoresist which is deposited onto the wafer & spin to acheive an even distuibution of the required thickness.

* The photorelist layer is than exposed to UV light through a mask which defness those region into which diffusion is to take place with transitor channel.

* The remaining photoresist is removed & a thin layer of SiO_2 (0.1μm typical) is grown over the entire chip surface and then polysilicon is deposited on top of these to form the gate structure. The layer consists of heavy doped polysilicon deposited by chemical vapour deposition

1.



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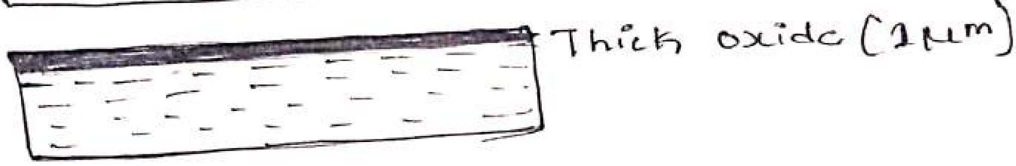

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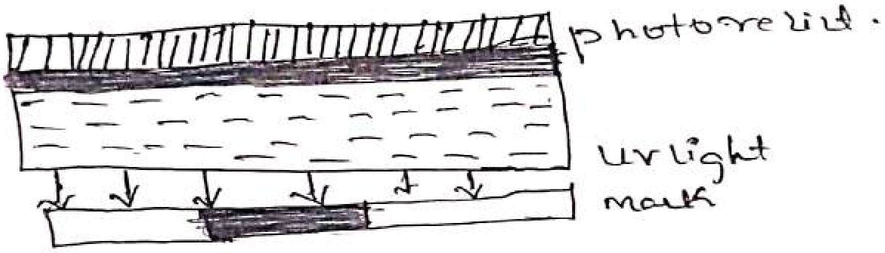
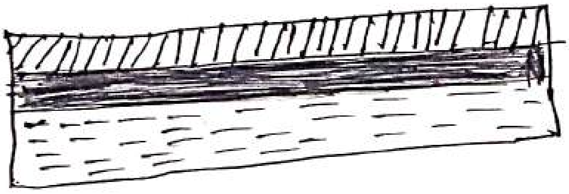


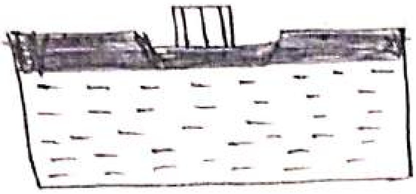
4.



5.

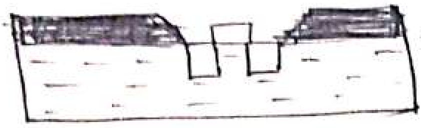
→ further photoresist coating & masking allows the polysilicon to be patterened & then the thin oxide is removed to expose area into which n-type impurities are to be diffused to form source and drain a shown diffusions is obessomed by heating the wafer to high temp & paping a gas containing n-type impurity.

6.



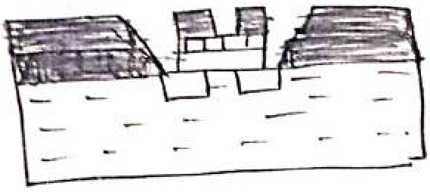
patterned poly (1-2µm) on the oxide (800-100Å)

7.



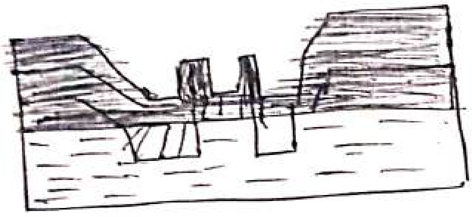
n+ diffusion (1µm dup)

8.



Contact holes (cuts)

9.

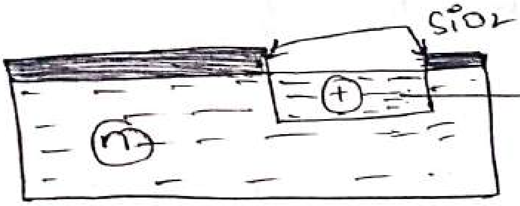


patterned metallization (aluminium 1µm)

⑧ Explain the fabrication steps of CMOS p-well process with neat diagram and write the mask sequence.

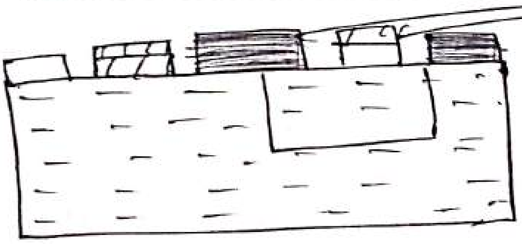
→ p-well

1.



p-well (4-5µm)

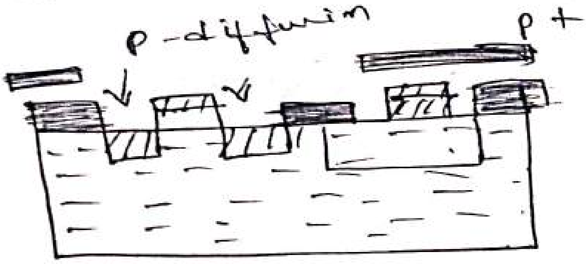
2.



polysilicon

Thin oxide & polysilicon

3.



p-diffusion

p+ mask (positive)

mark 1: defines the areas in which the deep p-well diffusion are to take place.

mark 2: defined the thin ox regions, namely those areas where the thick oxide in to be a stripped & thin oxide grown to acomodate p&n- transistor & wires.

mark 3: used to pattern the polysilicon layer which a deposite from the thin oxide.

mark 4: A p-well plus mark is now used to be in Effect "Ended" with mark 2) to define all areas where p-diffusion is to take place.

mark 5: This is usually performed using the -ve form of the p-plus mark & defines & those area where n-type diffusion into take place.

contact cuts are now defined.

mark 6: contact cuts are now defined.

mark 7: The neutral air pattern in defined by this mark

mark 8: An overall panivation (overglassed) layer is now applied & mark 8 is needed to define & openings for accsion to banding pads.

⑨ Explain the fabrication steps of cross n-well process with neat diagram and write the mark sequence.

→ n-well

formation of n-well regions
↓
Define nmos & pMos active areas
↓
field & gate oxidaition
↓
form a pattern of polysilicon
↓
p+ diffusion

n+ diffusion

↓

Contact Cuts

↓

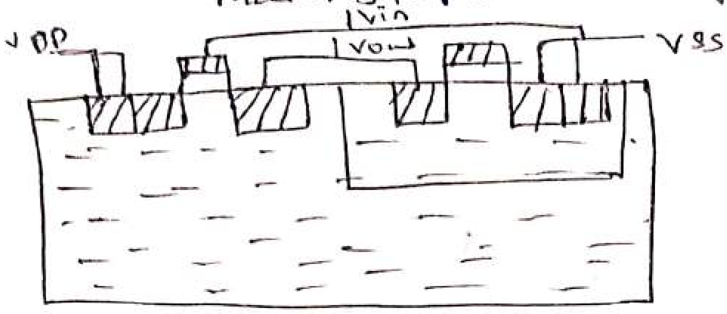
deposite & pattern metalization

↓

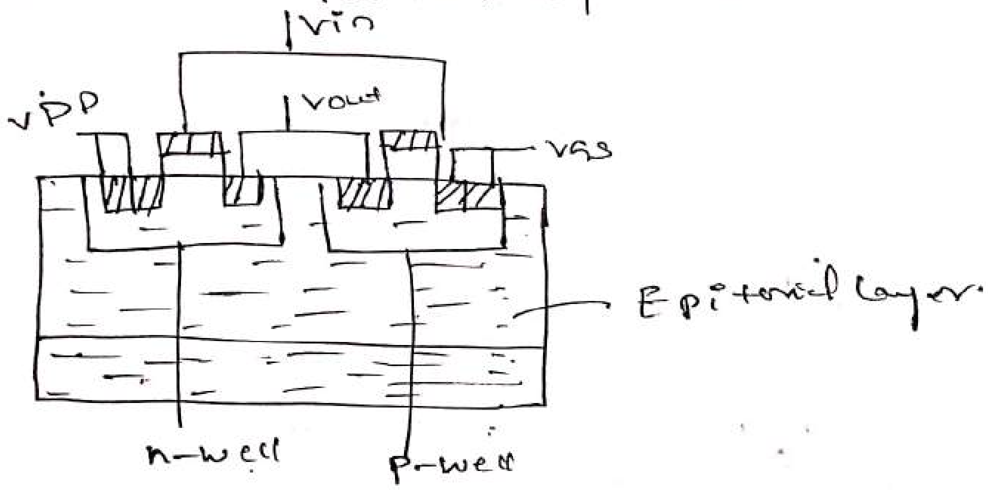
overglass write cuts bonding pads

↓

Main steps with a typical n-well.



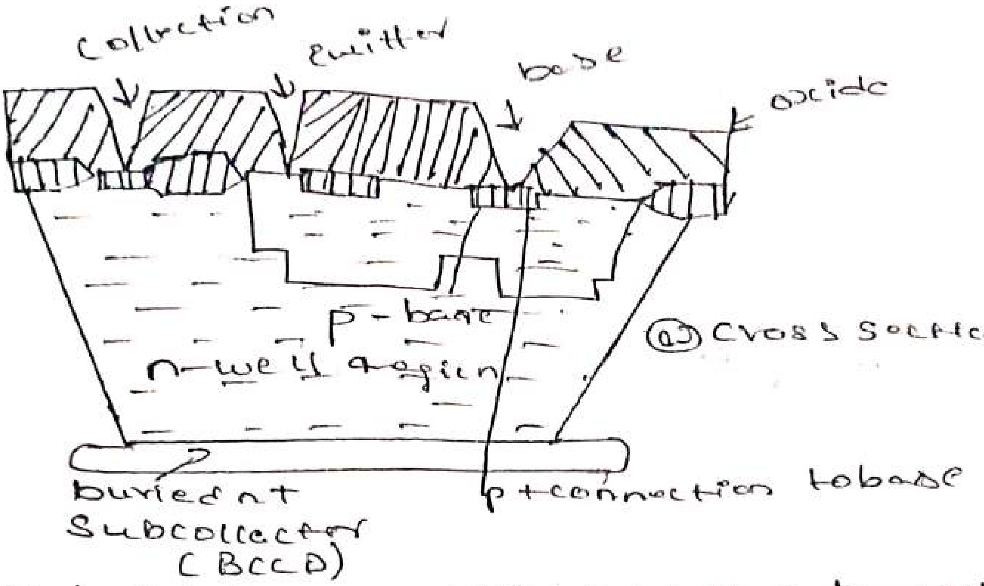
10) Write a note on twin-two process



A logical Extension of the p-well and n-well approaching is the twin the fabrication process.

Here we start with a Substrate with of high resistivity n-type material & there create both n-well and p-well regions. through this process it is possiable to preserve the performance of n-transistor without compromising the p-transistors Doping control is more readily accurated and some relaxation in manufacturing tolerances.

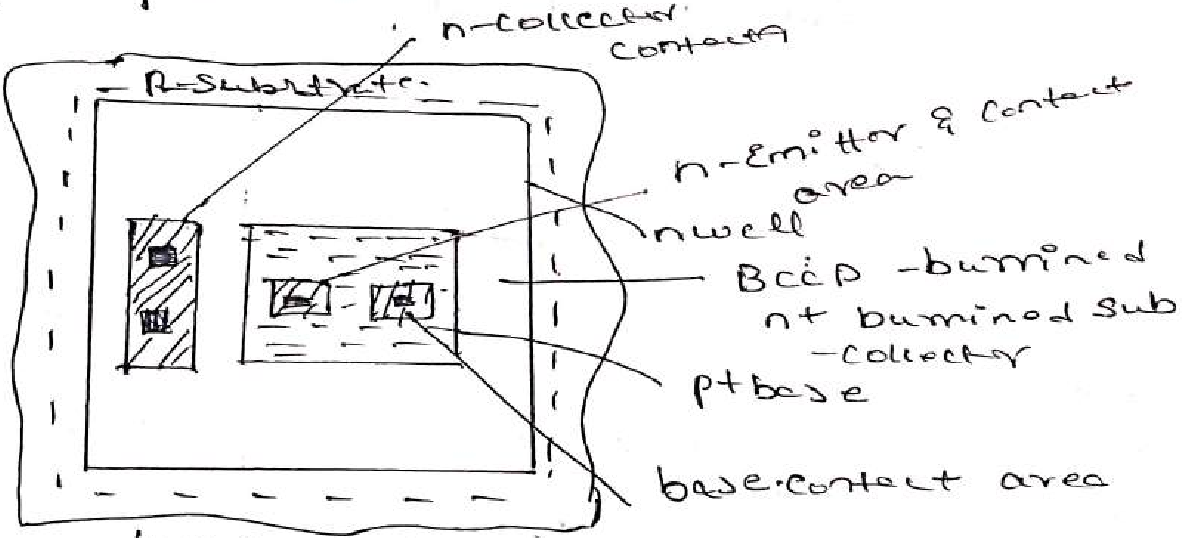
(11) Write the cross-section of BiCMOS process and Explain (16)



(a) Cross section

-> The total load driving capabilities of MOS transistor is less because of limited current sourcing & sinking abilities of both p & n transistor.

-> Bipolar transistor provided high gain, better noise & high frequency characteristic than MOS transistor.



b plain view

-> High power dissiption

-> It has high gain

-> low delay sensitivity of load

-> It has low input impedance

⑫ Distinguish b/w CMOS technology and BiCMOS technology?

→

CMOS technology	BiCMOS technology
→ low static power dissipation	High power dissipation
→ High input impedance	low input impedance
→ Scalable threshold voltage	low voltage swing logic
→ high package density	low packing density
→ low gm (gm×vin)	High gm (gm× evin)
→ Bidirectional capability	Essentially unidirection

CITY ENGINEERING COLLEGE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Second Assignment

VLSI Design (17EC63)

Sem:6th Sec:B

Module :3

1.What is scaling? Draw scaled nMOS transistor and explain.

2.What are the two scaling models? Write the scaling factors for all the device parameters.

3.Write the general considerations, problems and solutions in subsystem design processes.

4.List the different stages of design process. Explain Data path, subunits and interconnections.

5.Withthe sequence, Explain One-Bus, two-Bus and Three- Bus architectures.

6.What do you understand by floorplan? Write the tentative floorplan for 4-bit Data path.

7.Mention the rules for stick diagrams for Data path and control.

8.Explain 4x4 barrel shifter with a neat diagram.

9.Define Regularity. Explain 4-bit data path for processor.

10.Design a 4-bit adder. write necessary expressions and figures.

11.Explain Implementation of ALU functions with an Adder.

12.What are propagate and Generate signals? Explain Manchester carry chain.

13.How do you optimize Carry Select Adder? Explain with a neat figure and necessary expressions.

14. Write the structure of 24-bit carry skip Adder and worst-case carry propagate for Carry Skip Adder and explain with necessary equations.

15.Explain Carry Look Ahead Adder in detail.

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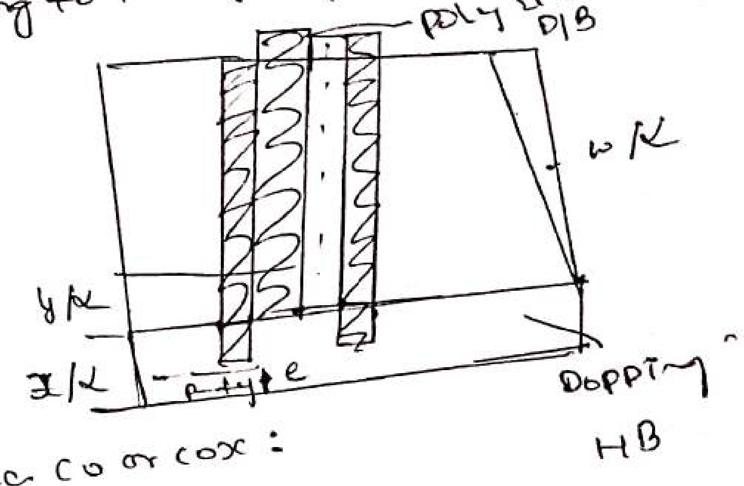
VLSI
Assignment-2

① What is scaling? Draw scaled nmos transistor and Explain

→ Scaling is the procedure of Measuring and assiging the objects to the numbers according to the specified rules.



Scaled nMOS transistor

(i) Gate area (Ag):

$Ag = L \cdot W$

Where L & W are channel length & width Both are scaled by $1/\alpha$

Then, $Ag = 1/\alpha^2$

(ii) Gate capacitance for unit area Co or cox:

$Co = \frac{Eox}{D}$ where, Eo permitivity of the oxide & thinox.

$Eox = [Sino \cdot \varepsilon o]$

D → scaled by $1/\beta$

D → gate oxide thickness by $1/1/\beta = \beta$.

(iii) Gate Capacitance Cg:

$Cg = Co \cdot L \cdot W$ [∵ L, W Scaled by $1/\alpha$ & Co by β)

Thus cg is scaled by $\beta \cdot 1/\alpha^2 = \beta/\alpha^2$

(iv) parastic Capactiance Cx:

Cx is proportiond by Ax/d

Thus, Cx is scaled by

$1/\alpha^2 \cdot 1/1/\alpha = 1/\alpha$

where, d = deplection width around Source/drain (scaled by $1/\alpha$.)

Ax = area of depplection region around S/D (Scale $1/\alpha^2$)

(v) Carrier density is channel Qon:

$Qon = Co \cdot vgs$

$cg = \beta$ $vg = 1/\beta$

Then $Qon = 1$

where Qon = avg Charge per unit area in the channel in 'on' state Cg is scaled.

(vi) Channel resistance Ron :

$Ron = L/W \cdot \frac{1}{Ron\,\mu}$

Thus, $Ron = 1/\alpha \cdot 1/1/\alpha = 1$

where μ - carrier mobility in the channel

(vii) Gate delay (Td) :

Td is proportional to Ron.Cg

Thus, $Td = 1\,\beta/\alpha^2 = \beta/\alpha^2$

(viii) Maximum operating frequency f0 :

$f_0 = \frac{W}{2}, \frac{\mu C_0 V_{DD}}{Eg}$ or $f_0 \propto \frac{1}{Td}$

Thus, $f_0 = 1/\beta\,\alpha^2 = \alpha^2/\beta$

(ix) Saturation current IdD :

$Idss = \frac{C_0\mu}{2} \cdot \frac{W}{L}(Vgs - Vt)^2$

Vgs & $Vt = 1/\beta$

Thus, $Idss = \beta(1/\beta)^2 = 1/\beta$

(x) current density J :

$J = \frac{Idss}{A}$ $J = \frac{1/\beta}{1/\alpha^2} = \frac{\alpha^2}{\beta}$

where A => cross section area of the channel in 'ON' state which is $1/\alpha^2$

(xi) Switching energy per gate Eg :

$Eg = \frac{1.Cg}{2}(V_{DD})^2$

So. $Eg = \beta/\alpha^2 \cdot 1/\beta^2 = 1/\alpha^2\beta$

(xii) power dissipation per gate pg :

$Pg = Pgs + Pgd$

$= \frac{V_{DD}^2}{Ron} + Eg f_0$

Thus $Pg = 1/\beta^2$

where, Pgs = Static component, Pgd = dynamic component.

(xiii) power dissipation per unit area. Pa :

$Pa = Pg/Ag$ Thus, $Pa = \frac{1/\beta^2}{1/\beta^2} = \frac{\alpha^2}{\beta^2}$

② What are the two Scaling Models ? Write the Scaling factors for all the device parameters ?

-> The two Scaling factors 1/α and 1/β

* 1/β is chosen as the scaling factor for Supply voltage VDD and gate oxide thickness D.

* 1/α is used as scaling factors for other Linear dimension

-> Scaling factors for the device parameters

* gate area (Ag)

* Gate capacitance per unit Area Co or Cox.

* Gate Capacitance Cg

* parasitic capacitance Cx.

* Carrier density in channel Qon.

* Channel Resistance Ron

* gate delay Td

* Maximum operating frequency f0

* Saturation Current Idss

* Current density J

* Switching energy per gate Eg

* power dissipation per gate Pg.

③ Write the general consideration problems and solutions in Subsystem design process

-> General considerations

* The consideration provide ways of handling (process) problems, The consideration provide ways of designing and realization system while are provided way of designing and realization system while are two complex.

* Also help in understanding and apprecating technologies. The consideration are as follows.

-> lower unit cell : with different approches avialable for some requirement lower unit cost in appreciable

-> Better performance : particularly in terms of speed power product.

problems: How to design complex System in a reasonable time and reasonable Effort.

-> The nature of architectures best Suitable to take the advantage of VLSI and the technology.

-> The translability of large / complex systems are implemented on silicon.

-> for the problem seen the Solution in as follows. problem 1 and 3 are greatly reduced if two aspects are followed

ⓐ Top-down design approch with aderate CAD tools

ⓑ partitioning the System sensibly.

ⓒ Aiming for simple interconnections.

ⓓ High regularity within Subsystem.

problem 2 can be stored by

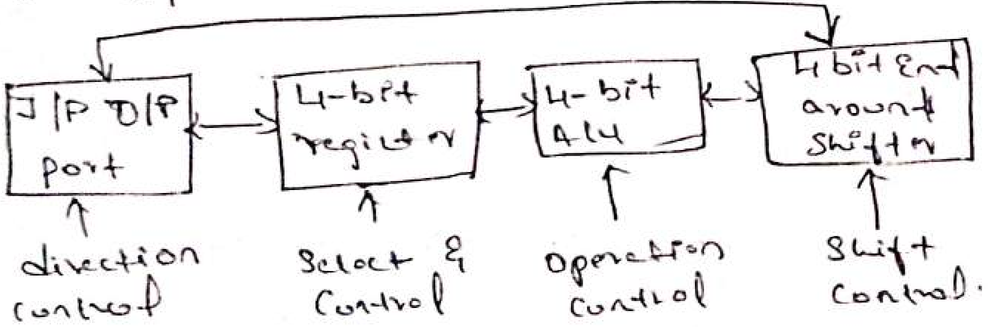
-> Select architectures that allows design objectives and high regularity in realization.

④ List the different types of design process. Explain data path Subunits and interconnections.

-> Structured design with the concept hierarchy.

-> It is possible to divide any complex function into less complex functions. This may be Subdivided into many even simpler & the bottom level bring commonly referred to as 'leaf-cell'.

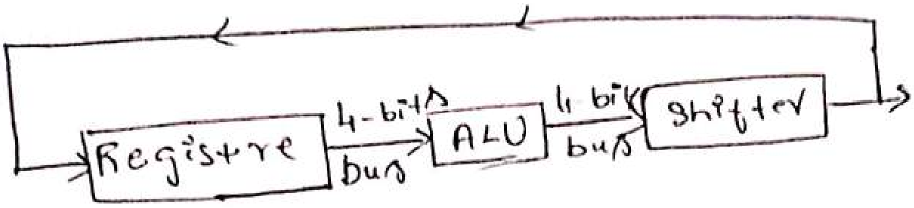
-> This process is Known as top-down design.



* Sub unit and basic interconnecting for data bars.

⑤ Write the sequence, Explain on-bus two bus and three bus architecture.

↳ One bus architecture :



The sequence is :

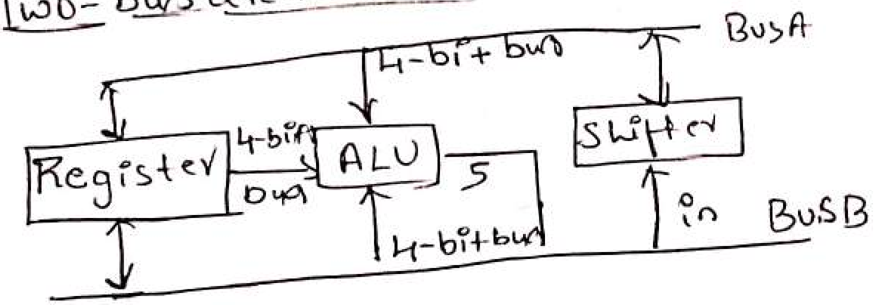
-> The first operand is moved from register to ALU and stored there

-> Second operand is moved from registor to ALU where operands are added (Subraction or any other arithmetic operations) and result is stored in ALU

-> The result in there passed through shifter and stored in register.

-> The process take 3 clock cycles and this be fastened by using two bus architecture.

Two-bus architecture :

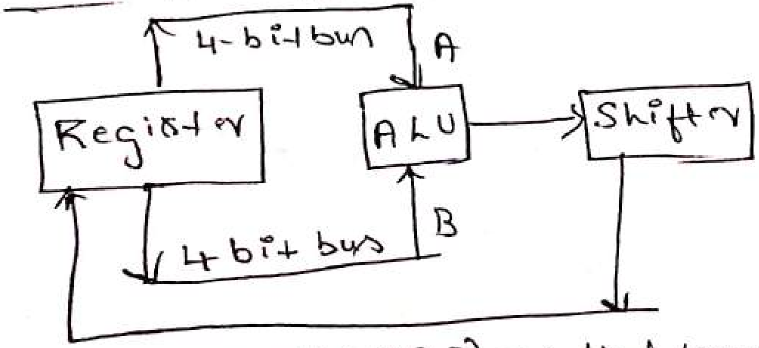


This Sequence

-> Both operands (A&B) are sent from register(s) to ALU are operated upon, results S in ALU.

-> Result is passed through the Shifter and stored in registers.

Three-bus architecture :



-> Both operands (A & B) are that from registers. operated in the ALU & result which is shifted is returned to another register.

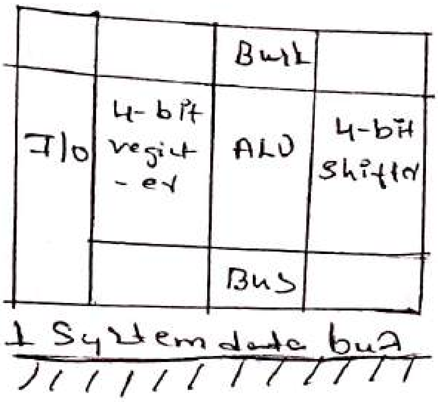
⑥ What do you understand by floorplan? Write the tentative floorplan for 4-bit data path.

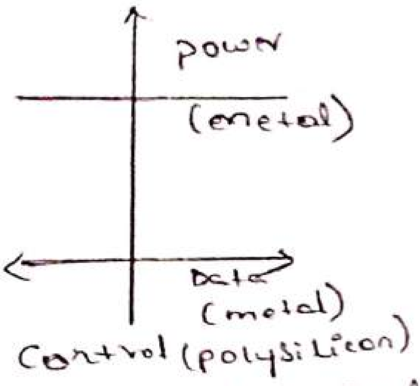
-> Tentative plan for 4-bit data path

-> The purposed processor will be seen do compulle are cgiluers array in what 4-bits non can be stored either from an I/P O/P port of form the o/p of the ALU via a shiftom.

