HOLY MARY INSTITUTE OF TECHNOLOGY & SCIENCE
(COLLEGE OF ENGINEERING)
Bogaram (V), Keesara (M), Medchal – 501 301

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

B TECH - III YEAR I-SEM

STUDENT HANDBOOK

A.Y. 2018-19

HOLY MARY INSTITUTE OF TECHNOLOGY & SCIENCE
(COLLEGE OF ENGINEERING)
Bogaram (V), Keesara (M), Medchal – 501 301

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

VISION :

To be a premier institute in the country and region for the study of engineering, technology and management by maintaining high academic standards which promote the analytical thinking and independent judgment among the prime stakeholders enabling them to function responsibly in the globalized society.

MISSION:

- To impart quality professional education that meets the needs of present and emerging technological world.
- To strive for student achievement and success, preparing them for life and leadership with ethics.
- To provide a scholarly and vibrant learning environment that enables faculty, staff and students achieve personal and professional growth.
- To contribute to advancement of knowledge, in both fundamental and applied areas of engineering, technology & management.
- To undertake research and development works by forging alliances with research institutes, government organizations, industries and alumni and become a centre of excellence for quality professional educations and research.

MISSION AND VISION OF THE ECE DEPARTMENT:

VISION:

To be a world leader and renowned for Electronics & Communication Engineering and research.

MISSION:

M1: To educate graduates in the basic principles underlying the field of Electronics & Communication Engineering.

M2: To train our students to think independently in terms to master systematic approach to problem solving.

M3: To have a keen awareness of the role of engineering in the modern society.

TABLE OF CONTENT

PROFESSIONAL ETHICS:

PROGRAMME: B.Tech ECE AC:YEAR: **2018-2019**	DEGREE: **B.TECH III YEAR**
COURSE: **Professional Ethics**	SEMESTER: **I** CREDITS: 4 COURSE COORDINATOR: Mrs. D.Aruna kumari
COURSE CODE: **MC500HS** REGULATION:**R16**	COURSE TYPE: **core**
COURSE AREA/DOMAIN: ECE	CONTACT HOURS: 5 hours/Week.
CORRESPONDING LAB COURSE CODE : NILL	LAB COURSE NAME: NILL

BRIEF NOTE ON THE IMPORTANTANCE OF THE COURSE AND HOW IT FITS IN TO THE CURRICULAM :

To Help The Students Appreciate The Essential Complementarily Between 'VALUES' And 'SKILLS' To Ensure Sustained Happiness And Prosperity Which Are The Core Aspirations Of All Human Beings. B. To Facilitate The Development Of A Holistic Perspective Among Students Towards Life, Profession And Happiness, Based On A Correct Understanding Of The Human Reality And The Rest Of Existence. Such A Holistic Perspective Forms The Basis Of Value Based Living In A Natural Way. C. To Highlight Plausible Implications Of Such A Holistic Understanding In Terms Of Ethical Human Conduct, Trustful And Mutually Satisfying Human Behavior And Mutually Enriching Interaction With Nature.

1.1 PREREQUISITES, IF ANY:

- Human values
- Human ethics & moral values

1.2 MARKS DISTRIBUTION:

Session Marks	University Mid Exam Marks	Total Marks
There shall be two mid tem examinations. Each Mid-term exam consists of subjective type and objective type test. The subjective test is for 10 marks, with duration of 1 hour Subjective test of each semester shall contain four questions; the student has to answer two out of them. Each carrying 5 marks The objective test paper Is prepared by JNTUH, which consists of 20 questions each carrying 0.5 marks and total of 10 marks. The student is assessed by giving two assignments, one, after completion of 1to 2 1/2 units and the second, after the completion of 2 1/2 to 5 units each carrying 5 marks. On the total the internal marks are 25. The average of two internal tests is the final internal marks. The external question paper is set by JNTUH consisting of part –A	100	100

and part- B. Where part consists of short answer questions carrying total marks of 25 and part part-B consists of 5 essay type questions consists of internal choice each carrying 10 marks and the total of 50. The total external marks are 75.awarded considering the average of two assignments in each course		

1.3 EVALUATION SCHEME:

S.No	Component	Total Duration	Marks
1.	I Mid Examination	90 Minutes	20
2.	I Assignment	----	05
3.	II Mid Examination	90 Minutes	20
4.	II Assignment	------	05
5.	External Examination	3 hours	100

1.4 COURSE OBJECTIVES:

I. The Students Will Understand The Importance Of Values And Ethics In Their Personal Lives And Professional Careers.

II. The Students Will Learn The Rights And Responsibilities As An Employee, Team Member And A Global Citizen

1.5 COURSE OUTCOMES:

On completion of this subject, the student should be able to

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which

2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of existence Design of finite impulse response filters for a given specifications.
3. . Such a holistic perspective forms the basis of Value based living in a natural way.
4. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with nature.

III Year B.Tech. ECE-II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**0**

1.6 PROFESSIONAL ETHICS SYLLABUS:

UNIT – I Introduction To Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts Of Ethics, Value Education, Dimensions Of Ethics, Profession And Professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics And Profession.

UNIT – II Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT – III Professional Practices In Engineering: Professions And Norms Of Professional Conduct, Norms Of Professional Conduct Vs. Profession; Responsibilities, Obligations And Moral Values In Professional Ethics, Professional Codes Of Ethics, The Limits Of Predictability And Responsibilities Of The Engineering Profession. Central Responsibilities Of Engineers – The Centrality Of Responsibilities Of Professional Ethics; Lessons From 1979 American Airlines DC-10 Crash And Kansas City Hyatt Regency Walk Away Collapse.

UNIT – IV Work Place Rights & Responsibilities, Ethics In Changing Domains Of Research, Engineers And Managers; Organizational Complaint Procedure, Difference Of Professional Judgment Within The Nuclear Regulatory Commission (NRC), The Hanford Nuclear Reservation. Ethics In Changing Domains Of Research – The US Government Wide Definition Of Research Misconduct, Research Misconduct Distinguished From Mistakes And Errors, Recent History Of Attention To Research Misconduct, The Emerging Emphasis On Understanding And Fostering Responsible Conduct, Responsible Authorship, Reviewing & Editing.

UNIT – V Global Issues In Professional Ethics: Introduction – Current Scenario, Technology Globalization Of Mncs, International Trade, World Summits, Issues, Business Ethics And Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics In Manufacturing And Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

- Professional Ethics: R. Subramanian, Oxford University Press, 2015.
- Ethics In Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCES:

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage Learning, 2015.
2. Business Ethics Concepts & Cases: Manuel G Velasquez, 6e, Phi, 2008

1.7 COURSE PLAN:

S.No	Unit No	Topic	No of sessions planned	Mode of teaching BB/PPT/ OHP/M M	Reference *	Remarks
1	I	INTRODUCTION TO PROFESSIONAL ETHICS	1	BB	A1,B1	
2		Basic concepts, Governing Ethics	1	BB	A1,B1	
3		Personal and Professional ethics	2	BB	A1,B1	
4		Ethical dilemmas, Life skills	1	BB	A1,B1	
5		Emotional Intelligence	2	BB	A1,B1	
6		Thought of Ethics	1	BB	A1,B1	
7		Value Education	2	BB	A1,B1	
8		Dimensions of Ethics	1	BB	A1,B1	
9		Profession and professionalism	2	PPT	A1,B1	
10		Professional risks	1	BB	A1,B1	
11		Professional Accountabilities	1	BB	A1,B1	
12		Professional Success	1	BB	A1,B1	
13		Ethics and Profession	1	PPT	A1,B1	
14		BASIC THEORIES	1	PPT	A1,B1	
15		Basic Ethical Principles	1	PPT	A1,B1	
16		Moral Developments	1	PPT	A1,B1	
		Deontology				
17	II	Utilitarism	1	BB	A1,C1	
18		Value theory	1	BB	A1,C1	
19		Casusis theory	1	BB	A1,C1	
20		Moral Absolution	2	PPT	A1,C1	
21		Moral Rationalism	2	PPT	A1,C1	
22		Moral Plunarism	2	PPT	A1,C1	
23		Ethical Egoism	1	BB	A1,C1	
24		Feminist Concequentialism	1	BB	A1,C1	
25		Moral Issues	2	BB	A1,C1	
26		Moral Dilemma	2	BB	A1,C1	
27		Moral Autonomy	2	BB	A1,C1	
28		PROFESSIONAL PRACTICEIN ENGINEERING	1	BB	A1,C1	