-> No from registera array can be fed in points to the ALU to be added (a sub etc) and the result can be shifter or not, before bein sictenened to the aegister array or possible out through the I/O port.

-> doviously, data connection b/w the I/P port, ALU & shifter must be in the form of 4-bit buten





-> Simultanously, we must recognize that each of the blocks must be sutiably connected links so that to function may be defined for any range of possible operations

⑦ Mention the rules for stick diagrams for data path and control

-> metal can cross polysilicon @ diffusion without any significant effect

-> When ever polysilicon crosses diffusion a transistor will be formed.

-> This include the second polysilicon layer for processes that have two

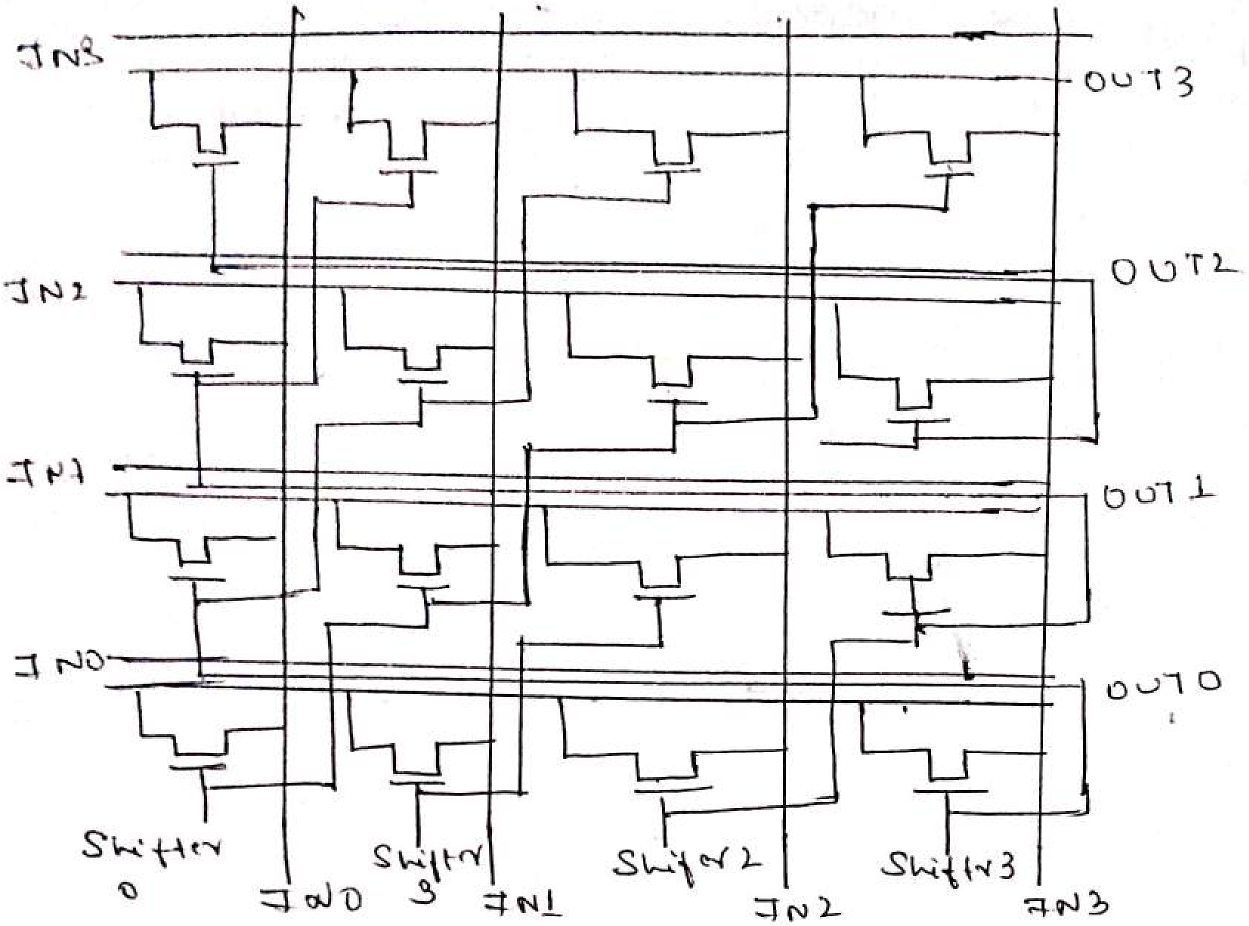
-> Whenever lines touch on the some level on interconnection in formed

-> Simple contacts can be used to join diffusion or polysilicon to metal.

-> first and second metal layer may be joined using a via.

-> Each layer has particullar electrical properties which must to taken into account.

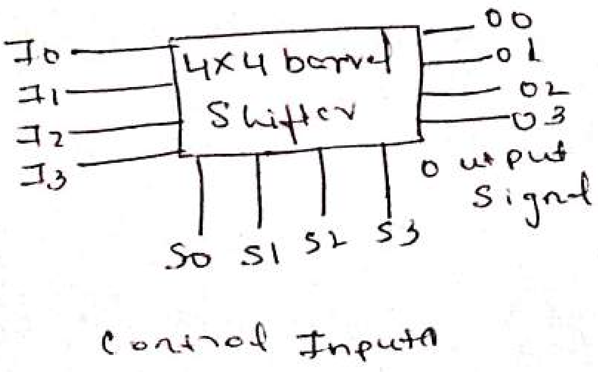
(8) Explain 4x4 barrel shifter with a neat diagram?



4X4 barrel shifter

->The interbus Swicthes have their gate inputs connected in a Staircase fasion in group of the four and there are now four Shifter control inputs which must be mutually exclusive in the active State.

->CMOS transmission gates may be used inplace of the simple pass transistor switches if appropriate. Barrel Shifter connects the input lines representing a word to a group of output lines with the required shift determined by its control inputs (Sh0, Sh1, Sh2, Sh3). Control I/P also determines the direction of the Shifter. If input word has n-bits and shifter from 0 to n-1 bit position are to be implemented.



SH0	SH1	SH2	SH3	SH4
O0	O1	O2	O3	O0
O1	O2	O3	O2	O1
O2	O3	O0	O1	O2
O3	O0	O1	O0	O3

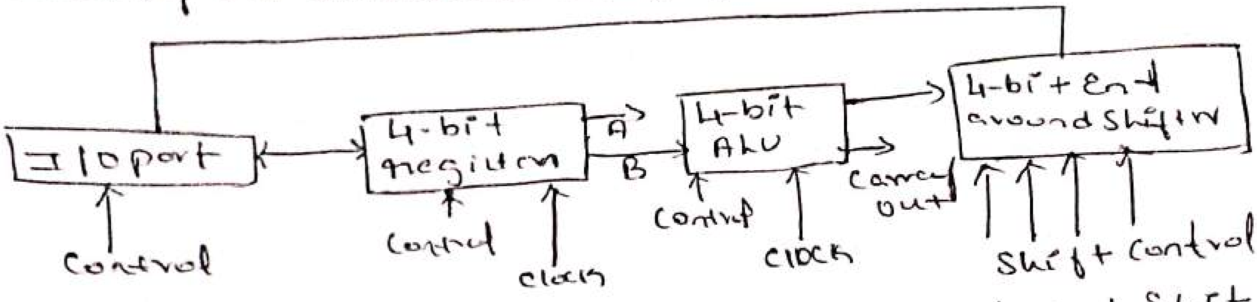
⑨ Define Regularity? Explain 4-bit data path processor.

-> Regularity should be as high as passible do minimize the design Effort read for any System. The level of any particular design as for on time aspects is concurrend may be measured by quanity using regularity as folows.

$$\text{Regularity} = \frac{\text{Total no of transistor on the Chip}}{\text{no of transistor Crts that must be designed in detail}}$$

4-bit data path processor :

-> The head of the ALU is a 4-bit adder crk and et in this which we actually design indicating later how it may be reality to Substract and perform logical operaton.



-SShifter Crk has been designed to accept and Shift a 4-bit parallel Sum from the ALU.

⑩ Design a 4-bit adder. Write neccesary expression and figures for an n-bit adder.

-> In order to drive the requirement for an n-bit adder.

-> Let us first consider the addition of 2 binary no A+B as follow

A 1 0 0 : 1 1 0 1 1 ↑ column
\+ B 0 1 1 : 1 1 0 1 0
① 0 0 0 : 1 0 1 0 1 ... Sum
previous carry
carry out new carry column

It'll be seen that for any column 4 there will be three I/P corresponding bits of the I/P no A4 & B4 and the frequency carry (4-1)

I/P			O/P	
AK	BK	CK-1	Sum	Carry
0	0	0	0	0
0	1	0	1	0
1	0	0	1	0
1	1	0	0	1
0	0	1	1	0
0	1	1	0	1
1	0	1	0	1
1	1	1	1	1

⑪ Explain Implementation of ALU function with an Adder? ⑦

-> Implementing of ALU function with adder.

-> An ALU must be able to add and Subtract two binary number perform logical operation such as AND, OR and Equality (Ex-or-OR) function.

-> Subtraction can be Easily Implemented using the adder Element suppose we need find A-B, then

* Compliment B and add 1 to it get B'

* Add this to A i.e, $A+B'$

* This given Subtraction using adder.

* This given Subtraction can be served from logical Compliment

-> Here Compliment of Subtraction

-> Considering the possibility.

We have the Sum and new Carry Equations as

$\text{Sum } S_K = H_K C'_{K-1} + H'_K C_{K-1}$

$\text{New carry } C_K = A_K B_K + H_K C_{K-1}$

$\text{where } H_K = A'_K B_K + A_K B'_K$

-> If in S_K if C_{K-1} is need at logic 0 then the expression would

$\to S_K = H_K \cdot 1 + H'_K 0$

$\to S_K = H_K = A'_K B_K + A_K B'_K$

-> This represents the EX.OR functions / operation.

-> If in C_K, if C_{K-1} is held at logic 0 then the Expression would be

$\to C_K = A_K B_K + H_K 0$

$\to C_K = A_K B_K$

-> This represents the AND function / operation

-> If in C_K if C_{K-1} is held at logic 1 then the expression would be

$\to C_K = A_K B_K + H_K \cdot 1 = A_K B_K + H_K$

$\to C_K = A_K B_K + A_K B_K + A_K B'_K$

$\to C_K = B_K + A_K B'_K$

$\to C_K = B_K + A_K$

-> This represents the OR functions / operation

-> Thus with suitable Switching of Carry line b/w adder Element will given ALU logic functions.

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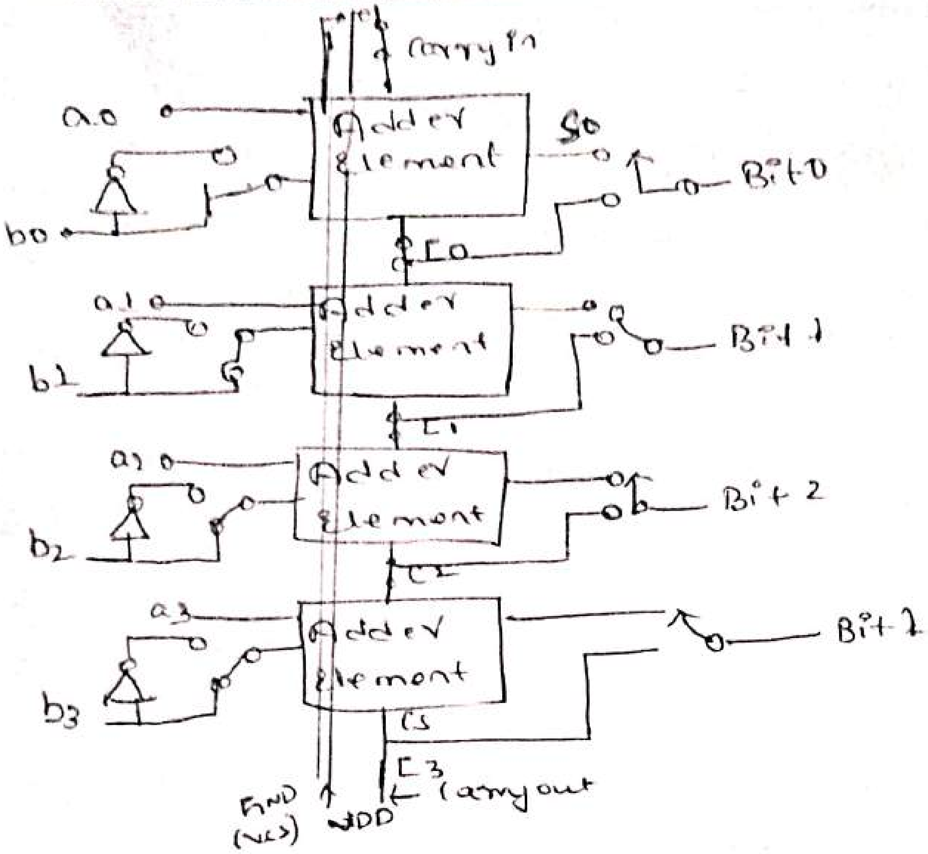


4-bit ALU

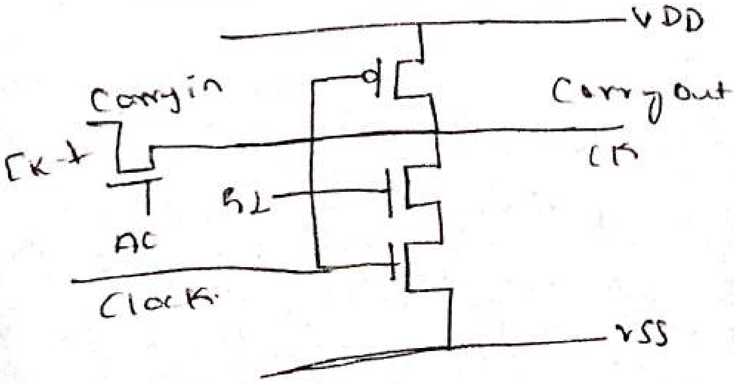
⑫ What are propogate and generate signals? Explain Manchester Carray Chain?

-> propogate signal from Ex-or gate is used to drive the transmission gate which acts like a controlling signal to propagate the carry signal. Only when p signal is high TG will be Enabled and propogates Ck-1

-> When p signal is 0 then depending on the input A & B carry will be generated.

-> The nmos & pmos pass transistor will generate the carry signal (when A=B=1, carry is generated and when A=B=0 carry is not generated)

=> Manchester carry chain



$P_K = a_K \oplus b_K$

$G_K = \overline{a_K \cdot b_K}$

-> It is a fast adder circuit, it is carry propagate adder ⑪
in which the delay taken by the carry to reach the last
stage of output is reduced.

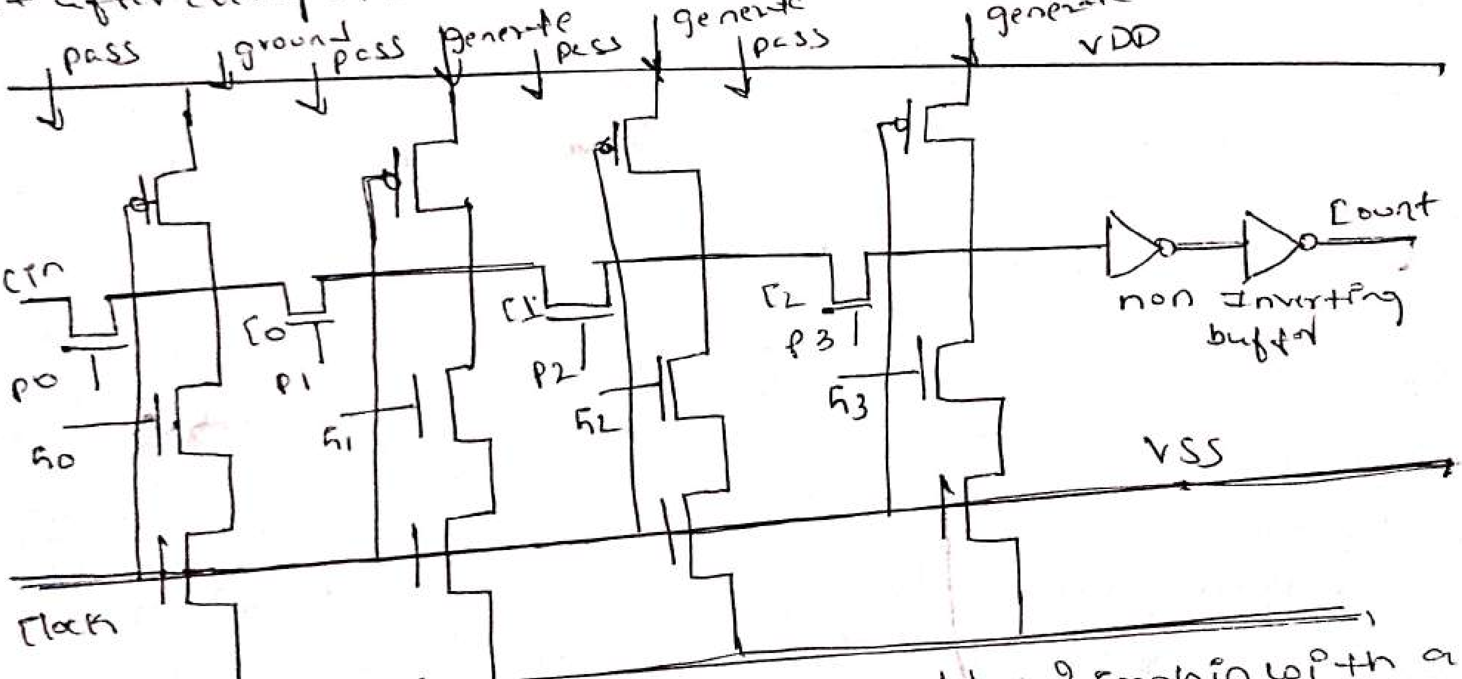
-> When clock is 0. output will be charged to logic high due to PMOS. When clock is 1 PMOS will be off. If Pk is high then the carry will be propogates

-> If Pk is 0, then Ck-1 will not be propogated.

-> Depending on inputs at Ak (Ak=Bk=1) carry will be generated or (Ak=Bk=0) no carry generation.

-> Even through Manchester carry are faster while cascading delay is observed cascading is done by connecting pass transistor in series.

-> As n pass transistor is cascading the delay also increase as square of n. then in order to reduce delay buffer are included at after every 4 chain as shown in the block.



⑬ How do you optimize carry select adder? Explain with a neat figure and neccessary expression.

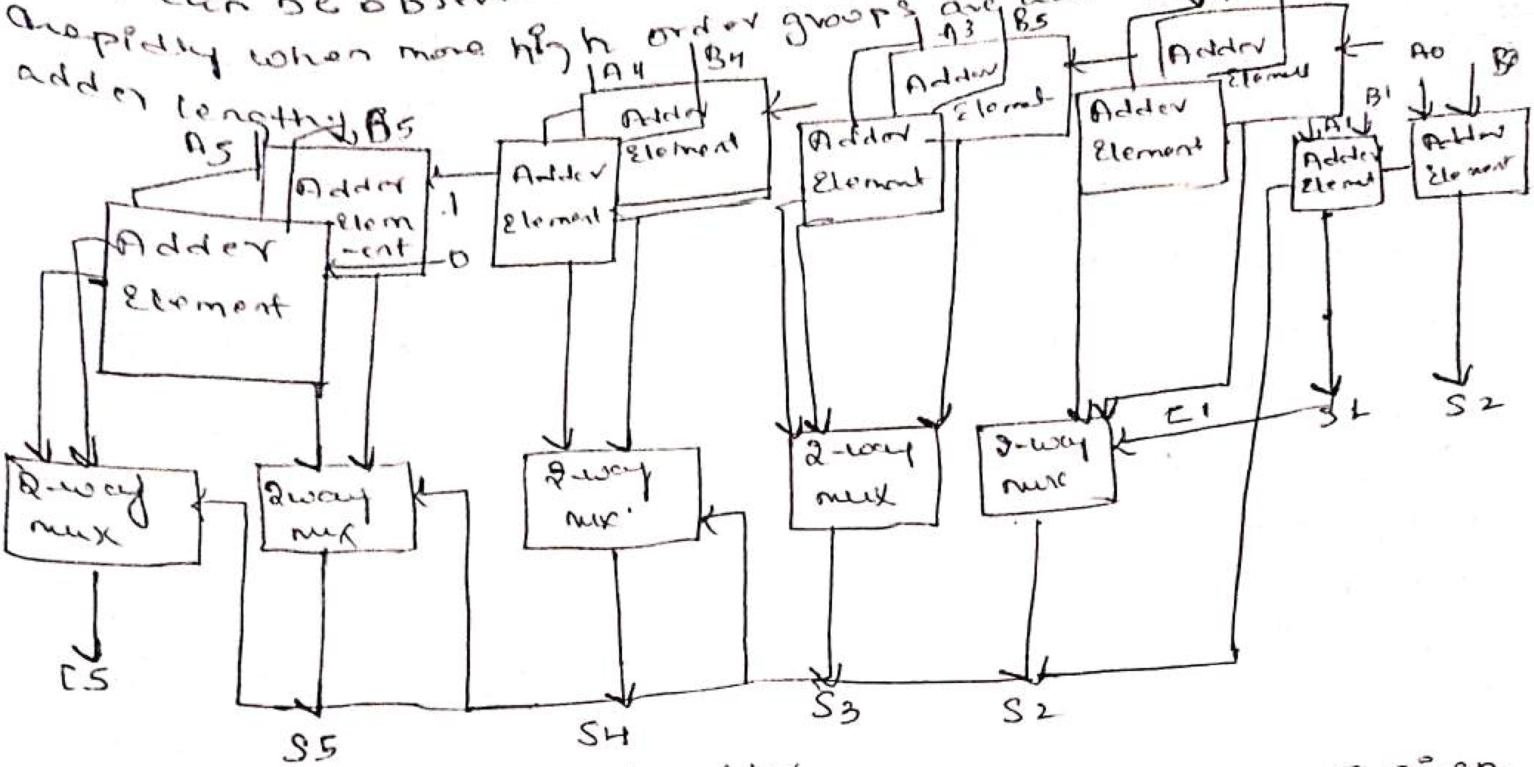
-> Carry Select adder:

-> In carry select adder the adder will be divided into group

-> It requires two identical parallel adders in each group except the least significant group as shown in the block diagram.

-> A mux is used to select valid results.

-> It can be observed that the group carries logic increase rapidly when more high order groups are added to the total adder length.



Optimization of Carry Skip adder

-> for n-bit ripple carry adder, the computational time T is given by T=K1n, where K1 is the delay through 1 adder cell.

-> As a carry select adder is a modification of carry skip while is having 2 adder in each block i,e, each block has 2 parallel paths. Thus computation times T becomes.

=> T = K1n/2 + K2 where K2 is the time needed by the mux to select the actual carry output.

-> If there many multiplexer then ripple through effect of carry is observed in mux reather than in the carry chain. Then optimum value of mux should be selected for the size of each block.

-> Suppose if there is an n-bit adder divided into 4-blocks and each block contain p adder cells (n = 4·p). The computation time for overall carry has 2 components.

-> propogation delay through the first block.

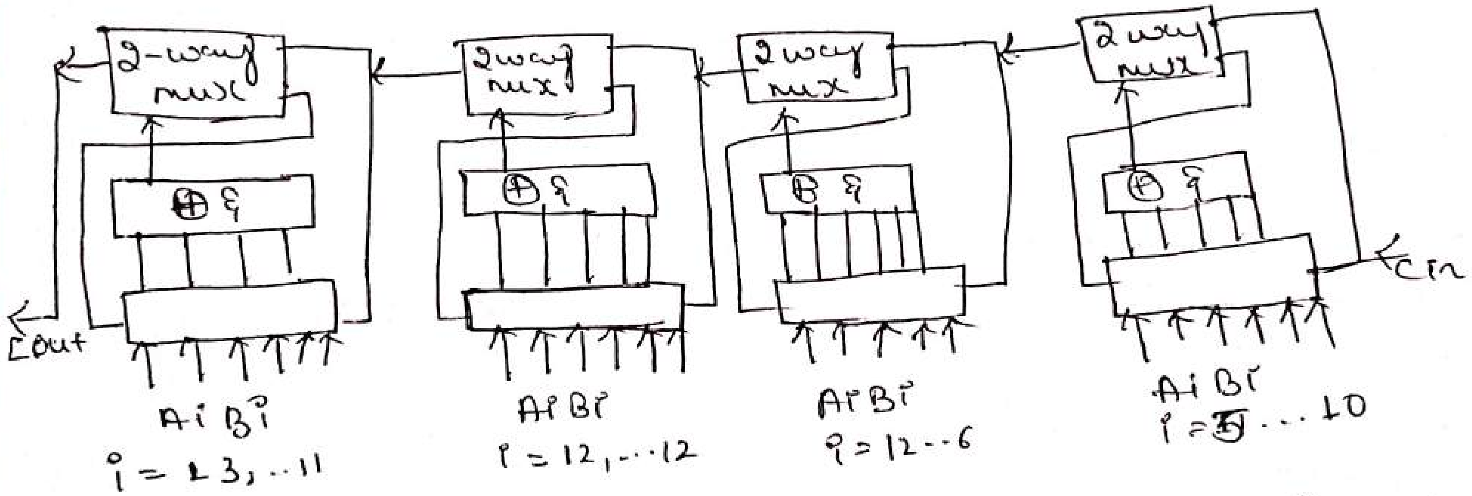
14) Write the structure of 24 bit carry skip adder and worst-case carry propogate for carry skip adder and explain with neccessary equations. ⑬

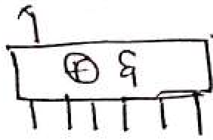
-> In a Ripple carry adder, if the input bits Ai and Bi are different for all position i, there the carry signal is propogated at all positions, and the additional is completed when the carry signal has propogated through the whole adder.

-> In this case, the ripple carry adder in as slow as it is large. Actually Ripple carry address are fast only for some configuration of the input words, where carry signals are generated at some position

-> carry skip address take advantages both of the generation or the propogation of the carry signals.

-> If in the block of A and B bits of two differs than the o/p i.e block propogation signal = 1. If it is 1 then carry entering the block can by pass and transmit the carry to the block through multiplexer.





In in block computes $(A_5 \oplus B_n)(A_4 \oplus B_4) \cdots (A_5 \oplus A_6) = \Pi P_i$ in each 6-bit block

-> **WORST CASE CARRY PROPAGATION FOR CARRY SKIP ADDER**

The configuration of the input words (for the worst case) is such that a carry signal in generated at the beginning of the first block that a carry signal in generated at the beginning of the first block. This carry signal in propogated by the succeeding adder calls but the last which generates another carry signal

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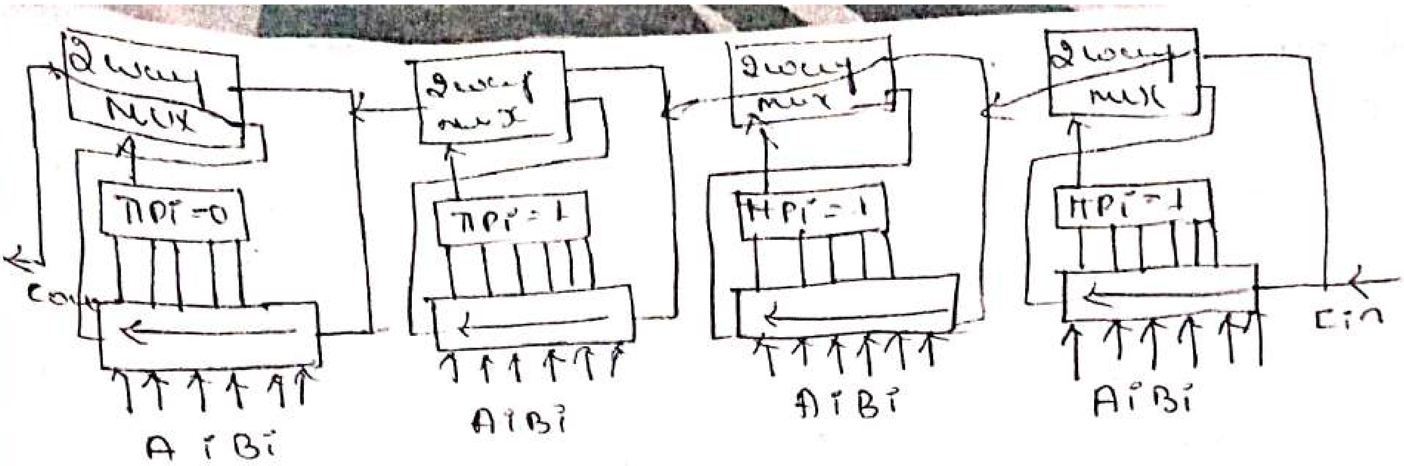


-> In those blocks the carry signals propagate to almost simultaneously.

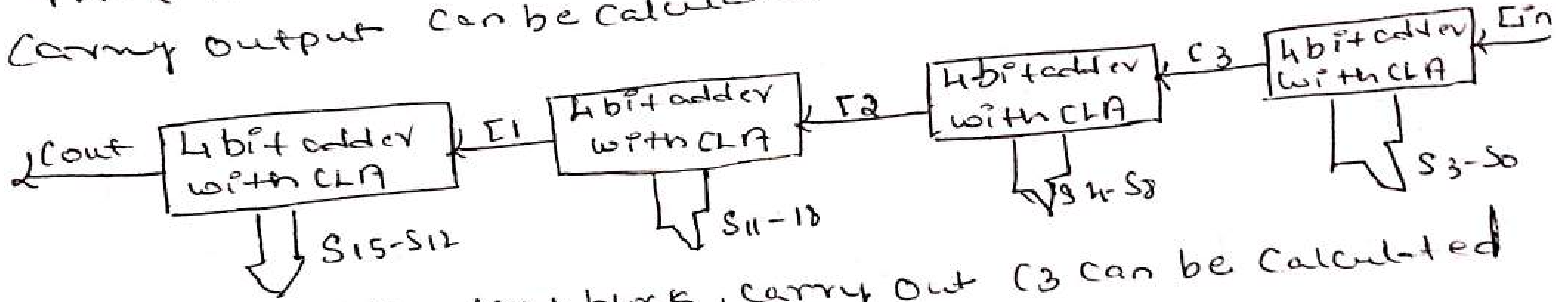
-> for the above condition the time to compute addition is given by $\boxed{T = 2(P-1)K1 + (m-2)K2}$

(15) Explain carry look ahead adder in detail?

-> This is another method to improve the throughout time of the adder.

-> Here the prediction of carry is done and based on the designing is done

-> ~~with~~ with the carry generate $G_K = A_K B_K$ and carry propagate $P_K = (A_K \text{ XOR } B_K) C_{in}$ the carry propagation can be avoided and carry output can be calculated.



-> Considering the first block, carry out C3 can be calculated as follow

$C_{out} = G_K + A_C C_{in}$

Thus for the first bit in first adder block is given by

$C_0 = G_0 + P_0 C_{in}$

||ly for 2nd bit it is given by

$C_1 = G_1 + P_1 G_0$ using C_0 in the Equation for C_1

$C_1 = G_1 + P_1 G_0 + P_1 P_0 C_{in}$.

for 3rd bit it in given by

$C_2 = G_2 + P_2C_1$ using C_1 Equation for c1

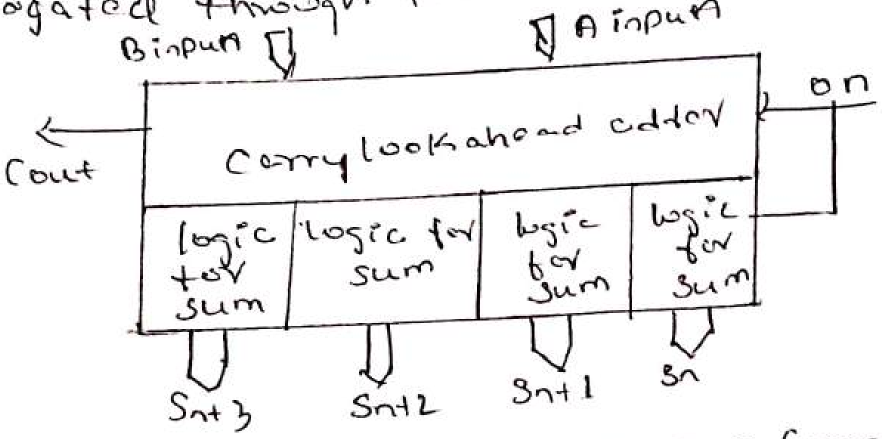
$C_2 = G_2 + P_2C_{in} + P_2P_1G_0 + P_2P_1P_0C_{in}$

for 4th bit it in given by

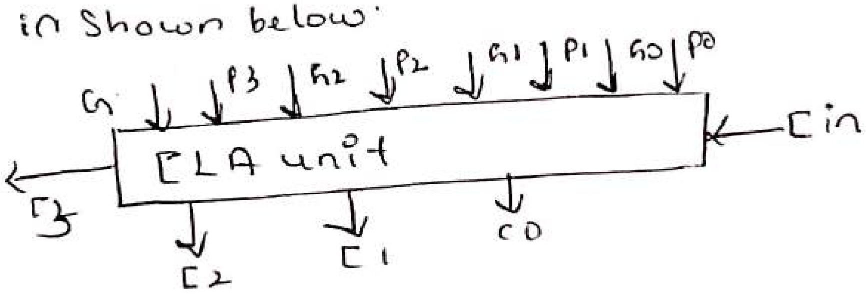
$C_3 = G_3 + P_3C_2$ using C_2 Equation for C_3

$C_3 = G_3 + P_3G_2 + P_3P_2G_1 + P_3P_2P_1G_0 + P_3P_2P_1P_0C_{in}$

→ from the above Equation we see that carryout C_3 can be calculated in prior without the need of need of carry being propogated through the adder cell



→ Each adder block has a 4bit CLA (carry look ahead) unit and in shown below.



→ Thus to increse the speed, the expression for C_3 can be written as

$C_3 = Y + \pi$

where $\pi = P_3P_2P_1P_0C_{in}$ and

$Y = G_3 + P_3G_2 + P_3P_2G_1 + P_3P_2P_1G_0$

CITY ENGINEERING COLLEGE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Third Assignment

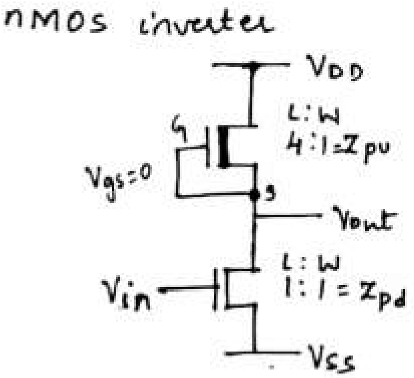
VLSI Design (17EC63)

Sem:6th   Sec:B

Module :2

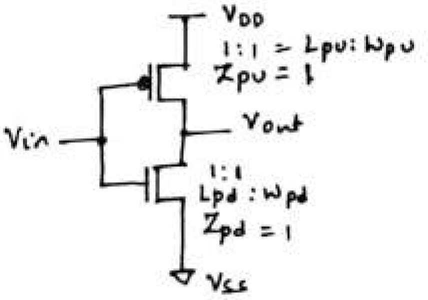
1.Explain the sheet resistance concept applied to MOS transistor and inverters.

2.Calculate the on resistance of 4:1 nMOS inverter with Rs=10KΩ,Zpu=4:1 and Zpd=1:1



Estimate the total power dissipationfor VDD=5V

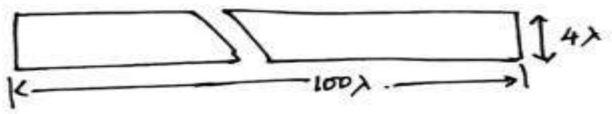
3.Calculate the ON resistance of 1:1 CMOS inverter with Rsn=10KΩ.Find the total power dissipation when VDD=5v.



4.write a note on area capacitance of layers and standard unit of capacitance.

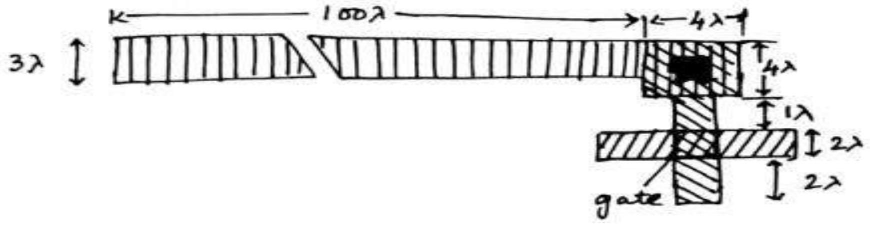
5.Calculate the area capacitance of the layer below if the layer is metal,polysiliconand diffusion.

C.S. Mallikarjuna

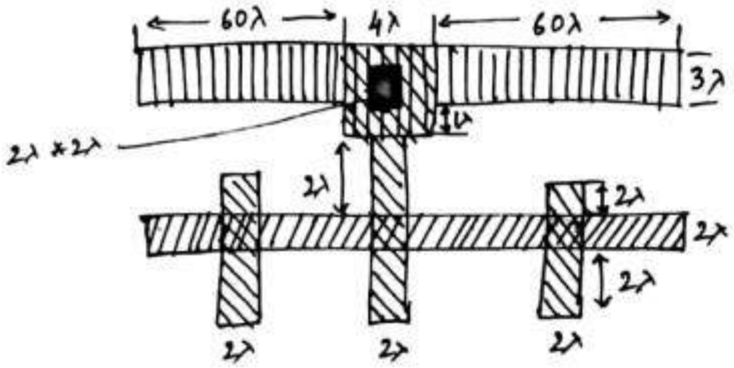


[NOTE— All calculations for 5μm technology]

6. Calculate the area capacitance of the multilayer structure shown below.



7.Findthe total capacitance for the following layout.



8.Explain delay unit,nMOS inverter delay.

9.Explain CMOS inverter delay.

10.Explain rise time and fall time estimation.

11.How do you resolve the problem of driving large capacitive loads by cascaded inverters as drivers.

12.Derive an expression for delay of cascaded inverters and N-nMOS inverters.

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ASSIGNMENT: 03

① Explain the sheet resistance concept applied to MOS transistor and inverter

→ Sheet Resistance Rs :

* Consider a uniform slab of conducting material of resistivity 'ρ', of width 'W', thickness 't' and length between faces L. The arrangement is shown in fig below.

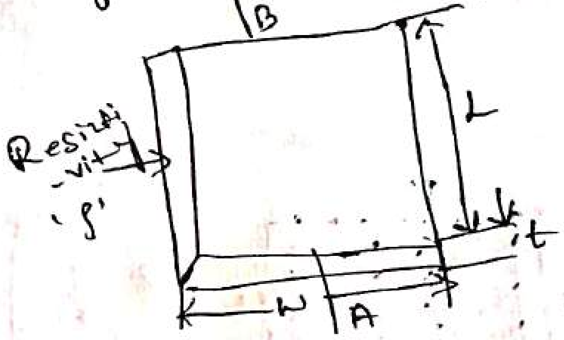


fig: Sheet resistance model

* consider the resistance RAB between two opposite faces

W.K.T $R_{AB} = \frac{\rho L}{A}\ \Omega$

where A - cross-section area = t*W

Thus $R_{AB} = \frac{\rho L}{tW}\ \Omega$ → ①

* Consider a square of resistance material in which L=W, then

$R_{AB} = \frac{\rho}{t} = R_S$

Thus $\boxed{R_S = \frac{\rho}{t}}$ Ω per square

where Rs = Sheet resistance / ohm per square

∴ Eqn ① can be re-written as $\boxed{R_{AB} = R_S \cdot \frac{L}{W}}$

* Thus, Rs is completely independent of the area of the square material and the actual values associated with the layer in a MOS circuit depend on the thickness of the layer

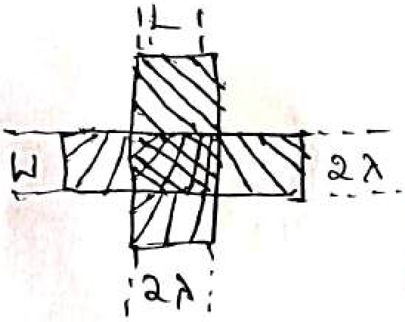
and the resistivity of the material forming the layer.

* Typical values of sheet resistance for 5µm technology is listed below in table

Layer	Rs(ohm per square) in 5µm technology
① Metal	0.03
② Diffusion(n^+) [for $p^+ = 2.5n^+$]	10 → 50
③ polysilicon	15 → 100
④ n-Channel transistor	10^4
⑤ p-Channel transistor	2.5×10^4

Sheet Resistance concept Applied To MOS transistors & Inverters :

Resistance calculation for transistor Channels



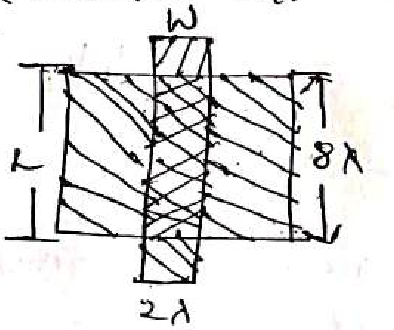
n-Channel MOSFET

$R = Rs \cdot \frac{L}{W}$

$= 10^4 \frac{\Omega}{\text{Square}} * \frac{2\lambda}{2\lambda}$ $(Rs = 10^4\Omega)$ from table

$= 10\Omega$

$\boxed{R = 10k\Omega}$



Z - aspect ratio

$\boxed{Z = \frac{L}{W}}$

$R = Rs * \frac{L}{W} = Rs * Z$ $\quad Z = \frac{L}{W} = \frac{8\lambda}{2\lambda} = 4$

$= 10^4 \frac{\Omega}{\text{Sqr}} * 4$

$\boxed{R = 4 \times 10^4\Omega}$

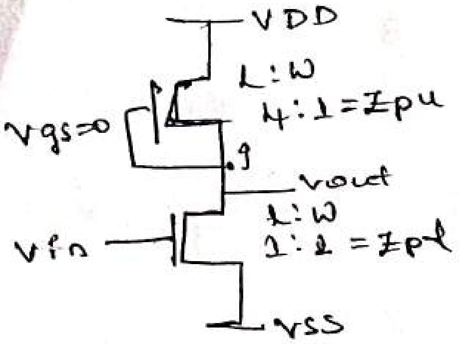
(or)

40kΩ

② Calculate the on resistance of 4:1 MOS Inverter with $RS = 10k\Omega$, $Z_{up} = 4:1$ and $Z_{pd} = 1:1$

Estimate the total power dissipation for $V_{DD} = 5V$

→ nMos inverter



* pull-up transistor – nmos depletion
↓↓
(always ON)
↓
∵ (Gate 2 source are short)

$\therefore R_{pu} = R_S * \frac{L_{pu}}{W_{pu}}$

$= R_S * Z_{pu}$ (pu = pull-up)

$= 10k\Omega * 4$

$\boxed{R_{pu} = 40k\Omega}$ $\left[\frac{L_{pu}}{W_{pu}} = Z_{pu} = \frac{8\lambda}{2\lambda} = 4\right]$

* pull-down transistor: – nmos Enhancement

(Let vin=5v) (logic 1) so that pull-down transistors is ON)

$\therefore R_{pd} = R_S * \frac{L_{pd}}{W_{pd}}$ (pd = pulldown)

$= R_S * Z_{pd}$ $\left[\frac{L_{pd}}{W_{pd}} = Z_{pd} = \frac{2\lambda}{2\lambda} = 1\right]$

$= 10k\Omega * 1$

$\boxed{R_{pd} = 10k\Omega}$

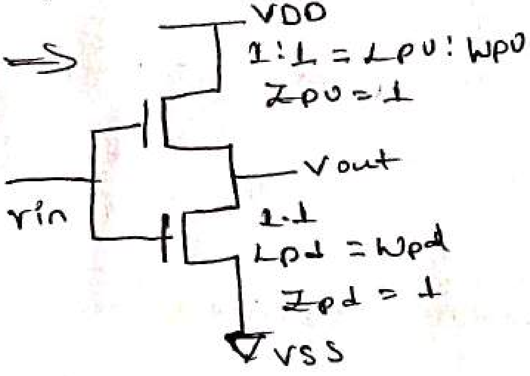
* Total ON Resistance (VDD to Gnd) $R_{ON} = R_{pu} + R_{pd}$

$= 40k\Omega + 10k\Omega$

$\boxed{R_{ON} = 50k\Omega}$

* power dissipation $= \frac{VDD^2}{R_{ON}} = \frac{(5)^2}{50k} = \underline{\underline{0.5mW}}$

③ Calculate the ON resistance of 1:1 CMos inverter with Rsn=10kΩ find the total power dissipation when VDD=5V

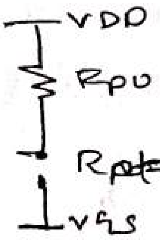


Case 1: when vin = 0V (logic 0)

PMos – ON

nMos – off

∴ Equivalent ckt is



$\therefore R_{pu} = R_{sp} = \frac{L_{pu}}{W_{pu}}$

$= 2.5 \times 10^4\Omega * 1$

$\boxed{R_{pu} = 25k\Omega}$ [Rsp → sheet resistance of PMos = 2.5×10⁴Ω from table]

∴ nMos is off ⇒ open ckt ⇒

$R_{pd} = \infty$

Total ∴ $R_{on} = R_{pu} + R_{pd}$

$= 2.5k\Omega + \infty = \infty$

$\boxed{R_{on} = \infty}$

power dilipation $= \frac{VDD^2}{R_{on}} = \frac{5^2}{\infty} = \boxed{0W}$

Case 2: When $V_{in} = 5V$ (logic 1)

PMOS - OFF

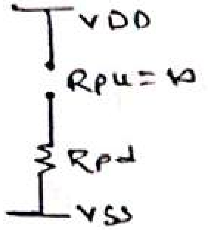
nMOS - ON

∴ $R_{pd} = R_{sn} \times \frac{L_{pu}}{W_{pu}}$

$= 10k\Omega \times 1$

$\boxed{R_{pu} = 10k\Omega}$

Equivalent ckt in



∴ pMOS in OFF => open ckt => $R_{pu} = \infty$

∴ Total $R_{ON} = R_{pu} + R_{pd}$

$= \infty + 10k\Omega$

$\boxed{R_{ON} = \infty}$

Power disipation $= \frac{VDD^2}{R_{ON}} = \frac{5^2}{\infty} = \boxed{0W}$

④ Write a note on area capacitance of layers and standard unit of capacitence?

-> Conducting layers are separated from the substrate and each other by insulting (dillectric) layer and thus leads to parallel plate capacitive effect, given by $C = \frac{\varepsilon_0 \varepsilon_r A}{D}$

-> Where, ε_0 -> absolute permittivity $= 8.854 \times 10^{-12}$ F/m (freespace)

ε_r -> relative permittivity of $SiO_2 \simeq 4.0$

D -> thickness of SiO_2 (distance b/w plates)

A -> Area of plates.

-> Area capacitance of layer is defined as capacitence per unit area

$$C_A = \frac{\varepsilon_0 \varepsilon_r}{D} \times \left[\frac{F}{m^2}\right] = \frac{pF}{\mu m^2}$$

-> Thus, knowing the dilletric (SiO_2) thickness (D), we can calculate area capacitence of various layer.

-> Typical area capacitence value for MOS circuits in listed below

⑤

Capacitance	(area-capacitance value in 5μm technology) [A]
① Gate to channel	4×10^{-4} pF/μm² (1.0) ↳ relative value
② Diffusion (active)	1×10^{-4} pF/μm² (0.25)
③ polysilicon to subtrate	0.4×10^{-4} pF/μm² (0.1)
④ Metal to substrate	0.3×10^{-4} pF/μm² (0.075)

[Relative value = specified value / gate to channel values]

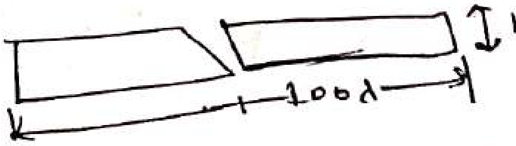
i.e Relative area capacitance = $\dfrac{\text{area capacitance of layer}}{\text{gate to channel area capacitance}}$

→ Standard unit of Capacitance ($\square C_g$):

* The load in strong capacitence in MOS technology, which is the capacitance at the output terminal of a device due to gate capacitence of next device ∴ capacitence is measured in terms of gate capacitence i.e relative in gate capacitance.

* Std unit of capacitence is $\square C_g$ and is defined as the gate-to channel capacitence of a MOS transistor having $L = W =$ feature size

⑤ Calculate the area capacitance of the layer below if the layer is metal, polysilicon diffusion



[Note: All calculations for 5μm technology]

→ (i) Capacitance = area of the layer * area capacitance of layer of a layer.

(i) Metal:

Capacitence of metal = area of metal * area capacitance of metal to substrate.

→ Area of given metal layer = $100\lambda * 4\lambda = 400\lambda^2$

→ for 5μm technology, $\lambda = 2.5\mu m$ [∵ $2\lambda = 5\mu m$]

→ Area capacitence of metal to substrate = 0.3×10^{-4} pF/μm² (table)

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$\therefore C_m = 400 * (2.5\,\mu m)^2 * 0.3 \times 10^{-4} \frac{pF}{\mu m^2}$

$\boxed{C_m = 0075\,pF}$ or $\boxed{C_m = 7.5\,\square C_g}$ $\left[\begin{array}{l} 1\square C_g = 0.01\,pF \\ ?\ \uparrow\ 0.015\,pF \end{array}\right]$

(II) polysilicon:

C_p = area of polaysilicon * area capacitence of polysilicon

$= 100\lambda * 4\lambda * 0.4 \times 10^{-4}\,pF/\mu m^2$

$= 400 * (2.5\,\mu m)^2 * 0.4 * 10^{-4} \frac{pF}{\mu m^2}$

$\boxed{C_p = 0.1\,pF}$ or $\boxed{C_p = 10\,\square C_g}$

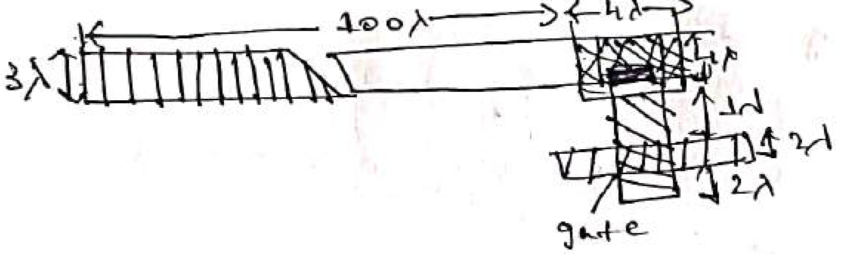
(III) Diffusion:

$C_d = 100\lambda * 4\lambda * 1 * 10^{-4}\,pF/\mu m^2$

$C_d = 400 * (2.5\,\mu m)^2 * 1 * 10^{-4}\,pF/\mu m^2$

$\boxed{C_d = 0.25\,pF}$ or $\boxed{C_d = 25\,\square C_g}$

(6) Calculate the area capacitence of the multilayer structure shown below



→ feature size $2\lambda = 5\,\mu m \therefore \lambda = 2.5\,\mu m$

W.K.T capacitence = relative area * relative area capacitence

(i) Metal capacitence (Cm):

Area of Metal $= 100\lambda * 3\lambda = 300\lambda^2$

Relative area of metal = $\frac{\text{Actual area}}{\text{Std gate area}} = \frac{300\lambda^2}{2\lambda * 2\lambda} = 75$

$\therefore C_m = 75 * 0.075\,\square C_g$ [Relative metal area Cap $= 0.075\,\square C_g$] (table)

$\boxed{C_M = 5.625\,\square C_g}$

(ii) polysilicon capacitence [Cp]: [Including gate region]

Area of polysilicon $= (4\lambda * 4\lambda) + (3\lambda * 2\lambda) = 22\lambda^2$

Relative area of polysilicon $= \frac{22\lambda^2}{4\lambda^2} = \underline{5.5}$

$\therefore C_p = 5.5 * 0.1 \square C_g$ [relative polysilicon area cap $= 0.1 \square C_g$] (table)

$\boxed{C_p = 0.55 \square C_g}$

(iii) Gate capacitance (cg) (for the transistor)

Area of transistor gate $= 2\lambda * 2\lambda$ $\therefore C_g = 1 * 1\square C_g$

Relative area of gate $= \frac{2\lambda * 2\lambda}{2\lambda * 2\lambda} = 1$ $\boxed{C_g = 1\square C_g}$

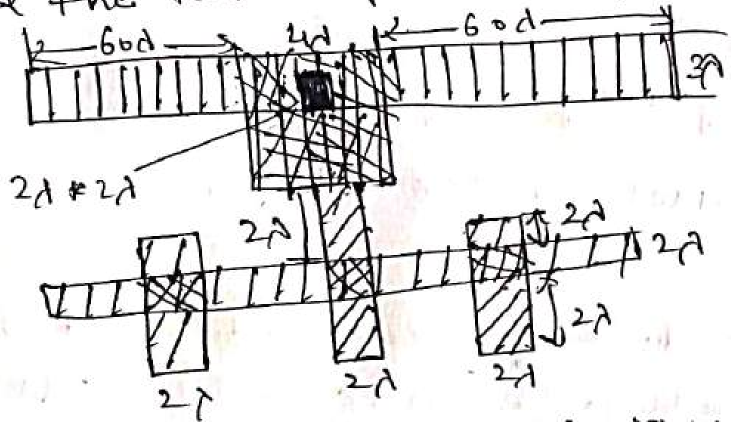
∴ the 3 capacitances appear in parallel w.r.t substrate, the total capacitance is determined by adding them

$C_T = C_m + C_p + C_g$

$= 5.625\square C_g + 0.55\square C_g + 1\square C_g$

$\boxed{C_T = 7.175\square C_g} = 0.07175\,pF$ [$\because 1\square C_g = 0.01\,pF$]

(7) Find the total capacitance for the following layout?