29	III	Professions and norms of Professional conduct	1	BB	A1	
30		Normsof Professional conduct vs profession	1	BB	A1	
31		Responsibilities	2	BB	A1	
32		Obligations and Moral values in Professional ethics	2	BB	A1	
33		Professional codes of ethics	2	BB	A1	
34		Limits of Predictability and responsibility of the engineering Profession	1	BB	A1	
		Central Responsibilities of Engineers	1	BB	A1	
35	IV	Centrality Responsibility of Professional Ethics	1	BB	A1	
36		Lessons from American Airlines	1	BB	A1	
37		Hyatt Regency Walkaway collapse	2	BB	A1	
38		WORK PLACE RIGHTS AND RESPONSIBILITIES	2	BB	A1	
39		Ethics in changing domains of Research	1	BB	A1	
40		Engineers and Managers	1	BB	A1	
		Organizational Complaint procedure	1			
41	V	difference of Professional Judgment within the NRC	1	BB	A1	
42		the Hanford Nuclear Reservation	2	BB	A1	
43		Ethics in changing domains of Research	1	BB	A1	
44		The us govt wide definition of research misconduct	1	BB	A1	
45		research misconduct distinguished from mistakes and errors	1	BB	A1	
46		recent history of attention to research misconduct	1	BB	A1	
47		the emerging emphasis on understanding and fostering responsible conduct	1	BB	A1	
48		responsible authorship	1	BB	A1	
49		reviewing and editing	1	BB	A1	

50		GLOBAL ISSUES IN PROFESSIONAL ETHICS	1	BB	A1	
51		Introduction-Current Scenario	1	BB	A1	
52		Technology Globalization of MNCs	1	BB	A1	
53		International Trade	1	BB	A1	
54		World Summits	1	BB	A1	

1.8 MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF THE PROGRAM OUTCOMES:

Course Objective	Course Outcomes				
	a	**b**	**c**	**d**	**e**
I	S				
II	S	S			
III			H		
IV				H	S
V					S

1.9 MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF THE PROGRAM OUTCOMES:

Course Outcomes	Program Outcomes													
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
a	S													
b	S	S									S		S	S
c	S	S												
d		S					S				S		H	S
e	S		S		S		S				S		S	

1.10 QUESTION BANK:

UNIT I : INTRODUCTION TO PE:

Composition and structure of the code of conduct / ethics relating to your specific professional discipline. Critically discuss the relevant clauses which comprise this code in the context of the issues.

UNIT III: PROFESSIONAL PRACTICE IN ENGINEERING:

Stevens (1999) noted that ethics codes are managerial tools for shaping change. To achieve this purpose, ethics codes must affect how people act by influencing them to behave in a prescribed manner in situations with ethical implications. Therefore, to review the ethical base of the professions (particularly that relating to health and safety issues), we need to review the codes of conduct, which have been drawn up in terms of the professional statutes.

As part of the course activities in this module, you were required to study the typical composition and structure of the codes of conduct / ethics and Professional Acts relating to a number of professional disciplines within the built environment. Critically discuss the relevant clauses in these documents which describe your profession's attitude to health and safety issues, commenting on their potential to meet these specific criteria, and comparing this with similar documentation used in the international built environment community. You may describe the approach adopted by any one of the constituent bodies of the Council for the Built Environment, as an alternative to your own profession if you so wish.

UNIT IV: WORK PLACE RIGHTS & RSPONSIBILITIES:

Discuss these features in detail, providing examples of how they may be applied in practice by a professional person in the built environment.

Events (2005) argues that the focus of recent sociological analysis has shifted away from the concepts of profession (as a distinct and generic category of occupational work) and professionalization (as the process to pursue, develop and maintain the closure of the occupational group) and towards the concept of 'professionalism'. The paper goes on to consider some of the consequences of the expansion of organizational forms of professionalism for aspects of trust, discretion and competence in professional work.

She further suggests that in contemporary societies we seem to be witnessing the

development of two different (and in many ways contrasting) forms of professionalism in knowledge-based, service-sector work: organizational and occupational professionalism. Discuss the nature of these forms of professionalism, particularly as it relates to potential changes in the views of society regarding trust, discretion and competence in terms of your own professional discipline.

UNIT V: GLOBAL ISSUES IN PROFESSIONAL ETHICS:

Consider the Code of Ethics for your profession. If you are uncertain about your discipline, choose a code from any of the other built environment professions studied in this module. You should clearly state which code / professional discipline your answer refers to.

a) Is there an explicit or implicit appeal to integrity contained in the code ? Explain, using examples.

b) Define integrity, relative to the way it is used in the code of ethics for your chosen discipline.

c) In this code, what specific requirements must the professional meet because of the value of integrity ?

d) Are these requirements too extensive, or not extensive enough ? Does this code include the specific requirements of integrity, such as honesty and promise keeping and loyalty and dependability ?

e) For the professionals covered by this code, do you foresee any potential problems or conflicts they may face in acting out the value of integrity ? Give three examples and explain each.

PROFESSIONAL ETHICS:
IMPORTANT LONG ANSWERS QUESTIONS :

UNIT -I

INTRODUCTION TO DIGITAL SIGNAL PROCESSING

1. Explain Governing Ethics
2. Write about personal & professional ethics
3. Explain emotional intelligence

4. Write about professional issues

UNIT-II

1. Write basic ethical principles
2. Explain value education
3. Write about moral values

UNIT -III

1. Explain profession & norms of responsibilities.
2. norms of responsibilities
3. Explain the limits of predictability

UNIT - IV

1. Explain work place rights & responsibilities
2. Explain the organization complaint procedure.
3. Write about responsible authorship reviewing & editing.
4. Design a FIR filter whose frequency response

UNIT -V

1) Explain technology globalization of MNCs.
2) Write briefly World summits.
3) Explain war ethics, bio ethics Explain about property rights.

PROGRAMME: B.Tech ECE AC:YEAR: **2018-2019**	DEGREE: **B.TECH III YEAR**
COURSE: **LINEAR AND DIGITAL IC APPLICATIONS**	SEMESTER: **I** CREDITS: 4 COURSE COORDINATOR: M.BHAVANA
COURSE CODE: **EC102PC** REGULATION:**R16**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: ECE	CONTACT HOURS: 4 hours/Week.
CORRESPONDING LAB COURSE CODE : **EC505PC & EC506PC**	LAB COURSE NAME : **LINEAR IC APPLICATIONS LAB & DIGITAL IC APPLICATIONS LAB**

2.1 COURSE OVERVIEW:

- To introduce the basic building blocks of linear integrated circuits.
- To learn the linear and non - linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To learn the theory of ADC and DAC.
- To learn the concepts of waveform generation and introduce some special function ICs.
- To understand and implement the working of basic digital circuits

2.2MARKS DISTRIBUTION:

Session Marks	University End Exam Marks	Total Marks
Mid Semester Test • There shall be two midterm examinations. • Each midterm examination consists of subjective type and objective type tests. • The subjective test is for 10 marks of 60 minutes duration. • Subjective test of shall contain 4 questions; the student has to answer 2 questions, each carrying 5 marks. • The objective type test is for 10 marks of 20 minutes duration. It consists of 10 multiple choice and 10 objective type questions, the student has to answer all the questions and each carries half mark. • First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion.	75	100

Assignment • Five marks are earmarked for assignments. • There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.		