→ The input capacitance, Cin is made up of 3 components, Cm, Cp & Cg. W.K.T capacitance = relative area * relative capacitance

(i) Metal capacitance (Cm):

Area of metal $= (60\lambda + 60\lambda) * 3\lambda = 48\lambda^2$

Relative area $= \frac{360\cancel{\lambda^2}}{4\cancel{\lambda^2}} = 90$

$\therefore C_m = 90 * 0.075 \square C_g$

$\boxed{C_m = 6.75\square C_g}$

(ii) polysilicon capacitance (Cp):

Area of polysilicon $= (4\lambda * 4\lambda) + (4\lambda * 2\lambda) + (4\lambda * 2\lambda) + (4\lambda * 2\lambda)$

$= 16\lambda^2 + 8\lambda^2 + 8\lambda^2$

$= 40\lambda^2$

Relative area $= \frac{40\lambda^2}{4\lambda^2} = 10$

$C_p = 10 * 0.1 \square C_g$

$\boxed{C_p = 1 \square C_g}$

(iii) Gate capacitance (Cp):

~~Area of polysilicon = $(4\lambda * 4\lambda) + (4\lambda * 2\lambda) + (4\lambda * 2\lambda) + (4\lambda * 2\lambda)$~~

~~$= 16\lambda^2 + 8\lambda^2 + 8\lambda^2 + 8\lambda^2$~~

~~$= 40\lambda^2$~~

~~Relative area $= \frac{40\lambda^2}{4\lambda^2} = 10$~~

~~$C_p = 10 * 0.1 \square C_g$~~

~~$C_p = 1$~~

Area of gate $= (2\lambda * 2\lambda) * 3$ [Since there are 3 transistors formed]

$= 12\lambda^2$

Relative area $= \frac{12\lambda^2}{4\lambda^2} = 3$

$C_g = 3 \times 1 \square C_g$

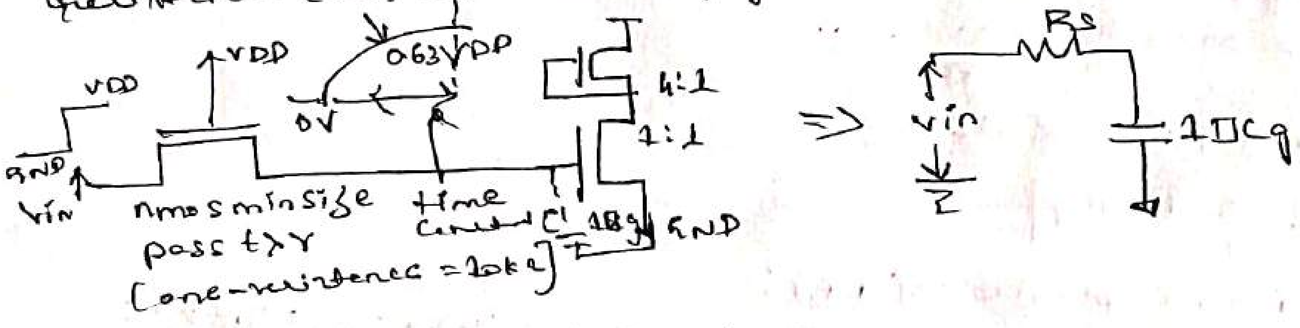
$\boxed{C_g = 3 \square C_g}$

$C_T = C_m + C_p + C_g = 6.75 \square C_g + 1 \square C_g + 3 \square C_g = \boxed{C_T = 10.75 \square C_g}$

⑧ Explain delay unit, nMOS inverter delay?

⇒ Delay unit (τ)

* It is defined as the product of sheet resistance (Rs) of an n-channel transistor and gate to channel capacitance of minimum sized transistor.
* Consider the case in which one standard gate-area capacitor being charged through one feature size square of n-channel resistance (Rs) as shown in figure below



-> from the above figure we have

time constant $\tau = [1 R_s * 1 \square C_g]$ seconds

-> for 5 μm technology, Rs of nMOS = 10 kΩ (10kΩ) & 1□Cg = 0.01 pF

$\therefore \tau = 10^4 \text{ohm} * 0.01 \text{pF}$

$\boxed{\tau = 0.1 \text{nsec}}$

* For 2µm technology, $R_s = 2 \times 10^4 \Omega$ & $4\square C_g = 0.0032 \text{pF}$

$\therefore \tau = 2 \times 10^4 \Omega * 0.032 \text{pF}$

$\boxed{\tau = 0.064 \text{nsec}}$

* for 1.2µm technology, $R_s = 2 \times 10^4 \Omega$ & $1\square C_g = 0.0023 \text{pF}$

$\tau = 2 \times 10^4 \Omega * 0.0023 \text{pF}$

$\boxed{\tau = 0.046 \text{nS}}$

τ is defined as time taken by capacitor to charge from 0 to 63% of maximum values it can charge upto. It is used as the fundamental time unit.

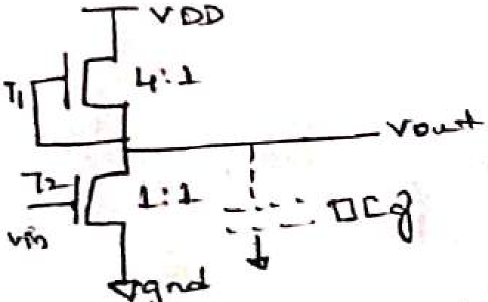
Ⓠ Explain CMOS inverter delay?

⇒

n-MOS inverter delay:

→ Consider the basic 4:1 nMOS inverter as shown below.

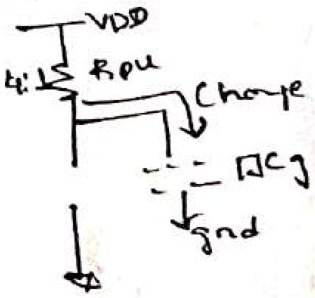
(Assuming the o/p is connected to another nmos inverter whose pull-down is (1:1) ∴ 1□Cg)



Case 1: $V_{in} = 0V \Rightarrow T_1 \rightarrow$ always ON, $T_2 \rightarrow$ OFF ∴ Equivalent ckt

∴ the capacitance charge through pull-up

The charging time is found as follow



$$T_{charge} = R_{pu} * \square C_g$$

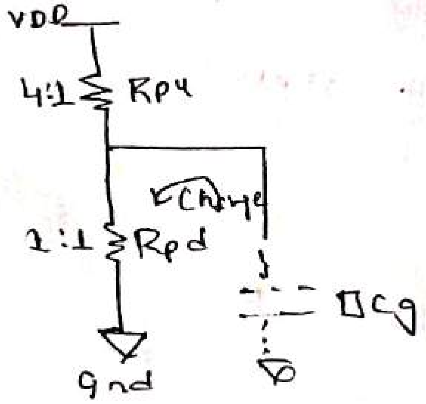
$$= R_s * \frac{L_{PU}}{W_{PU}} * \square C_g$$

$$= R_s * \frac{4}{1} * \square C_g$$

$$T_{charge} = \underbrace{4 R_s \square C_g}_{\tau}$$

$\boxed{T_{charge} = 4\tau}$ for ∇V_{in} (1→0)

Case 2: $V_{in} = 5V = 1$ T1 → always ON, T2 – ON Equivalent ckt is



∴ The capacitance discharge through pull-down

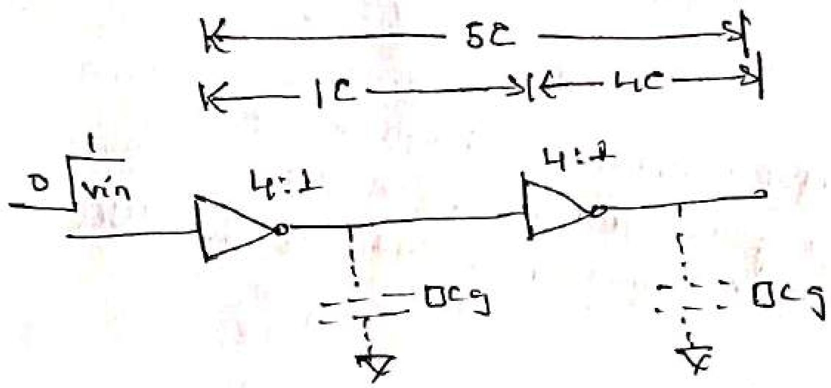
The discharge time is found as follow

$$T_{discharge} = R_{pd} * \square C_g$$
$$\Downarrow$$
$$= R_s \left\{ \frac{L_{pd}}{W_{pd}} \right\} * \square C_g$$
$$= R_s * \frac{1}{1} * \square C_g$$
$$= 1 \underbrace{R_s \square C_g}_{\tau}$$

$\boxed{T_{discharge} = 1\tau}$ for ΔV_{in} (0-1)

→ Thus it can be observed that, a single 4:1 inverter exhibits undesirable asymmetric delay (τ & 4τ). This asymmetric delay increases if inverter ratio is increased to 8:1 & so on.

→ Now, consider an nMOS inverter pair, cascaded as shown



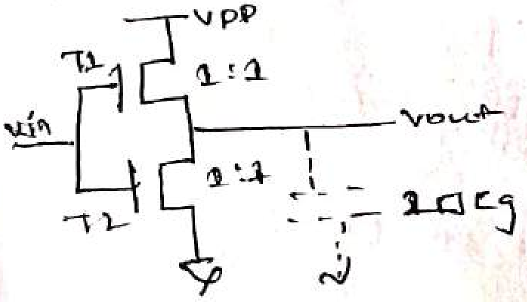
→ Thus, the delay over the pair of inverter is always constant (5τ) irrespective of the input (V_{in})

→ In general, delay through a pair of similar nMOS inverter is

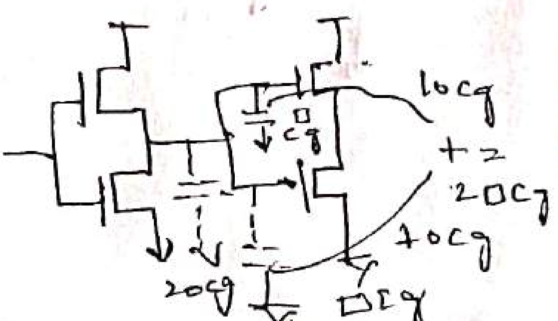
$$\boxed{T_d = [1 + Z_{pu}/Z_{pd}]\tau}$$ $\left[\text{here } Z_{pu}/Z_{pd} = 4:1 \quad (1+4/1)\tau = 5\tau \right]$

⑨ Explain CMOS inverter delay?

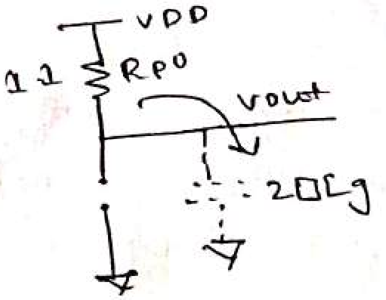
→ Consider the basic 1:1 CMOS inverter as shown below



[∵ Assuming the o/p is connected to another CMOS inverter ∴ since o/p is connected to 2 gate i/p, we get $2\square C_g$ as capacitance]



Case 1 : $\boxed{V_{in}=0V}$ → T1 → ON, T2 → OFF ∴ Equivalent ckt



∴ The capacitance charges, through pull-up (PMOS)

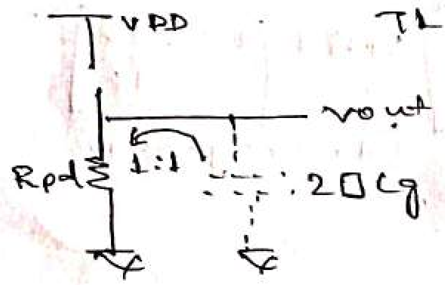
The charging time is found as follow

$$T_{charge} = R_{pu} * 2\square C_g$$
$$= R_s * \frac{L_{pu}}{W_{pu}} * 2\square C_g$$
$$= 2.5R_s * \frac{1}{1} * 2\square C_g \quad (R_s \text{ of PMOS} = 2.5 R_s \text{ of NMOS})$$
$$= \underbrace{5 R_s \square C_g}_{C}$$

$$\boxed{T_{charge} = 5C}$$

Case 2 : $\boxed{V_{in}=V_{DD}}$

T1 → off & T2 → ON ∴ Equivalent ckt



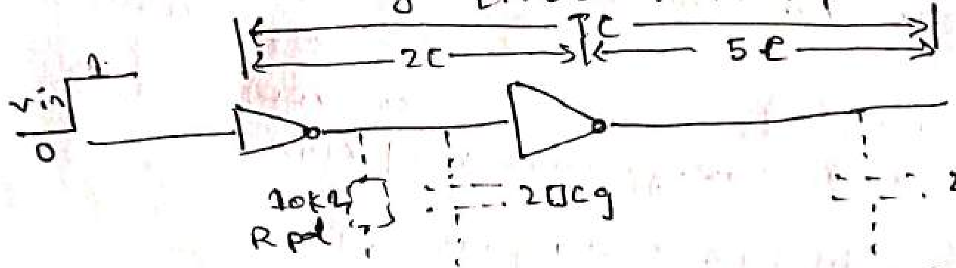
∴ The capacitance discharge, through pull-down (NMOS)

The discharge time is found as follow

$$T_{discharge} = R_{pd} * 2\square C_g$$
$$= R_s * \frac{L_{pd}}{W_{pd}} * 2\square C_g \Rightarrow R_s * \frac{1}{1} * 2\square C_g$$
$$= 2 \underbrace{R_s \square C_g}_{C}$$

$$\boxed{T_{discharge} = 2C}$$

=> Consider min size CMOS inverter pair delay



Thus the delay over the pair of CMOS inverter is (7C).. irrespective of the input.

⑩ Explain rise time and fall time estimation?

=> Rise time Estimation

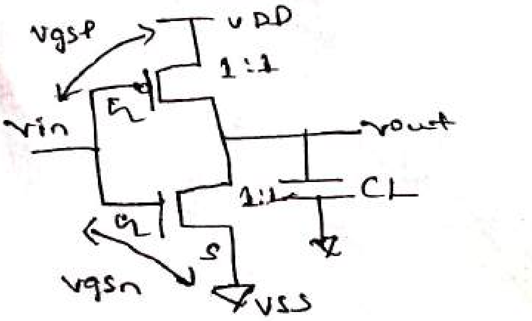


fig a : CMOS inverter

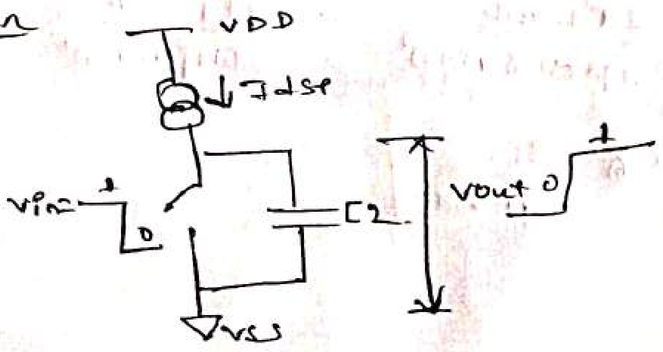


fig b : Rise-time model.

→ for rise-time estimation, capacitor has to charge through PMOS,

Let $\underline{vin} =$ ⌉$_0$ (1-so transit w) av

→ for the above I/P condition, W.K.T PMOS – ON & nMOS – OFF

→ In time analysis, Let us assume PMOS stayed in saturation region for the entire charging period of the Load capacity 'C'. Thus the circuit may be modeled as shown fig (b)

→ The saturation Current for PMOS is given by

$$I_{dsp} = \frac{\beta_p (V_{gs} - V_{tp})^2}{2}$$

Then current discharge C_L and its magnitude is approximately constant given by $\boxed{V_{out} = \frac{I_{dsn} \cdot t}{C_L}}$ W.K.T $\boxed{I = C\frac{dv}{dt}}$ (discharge current is –ve)

Substituting for I_{dsp} and rearranging, we have

$$V_{out} = -\frac{\beta_p (V_{gsp} - V_{tn})^2 \cdot t}{2 \cdot C_L}$$

$$\therefore t = \frac{-2C_L V_{out}}{\beta_n (V_{gsn} - V_{tn})^2} \rightarrow ①$$

Let → $t = \tau_{fn}$; $V_{gsp} = V_{gp} - V_{sn} = V_{in} = 0 = V_{in} = V_{DD}$

$\therefore \rightarrow V_{gsp} = V_{DD}$

→ $V_{tn} = +0.2V_{DD}$ (typical value)

→ vout various from VDD to 0. ∴ change in Vout = +VDD

Substituting, the above values in eqn ①, we obtain.

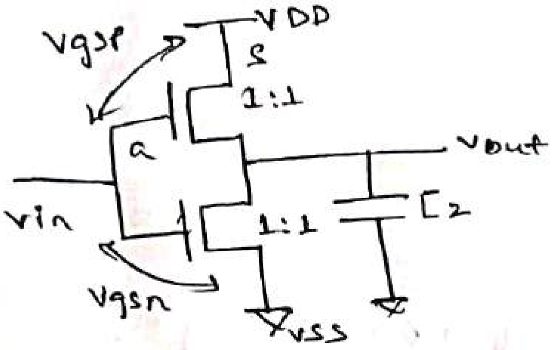
$$\tau_{ff} = \frac{-2C_L(-V_{DD})}{\beta_p (V_{gsp} - V_{tp})^2} = \frac{2C_L V_{DD}}{\beta_p (V_{DD} - (0.2V_{DD}))^2}$$

$$\tau_{ff} = \frac{2C_L V_{DD}}{\beta_p (0.8V_{DD})^2} = \frac{2C_L V_{DD}}{0.64\beta_n V_{DD}^2}$$

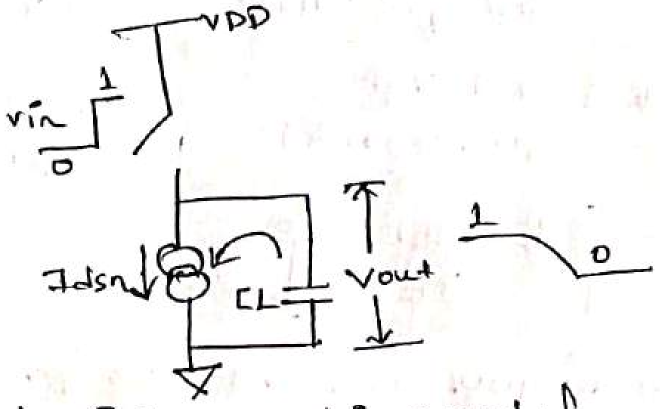
$$\therefore \boxed{\tau_{ff} \simeq \frac{3C_L}{\beta_p \cdot V_{DD}}}$$

FALL-TIME ESTIMATION:

Consider a CMOS inverter shown in fig(a)



fig(a): CMOS inverter



fig(b): FALL-time model

→ for fall-time estimation, capacitor has to discharge through nMOS transistor ∴ Let Vin = $\overset{1}{\underset{0}{\nearrow}}$ (0 → 1 transition) VDD

→ for the above input condition, W.K.T pMOS-OFF & n-MOS-ON

→ In this analysis, Let us assume nMOS stays in Solution region, for the entire discharge period of the load capacitor CL as shown in fig(b). Thus the circuit may be modeled as shown in fig(b).

→ The saturation current for nMOS is given by

$$I_{dsn} = \frac{\beta_n (V_{gsn} - V_{tn})^2}{2}$$

The current discharge CL and its magnitude is approximately constant given by $\boxed{V_{out} = \frac{I_{dsn} \cdot t}{C_L}}$ W.K.T $\boxed{I = C\frac{dV}{dt}}$

(discharge current is -ve)

Substituting for Idsp and rearranging, we have

$$V_{out} = -\frac{\beta_n (V_{gsn} - V_{tn})^2 \cdot t}{2 \cdot C_L}$$

$$\therefore t = \frac{2 C_L V_{out}}{\beta_n (V_{gsn} - V_{tn})^2} \rightarrow ①.$$

Let t = Tf ; Vgsn = Vgn − Vsn = Vin − 0 = Vin = VDD

∴ → Vgsn = VDD

→ Vtn = +0.1 VDD (typical value)

→ Vout varies from VDD to 0 ∴ Change in vout = −VDD

vout → VDD ↘ 0 (0 − VDD)

Substituting, the above value in eqn ①, we obtain

$$T_f = \frac{-2C_L(-V_{DD})}{\beta_n(V_{gsn}-V_{tn})^2} = \frac{2C_L V_{DD}}{\beta_n(V_{DD}-0.2V_{DD})^2}$$

$$T_f = \frac{2C_L V_{DD}}{\beta_n(0.8V_{DD})^2} = \frac{2C_L \cancel{V_{DD}}}{0.64\beta_n V_{DD}^{\cancel{2}}}$$

$$\therefore \boxed{\tau_f = \frac{3C_L}{\beta_n V_{DD}}}$$

⑪ How do you resolve the problem of driving large capacitive loads by cascade inverters as drivers.?

→ <u>Driving Large capacitive Loads</u> :

→ The problem of driving large capacitive loads arises when signals must be propagated from the chip to off chip destinations.

→ Off chip capacitances are very large and in the order of $C_L \geq 10^4 \square C_g$.

→ Large capacitance of this order, increases delay ($\because \tau = RC$) and thus must be driven through low resistances.

→ The problem of driving large capacitive loads can be reduced by

(i) Cascaded inverters as driver.

(ii) super Buffers

(iii) Bicmos drivers

<u>Cascade inverters as drivers</u> :

→ Inverter which drive large capacitive loads (C_L) will have large time delay.

→ To reduce, the time delay presented by large-off capacitances, we must reduce the pull-up (R_{pu}) & pull-down (R_{pd}) resistance.

→ To reduce the resistance value, the width of the channel must be increased $\therefore \downarrow R = \underset{\downarrow}{R_s} \cdot \frac{L}{\boxed{W}\uparrow} \rightarrow$ Long-length (fixed)

Sheet resistance fixed.

→ Increasing the width, results in increase in area of the inverter

→ The increase in area, further increases gate capacitance to the i/p ∵ $\uparrow C = \frac{\epsilon_0 \epsilon_r (A)\uparrow}{d}$

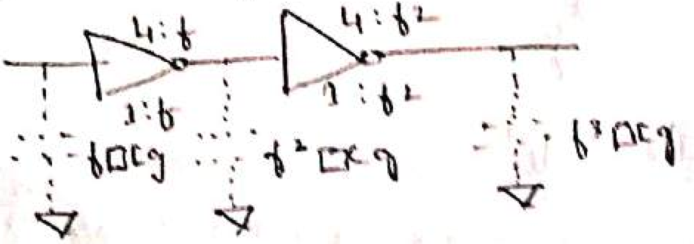
→ Thus increase in capacitance, will cause increase in delay which is undesirable.

→ The remedy for this is to use geometric cascaded of 'N' inverters.

→ The geometric cascade of N, inverter, each one of which is larger than the preceding stage by a width factor 'f' more shown in figure below (Eg: nmos inverter driving large C_L)

⑫ Derive an Expression for delay of Cascaded inverters cond N-nMOS inverters.

→ Consider any pair of inverters from the above cascade



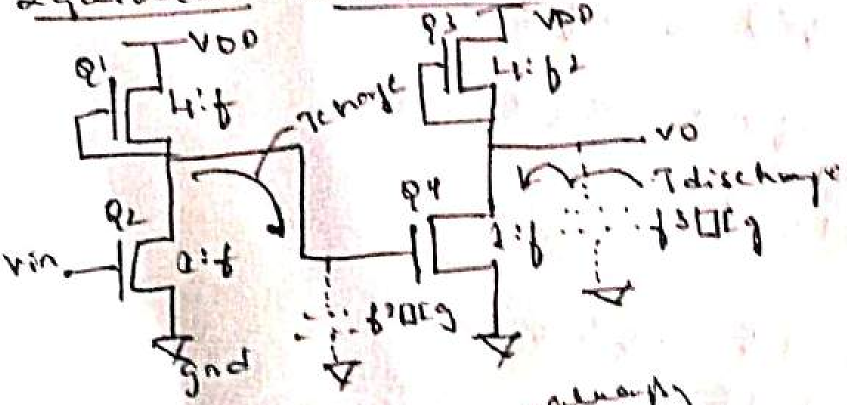
$C = \left[\frac{\epsilon_0 \epsilon_r}{d}\right] A$

$C = \square C_g \cdot A$

$C = \square C_g \times 1 \times f^2$

$C = f^2 \square C_g$

Equivalent schematic



Case 1: vin = 5v → Q_1 = ON (always) Q_3 = ON
Q_2 = ON Q_4 = off

Charging time of Q_2: $T_{charge} = R_{pu} * f^2 \square C_g$

$= R_s \frac{4}{f} * f^2 \square C_g$

$\frac{L}{W} = \frac{4}{f} = 4f\underbrace{R_s \square C_g}_{\tau}$

$\boxed{T_{charge} = 4f\tau}$

Case 2: vin = 0V → Q_1 - ON (always) Q_3 - ON
Q_2 - off Q_4 - ON

Discharging time of Q_4: $T_{discharge} = R_{pd} * f^3 \square C_g$

$= \left[R_s * \frac{L}{W}\right] * f^3 \square C_g$

$\frac{L}{W} = \frac{1}{f^2}$

$= R_s * \frac{1}{f^2} * f^3 \square C_g = R_s f \square C_g$

$\boxed{T_{discharge} = f\tau}$

∴ delay per stage of an nMOS inverter in

$= f\tau$ for Δv_{in} (0 → 1 transition)

$= 4f\tau$ for ∇v_{in} (1 → 0 transition)

∴ Total delay per nMOS pair $= 5f\tau$

The total delay of geometric cascade of N-nMOS inverter in

if N even, total $T_d = \frac{N}{2}(5f\tau) = 2.5Nf\tau$

if N odd, total $T_d = \frac{(N-1)}{2} 5f\tau + f\tau$ for Δv_{in}

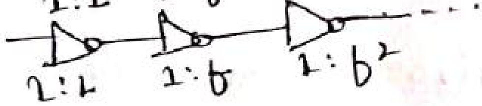
$= [2.5(N-1)+1] f\tau$ for Δv_{in} (0 → 1)

(or)

total $T_d = \frac{(N-1)}{2} 5f\tau + 4f\tau$ for ∇v_{in}

$= [2.5(N-1)+4] f\tau$ for ∇v_{in} (1 → 0)

→ Similerly for CMOS inverter pair



Delay per stage of an CMOS inverter in.