2.3 EVALUATION SCHEME:

S. No	Component	Duration	Marks
1	I Mid Examination	80minutes	20
2	I Assignment	-	5
3	II Mid Examination	80minutes	20
4	II Assignment	-	5
5	External Examination	3 hours	75

2.4 COURSE OBJECTIVES & OUTCOMES:

BLOOMS LEVEL (BL)

BL 1: Remember / knowledge BL2: Understanding BL3: Apply
BL 4: Analyze BL 5: Evaluate BL 6: Create

PROGRAM OUTCOMES		LEVEL	PROFICIENCY ASSESSED BY	BLOOMS LEVEL
A	An ability to apply knowledge of mathematics, science and engineering	S	Solving Gate and Text book Problems	APPLY
B	An ability to design and conduct experiments, as well as to analyze and interpret data	S	Solving Gate and Text book Problems	APPLY
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	H	Assignment and Gate questions	Apply and Analyze
D	An ability to identify, formulate and solve engineering problems.	S	Class Test & Group Activity	Apply
E	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	S	Mini and Micro Projects	Apply

F	An ability to understand the special duty they owe to protect the public's health, safety and welfare by virtue of their professional status as engineers in society.	N	--	--
G	An ability to understand and correctly interpret the impact of engineering solutions in global, societal and environmental contexts and demonstrate the knowledge of a need for sustainable development.	H	Mini / Micro Projects and GATE questions	Analyze and Justify
H	An understanding of professional and ethical responsibility.	N	--	--
I	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	S	Class Test & Seminar	Analyze
J	An ability to 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, give and receive clear instructions.	S	Seminars	Understand & Analyze
K	An ability to demonstrate knowledge and understanding of the engineering finance and management principles as a member and leader in a team to manage projects in multi-disciplinary environments.	S	Mini and Micro Projects	Apply
L	Recognition of the need for, and an ability to engage in life-long analyzing.	S	Group Activity	Analyze
M	An ability to design and implement projects in the areas including Signal Processing, Microwaves, Communication Systems, IC Technology and Embedded Systems.	H	Mini and Micro Projects	Apply
N	An ability to use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations.	S	Seminars & Projects	Analyze & Apply

HOW PROGRAM OUTCOMES ARE ASSESSED:

2.5 SYLLABUS:

UNIT - I

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT - II

Op-Amp, IC-555 & IC 565 Applications: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Saw tooth, Square Wave, IC555 Timer - Functional Diagram, Monostable, and Astable Operations, Applications, IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

UNIT – III

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV

Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families Combinational Logic ICs – Specifications and Applications of TTL-74XX & Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT – V

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers. Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture,

2.6 COURSE PLAN:

Unit no	Topic	No of sessions planned	Mode of teaching BB/PPT/OHP/MM	Reference *
I	**OPERATIONAL AMPLIFIER**			
	Ideal & practical op-amp characteristica,DC & AC char	1	BB	A1,A2
	Features of IC 741 Op-amp	1	BB	A1,A2
	Inverting & Non-inverting Op-amps,.	1	**BB**	A1,A2
	Differential & Instrumentation amp	2	BB	A1,A2
	Schmitt trigger	1	BB	A1
	Integrator and differentiators	1	BB	A1
	Introduction to voltage regulators	1	BB	A1
	Three terminal voltage regulators	1	BB	A1
	Features of IC 723 regulator	1	BB	A1
	AC amplifiers	2	BB	A1
II	**OP-AMP, IC-555,IC-565 APPLICATIONS**			
	Introduction to Active filters	1	BB	A1
	Band pass,band reject,all pass filters	1	BB	A1
	Analysis of low pass	2	BB	A1
	high pass Butterworth filters	1	BB	A1
	Waveform Generators(square,triangular,sawtooth)	2	BB	A1
	IC 555 TIMER(functional diag)	1	BB	A1
	Monostable and Astable multivibrators	2	**BB**	A1
	1IC 565 Blk diag,	1	BB	A1
	Description of individual blocks	1	BB	A1
	Applications	1	BB	A1
III	**DATA CONVERTERS**			
	DAC techniques, different types of DAC'S	1	BB	A1,A2
	Weighted resistor DAC,R-2R Ladder DAC,	2	BB	A1
	Inverted type ADC	1	BB	A1
	Different types of ADC'S(parellel)	2	BB	A1
	comparator type ADC	1	BB	A1
	successive approximation ADC,	2	BB	A1

	counter type ADC	1	BB	A1
	Dual slope ADC,	1	BB	A1
	DAC and ADC specifications	1	BB	A1
IV	**DIGITAL INTEGRATED CIRCUITS**			
	Classifiction of IC'S,CMOS transmission gate	1	BB	A3
	comparision of Logic families,CMOS driving TTL	1	BB	A3
	combinational logic IC'S-specifications	1	BB	A3
	code converters,mux,demux	1	BB	A3
	encoders, decoders,	2	BB	A3

Unit no	Topic	No of sessions planned	Mode of teaching BB/PPT/OHP/MM	Reference *
	priority generators/checkers,	1	BB	A3
	parallel binary/adder subractor,	2	BB	A3
	LED & LCD decoders	2	BB	A3
	Magnitude comparators	2	BB	A3
V	**SEQUENTIAL LOGIC IC'S AND MEMORIES**			
	74XX Series IC'S	1	BB	A3
	CMOS 40XX series IC'S	1	BB	A3
	Flipflops types	2	BB	A3
	synchronous counters,decade counters,	1	BB	A3
	shift registers	1	BB	A3
	Memories, ROM ,	1	BB	A3
	RAM,SRAM,	1	BB	A3
	DRAM	1	BB	A3
	ROM & RAM architectures,	1	BB	A3
	types of ROMS &Applications	1	BB	A3

2.7 MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objective	Course Outcomes				
	a	b	c	d	e
I	S				
II	S	S			
III			H		
IV				H	S
V					S

S= Supportive H= Highly Related

2.8 MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcomes	Program Outcomes													
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
a	S													
b	S	S									S		S	S
c	S	S												
d		S					S				S		H	S
e	S		S		S		S				S		S	

S= Supportive H= Highly Related

2.9 QUESTION BANK

S NO	QUESTION	BloomsTaxonomy Level	Course Outcome
	UNIT-I **OPERATIONAL AMPLIFIER**		
1	Mention the advantages of integrated circuits.	Remember	1,2
2	write down the various processes used to fabricate IC's using silicon planar technology.	Analyze	1,2
3	What is the purpose of oxidation?	Analyze	1,2
4	Why aluminum is preferred for metallization?	Remember	1,2
5	Define an operational amplifier.	Analyze	1
6	Mention the characteristics of an ideal op-amp.	Analyze	1
7	Define input offset voltage	Remember	1
8	What are the applications of current sources?	Remember	1
9	Define sensitivity. Mention the advantages of Wilson current source	Remember	1,2