$= 2f\tau$ for Δv_{in} (0 → 1 transition)

$= 5f\tau$ for ∇v_{in} (1 → 0 transition)

∴ Total delay per CMOS pair $= 7f\tau$

The total delay of geometric cascade of N CMOS inverter in

if N Even : total $T_d = \frac{N}{2}(7f\tau) = 3.5Nf\tau$

if N odd : total $T_d = \frac{(N-1)}{2} 7f\tau + 2f\tau$ for Δv_{in}

$= [3.5(N-1)+2] f\tau$ for Δv_{in}

(or)

total $T_d = (N-1) 7f\tau + 5f\tau$ for ∇v_{in}

$= [3.5(N-1)+5] f\tau$ for ∇v_{in}

→ As the width factor increases, the capacitive load at the I/P increases and the area occupied also increases. The rate at which the width increases, will influence the number of stages 'N' which must be cascaded to drive a particular value of 'C_L'

→ These 'N' & 'f' are interdependent and an optimum solution has to be obtain for minimum delay.

→ To determine the value of '<u>f</u>' which will minimize the overall delay for a given value of CL/Cg.

W.K.T $C_L = f^N \square C_g$ $\quad \therefore f^N = \frac{C_L}{1 \square C_g}$

Let $y = \frac{C_L}{1 \square C_g} = f^N$ $\quad \therefore y = f^N$

$y = f^N$

$\ln(y) = N \ln(f)$ $\quad \therefore N = \frac{\ln(y)}{\ln(f)}$

(from eqⁿ) delay $\propto N f \tau$

$= \frac{\ln(y)}{\ln(y)} \cdot f(\tau)$

Thus, it can be shown that the total delay is minimized if $\boxed{f = e}$ at $N = \frac{\ln(y)}{\ln(e)} = \ln(y)$

∴ overall delay <u>Td</u>

$= 2.5\,\overset{f}{e} N \tau$

nMOS → N - Even ⇒ $T_d = 2.5\,\overset{f}{e} N \tau$

N - odd ⇒ $T_d = [2.5(M-1)+1]\,e\tau$ for ΔV_{in}

$T_d = [2.5(N-1)+4]\,e\tau$ for ∇V_{in}

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MODULE WISE QUESTION BANK OF VLSI DESIGN (17EC63)

MODULE-1

1. Describe the historical development of MOS transistors. How did the introduction of MOSFETs impact the electronics industry?
2. Explain the basic operation of an n-channel MOSFET. What are the key regions of operation for a MOSFET?
3. Derive the ideal I-V characteristics of an n-channel MOSFET in the saturation region. What assumptions are made in this derivation?
4. Discuss the effect of channel-length modulation on the I-V characteristics of a MOS transistor. How does it impact the transistor’s performance?
5. Explain how the DC transfer characteristics of a MOSFET are derived. What factors affect the shape of the transfer characteristic curve?
6. Describe the main steps involved in the fabrication of an n-channel MOSFET. Include a discussion on doping and oxidation processes.
7. Compare and contrast the P-well process, N-well process, and Twin-tub process used in CMOS fabrication. What are the advantages and disadvantages of each?
8. Explain the concept of BiCMOS technology and how it integrates both bipolar and CMOS transistors on a single chip. What are the main applications of BiCMOS technology?
9. Detail the steps involved in the P-well process for CMOS fabrication. How does this process differ from the N-well process?
10. Describe the N-well process and its key steps. What are the benefits of using this process over the P-well process?
11. Explain the Twin-tub process and its significance in CMOS fabrication. How does it address some of the limitations of the P-well and N-well processes?

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MODULE-2

1.Describe the different layers typically found in a MOS transistor layout. How do these layers contribute to the overall function of the MOSFET?

2. Explain what a stick diagram is in the context of CMOS design. How does it differ from a full layout diagram?

3. What are design rules in semiconductor manufacturing? Why are they important, and how do they impact the design and performance of integrated circuits?

4. Outline the key steps in the layout process of a MOSFET. What considerations must be taken into account to ensure the layout adheres to the design rules?

5. Define sheet resistance and explain its significance in MOSFET design. How is it calculated, and what are its implications for circuit performance?

6. What are area capacitances, and how do they vary with different layers in a MOSFET? Provide examples of how these capacitances impact circuit behavior.

7. What is the standard unit of capacitance used in semiconductor design, and why is this unit commonly used?

8. Given a specific MOSFET layout, calculate the area capacitance of different layers. Explain the steps involved in the calculation.

9. What is a delay unit in the context of digital circuit design? How is it used to measure and compare the performance of different circuits?

10. Derive the delay equation for a CMOS inverter. What factors influence the delay of an inverter, and how can it be minimized?

11. Discuss the challenges associated with driving large capacitive loads in digital circuits. How can designers address these challenges to ensure reliable circuit performance?

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MODULE-3

1. Explain the concept of scaling in MOS circuits. What are the primary scaling models used to predict changes in device performance with technology scaling?
2. List and describe the key scaling factors for MOSFET device parameters such as threshold voltage, channel length, and drain current. How do these factors affect the overall performance of MOS circuits?
3. How does scaling impact the power consumption, speed, and area of MOSFETs? Provide examples of how these changes can influence circuit design and performance.
4. Discuss some of the challenges associated with scaling MOS circuits. How do issues like short-channel effects and leakage currents affect scaled devices?
5. What are some general considerations that must be taken into account during subsystem design? How do these considerations influence the overall system performance and integration?
6. Describe a typical design process for a digital subsystem. Include steps such as specification, architectural design, detailed design, and verification.
7. Explain the concept of regularity in design processes. How does regularity contribute to simplifying the design, layout, and manufacturing of integrated circuits?
8. Outline the design process for an Arithmetic Logic Unit (ALU) subsystem. What are the key components and considerations in designing an ALU?
9. Describe the Manchester carry-chain technique for fast addition. How does this technique improve the performance of adders in digital circuits?
10. Discuss various enhancement techniques used to improve the performance of adders. Include techniques such as carry-lookahead and carry-select.
11. Provide a detailed example illustrating the design process of an ALU subsystem incorporating Manchester carry-chain techniques. How do these techniques contribute to the overall performance of the ALU?

MODULE-4

1. What are some common architectural issues encountered in subsystem design? How can these issues be addressed to optimize performance and functionality?
2. Describe the basic concepts of switch logic. How is switch logic used in digital circuits, and what are its advantages?
3. Explain the concept of gate (restoring) logic. How does restoring logic improve the reliability and performance of digital circuits?
4. What is the purpose of a parity generator in digital systems? Describe the operation of a parity generator and the different types (even, odd).
5. Discuss the function of a multiplexer in digital systems. How is a multiplexer designed, and what are some common applications?
6. What is a Programmable Logic Array (PLA), and how does it differ from other programmable logic devices? Explain the basic structure and operation of a PLA.
7. What is an FPGA, and how does it differ from traditional ASICs? Describe the basic advantages and applications of FPGA-based systems.
8. Explain the basic concepts behind FPGA technology. What are the key components of an FPGA, and how do they contribute to its functionality?
9. How does digital design change when using FPGAs compared to traditional digital design approaches? Discuss the implications for design methodology and tools.
10. Describe the process of designing a system based on FPGAs. What are the key stages, and what considerations are important during the design process?
11. Outline the architecture of a typical FPGA. What are the main components, such as logic blocks, routing resources, and I/O blocks?
12. What is involved in the physical design of FPGA-based systems? Discuss aspects such as placement, routing, and timing constraints.

MODULE-5

1. What are the primary considerations in system timing for digital circuits? How do factors like clock frequency, setup time, and hold time impact system performance?
2. Describe the function and operation of different types of registers (e.g., D flip-flop, shift register). How are they used in digital systems to store and manipulate data?
3. What are some commonly used memory elements in digital systems? Compare and contrast SRAM, DRAM, and Flash memory in terms of their characteristics and applications.
4. How is system timing analyzed to ensure proper operation of digital circuits? Discuss methods such as timing diagrams and static timing analysis.
5. Explain the concept of memory hierarchy in digital systems. How does the hierarchy affect system performance and efficiency?
6. What is the purpose of testing and verification in digital circuit design? How do these processes contribute to ensuring the reliability and functionality of a design?
7. Describe the process of logic verification in digital circuits. What are the common techniques used to verify the correctness of logic designs?
8. What are the key principles behind logic verification? Discuss concepts such as equivalence checking, functional simulation, and formal verification.
9. What are the principles behind manufacturing tests for digital circuits? How are tests designed to detect defects and ensure the quality of fabricated devices?
10. What is Design for Testability (DFT), and why is it important? Describe common DFT techniques such as scan chains and boundary scan.
11. Explain how scan chains work and their role in improving testability. What are the benefits and limitations of using scan chains in a design?
12. How is test coverage measured, and what factors affect the quality of testing? Discuss strategies for improving test coverage and identifying potential weaknesses in test plans.

G.S.Mallikarjun

CEC | ECE | 6th sem | VLSI design | 17EC63 | 20-21

ATTENDANCE

	Sl. No.	Reg. No.	Name	21	21	21	21	21	21	21	21	21	21	21
				4	4	4	4	4	4	4	5	5	5	5
				19	20	23	24	26	27	30	3	4	7	8
				1	2	3	4	5	6	7	8	9	10	11
17 sch	1	ICE16EC020	Madan Halakatti	0	1	2	3	4	5	6	7	8	9	10
17 sch	2	ICE16EC045	T.U. Sowmya	1	2	3	4	5	6	7	8	9	10	11
15 sch	3	ICE16EC017	Kaushik·A	0	1	2	3	4	5	6	7	8	9	10
15 sch	4	ICE16EC053	Saeeda Shamael	1	2	3	4	5	6	7	8	9	10	11
17 sch	5	ICE17EC018	Chandana-R	1	2	3	4	5	6	7	8	9	10	11
17 sch	6	ICE17EC023	Divakar·S·D	1	2	3	4	5	6	7	8	9	10	11
17 sch	7	ICE17EC025	Govardhan K·N	1	2	3	4	5	6	7	8	9	10	11
17 sch	8	ICE17EC053	Sanjay·H	0	1	2	3	4	5	6	7	8	9	10
17 sch	9	ICE17EC060	Sheshadri	1	2	3	4	5	6	7	8	9	10	11
17 sch	10	ICE17EC061	Shyam Sundar·M·G.	1	2	3	4	5	6	7	8	9	10	11
17 sch	11	ICE17EC068	Tejaswini Ananth J.	1	2	3	4	5	6	7	8	9	10	11
17 sch	12	ICE17EC069	Thanushree·R	1	2	3	4	5	6	7	8	9	10	11
15 sch	13	ICE16EC401	Akshay Hegde.	0	1	2	3	4	5	6	7	8	9	10
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		Initials												

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T1

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ASSESSMENT

n.	Test Marks					Sessional Marks	Remarks
	1	2	3	4	5		

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CIRCULAR

Ref. No: CEC/ECE/DAC/2020-2021/01 **Date: 24-08-2020**

All the members of Department Advisory Committee are informed to attend a meeting which will be held as follows

Date: 25-08-2020
Time: 03.30 PM
Venue: **LAB A206**

Agenda:

- Conducting Add-on Course and soft skill training
- Faculty development programme
- Conducting coding, debugging events

G.S. Mallikarjuna
Prof. Mallikarjuna G S

HOD

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Department Advisory Committee Meeting

Date: 25-08-2020
Time: 03.30 PM
Venue: LAB A206

DAC Members Present:

Sl. No	Member Name	Designation	Role	Signature
1	Prof. Mallikarjuna G S	HOD	Convenor	G.S. mallikarjun
2	Dr. Shalini Prasad	Professor	Co-Convenor	S. Prasad
3	Prof. Shylaja K	Assistant Professor	Member	
4	Prof. Ravindra S	Assistant Professor	Member	
5	Prof. Aurobindo Koti	Assistant Professor	Member	Koti
6	Prof. SKL Narayana	Assistant Professor	Member	SKLn

The Department Advisory Committee meeting was conducted at Department of ECE, on 25th August 2020, at 03:30 PM.

Agenda of the Meeting:

- Conducting Add-on Course and soft skill training
- Faculty development programme
- Conducting coding, debugging events

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Minutes of Meeting:

In the Department Advisory Committee meeting, an overview of the department was presented, emphasizing student achievements, result analysis, and faculty accomplishments. The members discussed various suggestions for improvement and reviewed the meeting agenda.

The Committee proposed the following items for inclusion in the agenda:

- Second and Third year students are encouraged to participate in technical activities and to attend guest lectures or seminars to broaden their knowledge.
- A project exhibition has been proposed, offering final-year students a platform to showcase their work.
- The HOD also briefed about time table preparation, departmental activities.

G.S. Mallikarjuna

Prof. Mallikarjuna G S

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Visvesvaraya Technological University

"Jnana Sangama" Belagavi-590018, Karnataka State, India

Dr. A. S. Deshpande B.E., M.Tech., Ph.D.
Registrar

Phone: (0831) 2498100
Fax: (0831) 2405467

Ref: VTU/BGM/SO2/2020-21/4162

Dated: 4 DEC 2020

NOTIFICATION

Subject: Revised Academic Calendar for ODD semester 2020-21(Tentative) regarding...

Reference: Hon'ble Vice-Chancellor Approval dated 02.12.2020

Revised Academic Calendar for III, V, and VII semesters of B.E./B.Tech./B.Plan./B.Arch., and IX semester of B.Arch., III & V semester of MCA, III semesters of MBA, M.Tech., and M.Arch., for the academic Year 2020-21 is hereby notified as enclosed.

The Principals of Affiliated, Constituent, and Autonomous Engineering Colleges are hereby informed to bring the contents of this Notification to the notice of all the concerned.

Sd/-
REGISTRAR

Encl: Revised Academic Calendar for odd semester of 2020-21(Tentative)

To,

1. The Principals of all affiliated/ constituent /Autonomous Engineering Colleges under the ambit of VTU Belagavi.
2. The Chairpersons of all Departments, Centres for PG Studies in Belagavi, Kalaburgi, Muddenahalli, and Mysore.

Copy to.

1. To the Hon'ble Vice-Chancellor through the secretary to VC, VTU Belagavi for information
2. The Registrar (Evaluation), VTU Belagavi for information.
3. The Regional Directors (I/c) of all the regional offices of VTU for circulation.
4. The Special Officer CNC VTU Belagavi for uploading on VTU website
5. PS to Registrar VTU Belagavi
6. All the concerned Special Officer/s and Caseworker/s of the academic section, VTU, Belagavi

04.12.2020
REGISTRAR

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Revised Academic Calendar of VTU, Belagavi for ODD Semester of 2020-21 (Tentative)

	I Sem B. E. / B. Tech. / B. Arch./B.Plan	I sem M.Tech./MBA /MCA/M.Arch.	III, V B. E. /B. Tech./B.Plan/ B.Arch & VII sem BPlan /BArch & IX Sem B. Arch.	VII Sem B. E. /B. Tech	III & V Sem MCA	III Sem MBA	III Sem M. Tech.	III Sem M. Arch.
Commencement of ODD Semester	**14.12.2020**	**Will be announced later**	**01.09.2020**	**01.09.2020**	**01.09.2020**	**01.09.2020**	**01.09.2020**	**01.09.2020**
Last Working day of ODD Semester	**25.03.2021**		**16.01.2021**	**16.01.2021**	**16.01.2021**	**16.01.2021**	**16.01.2021**	**16.01.2021**
Practical Examinations	29.03.2021 Onwards#		21.01.2021 Onwards#	21.01.2021 Onwards#	08.02.2021 Onwards#	--	21.01.2021 Onwards#	--
Theory Examinations	12.04.2021 To 30.04.2021		08.02.2021 To 27.03.2021	08.02.2021 To 27.03.2021	21.01.2021 To 06.02.2021	21.01.2021 To 19.02.2021	28.01.2021 To 13.02.2021	21.01.2021 To 06.02.2021
Internship			---	**29.03.2021 To 10.04.2021**	---	---	---	---
Internship Viva-Voce			---	---	---	---	**15.02.2021 To 22.02.2021**	---
Professional training / Organization study			---	---	---	**22.02.2021 To 03.04.2021**	---	---
Commencement of EVEN Semester	**03.05.2021**		**29.03.2021**	**12.04.2021**	**15.02.2021**	**05.04.2021**	**23.02.2021**	**08.02.2021**

NOTE:

- VII Semester B. E. / B. Tech. students shall have to undergo **Internship** as per circular of University **VTU/Aca/2019-20/85, dated 12.05.2020.**
- I Semester B. E/ B. Tech / B. Arch Students shall compulsorily undergo **Induction Program** for 01 Weeks.
- The classroom sessions for all the semesters would be in **ONLINE mode/blended mode** until further orders.
- The Institute needs to function for **six days** a week with additional hours (**Saturday is a full working day).**
- The faculty/staff shall be available to undertake any work assigned by the university.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- (#) Notification regarding the Calendar of Events relating to the conduct of **University Examinations** will be issued by the Registrar (Evaluation) from time to time.
- Academic Calendar may be modified based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Revised Academic Calendar is also applicable for **Autonomous Colleges.**
- The MBA students are permitted to carry out **project work** in blended mode (ONLINE/OFFLINE). More emphasis on OFFLINE mode wherever feasible.

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CITY ENGINEERING COLLEGE
Kanakapura Main Road, Bangalore-560061

04.12.2020

REGISTRAR

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, "ಜ್ಞಾನಸಂಗಮ ಆವರಣ", ಬೆಳಗಾವಿ
Visvesvaraya Technological University, "Jnana Sangama"
Belagavi - 590 018, Karnataka State

Prof. A.S.Deshpande B.E., M.Tech., Ph.D
REGISTRAR

Phone : (0831) 2498100
Fax : (0831) 2405467

Ref. No.: VTU/Aca/2019-20/ 85

Date: 12 MAY 2020

Internship - Circular

This is in continuation to the UGC letter dated 29/04/2020 vide which the guidelines on examinations and calendar were issued. It was made clear that the guidelines are advisory in nature . The said guidelines also provide a framework for internship etc. However, keeping in view the current situation of lock down across the country due to Covid-19, the colleges may also take following measures for internship and other related activities:

1. Allow the students to take up 'online internships/ activities' including the activities that can be carried out digitally or otherwise from home.
2. Engage them to work as interns on ongoing projects.
3. Delay the start date for internship.
4. Reduce the period of internship clubbing with assignments etc.

12/5/2020

Registrar

To,

1) The Principals of all the affiliated , Constituent and Autonomous colleges of VTU.

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CITY ENGINEERING COLLEGE -ACADEMIC CALENDER2020-2021(ODD SEM)

	FEBAURAY -2021		March-2021		April-2021		May-2021	
DAY	DATE	EVENT	DATE	EVENT	DATE	EVENT	DATE	EVENT
MON	1	MoM on curriculam enrichment	1					
TUE	2	starting day of 1,3and 5th sems	2					
WED	3		3					
THU	4	1 st phase orientation day starts(online)	4		1			
FRI	5	2ndday oriantaion	5		2			
SAT	6	3rd day orientation	6		3		1	LABOUR'S DAY
SUN	7	4th day orientation	7		4		2	
MON	8	5th day orientation	8		5		3	
TUE	9	6th day orientation	9		6		4	
WED	10	7th day orientation	10		7		5	
THU	11	8nd day orientation	11	maha shivarathri	8		6	
FRI	12	9th day orientation	12		9		7	
SAT	13	2nd satuarday holiday	13	2nd satuarday holiday	10	2nd satuarday holiday	8	2nd satuarday holiday
SUN	14	10 day orientation	14		11		9	
MON	15		15		12		10	
TUE	16		16		13	ugadi	11	
WED	17		17		14	Dr Ambedkar jayanti	12	
THU	18		18		15		13	
FRI	19		19		16		14	
SAT	20		20		17		15	
SUN	21		21		18		16	
MON	22		22		19		17	
TUE	23		23		20		18	
WED	24		24		21		19	1st,3rdand 5th sems
THU	25		25		22		20	
FRI	26		26		23		21	
SAT	27	4th satuarday holiday	27	4th satuarday holiday	24	4th satuarday holiday	22	4th satuarday holiday
SUN	28		28		25		23	
MON			29	holi(gh)	26		24	
TUE			30		27		25	
WED			31		28		26	
THU					29		27	
FRI					30		28	
SAT				PRINCIPAL CITY ENGINEERING COLLEGE Kanakapura Main Road BANGALORE - 560 061			29	
SUN							30	
MON							31	

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CITY ENGINEERING COLLEGE -ACADEMIC CALENDER2020-2021(ODD SEM)

DEPT OF ECE

	FEBAURAY -2021		March-2021		April-2021		May-2021	
DAY	DATE	EVENT	DATE	EVENT	DATE	EVENT	DATE	EVENT
MON	1	MoM on curriculam enrichment	1					
TUE	2	starting day of 1,3and 5th sems	2	GUEST LECTURE 1				
WED	3		3					
THU	4	1 st phase orientation day starts(online)	4		1			
FRI	5	2ndday oriantaion	5		2			
SAT	6	3rd day orientation	6		3		1	LABOUR'S DAY
SUN	7	4th day orientation	7		4		2	
MON	8	5th day orientation	8		5		3	
TUE	9	6th day orientation	9		6	WORKSHOP	4	
WED	10	7th day orientation	10		7		5	
THU	11	8nd day orientation	11	maha shivarathri	8		6	
FRI	12	9th day orientation	12		9		7	
SAT	13	2nd satuarday holiday	13	2nd satuarday holiday	10	2nd satuarday holiday	8	2nd satuarday holiday
SUN	14	10 day orientation	14		11		9	
MON	15		15		12		10	
TUE	16		16		13	ugadi	11	
WED	17		17		14	Dr Ambedkar jayanti	12	
THU	18		18		15		13	
FRI	19		19		16		14	
SAT	20		20		17		15	
SUN	21		21		18		16	
MON	22		22		19		17	
TUE	23		23		20		18	
WED	24	INDUSTRIAL VISIT	24		21	GUEST LECTURE 2	19	1st,3rdand 5th sems
THU	25		25		22		20	
FRI	26		26		23		21	
SAT	27	4th satuarday holiday	27	4th satuarday holiday	24	4th satuarday holiday	22	4th satuarday holiday
SUN	28		28		25		23	
MON			29	holi(gh)	26		24	
TUE			30		27		25	
WED			31		28		26	
THU					29		27	
FRI					30		28	
SAT							29	
SUN							30	
MON							31	

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Department Of ECE

Sep-Dec 2020

Time Table For III Semester

DAY	1	2	3
	9:30 AM 10:15 AM	11AM 11:45 AM	12:30AM 01:15 PM
MON	*MAT*	*NT*	*COA*
TUE	*DSD*	*PE&I*	*COA*
WED	*NT*	*DSD*	*MAT*
THU	*ED*	*PE&I*	*DSD*
FRI	*COA*	*MAT*	*ED*
SAT	*ED*	*NT*	*PE&I*

SUBJECT CODE	SUBJECT NAME	FACULTY NAME	COURSE
18MAT31	Engineering Mathematics –III		MAT3
18EC32	Network Theory	Prof. Mallikarjuna GS	NT
18EC33	Electronic Devices	Prof. Ravindra S	ED
18EC34	Digital System Design	Prof. Deepa Mathew K	DSD
18EC35	Computer Organization & Architecture	Prof. Vishva Kiran RC	COA
18EC36	Power Electronics & Instrumentation	Prof. Aurobindo Koti	PE&I

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Department Of ECE

Sep-Dec 2020

Time Table For V Semester

DAY	1	2	3
	9:30 AM 10:15 AM	11AM 11:45 AM	12:30AM 01:15 PM
MON	*M&E*	*DSP*	*EW*
TUE	*VHDL*	*EW*	*ITC*
WED	*EW*	*VHDL*	*M&E*
THU	*DSP*	*PCS*	*VHDL*
FRI	*ITC*	*PCS*	*DSP*
SAT	*PCS*	*ITC*	*M&E*

SUBJECT CODE	SUBJECT NAME	FACULTY NAME	COURSE
18ES51	Technological Innovation Management And Entrepreneurship	Prof. Shylaja K	M&E
18EC52	Digital Signal Processing	Prof. Deepa Mathew K	DSP
18EC53	Principles of Communication Systems	Prof. Shalini Prasad	PCS
18EC54	Information Theory & Coding	Prof. Krishna K S	ITC
18EC55	Electromagnetic Waves	Prof. Ravindra S	EW
18EC56	Verilog HDL	Prof. Vishva Kiran RC	VHDL

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Department Of ECE

Sep-Dec 2020

Time Table For VII Semester

DAY	1	2	3
	9:30 AM 10:15 AM	11AM 11:45 AM	12:30AM 01:15 PM
MON	*M&A*	*DIP*	*PE*
TUE	*RTS*	*SC*	*M&A*
WED	*PE*	*M&A*	*DIP*
THU	*SC*	*RTS*	*PE*
FRI	*DIP*	*RTS*	*SC*
SAT	*PHASE 1 -PROJECT*		

SUBJECT CODE	SUBJECT NAME	FACULTY NAME	COURSE
17EC71	Microwave and Antennas	Prof. Shalini Prasad	M&A
17EC72	Digital Image Processing	Prof. Aurobindo Koti	DIP
17EC73	Power Electronics	Prof. Krishna K S	PE
17EC743	Real Time Systems	Prof. Mallikarjuna GS	RTS
17EC755	Satellite Communication	Prof. Shylaja K	SC

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CITY ENGINEERING COLLEGE

(Doddakallsandra, Off Kanakapura Road, Bangalore-560061)

Department of Electronics & Communication Engg.

Faculty Academic File

NAME: Shylaja . K.

DESIGNATION: Asst. Prof.