10	What is a current mirror? Explain the working of a wilder current source		
11	What is slew rate? Discuss the methods of improving slew rate.	Remember	1
12	What is an Active load? Explain the CE amplifier with active load	Remember	1
13	Explain pole zero compensation and frequency compensation in op-amp.	Analyze	1, 2
14	Define band gap reference? Explain in detail about the reference circuit		
15	Briefly explain the method of using constant current bias for increasing CMRR in differential?	Understand	1, 2
16	Explain the operation of a Schmitt trigger circuit		
17	Explain the working of full precision rectifier?		
18	Define ripple rejection with respect to voltage regulators	Analyze	1
	UNIT-II		
	OP-AMP, IC -555 & IC 565 APPLICATIONS		
1	Why active filters are preferred?	Remember	2
2	What is meant by cut off frequency of a high pass filter and how it is found out in a first order high pass filter	Understand	2
3	List the applications of 555 timer in monostable mode of operation	Remember	2
4	Define 555 IC?	Remember	2
5	List the basic blocks of IC 555 timer?	Remember	2
6	Define VCO.	Remember	2
7	What does u mean by PLL?	Understand	2
8	List the applications of 565 PLL	Apply	2
9	Define lock range.	Understand	2
10	Define capture range	Apply	2
11	Define pull-in time	Understand	2
	UNIT-III		
	DATA CONVERTERS		
1.	List the broad classification of ADCs	Remember	3
2.	List out the direct type ADCs	Understand	3
3.	List out some integrating type converters	Remember	3
4.	What is integrating type converter	Understand	3

5.	Explain in brief the principle of operation of successive Approximation ADC	Analyze	3
6.	What are the main advantages of integrating type ADCs	Understand	3
7.	What is the main drawback of a dual-slop ADC?	Remember	3
8	Define conversion time.	Remember	3
9.	Define accuracy of converter	Remember	3
10.	Explain in brief stability of a converter	Remember	3

UNIT-IV

DIGITAL INTERAGETED CIRCUITS

S.NO	QUESTION	BloomsTaxonomy Level	Course Outcome
1.	Explain how PROM, EPROM and EEPROM technologies differ from each other.	Analyze	10
2.	Design CMOS transistor circuit for 2-input AND gate.	Understand	4
3.	Explain sourcing current of TTL output?	Remember	4
4.	Which of the parameters decide the fan-out and how?	Understand	4
5.	Explain sinking current of TTL output?	Understand	4
6.	Explain the term Voltage levels for logic '1' & logic '0' with reference to TTL gate?	Understand	4
7.	Explain the DC Noise margin with reference to TTL gate?	Understand	4
8.	Explain Low-state unit load with reference to TTL gate?	Remember	4
9.	Explain High-state fan-out with reference to TTL gate?	Remember	4
10.	Explain the use of Package?	Remember	4

UNIT-V

SEQUNTIAL LOGIC ICS AND MEMORIES

1.	Define static RAM	Understand	5
2.	Define dynamic RAM	Understand	5
3.	Classify types of ROMs	Understand	5
4.	Applications of ROMS	Remember	5
5.	What is the difference between latch& Flip-Flop, Explain with logic diagram.	Remember	5
6.	Explain any one application of SR latch.	Understand	5

7.	What is race around condition? how it is avoided?	Remember	5
8.	How synchronous counters differ from asynchronous counters?	Understand	5
9.	List counter applications.	Understand	5
10.	State various applications of counters.	Remember	5

GROUP - II (LONG ANSWER QUESTIONS):

S. No	Question	BloomsTaxonomy Level	Course Outcome
	UNIT-I **OPERATIONAL AMPLIFIER**		
1.	With circuit diagram discuss the following applications of op-amp(Dec-03) (i) Voltage to current converter(ii)Precision rectifier	Evaluate	1,2
2.	Explain the operation of a Schmitt trigger circuit	Evaluate	1,2
3.	Explain the working of full precision rectifier	Evaluate	1,2
4.	Explain the internal structure of voltage regulator IC 723. Also draw a low voltage Regulator circuit using IC 723andexplain its operation.	Analyze	1,2
5.	Explain the following terms in an OP-AMP. Bias current	Evaluate	1,2
	(1) Thermal drift (2) Input offset voltage and current (3) Thermal drift		
6.	Explain the frequency compensation techniques of OP-AMP	Evaluate	1,2
7.	Draw the circuit of a symmetrical emitter coupled differential amplifier and derive for CMRR.	Evaluate	1,2
8.	Write a technical note on frequency response characteristics of differential amplifier. State the importance of frequency compensation	Analyze	1,2
9.	What is t instrumentation amplifier? What are the required parameters of an instrumentation amplifier? Explain the working of instrumentation amplifier with neat circuit diagram	Understand	1,2
10	Explain various DC and AC characteristics of an op.amp. Distinguish between ideal and practical characteristics	Remember	1,2

11	With circuit and waveforms explain the application of OPAMP as (1) Integrator (2) Voltage series Feedback Compensation	Evaluate	1,2
	UNIT-II **OP-AMP, IC -555 & IC 565 APPLICATIONS**		
1.	Design a second order low pass filter	Evaluate	4
2.	Draw the circuit of a 1st order Butterworth low pass filter and derive its transfer function.	Analyze	4
3.	Explain the functional block diagram of 555timer	Evaluate	4
4.	Explain working of PLL using suppropriate block diagram and explain any one application of the same	Evaluate	4
5.	Draw the block diagram of an Astable multivibrator using 555timer and derive an expression for its frequency of oscillation	Evaluate	4,5
6.	Draw the block diagram of monostable multivibrator using 555timer and derive an expression for its frequency of oscillation	Evaluate	4,5
7.	write short notes on i) capture range ii) Lock in range iii) Pull in time	Analyze	4,5
8.	Explain about power amplifier and video amplifier	Analyze	4,5
9.	Draw the circuit of a 1st order Butterworth high pass filter and derive its transfer function	Analyze	4,5
10.	Explain Band pass ,band reject and all pass filters	Analyze	4,5
	UNIT-III **DATA CONVERTERS**		
1.	Explain the working of a Weighted resistor D/A converter	Evaluate	8
2.	Explain successive approximation A/D converter	Understand	8
3.	Explain the working of a dual slope A/D converter	Remember	8
4.	Explain the working of a Voltage to Time converter	Understand	8
5.	Explain the working of a counter type A/D converter and state it's important feature	Understand	8
6.	Explain the working of a Voltage to Frequency converter	Understand	8
7.	Explain the working of a Voltage to Frequency converter	Analyze	8
8.	With neat diagram, explain the working principle of R-2R ladder type DAC	Analyze	7,8
9.	Explain the following application of operational amplifier. (1) peak detector (2) Functions of flash type A/D converter.	Understand	7,8

10.	With neat diagram, explain the working principle of Weighted resistor DAC	Understand	7,8
	UNIT-IV **DIGITAL INTERAGETED CIRCUITS**		
1.	(a) Explain the following terms with reference to CMOS logic. i. Logic Levels ii. Noise margin iii. Power supply rails iv. Propagation delay (b) What is the difference between transmission time and propagation delay? Ex- plain these two parameters with reference to CMOS logic.	Apply	10
2.	(a) Draw the circuit diagram of two-input 10K ECL OR gate and explain its operation. (b) List out different categories of characteristics in a TTL data sheet. Discuss electrical and switching characteristics of 74LS00.	Analyze	10
3.	(a) Discuss the steps in VHDL design flow. (b) Explain the difference in program structure of VHDL and any other procedural language. Give an example	Understand	10
4.	(a) Design CMOS transistor circuit for 2-input AND gate. Explain the circuit with the help of function table? (b) Draw the resistive model of a CMOS inverter circuit and explain its behavior for LOW and HIGH outputs.	Remember	10
5.	(a) Design a three input NAND gate using diode logic and a transistor inverter?Analyze the circuit with the help of transfer characteristics. (b) Explain sinking current and sourcing current of TTL output? Which of the parameters decide the fan-out and how?	Evaluate	10
6.	(a) Realize the logic function performed by 74×381 with ROM. (b) How many ROM bits are required to build a 16-bit adder/subtractor with mode control, carry input, carry output and two's complement overflow out- put. Show the block schematic with all inputs and outputs.	Evaluate	10
7.	Explain how to estimate sinking current for low output and sourcing current for high output of CMOS gate.	Evaluate	10
8.	Explain the necessity of two-dimensional decoding mechanism in memories.	Apply	10
9.	With the help of timing waveforms, explain read and write operations of SRAM.	Remember	10
10.	Draw MOS transistor memory cell in ROM and explain the operation.	Apply	10
	UNIT-V **SEQUNTIAL LOGIC ICS AND MEMORIES**		

1.	How many ROM bits are required to build a 16-bit adder/subtractor with mode control, carry input, carry output and two's complement overflow out- put. Show the block schematic with all inputs and outputs.	Understand	9
2.	Draw the basic cell structure of Dynamic RAM. What is the necessity of	Analyze	9
	refresh cycle? Explain the timing requirements of refresh operation.		
3.	Discuss in detail ROM access mechanism with the help of timing waveforms.	Analyze	9
4.	Draw the logic diagram of 74×163 binary counter and explain its operation.	Understand	10
5.	Design a modulo-100 counter using two 74×163 binary counters?	Apply	10
6.	Design a Modulo-12 ripple counter using 74×74?	Apply	10
7.	Discuss how PROM,EPROM, EEPROM technologies differ from each other?	Analyze	10
8.	Differentiate between ripple counter and synchronous counter? Design a 4-bit counter in both modes and estimate the propagation delay.	Remember	10
9.	Design a modulo-88 counter using 74X163 Ics.	Understand	

2.10 QUESTIONS:

S.No	QUESTIONS	BloomsTaxonomy Level	Course Outcome
	UNIT-I **OPERATIONAL AMPLIFIER**		
1.	An op-amp with a slew rate = 0.5V/μS is used as an inverting amplifier to obtain a gain of 100. The voltage gain Vs frequency characteristic of the amplifier is flat up to 10 KHz. Determine i. The maximum peak-to-peak input signal that can be applied without any distortion to the output ii. The maximum frequency of the input signal to obtain a sine wave output of 2V peak	Evaluate	1,2
2.	Design a Schmitt trigger for UTP =0.5v and LTP=-0.5V	Analyze	1,2
3.	Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 KHz. If a sine wave of 1V peak at 1000 Hz is applied to this differentiator draw the output waveforms	Remember	1,2
4.	Determine the output voltage of the differential amplifier having input voltages V1=1mV and V2=2 mV. The amplifier has a differential gain of 5000 and CMRR 1000	Remember	1,2

5.	Draw the output waveform for a sine wave of1vpeak at 100Hzapplied to the differentiator	Remember	1,2
6.	Design an op-amp differentiator that will differentiate an Input signal with fmax = 100Hz	Explain	1,2
7.	Determine the input impedance of 741 operational amplifier employed as voltage follower having Av=50,000 and Ri= 0.3MEGA OHM	Remember	1,2

UNIT-II

OP-AMP, IC -555 & IC 565 APPLICATIONS

S.No	QUESTIONS	BloomsTaxonomy Level	Course Outcome
1.	Design an Astable Multivibrator using 555 Timer to produce 1Khz square wave form for duty cycle=0.50	Evaluate	3,4
2.	Design and draw the wave forms of 1KHZ square waveform generator	Evaluate	3,4
	using555 Timer for duty cycle i)D=25% ii) D=50%		
3.	Design a 555 based square wave generator to produce an asymmetrical square wave of 2 KHz. If Vcc=12V, draw the voltage curve across the timing capacitor and output waveform.	Analyze	3,4
4.	Draw the schematic diagram of an all pass filter and determine the phase shift φ between the input and output at f = 2kHz	Analyze	3,4

UNIT-III

DATA CONVERTERS

1.	A dual slope ADC uses a16-bitcounteranda 4MHzclock rate. The maximum input voltage is+10v. The maximum integrator output voltage should be-8v when the counter has cycled through 2n counts. The capacitor used in the integrator is 0.1 μF Find the value of the resistor R of the integrator.	Apply	7,8
2.	Find the voltage at all nodes 0,1,2,…. And at the output of a 5-bit R-2R ladder DAC. The least Significant bit is 1 and all other bits are equal to 0. Assume VR = -10V and R=10KO.	Remember	7,8
3.	A dual slope ADC uses an 18 bit counter with a 5MHz clock. The maximum integrator input voltage in +12V and maximum integrator output voltage at 2n count is -10V. If R=100KO, find the size of the capacitor to be used for integrator	Understand	7,8
4.	Calculate basic step of 9 bit DAC is 10.3 mV. If 000000000 represents 0V, what output produced if the input is 101101111	Apply	7,8

5.	Calculate the values of the LSB,MSB and full scale output for an 8 bit DAC for the 0 to 10V range	Apply	7,8
6.	An ADC converter has a binary input of 0010 and an analog output of 20mv. What is the resolution	Apply	7,8
7.	How many levels are possible in a two bit DAC what is its resolution if the output range is 0 to 3V	Apply	7,8
8.	Calculate what is the conversion time of a 10 bit successive approximation A/D converter if its 6.85V	Remember	7
9.	A dual slope uses a 16 bit counter and a 4 MHz clock rate. The maximum input voltage is +10V. The maximum integrator output voltage should be -8V when the counter has cycled through 2n counts. The capacitor used in the integrator is 0.1µf. Find the value of the resistor R of the integrator	Apply	7
10	Analyze the fall time of CMOS inverter output with RL = 100, VL = 2.5V and CL=10PF. Assume VL as stable state voltage.	Apply	7
11	Design the logic circuit and write a data-flow style VHDL program for the following function .F (R) = A,B,C,D (1, 4, 5, 7, 9, 13, 15)	Analyze	7,8
12	A simple floating-point encoder converts 16-bit fixed-point data using four high order bits beginning with MSB. Design the logic circuit and write VHDL data-flow program.	Remember	7,8
13	Design a 4-bit binary synchronous counter using 74×74. Write VHDL program for this logic. Using data flow style	Analyze	7,8
14	Draw the logic diagram of 74×163 binary counter and explain its operation.	Remember	7,8
15	Design a modulo-100 counter using two 74×163 binary counters?	Understand	7,8
16	A single pull-up resistor to +5V is used to provide a constant-1 logic source to 15 different 74LS00 inputs. What is the maximum value of this resistor?	Analyze	7,8
S.No	**QUESTIONS**	**BloomsTaxonomy Level**	**Course Outcome**
	How much high state DC noise margin can be provided in this case?		
UNIT-IV			
DIGITAL INTERAGETED CIRCUITS			
1.	Determine the ROM size needed to realize the logic function performed by 74×153 and 74×139.	Apply	9,10
2.	Realize the logic function performed by 74×381 with ROM.	Evaluate	9
3.	Explain the internal structure of 64K×1 DRAM with the help of timing diagrams.	Apply	9

4.	Explain the necessity of two-dimensional decoding mechanism in memories. Draw MOS transistor memory cell in ROM and explain the operation.	Apply	9

1. LDICA SHORT ANSWER QUESTIONS

UNIT-I
OPERATIONAL AMPLIFIER

1	Mention the advantages of integrated circuits.
2	write down the various processes used to fabricate IC's using silicon planar technology.
3	What is the purpose of oxidation?
4	Why aluminum is preferred for metallization?
5	Define an operational amplifier.
6	Mention the characteristics of an ideal op-amp.
7	Define input offset voltage
8	What are the applications of current sources?
9	Define sensitivity. Mention the advantages of Wilson current source
10	What is a current mirror? Explain the working of a wilder current source
11	What is slew rate? Discuss the methods of improving slew rate.
12	What is an Active load? Explain the CE amplifier with active load
13	Explain pole zero compensation and frequency compensation in op-amp.
14	Define band gap reference? Explain in detail about the reference circuit
15	Briefly explain the method of using constant current bias for increasing CMRR in differential?
16	Explain the operation of a Schmitt trigger circuit
17	Explain the working of full precision rectifier?
18	Define ripple rejection with respect to voltage regulators