SEMESTER: V

SECTION: A

SUBJECT NAME & CODE T.I.M.E (18ES51)

ACADEMIC YEAR 202021

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PRINCIPAL
CITY ENGINEERING COLLEGE
Kanakapura Main Road, Bangalore-560061

B. E. 2018 Scheme Fifth Semester Syllabus (EC / TC)

Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

SEMESTER – V

TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP

Course Code	: **18ES51**	CIE Marks : 40
Lecture Hours/Week	: 03	SEE Marks : 60
Total Number of Lecture Hours : 40 (08 Hours / Module)		Exam Hours : 03
CREDITS 03		

Course Learning Objectives: This course will enable students to:

- Understand basic skills of Management
- Understand the need for Entrepreneurs and their skills
- Identify the Management functions and Social responsibilities
- Understand the Ideation Process, creation of Business Model, Feasibility Study and sources of funding

Module-1

Management: Nature and Functions of Management – Importance, Definition, Management Functions, Levels of Management, Roles of Manager, Managerial Skills, Management & Administration, Management as a Science, Art & Profession **(Selected topics of Chapter 1, Text 1).**

Planning: Planning-Nature, Importance, Types, Steps and Limitations of Planning; Decision Making – Meaning, Types and Steps in Decision Making **(Selected topics from Chapters 4 & 5, Text 1). L1,L2**

Module-2

Organizing and Staffing: Organization-Meaning, Characteristics, Process of Organizing, Principles of Organizing, Span of Management (meaning and importance only), Departmentalisation, Committees–Meaning, Types of Committees; Centralization Vs Decentralization of Authority and Responsibility; **Staffing**-Need and Importance, Recruitment and Selection Process **(Selected topics from Chapters 7, 8 & 11,Text 1).**

Directing and Controlling: Meaning and Requirements of Effective Direction, Giving Orders; Motivation-Nature of Motivation, Motivation Theories (Maslow's Need-Hierarchy Theory and Herzberg's Two Factor Theory); Communication – Meaning, Importance and Purposes of Communication; Leadership-Meaning, Characteristics, Behavioural Approach of Leadership;

Coordination-Meaning, Types, Techniques of Coordination; Controlling – Meaning, Need for Control System, Benefits of Control, Essentials of Effective Control System, Steps in Control Process
(Selected topics from Chapters 15 to 18 and 9, Text 1). L1,L2

Module-3

Social Responsibilities of Business: Meaning of Social Responsibility, Social Responsibilities of Business towards Different Groups, Social Audit, Business Ethics and Corporate Governance **(Selected topics from Chapter 3, Text 1).**
Entrepreneurship: Definition of Entrepreneur, Importance of Entrepreneurship, concepts of Entrepreneurship, Characteristics of successful Entrepreneur, Classification of Entrepreneurs, Myths of Entrepreneurship, Entrepreneurial Development models, Entrepreneurial development cycle, Problems faced by Entrepreneurs and capacity building for Entrepreneurship **(Selected topics from Chapter 2, Text 2). L1,L2**

Module-4

Family Business: Role and Importance of Family Business, Contributions of Family Business in India, Stages of Development of a Family Business, Characteristics of a Family-owned Business in India, Various types of family businesses **(Selected topics from Chapter 4,(Page 71-75) Text 2).**
Idea Generation and Feasibility Analysis- Idea Generation; Creativity and Innovation; Identification of Business Opportunities; Market Entry Strategies; Marketing Feasibility; Financial Feasibilities; Political Feasibilities; Economic Feasibility; Social and Legal Feasibilities; Technical Feasibilities; Managerial Feasibility, Location and Other Utilities Feasibilities. **(Selected topics from Chapter 6(Page No. 111-117) & Chapter 7(Page No. 140-142), Text 2) L1,L2**

Module-5

Business model – Meaning, designing, analyzing and improvising; Business Plan – Meaning, Scope and Need; Financial, Marketing, Human Resource and Production/Service Plan; Business plan Formats; Project report preparation and presentation; Why some Business Plan fails? **(Selected topics from Chapter 8 (Page No 159-164, Text 2)**
Financing and How to start a Business? Financial opportunity identification; Banking sources; Nonbanking Institutions and Agencies; Venture Capital – Meaning and Role in Entrepreneurship; Government Schemes for funding business; Pre launch, Launch and Post launch requirements; Procedure for getting License and Registration; Challenges and Difficulties in Starting an Enterprise**(Selected topics from Chapter 7(Page No 147-149), Chapter 5(Page No 93-99) & Chapter 8(Page No. 166-172) Text 2)**
Project Design and Network Analysis: Introduction, Importance of Network

Analysis, Origin of PERT and CPM, Network, Network Techniques, Need for Network Techniques, Steps in PERT, CPM, Advantages, Limitations and Differences.

(Selected topics from Chapters 20, Text 3). **L1,L2,L3**

Course Outcomes: After studying this course, students will be able to:

1. Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business
2. Identify the various organizations' architecture
3. Describe the functions of Managers, Entrepreneurs and their social responsibilities
4. Understand the components in developing a business plan
5. Recognize the various sources of funding and institutions supporting entrepreneurs

Text Books:

1. Principles of Management – P.C Tripathi, P.N Reddy, McGraw Hill Education, 6th Edition, 2017. ISBN-13:978-93-5260-535-4.
2. Entrepreneurship Development Small Business Enterprises- Poornima M Charantimath, Pearson Education 2008, ISBN 978-81-7758-260-4.
3. Dynamics of Entrepreneurial Development and Management by Vasant Desai. HPH 2007, ISBN: 978-81-8488-801-2.
4. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 8th Edition, Tata Mc-Graw Hill Publishing Co.Ltd.- New Delhi, 2012

Reference Book:

1. Essentials of Management: An International, Innovation and Leadership perspective by Harold Koontz, Heinz Weihrich McGraw Hill Education, 10th Edition 2016. ISBN- 978-93-392-2286-4.

G.S. Mallikarjuna
HOD, ECE

CITY ENGINEERING COLLEGE

Department of Electronics & Communication

IA marks for 5th Sem **Sub: TIM&E** **Code:18ES51** **Academic Year: 2020-2021**

Sl.No	Student Name	USN	Test Marks	Assignment Marks	FINAL IA Marks
			30	10	40
1	INDIRESH H BRAHMADESHEM	1CE16EC015			
2	JYOTHESH KARNAM	1CE17EC028			
3	A T HARSHITH	1CE18EC001			
4	AKANKSHA G KULKARNI	1CE18EC002			
5	AMARJITH V S	1CE18EC003			
6	ANKIT KUMAR	1CE18EC004			
7	GANGADHAR P UPAR	1CE18EC005			
8	JOYEETA SARKAR	1CE18EC006			
9	KARTHIK P S	1CE18EC007			
10	KRUTHIKA S	1CE18EC008			
11	KUSHAL V V	1CE18EC009			
12	MANOJ KUMAR R S	1CE18EC010			
13	MOHAMMED IMRANULLA KHAN	1CE18EC011			
14	NAYANA CY	1CE18EC012			
15	NOOR FATHIMA AFSAR	1CE18EC013			
16	POORNESH K	1CE18EC014			
17	PRAJWAL L	1CE18EC015			
18	RAKSHITHA T K	1CE18EC015			
19	SAGAR S	1CE18EC017			
20	SAIMA IRFATH J	1CE18EC018			
21	SANGEETHA C	1CE18EC019			
22	SHREYAS H C	1CE18EC020			
23	SHRINIDHI B CHEREKAR	1CE18EC021			
24	SOUNDARYA H	1CE18EC022			
25	SOWNDARYA HC	1CE18EC023			
26	SRIVATHSA G	1CE18EC024			
27	UMME ASRA N	1CE18EC025			
28	NAVEEN N POOJARI	1CE19EC400			
29	KAUSHIK A	1CE16EC017			
30	SAEEDA SHAMAEL	1CE16EC053			
31	MADAN HALAKATTI	1CE16EC020			
32	T U SOUMYA	1CE16EC045			
33	CHANDANA R	1CE17EC018			
34	DIVAKAR S D	1CE17EC023			
35	GOVARDHAN KN	1CE17EC025			
36	SANJAY H	1CE17EC053			
37	SHESHADRI	1CE17EC060			
38	SHYAM SUNDAR M G	1CE17EC061			
39	TEJASWINI ANANTH JANTHALI	1CE17EC068			
40	THANUSHREE R	1CE17EC069			
41	AKSHAY HEGDE				

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CITY ENGINEERING COLLEGE

Kanakapura Main Road, Bangalore-560061

Name of the Faculty: SHYLAJA K LESSON PLAN ACADEMIC YEAR: 2020-21

CITY ENGNEERING COLLEGE
Doddakallasandra, off kanakapura road,
Bangalore 560061.

Course Title: Management and Entrepreneurship	Course Code: 18ES51
Total contact hours: L: T:P:S: 4:0:0:1	Credits: -04
Internal Marks: 40	External Marks: 60
Semester: V	Academic year: 2020-21
Faculty: SHYLAJA K	Date :1/09/2020

Course Objective:

This course will enable students to:

- Understand basic skills of Management
- Understand the need for Entrepreneurs and their skills
- Understand Project identification and Selection
- Identify the Management functions and Social responsibilities
- Distinguish between management and administration

Course Outcomes:

After studying this course, students will be able to:

- Understand the fundamental concepts of Management and Entrepreneurship
- Select a best Entrepreneurship model for the required domain of establishment
- Describe the functions of Managers, Entrepreneurs and their social responsibilities
- Compare various types of Entrepreneurs
- Analyze the Institutional support by various state and central government agencies

WEEK	DAY	CONTENT	BT LEVEL	CO
		MODULE 1		
1	1	Management: Nature and Functions of Management – Importance, Definition	L1, L2	**CO1**
	2	Management Functions, Levels of Management,		
	3	Roles of Manager, Managerial Skills, Management & Administration,		
	4	Management as a Science, Art & Profession		
2	1	Planning: Planning-Nature, Importance	L1, L2	**CO1**
	2	Types, Steps and Limitations of Planning;		
	3	Decision Making – Meaning, Types		
	4	Steps in Decision Making		

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CITY ENGINEERING COLLEGE
Kanakapura Main Road, Bangalore-560061

Name of the Faculty: SHYLAJA K LESSON PLAN ACADEMIC YEAR: 2020-21

WEEK	DAY	CONTENT	BT LEVEL	CO
		MODULE 2		
3	1	**Organizing and Staffing**: Organization-Meaning, Characteristics	L1, L2	**CO1**
	2	Process of Organizing, Principles of Organizing, Span of Management		
	3	Departmentalization, Committees–Meaning, Types of Committees;		
	4	Centralization Vs Decentralization of Authority and Responsibility; Staffing-Need and Importance		
4	1	Recruitment and Selection Process	L1, L2	**CO1**
	2	**Directing and Controlling**: Meaning and Requirements of Effective Direction		
	3	Giving Orders; Motivation-Nature of Motivation, Motivation Theories (Maslow's Need-Hierarchy Theory and Herzberg's Two Factor Theory);		
	4	Communication – Meaning, Importance and Purposes of Communication; Leadership-Meaning, Characteristics, Behavioral Approach of Leadership;		
5	1	Quiz		
	2	Coordination-Meaning, Types, Techniques of Coordination; Controlling – Meaning, Need for Control System, Benefits of Control, Essentials of Effective Control System, Steps in Control Process	L1, L2	CO1
		MODULE 3		
5	3	Social Responsibilities of Business: Meaning of Social Responsibility, Social Responsibilities of Business towards Different Groups	L1, L2	**CO2, CO3**
	4	Social Audit, Business Ethics and Corporate Governance		
6	1	**Entrepreneurship**: Definition of Entrepreneur, Importance of Entrepreneurship, concepts of Entrepreneurship	L1, L2	**CO2** **CO3, CO4**
	2	Characteristics of successful Entrepreneur, Classification of Entrepreneurs, Myths of Entrepreneurship		
	3	Entrepreneurial Development models, Entrepreneurial development cycle, Problems faced by Entrepreneurs and capacity building for Entrepreneurship		

		MODULE4		
6	4	**Family Business:** Role and Importance of Family Business, Contributions of Family Business in India.	L1, L2	**CO5**
7	1	Stages of Development of a Family Business, Characteristics of a Family-owned Business in India.	L1, L2	**CO5**
	2	Various types of family businesses. **Idea Generation and Feasibility Analysis**: Introduction.		
	3	Idea Generation; Creativity and Innovation; Identification of Business Opportunities, Market Entry Strategies; Marketing Feasibility; Financial Feasibilities; Political Feasibilities		
	4	Economic Feasibility; Social and Legal Feasibilities; Technical Feasibilities; Managerial Feasibility, Location and Other Utilities Feasibilities.		
		MODULE 5		
8	1	**Business model:**	L1, L2, L3	
	2	The Adoption process, Product Innovation, Product Planning and Development Strategy,		
	3	Project Classification, Aspects of a Project, the project Cycle, Features and Phases of Project management,		
	4	Product Planning and Development Process		
9	1	Product Planning and Development Process	L1, L2, L3	
	2	Concepts of Projects and Classification: Introduction, Meaning of Projects, Characteristics of a Project, Project Levels,		
	3	Project Classification, Aspects of a Project, the project Cycle, Features and Phases of Project management,		
	4	Project Management Processes, Project Identification: Feasibility Report,		
	1	Project Feasibility Analysis. Project Formn: Meaning	L1, L2, L3	

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10	2	Steps in Project, Sequential Stages, Formulation		
	3	Project Design and Network Analysis: Introduction, Importance of Network Analysis		
	4	Second test paper distribution and discussion		
11	1	Origin of PERT and CPM	L1, L2, L3	
	2	Network- Network Techniques		
	3	Need for Network Techniques, Steps in PERT, CPM, Advantages, Limitations and Differences.		
	4	Steps in PERT		
12	1	CPM	L1, L2, L3	
	2	Advantages, Limitations and Differences		
	3	Examples		
	4	Revision		
13	1	Third test paper distribution and discussion		
	2	University question paper discussion		
	3	Mock examination		
	4	Revision		

Bloom's Taxonomy Level (L)

L1-Remembering L2-Understanding L3-Applying L4-Analysing L5-Evaluating L6-Creating

TEXT BOOKS:

1. Principles of Management- P.C. Tripathi, P.N. Reddy: Tata McGraw Hill, 2007.
2. Dynamics of Entrepreneurial Development & Management- Vasant Desai- Himalaya Publishing House, 2007.
3. Entrepreneurship Development-Small Business Enterprises- Poornima M Charantimath, Pearson Education, 2006

REFERENCE BOOKS:

1. Management Fundamentals - Concepts, Application, Skill Development - Robert Lusier, Thomson, 2007.
2. Entrepreneurship Development - S S Khanka, S Chand & Co, 2007.
3. Management - Stephen Robbins 17th Edition, Pearson Education / PHI, 2003.
4. Web Sites for the Institutions listed in the Unit 7 on Institutional Support

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CITY ENGINEERING COLLEGE, Doddakallasandra, Benguluru-61		
Department	:	**Electronics and communication Engg.**
Semester/Section	:	**5th A**
Sub/code	**:**	**TIM & E/18ES51**
Module(s)	:	**1&2**
Course Instructor	:	**SHYLAJA.K**
Date of Issue	:	**20-10-2020**
Date of Submission	:	**23-10-2020**

ASSIGNMENT-I

1	Define management. Explain the principal functions of management.
2	Discuss the different types of managerial skills.
3	Comment on the true nature of management. Is it a Science or an Art or profession?
4	Define planning. Explain the nature & importance of planning.
5	Explain important characteristics of Objectives.
6	Distinguish between policies and programmes.
7	What are the steps involved in Planning? Explain.
8	Explain different types of Decisions.
9	Explain process of organizing.
10	Discuss the principles of organizing.
11	Define span of management and departmentalization.
12	Write a note on Committee.
13	Differentiate between Centralization & Decentralization and Responsibility & Authority.
14	What are the requirements of effective Direction? Explain the nature of motivation.
15	Explain Maslow's Need Hierarchy Theory.

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Question Bank/Assignment 2

1. Explain the purposes of Communication.

2. a) What are the characteristics of Leadership?

b) Why a control system is needed? Explain the benefits of control.

3. Explain three points of view under Behavioral Approach of Leadership.

4. Discuss the essentials of Effective control system.

5. a)What do you mean by Social Responsibility? Write a note on Social Audit.

b) Explain Business ethics and Corporate governance.

6. a) Define Entrepreneurship. List the characteristics of successful Entrepreneur.

b) What do you understand by capacity building?

7. What are the different myths of Entrepreneurship? Explain Entrepreneurship Development Model.

8. What are the problems that are faced by an Entrepreneur?

9. a)Define Family Business. What are the advantages of Family Business over other Business?

b) Explain the stages of development of a Family Business.

10. a)Identify the characteristics of Family –Owned Business in INDIA.

b) Explain various types of Family business.

11. a) what are the five-step framework that helps screen Idea.

b) Highlight the different changes that lead to creation of an Opportunity.

12. a)Explain three general approaches wherein Entrepreneur use to identify an opportunity .

b) Explain Marketing Feasibility, Financial Feasibility, Economic Feasibility and technical Feasibility.

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Question Bank/Assignment 3

1.a) What is a business model? What are the important aspects of business model?

b) What are the five phases of Business model design process?

2. What is a Business plan? What are the reasons for preparing a Business plan?

3.a) List the key elements for an Entrepreneur to create a successful Business Marketing Plan.

b) Highlight the key steps to Human Resource Planning Process.

4. Explain five steps of Production Planning.

5. Tabulate the content of Business plan format.

6. Explain the broad segments of project report.

7. Why do some business plans fails? Explain.

8. Explain the role of Venture capital and Angel investing in Financing a Business.

9. Explain different Government schemes for funding Business.

10. What are the different ways to ensure a strong start (pre- launch) for the Business?

11. a) Explain the importance of product launch.

b) List the elements of good launch.

c) what are the advantages and disadvantages of a product launch.

12. What are the biggest challenges Entrepreneurs face when starting their own Business? How do successful Entrepreneurs handle and solve problems in Business?

13. Highlight the importance of Network Analysis.

14. Explain the steps in PERT.

15. a) What are the advantages and disadvantages of PERT?

b) Bring out the differences between PERT and CPM.

16. Write a note on CPM highlighting its advantage and disadvantages.

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1	C	E						

SUB CODE: 18ES51

CITY ENGINEERING COLLEGE
FIRST INTERNAL TEST (ONLINE)

Branch: E&C
Sub Name: TIM & E
Sem: V
Duration: 1 ½hrs.

Date: 27-10-2020
Time: 10:00AM-11:30 AM
Max Marks: 50

Note: Answer all Questions selecting any ONE FULL question from each part.

Q No.	Sub Q No.	Question	Marks	CO's	BT'S
		PART-A			
1		Define management. Explain the principal functions of management	10	CO1	L1, L2
		OR			
2		Discuss the different types of managerial skills.	10	CO2	L1, L2
		PART-B			
3		Define planning. Explain the nature & importance of planning.	10	CO1	L1, L2
		OR			
4	a	Explain important characteristics of Objectives.	05	CO1	L1, L2
	b	Distinguish between policies and programmes.	05		
		PART-C			
5		What are the steps involved in Planning? Explain.	10	CO1	L1, L2
		OR			
6	a	Explain different types of Decisions.	05	CO1	L1, L2
	b	Explain process of organizing.	05		

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PART-D

7		Discuss the principles of organizing.	10	CO1	L1, L2
OR					
8	a	Define span of management and departmentalization.	05	CO1	L1, L2
	b	Write a note on Committee.	05		

PART-E

9	a	Differentiate between Centralization & Decentralization and Responsibility & Authority.	05	CO1	L1, L2
	b	What are the requirements of effective Direction? Explain the nature of motivation.	05		
OR					
10		Explain Maslow's Need Hierarchy Theory.	10	CO1	L1, L2

Bloom's Taxonomy: L1: Remembering, L2: Understanding

Course Outcomes: CO1: Understand the fundamental concepts of Management
CO2: Describe the functions of Managers

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"The secret of change is to focus all of your energy, not on fighting the old, but on building the new."

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CITY ENGINEERING COLLEGE
DEPARTMENT OF E&CE

SCHEME FOR VALUATION

Internal Test 1

Semester & Section: V/A

Date: 27-10-2020

Q. No	Details of the Answer	Marks Distribution	Total Marks
1.	Definition of management: It's a function of guidance and leadership control of effects of group of individuals in order to acheive goals or objectives of an orgn. OR Mgmt is the art of getting things done thro' people.	2	
	Principal functions of mgmt: (i) planning (ii) Organizing (iii) staffing (iv) Directing (v) controlling explanation of each in brief	8	10
2	Different types of managerial skills: - conceptual skills - Human relation skills - Technical skills listing & explanation	1+(3×3)	10
3.	Planning: It's one of the principal function of mgmt involves mission & objectives and actions to acheive them. Tasks are determined in advance	2	
	Nature: - Deciding in advance - Intellectual process requires think before act. - parent exercise in all processes - vital at all levels of orgn.	4	
	Importance: - Reduces uncertainity & minimizes risk - Effective control of activity - Focus attention & concentration of objective of an enterprise - economic operation & leads to success.	4	10

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Question No.	Details of the Answer	Marks Distribution	Total Marks
4a	characteristics of Objectives: - Objectives are multiple in no. - Either tangible or non-tangible - Have periority & arranged in heirarchy - sometimes clash with each other. - These are achaved by means of strategies	1x5	5
4b	**Policies** — **Programmes** - general guidelines of orgn. — - general guidelines at the action level - Top level activity — - Departmental activity - fulfill the objectives of an orgn. — - guides the way to implement the policies - often made without any study & analysis — - Always made after thorough study	1x5	5
5	Steps involved in planning: - Awareness of Business opportunities - setting goals & objectives - considering planning premises - Identifying alternate course of action - Evaluate alternate — " — - choosing the best alternative - Formulation of supporting plans - Implementation of plans.	1x10	10
6a	Types of Decisions: - Programmed & Non-Programmed - Individual & collective decisions - Major & Minor - strategic & routine - simple & complex	1x5	5
6b	Process of planning Organizing: - considering objectives - Deciding organizational boundaries - grouping of activities into departments - deciding key depts & span of mgmt	1x5	5

<table>
<tr><th>Question No.</th><th>Details of the Answer</th><th>Marks Distribution</th><th>Total Marks</th></tr>
<tr><td>7</td><td>Principles of organizing
- objectives
- specialization
- Mgmt by exception principle
- Unity of command
- Scalar principle
- Delegation
- Responsibility
- Authority
- Efficiency
- Simplicity</td><td>1x10</td><td>10</td></tr>
<tr><td>8 a</td><td>Span of management :
- Span of control which indicates the no of subordinates who report directly to the mgmt.</td><td>2</td><td></td></tr>
<tr><td></td><td>Departmentalization : The horizontal differentiation of tasks or activities into discrete segments various dept - marketing, engg, prodn, finance personnel, purchase ---</td><td>3</td><td>5</td></tr>
<tr><td>8b</td><td>Committee :
To highlight - defn of committee
- situation
- Types
- Examples</td><td>5</td><td>5</td></tr>
<tr><td>9 a</td><td><table>
<tr><th>Centralization</th><th>Decentralization</th></tr>
<tr><td>- Retention of power lies with top mgmt</td><td>- Authority, responsibility lies with various levels of mgmt.</td></tr>
<tr><td>- Systematic & consistent reservation of authority</td><td>Systematic dispersal of authority.</td></tr>
<tr><td>- Vertical flow of commn</td><td>- open & free</td></tr>
<tr><td>- slow decision making</td><td>- fast</td></tr>
<tr><td>- Proper coordination & leadership</td><td>- sharing of burden & responsibility</td></tr>
<tr><td>- Suited for small sized organization</td><td>- large sized orgn</td></tr>
</table></td><td>1x5</td><td>5</td></tr>
</table>

Question No.	Details of the Answer	Marks Distribution	Total Marks
9b	Requirements of direction: - Supervision - Motivation - Leadership - Communication - control	2	5
	Nature of Motivation: - different motives among individuals - unaware of self motivation - changing motives - expressing differently.	3	
10	Maslow's Need Hierarchy Theory: - physiological needs - food, shelter, clothing - - - Safety needs - - protection against danger/loss - Social needs - friendship, affection, assn, acceptance, belongingness - Esteem needs - self esteem, achievement - self actualization - realization of one's potential	2x5	10

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CITY ENGINEERING COLLEGE
SECOND INTERNAL TEST (ONLINE)

Branch: E&C
Sub Name: TIM&E
Sem: V
Duration: 1 ½hrs.

Date: 17-12-2020
Time: 10:30AM-12:00 PM
Max Marks: 50

Note: Answer all Questions selecting any ONE FULL question from each part.

Q No.	Sub Q No.	Question	Marks	CO's	BT'S
		PART-A			
1	a	What are the characteristics of Leadership?	05	CO3	L1, L2
	b	Why a control system is needed? Explain the benefits of control.	05		
		OR			
2		Explain the purposes of Communication.	10	CO3	L1, L2
		PART-B			
3		Explain three points of view under Behavioral Approach of Leadership.	10	CO3	L1, L2
		OR			
4		Discuss the essentials of Effective control system.	10	CO3	L1, L2
		PART-C			
5	a	What do you mean by Social Responsibility? Write a note on Social Audit.	05	CO3	L1, L2
	b	Explain Business ethics and Corporate governance.	05		
		OR			
6	a	Define Entrepreneurship. List the characteristics of successful Entrepreneur.	05	CO3	L1, L2
	b	What do you understand by capacity building?	05		

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PART-D

7		What are the different myths of Entrepreneurship? Explain Entrepreneurship Development Model.	10	CO3	L1, L2
OR					
8	a	What are the problems that are faced by an Entrepreneur?	05	CO3	L1, L2
	b	Define Family Business. What are the advantages of Family Business over other Business?	05		

PART-E

9	a	Explain the stages of development of a Family Business.	05	CO3	L1, L2
	b	Identify the characteristics of Family –Owned Business in INDIA.	05		
OR					
10	a	what are the five-step framework that helps screen Idea.	05	CO3	L1, L2
	b	Explain Marketing Feasibility, Financial Feasibility, Economic Feasibility and technical Feasibility.	05		

Bloom's Taxonomy: L1: Remembering L2: Understanding

Course Outcomes: CO3: Describe the functions of Entrepreneurs and their social responsibilities

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Do not focus on numbers. Focus on doing what you do best. It's about building a community who want to visit your site every day because you create value and offer expertise.

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CITY ENGINEERING COLLEGE
DEPARTMENT OF E&CE

SCHEME FOR VALUATION

Internal Test 2

Semester & Section: V/A

Date: 17-12-20

Q. No	Details of the Answer	Marks Distribution	Total Marks
1 a	characteristics of leadership: - Implies the existance of followers - Involves a community of interest between the leaders - Involves an unequal distribution of authority among leaders - Implies that leaders can influence their followers or subordinates in addition to being able to give their followers or subordinates.	1 1 1 2	5
1b	Need of a control system: - Measure progress - To uncover deviations - Mistakes, complexity - To indicate corrective actions - To transmit corrective action to the operation - To help meet the deadlines - Increases productivity - Improves safety - Lowers cost - workers control over their environment.	2+3	5
2	Purposes of communication: - Needed in recruitment - In Orientation progr. - To acquaint with the subordinates - To project image of an enterprise in society - Helps in decision making - To acheive coordn - Managerial efficiency - cooperation & peace - effective functioning - personal safety	1×10	10

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Question No.	Details of the Answer	Marks Distribution	Total Marks
3	Three points of view under behavioural approach of leadership. - Motivation - Authority - Democratic leadership - Free Rein - Supervision.	1 3×3	10
4	Essentials of effective control system: - Suitability - Timely & forward looking - objective & comprehensible - Flexible - Economical - Prescriptive & operational - Acceptability - Reveals exceptions at strategic points - Motivate people to perform high - Less attention to other aspects - Periodic Review	1×10	10
5a	Defn of Social responsibility Social Audit explanation	2 3	5
5b	Business ethics & corporate governance To highlight the meaning, features & importance	2 3	5
6 a	Definition of Entrepreneurship - process of actions of an E who is in search of new ideas & exploits such idea in gainful opportunities by accepting risk & uncertainty	2	

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Question No.	Details of the Answer	Marks Distribution	Total Marks
	characteristics of a successful Entrepreneur - creativity, innovation, dynamism, leadership, team building, problem solving, Goal orientation	3	5
6b	Capacity building: - create right environment for success - ensure that Entrepreneurs have access to right skills - Have access to smart capital - enable networking & exchange	5	5
7	Myths of Entrepreneurship: - Entrepreneurs are born not made - EAs fit an ideal profile - Need money - Need luck - great idea - Best friend - a best partner - No loss - profit high - Have successful - simple life & work for self	1x10	10
8a	Problems faced by Entrepreneurs: - Internal problem - Ex - External problem - Ex	5	5
8b	Family Business definition Advantages - Stability - Commitment - Flexibility - long term outlook - Decreased cost	2 3	5

Question No.	Details of the Answer	Marks Distribution	Total Marks
9 a	stages of development of a Family Business. - Entrepreneurial - Functionally Specified - Process driven - Market driven.	1 1×4	5
9b	characteristics of family-oriented Business in INDIA - Family relationship - loyalty - composition of board of Directors - Dedication - Male domination	1×5	5
10 a	Five-step frame work that help screen Idea: - urgency of market needs - Adequate market size - Sound business model - Potential brand value - Able management team.	1×5	5
10b	Marketing feasibility Financial -11- Economic -11- Technical feasibility Meaning & explanation of each	1+(1×4)	5

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SUB CODE: 18ES51

CITY ENGINEERING COLLEGE
THIRD INTERNAL TEST (ONLINE)

Branch: **E&C**
Sub Name: TIM & E
Sem: **V**
Duration: 1 ½hrs.