Unit II

OP-AMP, IC -555 & IC 565 APPLICATIONS:

1	Why active filters are preferred?
2	What is meant by cut off frequency of a high pass filter and how it is found out in a first order high pass filter
3	List the applications of 555 timer in monostable mode of operation
4	Define 555 IC?
5	List the basic blocks of IC 555 timer?
6	Define VCO.
7	What does u mean by PLL?
8	List the applications of 565 PLL
9	Define lock range.
10	Define capture range
11	Define pull-in time

DATA CONVERTERS CIRCUITS:

1.	List the broad classification of ADCs
2.	List out the direct type ADCs
3.	List out some integrating type converters
4.	What is integrating type converter
5.	Explain in brief the principle of operation of successive Approximation ADC
6.	What are the main advantages of integrating type ADCs
7.	What is the main drawback of a dual-slop ADC?
8	Define conversion time.
9.	Define accuracy of converter
10.	Explain in brief stability of a converter

2.11 ASSIGNMENT QUESTIONS:

1.	Explain how PROM, EPROM and EEPROM technologies differ from each other.
2.	Design CMOS transistor circuit for 2-input AND gate.
3.	Explain sourcing current of TTL output?
4.	Which of the parameters decide the fan-out and how?
5.	Explain sinking current of TTL output?
6.	Explain the term Voltage levels for logic '1' & logic '0' with reference to TTL gate?
7.	Explain the DC Noise margin with reference to TTL gate?
8.	Explain Low-state unit load with reference to TTL gate?
9.	Explain High-state fan-out with reference to TTL gate?
10.	Explain the use of Package?

1. Explain briefly the difference between digital and linear IC's.
2. What is the difference between monolithic and hybrid IC's?
3. What is the major difference between SSI, MSI, LSI, VLSI, ULSI & GSI?
4. What is the major difference between the power supply requirements of linear and digital IC's?
5. What information is contained in the typical op-amp data sheet?
6. Explain why proper interpretation of op-amp data sheet is important.
7. List the parameters that should be considered for ac and dc applications
8. What are the three factors that effect the electrical parameters of an op amp?
9. Explain the difference between constant current bias and current mirror.
10. Why FET opamps are better than BJT op-amps?
11. What is the major functional block of an op-amp.
12. Differentiate the inverting, non inverting modes of an op-amp
13. Write a short note on stability of an op-amp
14. Write short notes on slew rate of an op-amp
15. Write short notes on frequency response of an op-amp

Part 2

1. What are the major advantages and disadvantage of a single supply ac amplifier?
2. Explain briefly the advantages of the differential input and output amplifier.

3. If a 741ic is configured as an i – v converter. What is the lowest5 value of current that may be measured?
4. Explain the difference between ac and dc voltage follower
5. Explain the difference between integrator and differentiator and give one application of each.
6. What is the difference between basic comparator and Schmitt trigger?
7. What is sample and hold and why is it needed?
8. Explain briefly why integration is proffered over differentiation in analog computers
9. Indicate how two analog voltages are multiplied using log and anti log amplifiers
10. What are the limitations of ordinary op-amp differentiator?
11. write short notes on instrumentation amplifier
12. Differentiate between I-V and V-I converters.
13. Differentiate between multipliers and dividers.
14. Write short notes on zero crossing detector

UNIT II:

Part 1

1. Define a filter and how are filters classified?
2. Write short notes on active filters
3. Write short notes on passive filters
4. Differentiate analog and digital filters
5. Differentiate audio and radio frequency filters
6. Write short notes on band pass filters
7. List the commonly used filters?
8. What is a pass band and a stop band for a filter?
9. What are the advantages of active filters over passive ones?
10. What is all pass filter? Where and why is it needed?
11. What is the difference between the saw tooth wave and the triangular wave?
12. What is VCO? Give two applications of a VCO?
13. What are the important of band pass filter?
14. How to get a notch filter from a band pass filter?
15. List out the advantages and disadvantages of active and passive filters

Part2

1. List out the important features of 555 timer
2. What are the two basic modes in which the 555 timer operates.
3. What must the relationship be between the pulsewidth tp and the time period t of the input trigger signal if the 555 is to be used as a divider by 4 net works
4. Briefly explain the internal structure of 555 timer
5. why 555 timer is called as 555IC
6. Explain the operation of comparators used in 555.
7. What is the role of transistors in 555 IC.
8. List one application each in which the 555 can be used as a monostable and astable multivibrator
9. List the basic building blocks of the discrete PLL.
10. what is the use of VCO in PLL.
11. What is the major difference between digital and analog plls?
12. What is the major difference between small signal and power amplifiers?
13. What is voltage regulator and list out the different voltage regulators.
14. What are the advantages of adjustable voltage regulator over fixed voltage regulator?
15. What is voltage refrence and why is it needed?

UNIT III:

1. Classify DACS on the basis of their outputs
2. Name the essential parts of a DAC
3. Describe the various types of electronic switches used in D/A converter
4. How many resistors are required in 12-bit weighted resistor DAC?
5. Why is an inverted R-2R ladder network DAC better than R-2R ladder DAC.
6. List the various A/D conversions techniques
7. Which is fastest ADC and why?
8. Explain how dual slope ADC provides noise rejection
9. Explain the important specifications of D/A and A/D converters
10. Give the conversion time for different types of ADC converters
11. What is the need of ADC converters

12. What is the need of DAC converters
13. Differentiate ADC and DAC converters
14. Explain the operation of ADC and DAC in computers
15. For the input to a processor which type of converter is used and why?

UNIT IV

1. Explain the following terms with reference to ttl gate?
   i. Logic levels.
   ii. Dc noise margin.
   iii. Low-state unit load. Iv. High-state fan out.
2. List out ttl families and compare them with reference to propagation delay, power consumption, speed power
   product and low level input current?
3. List out standard ttl characteristics and explain them briefly with necessary diagrams.
4. Design cmos transistor circuit for 2-input and gate? With the help of function table explain the circuit?
5. What is meant by tri-state logic ? Draw the circuit of tri-state ttl logic and explain its functions.
6. Compare different logic families and mention their advantages and disadvantages?
7. List out ttl families and compare them with reference to propagation delay, power consumption, speedpower product and low level input current?
8. List out standard ttl characteristics and explain them briefly with necessary diagrams.
9. Design cmos transistor circuit for 2-input and gate? With the help of function table explain the circuit?
10. Design a 4-input cmos or-and-invert gate? Explain the circuit with the help of logic diagram and function table?
11. Compare various logic families
12. Write short notes on TTL
13. Write short notes on MOS technologies
14. Write short notes on ECL
15. Differentiate between ECL and TTL

Part2

1. Design a 32:1 multiplexer using two 16:1 multiplexer ic's
2. Design a full adder using 8:1 mux ics. Compare the ic package count with the nand-nand realization
3. Design a 4-bit adder/subtractor circuit with add/sub control line
4. Design a parity generator circuit to check odd or even parity
5. Describe encoding and give an example
6. Describe decoding and give an example.
7. Discuss the basic structure of parallel binary adder. Show how two 74ls83a can be connected to form an 8-bit parallel adder.
8. Discuss the basic structure of parallel binary adder. Use 74ls283 adders to implement 12 bit parallel adder.
9. What does a comparator do. Use 74hc85 comparators to compare the magnitudes of two 8-bit numbers. Show the comparators with proper connections.
10. What is the basic function of decoder. Determine the logic required to decode the binary number 1011 by producing a high level on the output.
11. Write short notes on mux
12. Write short notes on demux
13. List out the different types of encoders
14. List out the different types of decoders
15. What is code converter. List different types of code converters.