Date: 07-01-2021
Time: 10:00AM-11:30 AM
Max Marks: 50

Note: Answer all Questions selecting any ONE FULL question from each part.

Q No.	Sub Q No.	Question	Marks	CO's	BT'S

PART-A

1	a	What is a business model? What are the important aspects of business model?	05	CO3	L1, L2, L3
	b	What are the five phases of Business model design process?	05		
		OR			
2		What is a Business plan? What are the reasons for preparing a Business plan?	10	CO3	L1, L2, L3

PART-B

3	a	List the key elements for an Entrepreneur to create a successful Business Marketing Plan.	05	CO3	L1, L2, L3
	b	Highlight the key steps to Human Resource Planning Process.	05		
		OR			
4		Tabulate the content of Business plan format.	10	CO3	L1, L2, L3

PART-C

5		Why do some business plans fail? Explain.	10	CO3	L1, L2, L3
		OR			
6		Explain the role of Venture capital and Angel investing in Financing a Business.	10	CO3	L1, L2, L3

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PART-D

7	a	Explain the importance of product launch.	05	CO4	L1, L2, L3
	b	what are the advantages and disadvantages of a product launch?	05		
OR					
8		What are the biggest challenges Entrepreneurs face when starting their own Business? How do successful Entrepreneurs handle and solve problems in Business?	10	CO4	L1, L2, L3

PART-E

9	a	Highlight the importance of Network Analysis.	05	CO4	L1, L2, L3
	b	Bring out the differences between PERT and CPM.	05		
OR					
10		Explain the steps in PERT	10	CO4	L1, L2, L3

Bloom's Taxonomy: L1: Remembering, L2: Understanding; L3: Analyze

Course Outcomes: CO3: Understand the components in developing a business plan
CO4: Awareness about various sources of funding and institutions supporting entrepreneurs

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> "A WRONG PLAN Will Not Just Damage Your Business. It Will Also Damage Your Funds, Resources, Market Reputations, Time And Above All Your Morale."

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CITY ENGINEERING COLLEGE
DEPARTMENT OF E&CE

SCHEME FOR VALUATION

Internal Test 3

Semester & Section: V/A

Date: 7/1/21

Q. No	Details of the Answer	Marks Distribution	Total Marks
1a	Business Model: - company's plan for making profit. - Identifies product / service Important aspects - company's strategy for profit - Levels are pricing & cost - includes info about product / service, business plan, target market & expenses. - successful idea.	1 1×4	5
b	Five phases of Business model design procedure. - Mobilize - understand - Design - Implement - Manage		
2	Business plan - Road map & blue print of the project. It's a written document showcases the details for achieving the goals. Reasons for preparing a business plan: - Entrepreneurs reap benefits - To get finance from banks - To attract business partners & key employees - enables board of directors to make capital investment decision - To think thro' the key elements of business. - To ~~measure~~ measure actual performance against expected - It can be used as budget - For communicating to others what business is accomplishing	1 1×9	10

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<table>
<tr><th>Question No.</th><th>Details of the Answer</th><th>Marks Distribution</th><th>Total Marks</th></tr>
<tr><td>3 a</td><td>Key elements of for an Entrepreneur to create a successful business Marketing plan.
- Overall Summary of Business model
- A strategy that must be followed
- Availability of Products & Services
- Pricing Strategy.
- Awareness of product
- Beneficiaries
- Object - short & long
- SWOT analysis
- PEST analysis (any 5)</td><td>1×5</td><td>5</td></tr>
<tr><td>3 b</td><td>Key steps to Human Resource Planning Process
- Analyzing present labour supply
- Forecasting labor demand
- Balancing project labor demand with supply
- Supporting Organizational goals.</td><td>5</td><td>5</td></tr>
<tr><td>4.</td><td>Content of Business plan format:
<table>
<tr><th>Sl.No.</th><th>Content</th><th>Remarks</th></tr>
<tr><td>1.</td><td>Executive Summary</td><td>Snapshot of Business</td></tr>
<tr><td>2</td><td>Company description</td><td>actual work Research facilities</td></tr>
<tr><td>3</td><td>Market analysis</td><td>(Market & competitors)</td></tr>
<tr><td>4</td><td>Orgn & management</td><td>Business & mgmt structure</td></tr>
<tr><td>5</td><td>Service or product</td><td>Service/product offered</td></tr>
<tr><td>6</td><td>Sales & Marketing</td><td>Marketing & Sales Strategy</td></tr>
<tr><td>7</td><td>Funding</td><td>Money for 3-5 years of</td></tr>
<tr><td>8</td><td>Financial projections</td><td>supply info</td></tr>
<tr><td>9</td><td>Appendix</td><td>optional section that includes permits ---</td></tr>
</table></td><td>10</td><td>10</td></tr>
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Question No.	Details of the Answer	Marks Distribution	Total Marks
5	Failure of Business are due to: - failure to address the customers problems and needs - Unrealistic goals set by the promoters - Lack of committment to the business by the promoter - Lack of experience of promoter - Lack of professionalism	2×5	10
6	Venture capital & Angel investing in Financing a Business - - investment by venture capitalists - impt equity for start-up companies - Provides equity for business & high returns - National level Orgn (CIVCA) - promotes & encourage VC in the country	5	
	Angel investing - investors are wealthy investors. - Provide cash to young investors - experience ~~inves~~ Entrepreneurs - expect low return. - ready to take risks - unattended firms by VC.	5	10
7 a	Importance of Product launch: - New product introduced to market - It creates awareness - idea of strategies to be implemented	1 2×2	5
7b	Advantages & disadvantages of a product launch. - Excitement & Attention - Building Trust - Training & preparation - Increased revenue streams		

Question No.	Details of the Answer	Marks Distribution	Total Marks
	Disadvantages: - High Investment - Improper approach to launch.		5
8	Biggest challenge Entrepreneurs face starting Business. - Developing vision & Business Idea - Assembling a business team - Raising capital for business - Finding right business location - Finding good employee - Finding good customers - Dealing with competition - Unforeseen business challenges & expenses - Adaptability - Exiting the Business	1×10	10
9a	Importance of N/w analysis - Project to be sequenced. - Inter relationship - Detailed n/w & operation - Taking previous experience & probabilities - cost estimate depend on project time estimates - physical progress of projects.	1×5	5
9b.	PERT - Origin in Naval - event oriented - uncertain - Probabilistic model - demarcate betn critical & non critical activities CPM - Industrial - activity oriented - No uncertainity - deterministic model - ~~No~~ Marks only critical activities	1×5	5
10	Steps in PERT - establishment of objectives - seek schedule work breakdown - Technical & managerial individuals to work together - Basic familiarity with general nature of the work & ultimate objective desired.	5	5

Akanksha G Kulkarni
USN: 1CE18EC002

Sub. code : 18EG51

Assignment -1

1) Define management. Explain the principle functions of management

- Management is a function of guidance and leadership control of efforts of group of individuals in order to achieve goals/objectives of an organization. Management is a critical element in the growth of the country economically. It is the dynamic life giving element in every organization. Managing has become essential to ensure the co-ordination of individuals efforts. The definitions of management are:

• Management is the art of getting things done through people.
• Management is the process consisting of planning, organizing, actuating & controlling, performed to determine & accomplish the objectives with help of people & resources.

Principle functions of Management

i) Planning: Determination in advance as to what should be done. Planning is the function that is referred to as decision making. It involves missions & objectives and actions to achieve them. This involves:

* Setting long & short term goals for organization.
* Selecting objectives, strategies & policies to accomplish the planned goals.
* Deciding in advance how, what, when & where to do and who should do.
* Planning bridges to gap from where we are now to where we want to be in future.

ii) Organizing: Organizing is a part of management that involves in establishing an intentional structure of roles for people to fill in an organization. To organize a business well, it is required to provide all useful things for its proper functioning. They are raw materials, tools, capitals & personnel. This involves.

• Determination of activities required to achieve goals.
• Grouping these activities into departments

- Assigning groups of activities to the manager.
- Forming delegation of authority.
- Making provisions for co-ordination of activities.

iii) Staffing: This makes the provision for man power to fill different positions. This is done by identifying work-force requirements, recruiting new staff, selecting, placing, promoting, appreciating, planning their career, training the staff to accomplish their tasks effectively and efficiently. This involves:
- Finding right person for the right job.
- Selecting the personnel.
- Placement, training & developing new skills required for present & future jobs.
- Creating new jobs.
- Appraising the staff and planning their growth & promotion, etc.

iv) Directing: It involves three sub functions namely, communication, leadership & motivation.
- Communication is the process of passing information & understanding from one person to another.
- Leadership is the process by which a manager guides & influences the work on his subordinates.
- Motivation means encouraging the minds of employees of an organization to give their best.

v) Controlling: Controlling is measuring & correcting the activities of subordinates to make sure that the work is going on as per the plans. Controlling relates to the measurement of achievements. It involves:
- Establishing standards of performance
- Measuring performance and comparing with the standards.
- Taking necessary actions to ensure that the standards are met.

2) Discuss different types of managerial skills.

- A skill is an individuals ability to perform physical or mental tasks with a specified outcome. There are different skills at different levels of management or managerial skills.

- Conceptual skills: The ability to view of an organization and its future, think in abstract, analyze the forces working in a situation, creative & innovative ability, the ability to assess the environment and the changes taking place.

- Human relations skill: Ability to interact effectively with people at all levels. This skill develops the ability to recognise the feelings & sentiments, to judge the possible reactions, to examine his own concepts & values to develop more useful attitudes.

- Technical skill: The persons knowledge and proficiency in any type of process or technique.

3) Comment on the true nature of management. Is it a Science or an Art or profession?

- The true nature of management is where:
- The production process involves land, labour, capital, organization & entrepreneurship.
- The production is the result of their combined efforts.
- The success of production depends on their effective combination & cooperation.
- To understand whether it is an art or science profession, firstly, we need to understand that.
- The art is doing things in the light of realities of a situation. Under art one normally learns 'how' of the phenomenon.
- It is art of getting things done through other in dynamic & mostly non-repetative situations
- Science is an organization knowledge. The essential feature of

any science is the application of scientific methods to development in knowledge.

So, management is partly art & partly science. Management doesn't possess the characteristics of profession.

A profession is expected to have organized & systematic knowledge, formalized methods of acquiring training & experience.

But nowadays, management has become a profession other than art and science.

4) Explain important characteristics of Objectives.

- Objectives are the broad end of organization which are achieved by means of strategies. Strategies have two major group plans : single use plans & standing plans. Single use plans are developed to achieve a specific end, which dissolves the plan once reached. The plans are programmes and budgets. Standing plans are designed for reoccuring situations.

Characteristics of Objectives.

- Objectives are multiple in number.
- These are market standing, innovation, productivity & financial resources, profitability, manager performance & development, worker performance & attitude and public responsibility.
- Objectives are either tangible or non-tangible.
- Objectives have priority & are generally arranged in hierarchy.
- They sometimes clash with each other.

5) Define planning. Explain the nature & importance of planning.

- Planning is the function that is referred to as decision making. It involves missions & objectives and actions to achieve them. It basically means determination of tasks in advance & what is to be done.

Nature of Planning:

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- Planning is the most basic function of management. It is deciding in advance, what to do, when & how to do, who has to do, etc.

- It is intellectual process, which requires a manager to think before acting. It involves selection of objectives & goals and determine the way and means to achieve them. A manager should continuosly watch the progress of plans like a navigator. It is vital at all levels of organization.

Planning involves four important qualities.

- It must be efficient and contribute to accomplish purpose and objectives at the least cost.
- It must be considered as parent exercise in all processes.
- [illegible] must spread through all management functions.

Importance of Planning:

- Uncertainity & minimize risk: Planning provides logical facts & procedure to managers for making decisions. This logical decisions making based on plans to organize minimizes uncertainity & risks.

- Effective control: Planning, setting goals, targets and means to accomplish them. These goals & plans become standards or benchmarks a inst which performance can be measured. Thus good planning helps effective control of activity.

- Focuses attention and concentration on objective of the enterprise:

Planning helps the managers to focus their attention on goals & activities of organization. This makes entire organization to accomplish the goals.

- Economic operations & leads to success: Planning does not just ensure success but leads to it. If the work is planned in advance, there will be no confusion and things will happen as per plan & can even reduce uncoated expenditure.

- Bridge between present and future: There is a vast gap between what we are today & what we want to be in future. A proper and systematic plan forms the bridge between the present & future. Hence planning is important for the success of any organization.

6) Explain different types of Decisions.

- A decision is a choice between two or more alternatives. Decisions are made by the manager & the action is taken by others.

Types of Decisions:

- Programmed & Non-programmed decisions: • Programmed or progra rtic are those decisions taken within preview of the policies, rules or procedures. These are routine or structured decisions.
- Non programmed decisions are called strategic decisions. These involve heavy expenditure & are generally taken by top management.

- Individual & Collective decisions: Individual decisions are taken by a single person.

Collective decisions are taken by a group of people. Group decisions making has advantages like increased acceptance, better communicati / Ideas.

- Major & Minor decisions: Minor decisions are related to day to day periodical occurances.

  Ex. Purchase of stationery, etc.

Major decisions are generally done by top management.

Ex. Purchase of machinery, hiring people, etc.

- Strategic & routine decisions: Strategic decisions are done by top management.

  Ex. Price increase, discount, etc.

Routine decisions are day to day decisions.

- Simple & Complex decisions.

- Temporary or permanent decisions: Some decisions are to be taken depending on situation till the solution is found. Such decisions are known as temporary decisions.
  Permanent decisions are taken on firm / permanent basis.

7) Explain process of Organizing.

- Organizing means designing the organization structure. The manager differentiates & integrates the activities of the organization.

- Differentiation means the process of departmentalization or segmentation of activities based on some homogenity.
- Integration is the process of achieving unity of effort among the various departments.
- The seven step procedure are:

* Considering of objectives: Objectives determine the various activities which need to be perform & the type of organization which need to be built for this purpose.

* Deciding organizational boundaries.

* Grouping of activities into departments: To identify the activities necessary to achieve them & to group the closely related & similar activities into departments & sections.

* Deciding which departments will be the key departments: The activities of the department essential for fulfillment of goals.

* Determining the span of management: Designing the structure is to determine the number of subordinates who

should report directly to each executive.

* Determining levels at which various types of decisions are to be made: The levels at which various major & minor decisions to ~~to~~ be made must be determined.

* Setting up a co-ordination mechanism: As individuals & departments carry out their specialized activities, the Overall goalsof the organization may become submerged or conflicts among organization members may develop, so need to be checked. The analysis of activities, decisions & relations need to be done.

8) Distinguish between policies & programmes.

-

Policy	Procedures [Programmes]
• General guidelines of the organization.	• General guidelines ~~of~~ at the action level.
• Top level activity	• Departmental activity
• Policies fulfill the objectives of an organization.	• Procedure guides the way to implement the policies.
• Policies are often made without any study or analysis.	• Procedures are always made after through study & analysis.

9) What are the steps involved in planning? Explain.

- Steps in planning:

• Awareness of business opportunities:
It is necessary to analyze the internal & external environment to know the trends in the near-future. Business activities are influenced by government regulations, technological changes, availability of raw materials, labour, etc. The business men / women have to look for opportunities by observing the environment.

- Settings goals & objectives:

Plans are prepared with a view to achieve certain goals. So establishing the objective is an important step in planning. The overall objective of the enterprise must be stated along with the specific objective of individual departments & divisions in the organization. The objective must be stated in measurable terms i.e. percentage, production, sales, no. of units, etc.

- Considering planning premises:

Planning premises are the anticipated environment in which plans are expected to operate. As planning is for future, certains assumptions about future are uncertain. It is necessary to make assumption about the factors influencing internal & external environment. The factors which affect the plan must be identified & evaluated.

- Identifying alternate course of action:

For doing a work there are always certain alternatives. The planners should study the entire alternative considering their strong & weak points & finally identify the most promising one to the goal.

- Evaluating alternative course of action.

Once the alternative course of action are identified, the next step is to evaluate the same. Evaluation means studying the merits & demerits of each alternatives, should be closely studied to determine suitability.

- Choosing the best alternatives:

The alternative selected should help the organization in making an optimum use of available resources & help to attain the objective set in most effective manner.

- Formulation of supporting plans:

The main plan should be supported by no. of supporting plans to attain the goal. Without the supporting plan, it is not possible to carry Out the main plan.

- Implementation of plans:

It means putting the plans into action so as to achieve the business objective. After implementation of plans it is necessary to ensure that the activities of enterprise proceed in the right direction.

10) Discuss the principles of organizing.

- Objectives: The objective of enterprise influence the organizational structure & hence the objective of enterprise should first be clearly defined.
- Specialization: The activities of enterprise should be defined according to functions & assigned to person according to their specialization.
- Span of Control: As there is a limit to no. of people that can be supervised effectively by one boss, the span of control should be minimum as far as possible.
- Management by exception principle: Only complex problems should be referred to higher level & other problems should be dealt by lower level.
- Scalar principle: The line of authority from the chief executive at the top to the first line supervisor at the ~~top~~ bottom must be clearly defined.
- Unity of command: Each subordinate should have only one superior whose command he has to obey.
- Delegation: Proper authority should be delegated at lower levels of organization. Also the authority delegated should be equal to responsibility.
- Responsibility: The superior should be held responsible for the acts of subordinates.
- Authority: Authority is a tool by which a manager is able to accomplish the desired objectives.
- Efficiency: The organization structure should enable the enterprise to function effectively & accomplish its objective with lowest possible cost.
- Simplicity: Organization structure should be as simple as possible and all levels should be ~~f~~ as far as possible minimum.

- Flexibility: The organization should be adaptable ~~thi~~ to the changing circumstances.
- Balance: A reasonable balance in the size of various departments, between centralization & decentralization.
- Unity of direction: One objective & one plan for a groupof activities having the same goal.
- Personal ability: There is need for proper selection, placement & training of staff.
- Acceptability: The structure of organization should be acceptable to the people who constitute it.

11) Define span of management & departmentalization.

– Span of Management.

The term span of management is also referred to as "span of control or supervision or authority," which indicates the number of subordinates who report directly to the management. Organizations with many members maybe divided into ~~into~~ managers & subordinates. In a business with hierarchial structure, the managers oversee the work of subordinates. The span of control is the amount of people that report to the manager in a hierarchy.

Departmentalization

The horizontal differentiation of tasks or activities into discrete segments is called as departmentalization. There are several bases, each of which is suitable for particular corporate size, strategies & purposes.

Each major function of enterprise is grouped into department. Various functions are marketing, engineering, production, finance, personnel, purchase, etc.

12) What are the requirements for effective direction? Explain the nature of motivation.

– Requirements of direction

- Supervision - guiding and directing efforts of employees to accomplish stated work outputs.

- Motivation - It is a complex force starting & keeping person at work.
- Leadership - It is process of influencing behaviour of others to work willingly for achieving goals.
- Communication - It is transfer of information, ideas & thoughts between people.

Nature of Motivation.

- Individual differ in motives.
- Sometimes individual himself is unaware of his motives.
- Motives keep changing.
- Motives are expressed differently & are complex.
- Multiple motives make the choice of goals difficult for an individual

13) Differentiate between (a) Centralization & Decentralization.

- Basis for comparison.	Centralization	Decentralization.
• Meaning	• The retention of power & authority w.r.t planning & decisions with the top management.	• The dissemination of authority, responsibility to the various levels of management.
• Involves	• Systematic & consistent reservation of authority.	• Systematic dispersal of authority.
• Communication flow.	• Vertical	• Open & free.
• Decision making	• Slow	• Comparatively fast.
• Advantage	• Proper co-ordination & leadership.	• Sharing of burden & responsibility.
• Power of decision making.	• Lies with the top management.	• Multiple people have the power
• Implemented when	• Inadequate control over the organization.	• Considerable control over the organization.
• Best suited for.	• Small sized organization.	• Large sized organization.

b) Authority & Responsibility.

Basis for comparsion.	Authority	Responsibility.
• Meaning	• Authority refers to power / right attached to a particular job, to give orders, enforce rules, make decision & exact compliance.	• Responsibility denotes duty to undertake or accomplish a task successfully assigned by senior by ones own commitment
• What is it ?	• Legal right to issue order.	• Corollary of authority
• Results from	• Formal position in an organization.	• Superior - subordinate relationship.
• Task of manager.	• Delegation of authority	• assumption of responsibility.
• Requires	• Ability to give orders	• Ability to follow orders.
• Flow	• Downward	• Upward.
• Objective	• To make decisions & implement them	• To execute duties assigned by superior.
• Duration	• Continues for long period.	• Ends as soon as the task is accomplished.

14) Explain Maslowe's Need Hierarchy Theory.

– Maslow's Theory.

Abraham Maslow is considered the Pioneer for contributing a systematic scheme of hierarchy. After a proper research he came to conclusion that there are some needs of employees which they expect to be satisfied once they join an organization upon which they get motivated to work. A gap between the two may lead them to work slow or refuse to work.

Maslowes hierarchy of needs

Maslow suggested ~~that~~ the following needs for human motivation which could be arranged hierarchially as:

- Physiological needs:
  This being the lowest order includes the need for food, water, clothing & shelter for a person who lacks everything. This could be the major motivation & should be the first need to be satisfied.

- Safety needs:
  This is the next important need. Theseare the needs for protection against danger or loss of existing physiologicalneeds.

- Social needs:
  This being third in line comprises of social needs that i giving & receiving love, friendship, affection, belongingness, association & acceptance. If a person senses absence of his friends this will motivate him towards affectionate relations.

- Esteem needs:
  This need can be subdivided into two categories:
  i) Need for achievement, strength & freedom.
  ii) Need for self esteem or self worth.

- Self actualization:
  This being the highest level of hierarchy is the need to realize one's potential for continued self development and desire to become more of what one is capable of. This is called self actualization.

15) Write a note on Committee.

- A committee is a group of people performing a set of tasks with the objective of solving certain problems.
- Complex business world, some of the administrative tasks can't be performed by a single person alone
- Such situation may call for two or more people to perform such tasks.
- A committee is a group of people pooled to carry out a defined objective
- A committee is a body of persons appointed or elected to meet on an

organized basis for consideration of matters brought before it.

- The area of operation of a committee is determined by its constitution

Principles

- The no. of people in a committee should depend on need (5-10).
- Responsibility, authority, objectives, duties of a committee should be identified clearly.
- Agenda of committee should be proposed or communicated to community at least a week before they meet for discussion.
- Problems which can be taken care by an individual should not be included in the agenda of the committee.
- Committee meetings should begin & end on prefixed meetings.
- Problems not related to the subject shouldn't be discussed as it is a waste of time.
- The recommendation made by committee should be published & circulated to interested people.
- The committee should be appraised if its action is taken upon its recommendation.
- A committee must be dissolved after its purpose.

Various functions of committee

- Collect necessary information from different sources & arrange them in order.
- Collected information is critically examined & analyzed.
- Framing policies of organization.
- Draft a detailed report containing the recommendation for the purpose of implementation.
- Selecting of personnel, directing & controlling the officers at regular intervals to achieve goals.

Types of Committee

- Standing or permanent committee
- Temporary committee
- General advisory committee
- Joint consultative committee
- Academic committee
- Religious committee
- Educational committee

Advantages

- Committees provide a forum for ~~providing~~ pooling of knowledge and experience of many people of different skills, ages & backgrounds.
- Committees are excellent means of transmitting information & ideas both upwards & downwards.
- Committees are impersonal in action & hence their decisions are generally unbiased & based on facts.
- When departmental heads are members of committee, people get an an opportunity to understand each others problems & hence improve co-ordination.

Weakness

- Committee delay action
- They are expensive form of organization
- In case a wrong decision is taken by the committee no one is held responsible which may result irresponsibility among other members.
- Decisions are generally arrived on the basis of compromise & hence they are not best decisions.
- As committee consists of large number of people, it is difficult to maintain secrecy.

TIME | V Sem | 18ES51

ATTENDANCE

Sl. No.	Reg.No.	Name	2/9/20	5/9/20	7/9/20	9/9/20	12/9/20	14/9/
			1	2	3	4	5	6
1	ICE16EC015	Indiresh Brahmadesham	1	2	3	4	4	5
2	ICE17EC028	Jyothesh Karnam	1	2	3	4	5	5
3	ICE18EC001	A.T. Harshith	1	2	3	4	5	6
4	ICE18EC002	Akanksha . G. Kulkarni	1	2	3	4	5	6
5	ICE18EC003	Amarjith. V.C	1	2	3	4	4	5
6	ICE18EC004	Ankit Kumar	1	2	3	4	5	6
7	ICE18EC005	Gangadhar P. Upar	1	2	3	4	4	5
8	ICE18EC006	Jayeeta Sarkar	1	2	3	4	5	6
9	007	Karthik P.S	1	2	3	4	4	5
10	008	Keerthika.S	1	2	3	4	5	6
11	009	Kushal.V.V	1	2	3	3	4	5
12	010	Manoj Kumar . R.S	1	2	3	3	4	5
13	011	Md. Imranulla Khan	1	2	3	3	4	5
14	012	Nayana . C.Y	1	2	3	4	5	6
15	013	Noor Fathima Afsar	1	2	3	4	5	6
16	014	Poornesh . K	1	2	3	4	5	6
17	015	Prajwal. L	1	2	3	3	4	5
18	016	Rakshitha. T.K	1	2	3	4	5	6
19	017	Sagar S	1	2	3	3	4	5
20	018	Saima ifath. J	1	2	3	4	5	6
21	019	Sangeetha . C	1	2	3	4	5	6
22	020	Shreyas . H C	1	2	3	4	5	6
23	021	Shrinidhi B. Cherkar	1	2	3	4	5	6
24	022	Soundarya . H	1	2	3	4	5	6
25	023	Soundarya . H . C .	1	2	3	4	5	6
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ASSESSMENT

16/9/20	15/9/20	21/9/20	23/9/20	28/9/20	30/9/20	3/10/20	5/10/20		% of Attendance	Test Marks					Sessional Marks	Remarks
7	8	9	10	11	12	13	14	60		1	2	3	Asg	Assg		
										50	50	50	30	10	25	
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7	7	8	9	10	11	11	12			30	50	40	24	10	34	
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6	6	7	8	9	10	11	12			50	50	50	30	10	40	
7	8	9	10	11	12	13	14			50	50	50	30	10	40	
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7	8	9	10	11	12	13	14			50	50	50	30	10	40	
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ATTENDANCE

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			1	2	3	4	5	6	7
26	1CE18EC024	Srivatsa · G.	1	2	3	4	5	6	7
27	025	Umme Asra · N	1	2	3	4	5	6	7
28	19EC400	Naveen ·N· Poojari	1	2	3	4	5	6	7
29	1CE16EC020	Madan Halakatti	1	2	3	4	5	6	7
30	16EC045	T·U· Sowmya	1	2	3	4	5	6	7
31	17EC018	Chandana ·R	1	2	3	4	5	6	7
32	17EC023	Divakar ·S·D	1	2	3	4	5	6	7
33	17EC025	Govardhan · K·N	1	2	3	4	5	6	7
34	17EC053	Sanjay · H	1	2	3	4	5	6	7
35	17EC060	Sheshadri	1	2	3	4	5	6	7
36	17EC061	Shyam Sundar · M·G	1	2	3	4	5	6	7
37	17EC068	Tejaswini Ananth Jantali	1	2	3	4	5	6	7
38	17EC069	Thanushree ·R	1	2	3	4	5	6	7
39	16EC017	Kaushik · A	1	2	3	4	5	6	7
40	16EC053	Saeeda Shammad	1	2	3	4	5	6	7
41	16EC401	Akshay Hegde.	1	2	3	4	5	6	7
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ATTENSMENT

Sl. No.	Reg.No.	ce	Test Marks 1	2	3	Avg	Assgn	Sessional Marks	Remarks
			50	50	50	30	10	25	
26	1CE18EC024	Srivatsa. G.	50	48	50	30	10	40	
27	025	Umme Asra. N	50	50	50	30	10	40	
28	19EC400	Naveen .N. Poojar	36	34	35	21	—	21	
29	1CE16EC020	Madan Halakatt	50	45	50	29	10	39	
30	16EC045	T.V. Sowmya	50	50	50	30	10	40	
31	17EC018	Chandana .R	50	50	50	30	10	40	
32	17EC023	Divakar .S.D	50	50	46	30	10	40	
33	17EC025	Govardhan . K.N	50	50	50	30	10	40	
34	17EC053	Sanjay. H	50	50	50	30	05	35	
35	17EC060	Sheshadri	50	50	50	30	10	40	
36	17EC061	Shyam Sundar .	50	50	50	30	10	40	
37	17EC068	Tejasvini Ananth	50	50	50	30	10	40	
38	17EC069	Thanushree .R	50	50	50	30	05	35	
39	16EC017	Kaushik . A	50	50	50	15	5	20	
40	16EC053	Saeeda Shamm	50	50	50	15	5	20	
41	16EC401	Akshay Hegde							
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CIRCULAR

Ref No: CEC/ME/DAC/ACY 2020-2021/02 Date: 15-04-2021

This is to inform the members of Department Advisory Committee that meeting is scheduled on 15-04-2021 at 10: 00 AM in ME department.

Agenda:

- Planning of Internships & Project work for 8th semester students.
- Involving students in technical activities.
- Planning to give more attention to non-attentive students.
- Conducting workshop/seminar/guest lectures.
- Planning to improve result of students.
- Planning to conduct value added course for students.
- Planning of Course preference, Course allocation & Work load distribution for upcoming odd semester.

Dr.S.Karunakara

HOD

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DEPARTMENT OF MECHANICAL ENGINEERING

Department Advisory Committee Meeting

Date: 15/04/2020
Time: 10:00 AM
Venue: ME Department

DAC Members Present:

Sl. No	Member Name	Designation	Role
1	Dr. S KARUNAKARA	HOD	Convenor
2	Dr. UMA T R	Professor	Member
3	HARSHA VARDHAN U	Professor	Co-Convenor
4	ANIL KUMAR R	Assistant Professor	Member
5	SHRUTI NAIK	Assistant Professor	Member
6	VIJAY KUMAR	Assistant Professor	Member
7	SAMPATH H P	Assistant Professor	Member
8	RAKESH Y D	Assistant Professor	Member
9	SHIVARAJA H B	Assistant Professor	Co-Convenor
10	Manjunath	Design Engineer	Alumni

The Department Advisory Committee meeting was conducted at Department of ME, 15th April, 2021, at 10 AM.

Agenda of the Meeting:

- Planning of Internships & Project work for 8th semester students.
- Involving students in technical activities.
- Planning to give more attention to non-attentive students.
- Conducting workshop/seminar/guest lectures.
- Planning to improve result of students.
- Planning to conduct value added course for students.
- Planning of Course preference, Course allocation & Work load distribution for upcoming odd semester.

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Minutes of Meeting:

During the Department Advisory Committee meeting, an overview of the department was provided, showcasing student achievement, and faculty accomplishments and contributions. The members discussed suggestions for improvement and reviewed the meeting agenda.

The HOD welcomed all the staff for the meeting. The following points were discussed as follows.

- The staff should give the list of non-attentive students and troubleshooting students if any to the HOD.
- It was proposed to conduct a workshop, seminars & guest lecture on recent trending topics.
- The staff members were informed to conduct classes and labs regularly, to timely conduct and complete the entrusted responsibility, to actively participate in the dept and college activities and finally to take suitable actions for getting results and admissions to the dept.
- The guide has to check and discuss about the internship practice taken by students of 7th semester allocated to him or she. The guide must visit the site where internship is practiced by the students and discuss with supervisor of students at the site.
- The staff members who have not registered for should immediately act upon to register for PhD.
- Valuation data has to be submitted by all the faculties who involved in valuation.
- The staff should not involve in any gossiping, strict actions will be taken in such cases.

HOD thanked all the staff for having attended the meeting.

Dr.S.Karunakara

HOD

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ACADEMIC YEAR:2020-21

Department of Mechanical Engineering

COURSE PREFERENCE

Name of the Faculty: Dr. S. Karunakara

Designation: professr

Sl. No	Course Code and Name	Year/Semester
1	18ECJDL25 / EVN	I / II
2	18ME61 / FBM	III / VI

Signature of Faculty

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CITY
ENGINEERING COLLEGE

ACADEMIC YEAR:2020-21

DEPARTMENT OF Mechanical Engineering

COURSE PREFERENCE

Name of the Faculty: Shruti Naik

Designation: Assistant Professor

Sl. No	Course Code and Name	Year/Semester
1.	CAED [Computer Aided Engineering Drawing	I/I 18E4DL25
2.	18ME62 (Computer Integrated Manufacturing	I/ME-Ist

Signature of Faculty

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CITY
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ACADEMIC YEAR: 2020-21 Even SEM

DEPARTMENT OF MECHANICAL ENGINEERING

COUR, SE ALLOCATION

Sl.No	Name of the Faculty	Course Code and Name	Year/ Semester	Signature
1	Dr. S Karunakara	18ME61,18EGDL25	VIII,VI	
2	Dr. Uma T R	18ME42, 17ME652	IV, VI	
3	Harsha Vardhan U	17ME61, 18ME41	VI, IV	
4	Anil Kumar R	15ME81, 15ME41	VIII, IV	
5	Shruti Naik	18ME42, 15ME83	IV, VIII	
6	Vijay Kumar	18ME61, 18ME44	VI, IV	
7	Sampath H P	17ME62, 18ME43	VI, IV	
8	Rakesh Y D	15ME82, 18ME42	VIII, IV	
9	Shivaraja H B	17ME62, 18ME43	VI, IV	

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Department of Civil Engineering — Calendar of Events Even Semester of 2020-21

	APRIL 2021		MAY / JUNE 2021		JUNE/ JULY 2021		JULY/ AUGUST 2021	
DAY	Date	EVENT	Date	EVENT	Date	EVENT	Date	EVENT
MON			3		7		12	Third CIE – 8th Sem
TUE			4		8		13	
WED			5		9		14	
THU	1		6		10		15	
FRI	2	Good Friday	7		11		16	
SAT	3		8		12		17	
SUN	4		9		13		18	
MON	5		10		14		19	
TUE	6		11		15	Second CIE – 8th Sem	20	Last Working Day: 8th Sem
WED	7		12		16		21	
THU	8		13		17		22	22nd to 30th – 8th Sem Theory Exam
FRI	9		14	Basava Jayanti	18		23	
SAT	10		15		19		24	
SUN	11		16		20		25	
MON	12		17		21		26	
TUE	13	Ugadi	18		22		27	
WED	14	Ambedkar Jayanthi	19		23	Technical Seminar	28	
THU	15		20		24		29	Third CIE – 4th & 6th Sem
FRI	16		21		25		30	
SAT	17		22		26		31	
SUN	18		23		27		Aug 1	
MON	19	Commencement of 4th, 6th, 8th Semester	24	Project Phase – II Presentation	28	Second CIE – 4th & 6th Sem	2	2nd to 8th Internship / Project Viva
TUE	20		25		29		3	
WED	21		26		30		4	
THU	22		27		July 1		5	
FRI	23		28	Guest Lecture	2		6	
SAT	24		29		3		7	Last Working Day: 4th& 6th Sem
SUN	25		30		4		8	
MON	26	Workshop/ Technical Activities	31	First CIE – 4th, 6th & 8th Sem	5	Final Demo of Projects	9	
TUE	27		June 1		6		10	
WED	28		2		7		11	
THU	29		3		8		12	
FRI	30		4		9		13	
SAT	May 1	MAY DAY	5		10		14	
SUN	2		6		11		15	

Practical Exam for 4th & 6th Sem : 9.8.21 to 19.8.21, Theory exams : 23.8.21 to 9.9.21

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DEPARTMENT OF MECHANICAL ENGINEERING

EVEN 2020-2021 TIME TABLE

SEMESTER: IV ME 'A' SEC CBCS **2018 SCHEME** **CLASS ROOM: A106**

DAY	9:00-10:00 AM	10:00-11:00 AM	11:00-11:15 AM	11:15 AM-12:15 PM	12:15-1:15 PM	1:15-2:00 PM	2:00-3:00 PM	3:00-4:00 PM	4:00-5:00 PM
MON	18ME44	18MAT41	*BREAK*	18ME45	18ME42	*LUNCH*	18ME45	18ME43	
TUE	18ME42	18ME44		18MAT41	18ME45		18MEL48A		
WED	18MAT41	18ME43		18ME46A	18ME44		18ME42		
THU	18ME43	18ME44		18ME45	18MAT41		18ME43	18ME42	
FRI	18ME46	18ME46		18MEL47A			DEPARTMENT ACTIVITY		
SAT	NSS/SPORTS/YOGA BNSK359/BPEK359/BYOK359			NSS/SPORTS/YOGA BNSK359/BPEK359/BYOK359					

SUBJECT CODE	SUBJECT NAME	SUBJECT HANDELED
18MAT41	Mathematics	Prof Vanitha G R
18ME42	Applied Thermodynamics	Prof Harshavardhan
18ME43	Fluid Mechanics	Prof Veeresh Naik
18ME44	Kinematics of Machines	Prof Sampath
18ME45B	Metal Casting and Welding	Prof Rakesh Y D
18ME46A	Computer Aided Machine Drawing	Prof Shruti Naik
18MEL47A	Material Testing lab	Prof Vinay Kumar H M
18MEL48A	Workshop and Machine Shop Practice	Prof Anil Kumar
BNSK359/BPEK359/BYOK359	NSS/SPORTS/YOGA	Mr Rangaswamy

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DEPARTMENT OF MECHANICAL ENGINEERING

EVEN 2020-2021 TIME TABLE

SEMESTER: VI ME 'A' SEC CBCS **2017 SCHEME**

DAY	9:00 AM 10:00 AM	10:00AM 11:00 AM	11:00 AM 11:15 AM	11:15 AM 12:15 PM	12:15 PM 1:15 PM	1:15 PM 2:00 PM	2:00 PM 3:00 PM	3:00 PM 4:00 PM	4:00 PM 5:00 PM
MON	18ME61	18ME63	*BREAK*	18ME62	18ME653	*LUNCH*	18ME653	18ME664	
TUE	18ME63	18ME62		18ME664	18ME64		18MEL67		
WED	18ME653	18ME664		18ME63	18ME61		18MEL68		
THU	18ME64	18ME63		18ME62	18ME61		18ME61	18ME664	
FRI	18ME62	18ME61		18ME653	18ME64		DEPARTMENT ACTIVITY		
SAT	NSS/SPORTS/YOGA BNSK359/BPEK359/BYOK359			NSS/SPORTS/YOGA BNSK359/BPEK359/BYOK359					

SUBJECT CODE	SUBJECT NAME	SUBJECT HANDELED
18ME61	Finite Element Method	Prof Veeresh Naik
18ME62	Design of Machine Elements II	Prof Sampath H P
18ME63	Heat Transfer	Prof Sampath H P
18ME64	Non Traditional Machining	Dr. Uma T R
18ME653	Metal Forming	Prof Anil Kumar
18ME664	Total Quality Management	Prof Rakesh Y D
18MEL67	Heat Transfer Lab	Prof Vijay Kumar
18MEL68	Modeling and Analysis Lab(FEA)	Prof Sampath H P

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DEPARTMENT OF MECHANICAL ENGINEERING

EVEN 2020-2021 TIME TABLE

SEMESTER: VIII ME ‘A’ SEC CBCS **2017 SCHEME**

DAY	1	2	TEA	3	4	LUNCH	5	6	7
	9:00 AM 10:00 AM	10:00AM 11:00 AM	11:00 AM 11:15 AM	11:15 AM 12:15 PM	12:15 PM 1:15 PM	1:15 PM 2:00 PM	2:00 PM 3:00 PM	3:00 PM 4:00 PM	4:00 PM 5:00 PM
MON	17ME81	17ME82	*BREAK*	17ME835	17ME835	*LUNCH*			
TUE	17ME82	17ME81		17ME82	18ME81		PROJECT PHASE II		
WED	17ME835	17ME835		17ME81	17ME82		17ME84		
FRI	17MES86			17MES86					
SAT									

SUBJECT CODE	SUBJECT NAME	SUBJECT HANDELED
17ME81	Energy Engineering	Prof. Anilkumar R.
17ME82	Tribology	Prof. Shivaraj
17ME835	Project Phase II	Dr. S. Karunakara
17ME84	Internship	Dr. Uma T R
17ME85	Project Phase II	Prof. Harshavardhan U
17MES86	Seminar	Prof. Shruti Naik

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CITY ENGINEERING COLLEGE

Department of Mechanical Engineering

Individual Time Table 2022(EVEN SEM)

DR.S.Karunakara

DAY/TIME	9:15AM-10:10AM	10:10AM-10:10AM	11:05AM-11:20AM	11:20AM-12:15PM	12:15PM-1:10PM	1:10PM-2:00PM	2:00PM - 2:50PM	2:50PM-3:40PM	3:40PM-4:30PM
MON			BREAK			BREAK			
TUE	18ME61								
WED					18ME42				
THU	18ME42			18ME61					
FRI		18ME61		EVN	EVN				
SAT		18ME42		18ME61					

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LESSON PLAN FOR THE ACADEMIC YEAR 2021 – 2022 (EVEN SEM)

Name of the staff: **Dr.S.Karunakara** Dept: **Mechanical Engineering**

Class:**6th SEM, CBCS Scheme** Subject: **FINITE ELEMENT METHODS (18ME61)**

Course Learning Objectives:

CLO1 To learn the basic principles of finite element analysis procedure
CLO2 To understand the design and heat transfer problems with application of FEM.
CLO3 Solve 1 D, 2 D and dynamic problems using Finite Element Analysis approach.
CLO4 To learn the theory and characteristics of finite elements that represent engineering structures.
CLO5 To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses

Sl No.	Topic to be covered	Remarks
01	**Module I Introduction to Finite Element Method :** General description of the finite element method.	13 Hours
02	Engineering applications of finite element method.	
03	Boundary conditions: homogeneous and nonhomogeneous for structural, heat transfer and fluid flow problems.	
04	Potential energy method, Rayleigh Ritz method	
05	Galerkin's method	
06	Displacement method of finite element formulation	
07	Convergence criteria, Discretisation process, Types of elements: 1D, 2D and 3D	
08	Node numbering, Location of nodes, Strain displacement relations, Stress strain relations	
09	Plain stress and Plain strain conditions, temperature effects	
10	**Interpolation models:** Simplex, complex and multiplex elements	
11	Linear interpolation polynomials in terms of global coordinates 1D	
12	Linear interpolation polynomials in 2D, 3D Simplex Elements	
13	Problems	
14	**Module II One-Dimensional Elements-Analysis of Bars and Trusses**	13 Hours
15	Linear interpolation polynomials in terms of local coordinate's for 1D, 2D elements	
16	Higher order interpolation functions for 1D quadratic and cubic elements in natural coordinates	
17	Constant strain triangle, Four-Nodded Tetrahedral Element (TET 4)	
18	Eight-Nodded Hexahedral Element (HEXA 8), 2D isoparametric element	
19	Lagrange interpolation functions	
20	Numerical integration: Gaussian quadrature one point, two point	

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	formulae	
21	2D integrals. Force terms: Body force, traction force and point loads	
22	**Numerical Problems:** Solution for displacement, stress and strain in 1D straight bars	
23	stepped bars and tapered bars using elimination approach and penalty approach	
24	Analysis of trusses.	
25	Analysis of trusses.	
26	Problems	
27	**Module III Beams and Shafts:** Boundary conditions, Load vector	09 Hours
28	Hermite shape functions	
29	Beam stiffness matrix based on Euler-Bernoulli beam theory, Examples on cantilever beams	
30	propped cantilever beams, Numerical problems on simply supported	
31	fixed straight and stepped beams using direct stiffness method	
32	Concentrated and uniformly distributed load.	
33	**Torsion of Shafts:** Finite element formulation of shafts	
34	Determination of stress and twists in circular shafts.	
35	Problems	
36	**Module IV Heat Transfer:** Basic equations of heat transfer:	11 Hours
37	Energy balance equation	
38	Rate equation: conduction	
39	Rate equation: convection, radiation	
40	energy generated in solid, energy stored in solid	
41	1D finite element formulation using vibrational method	
42	Problems with temperature gradient and heat fluxes	
43	heat transfer in composite sections, heat transfer in straight fins	
44	**Fluid Flow:** Flow through a porous medium	
45	Flow through pipes of uniform, Flow through pipes of Stepped sections.	
46	Problems	
47	**Module V Axi-symmetric Solid Elements:** Derivation of stiffness matrix of axisymmetric bodies with triangular elements	10 Hours
48	axisymmetric bodies with triangular elements	
49	Numerical solution of axisymmetric triangular element(s) subjected to point loads.	
50	Numerical solution of axisymmetric subjected to angular vessels, pressure vessels.	
51	**Dynamic Considerations:** Formulation for point mass	
52	Consistent element mass matrix of one dimensional bar element	
53	Consistent element mass matrix of truss element	
54	Lumped mass matrix of bar element	
55	Lumped mass matrix of Truss element.	
56	Evaluation of Eigen values and eigen vectors	
57	Applications to bars, stepped bars, and beams.	

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Course Outcomes: At the end of the course, the student will be able to:

CO1: Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements.

CO2: Develop element characteristic equation and generation of global equation.

CO3: Formulate and solve Axi-symmetric and heat transfer problems.

CO4: Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi-symmetric and dynamic problems

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	1	1	1	2	-	-	1	1	1	2	2
CO.2	2	3	2	1	2	-	-	1	1	1	2	2
CO.3	3	2	3	1	3	-	-	1	1	1	2	2
CO.4	3	2	2	1	3	-	-	1	1	1	3	3

Text Books:

1. Logan, D. L., A first course in the finite element method,6th Edition, Cengage Learning,2016.
2. Rao, S. S., Finite element method in engineering, 5th Edition, Pergaman Int. Library ofScience, 2010.
3. Chandrupatla T. R., Finite Elements in engineering, 2nd Edition, PHI, 2013.

Reference Books:

1. J.N.Reddy, **"Finite Element Method"**- McGraw -Hill International Edition.Bathe K. J.Finite Elements Procedures, PHI.
2. Cook R. D., et al. **"Concepts and Application of Finite Elements Analysis"**- 4th Edition, Wiley & Sons, 2003.

Test Dates

USN

COURSE CODE: 18ME61

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BANGALORE – 62

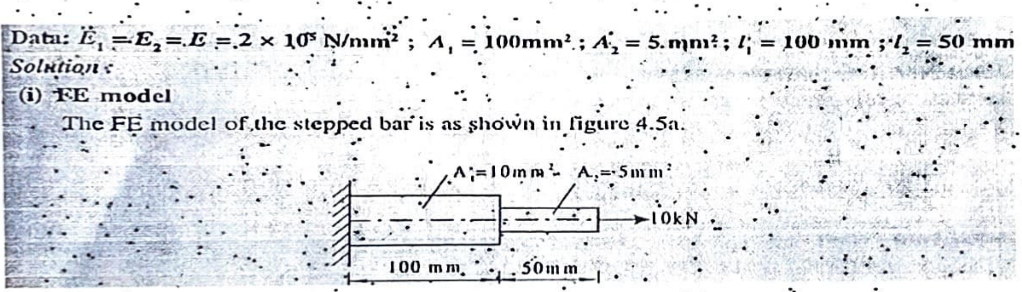
SECOND INTERNAL ASSESSMENT

PROGRAMME: MECHANICAL ENGINEERING
COURSE NAME: FEM
SEM: VI
Duration: 1.30 Hrs

DATE: 1306/2022
TIME:

MAX MARKS: 50

Note: Answer any FIVE questions choosing.

Sl.No		Marks
1.	Derive the stiffness matrix for a 1D 2 noded bar element	10
	OR	
2.	Derive the shape functions for a 1D element	10
3.	A two element bar is shown in fig 1:Determine the nodal displacements and Reaction forces.  Data: $E_1 = E_2 = E = 2 \times 10^5$ N/mm^2 ; $A_1 = 100$mm^2 ; $A_2 = 5$ mm^2 ; $l_1 = 100$ mm ; $l_2 = 50$ mm *Solution :* **(i) FE model** The FE model of the stepped bar is as shown in figure 4.5a. Fig 1	10
	OR	
4.	Derive the stiffness matrix for Truss element	10
5.	Derive shape functions for a nine noded rectangular element	10
	OR	
6.	Describe isoperimetric, sub parametric and super parametric elements	10
7.	Using penalty approach determine nodal displacements and stresses in each element as shown in fig.2	10

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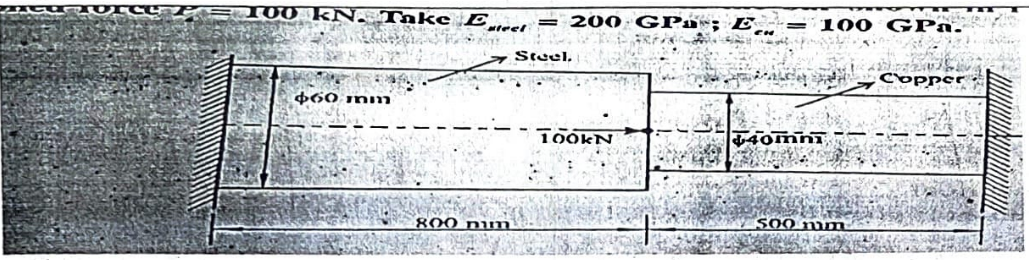
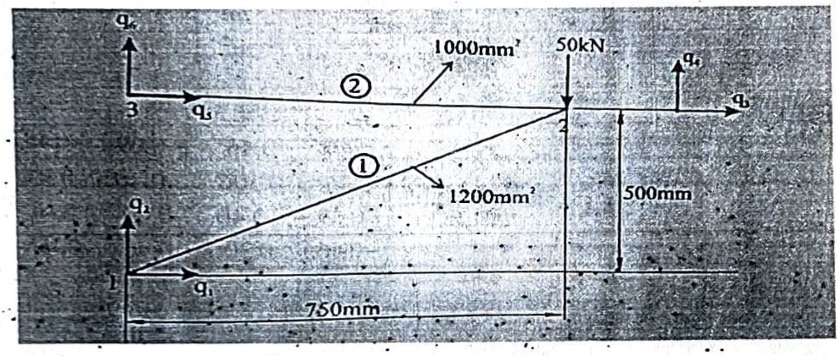
	= 100 kN. Take E_{steel} = 200 GPa; E_{cu} = 100 GPa.  Fig 2	
	OR	
8.	For a two bar truss element determine nodal displacements and stress in each element for the shown fig 3. Take E=200GPa  Fig 3	10
	Mandatory	
9.	Write short notes on : a. Simplex, complex and multiplex elements b. Geometric invariance –Pascal triangle c. Convergence requirements d. Shape function and relation between Cartesian and natural coordinate system	(5marks each) =20

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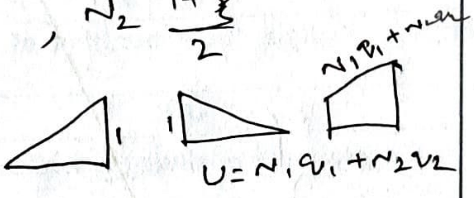
DEPARTMENT OF ..MECHANICAL..

SCHEME FOR VALUATION

Internal Test 2

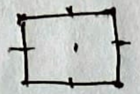
Semester & Section:

Date: 13/6

Question No.	Details of the Answer	Marks Distribution	Total Marks
1a	$K = \frac{AE}{L}\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$	5+5	10
2	$N_1 = \frac{1-\xi}{2}$, $N_2 \frac{1+\xi}{2}$  	5 5	10
3.	$K = 10^4\begin{bmatrix} 2 & -2 & 0 \\ -2 & 4 & -2 \\ 0 & -2 & -2 \end{bmatrix}$	5	10
	$\left.\begin{matrix} q_2 = .5 \\ q_3 = 1 \end{matrix}\right\}$ 3	3	
	$R_1\ R_2\ R_3 = \begin{bmatrix} -1000 & 0 & 0 \end{bmatrix}$	2	
4.	$K = \frac{AE}{L}\begin{bmatrix} l^2 & lm & -l^2 & -lm \\ -lm & -m^2 & lm & m^2 \end{bmatrix}$	7	10
	Sketch	3	

Staff

HOD

Question No.	Details of the Answer	Marks Distribution	Total Marks
5.	Shape functions  9 shape fuction	1+ 9	10
6.	Iso, Sub, Superpara Elements	3+3+ 4	10
7.	$q_1 = 6.99 \times 10^{-6}$ mm $q_2 = 0.1044$ mm $q_3 = 2.3 \times 10^{-6}$ mm	3 4 3	10
8	Truss $\left.\begin{array}{l} q_1 = .11 \\ q_2 = .03 \\ q_5 = .07 \end{array}\right\}$ mm	3+3 +4	10
9.	Short notes: 4×5	20	20

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