UNIT V

1. Design a 16x2 cam using two 8x2 cam chips
2. Explain linear selection addressing and coincident selection addressing
3. It is desired to find the max. Valued number stored in a cam of size 16x8. Suggest a suitable method
4. Suggest a suitable arrangement for expanding the bit capacity of ccd's
5. Suggest a suitable arrangement for expanding the word length of ccd's
6. It is desired to design a memory system for storing information which is not already stored in it. this type of memory is known as learning memory. Will you prefer to use ram or cam

7. Discuss and compare the s-r, d and j-k flip flop.
8. Explain the operation of edge triggered d flip flop and draw its output waveforms.
9. How does a j-k flip flop differ from an s-r flip flop in its basic operation?
10. Discuss about the flip flop operating characteristics.
11. Write short notes on counters
12. What do you mean decade counters.
13. Write short notes on registers. What is the need of shift register.
14. Write down the application of counters

2.12 OBJECTIVE QUESTIONS :

1. Which is not the internal circuit of operational amplifier?
a) Differential amplifier
b) Level translator
c) Output driver
d) Clamper

2. The purpose of level shifter in Op-amp internal circuit is to
a) Adjust DC voltage
b) Increase impedance
c) Provide high gain
d) Decrease input resistance

3. How a symmetrical swing is obtained at the output of Op-amp
a) Providing amplifier with negative supply voltage
b) Providing amplifier with positive voltage
c) Providing amplifier with positive& negative voltage
d) None of the mentioned

4. What is the purpose of differential amplifier stage in internal circuit of Op-amp?
a) Low gain to differential mode signal
b) Cancel difference mode signal
c) Low gain to common mode signal
d) Cancel common mode signal

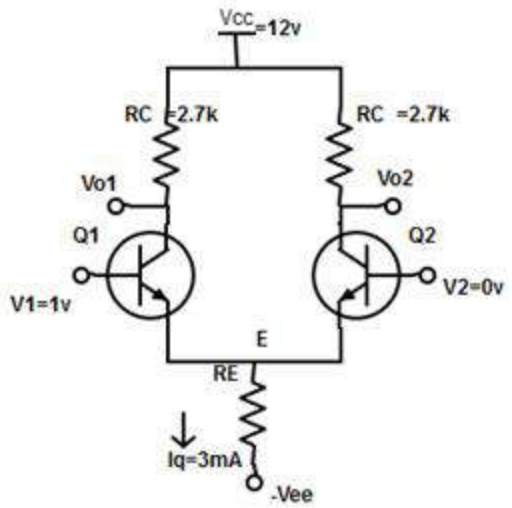
5. Which of the following is not preferred for input stage of Op-amp?
a) Dual Input Balanced Output
b) Differential Input Single ended Output
c) Cascaded DC amplifier

d) Single Input Differential Output

6. What will be the emitter current in a differential amplifier, where both the transistor are biased and matched? (Assume current to be I_Q)

a) $I_E = I_Q/2$
b) $I_E = I_Q$
c) $I_E = (I_Q)^2/2$
d) $I_E = (I_Q)^2$

7. From the circuit, determine the output voltage (Assume $\alpha_F=1$)



a) $V_{O1}=3.9v$, $V_{O2}=12v$
b) $V_{O1}=12v$, $V_{O2}=3.9v$
c) $V_{O1}=12v$, $V_{O2}=0v$
d) $V_{O1}=3.9v$, $V_{O2}=-3.9v$

8. At what condition differential amplifier function as a switch

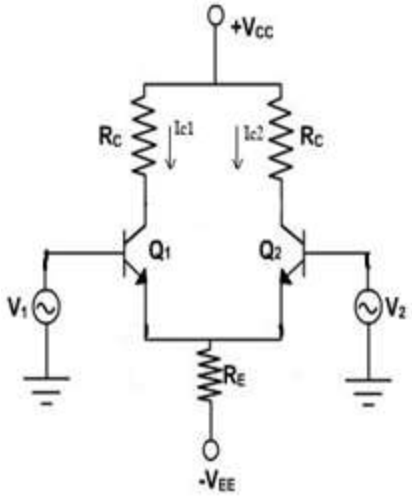
a) $4V_T < V_d < -4V_T$
b) $-2V_T \leq V_d \leq 2V_T$
c) $0 \leq V_d < -4V_T$
d) $0 \leq V_d \leq 2V_T$

9. For $V_d > \pm 4V_T$, the function of differential amplifier will be

a) Switch
b) Limiter
c) Automatic gain control
d) Linear Amplifier

10. Change in value of common mode input signal in differential pair amplifier make
a) Change in voltage across collector
b) Slight change in collector voltage
c) Collector voltage decreases to zero
d) None of the mentioned

11. Find collector current I_{C2}, given input voltages are V_1=2.078v & V_2=2.06v and total current I_Q=2.4mA. (Assume α=1)



a) 0.8mA
b) 1.6mA
c) 0.08mA
d) 0.16mA

12. A differential amplifier has a transistor with β_0= 100, is biased at I_{CQ} = 0.48mA. Determine the value of CMRR and A_{CM}, if RE =7.89kΩ and RC = 5kΩ.
a) 49.54 db
b) 49.65 d
c) 49.77 db
d) 49.60 db

13. What is the best choice of IC package used for experimental purpose?
a) DIP package
b) Metal can package
c) Flat pack
d) Transistor pack

14. What is the general information specified in ordering an IC?
a) Temperature range
b) Device type
c) Package type
d) All of the mentioned

15. Find the ordering information for µA741TC.
a) Sprague 741 DIP with Industrial temperature range
b) Intersil 741 DIP with commercial temperature range
c) Fairchilds 741 DIP with commercial temperature range
d) Texas instrument 741 metal can with Industrial temperature range

16. How a Motorola IC with plastic DIP and commercial temperature range is ordered?
a) ICLxxxP -> 0^o to 75^oc
b) CAxxE -> -55^o to $+125^o$c
c) LMxxxxA -> -40^o to$+85^o$c
d) MCxxxP -> 0^o to 70^oc

17. What does the 1-2-3 numbering system used in National Semiconductor IC denotes
a) Validity in years
b) Temperature range
c) Package type
d) Ordering information

18. How does a industrial temperature range device in National Semiconductor IC is represented?
a) LM305
b) LM101
c) LM201
d) All of the mentioned

19. Dual-In-Line pack is considered to be suitable for mounting because,
a) Easy to handle
b) Fits mounting hardware
c) Inexpensive
d) All of the mentioned

20. What is the use of notch and dot in DIP ICs?
a) Determine the pin configuration
b) Designed to represent device type
c) Represent property of IC
d) Find the pin number

21. How an eight pin Dual-In-Line Package is shortly named
a) 8p DIP
b) Maxi DIP
c) Mini DIP
d) ES DIP

22. Which is the most striking feature in monolithic integrated circuit transistor?
a) Collector contact is present at the bottom of IC

b) Collector contact is present at the top of IC

c) Collector contact is absent
d) Collector contact is present on one of the sides of IC

23. Why monolithic IC transistor is preferred over discrete planar epitaxial transistor?
a) Due to structural difference
b) Increase in V_{CE} (sat) and collector series resistor
c) Improvement in circuit performance
d) All of the mentioned

24. Which of the following transistor has the limitation, due to the requirement of additional fabrication steps and design consideration?
a) Vertical pnp transistor
b) Lateral pnp transistor
c) Triple diffused pnp transistor
d) Substrate pnp transistor

26. The 'buried layer' reduces collector series resistance by providing,
a) A low resistivity current path from n-type layer to n^+ contact layer
b) A low resistivity current path from p-type layer to n^+ contact layer
c) A high resistivity current path from n-type layer to n^+ contact layer
d) A high resistivity current path from p-type layer to n^+ contact layer

27. At what potential, the substrate of a vertical pnp transistor should be kept to attain good isolation?
a) Same potential
b) Positive potential
c) Different potential
d) Negative potential

28. Which method is used in the fabrication of pnp transistor?
a) Vertical substrate pnp
b) Triple diffused pnp
c) Lateral pnp
d) All of the mentioned

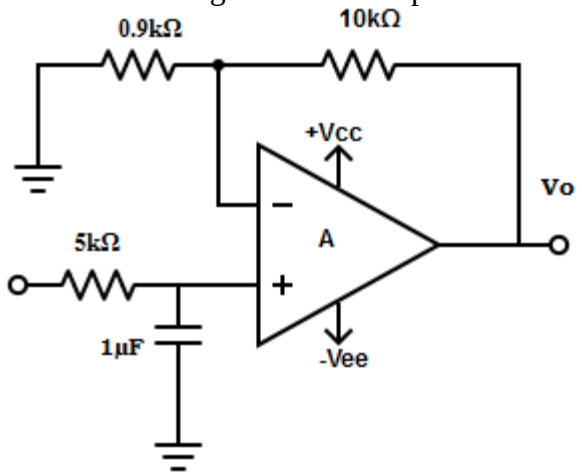
29. The diffusion of collector impurities in npn transistor should be small because,
a) No additional diffusion or masking steps required
b) Bandwidth is controlled by lateral diffusion of p-type impurity
c) Collector need not be kept at negative potential
d) None of the mentioned

30. The advantage of Multi-emitter transistor is
a) To reduce fabrication steps

b) To save chip area
c) To lower design consideration
d) To provide linear output

31. Which transistor is best suitable to achieve very fast switching in digital circuits?
a) Lateral pnp transistor
b) Schottky transistor
c) Multi-emitter transistor
d) NPN transistor

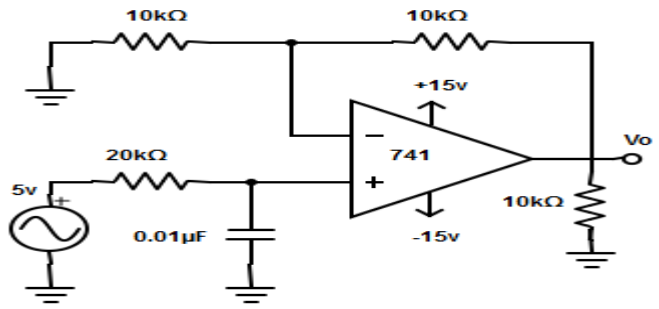
32. Find the voltage across the capacitor in the given circuit



a) $V_O = V_{in}/(1+0.0314jf)$
b) $V_O = V_{in} \times (1+0.0314jf)$
c) $V_O = V_{in}+0.0314jf/(1+jf)$
d) None of the mentioned
View Answer

33. Find the complex equation for the gain of the first order low pass butterworth filter as a function of frequency.
a) $A_F/[1+j(f/f_H)]$.
b) $A_F/\sqrt{[1+j(f/f_H)^2]}$.
c) $A_F \times [1+j(f/f_H)]$.
d) None of the mentioned

34. Compute the pass band gain and high cut-off frequency for the first order high pass filter.



a) A_F=11, f_H=796.18Hz
b) A_F=10, f_H=796.18Hz
c) A_F=2, f_H=796.18Hz
d) A_F=3, f_H=796.18Hz

35. Match the gain of the filter with the frequencies in the low pass filter

Frequency	Gain of the filter
1. $f < f_H$	i. $V_O/V_{in} \cong A_F/\sqrt{2}$
2. $f=f_H$	ii. $V_O/V_{in} \leq A_F$
3. $f>f_H$	iii. $V_O/V_{in} \cong A_F$

a)1-i,2-ii,3-iii
b)1-ii,2-iii,3-i
c)1-iii,2-ii,3-i
d)1-iii,2-i,3-ii

36. Determine the gain of the first order low pass filter if the phase angle is 59.77^o and the pass band gain is 7.
a) 3.5
b) 7
c) 12
d) 1.71

37. In a low pass butterworth filter, the condition at which $f=f_H$ is called
a) Cut-off frequency
b) Break frequency
c) Corner frequency
d) All of the mentioned

36. Find the High cut-off frequency if the pass band gain of a filter is 10.
a) 70.7Hz

b) 7.07kHz
c) 7.07Hz
d) 707Hz

37. To change the high cutoff frequency of a filter. It is multiplied by R or C by a ratio of original cut-off frequency known as
a) Gain scaling
b) Frequency scaling
c) Magnitude scaling
d) Phase scaling

38. What makes the output voltage equals to zero in practical op-amp?
a) Input offset voltage
b) Output offset voltage
c) Offset minimizing voltage
d) Error voltage

39. What happens due to mismatch between two input terminals in an op-amp?
a) Input offset voltage
b) Output offset voltage
c) Bothe the input and output offset voltage
d) None of the mentioned

40. Define polarity of the output offset voltage in a practical op-amp?
a) Positive polarity
b) Negative polarity
c) Positive or negative polarity
d) None of the mentioned
41. The input offset voltage of 741 op-amp has an absolute maximum value of 6mv, which means
a) Minimum difference between input terminals in 741 op-amp can be large as 6mv DC
b) Minimum difference between input terminals in 741 op-amp can be large as 6mv AC
c) Maximum difference between input terminals in 741 op-amp can be large as 6mv DC
d) Maximum difference between input terminals in 741 op-amp can be large as 6mv AC

42. Input bias current is defined as
a) Average of two input bias current
b) Summing of two input bias current
c) Difference of two input bias current
d) Product of two input bias current

43. Although the value of input bias current is very small, it causes
a) Output voltage
b) Input offset voltage
c) Output offset voltage
d) All of the mentioned

44. The formula for output offset voltage of an op-amp due to input bias current
a) $V_{OIB}= R_F*I_B$
b) $V_{OIB}= (R_F+R_1)/I_B$
c) $V_{OIB}= (1+R_F)*I_B$
d) $V_{OIB}= [1+(R_F/R_1)]*I_B$

45.Which factor affects the power supply voltages in amplifier?
a) Poor regulation and filtering
b) Resistive network connected to amplifier

c) Change in temperature

d) All of the mentioned

46. Change in the input bias current does not affect?

a) Input offset voltage

b) Output offset voltage

c) Input offset current

d) Output offset current

47. A supply voltage rejection ratio of 15µv/v is given for an op-amp. Find its equivalent value in decibels

a) 74db

b) 77dB

c) 76.48dB

d) 76dB

48. When does the op-amp perform better?

a) Low value of SVRR in µV/V

b) High value if SVRR in µV/V

c) Low value of SVRR in dB

d) High value of SVRR in dB

49.How an AC amplifier can be powered by a single supply voltage, produces voltage swing?

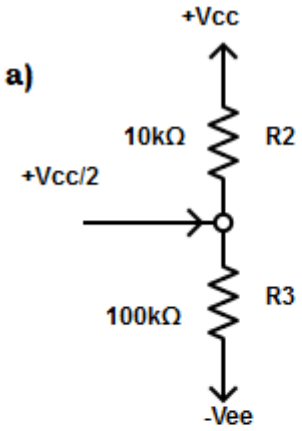
a) By inserting a voltage divider at the inverting input

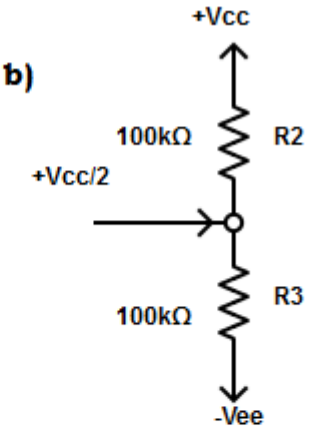
b) By inserting a voltage divider at the non-inverting input

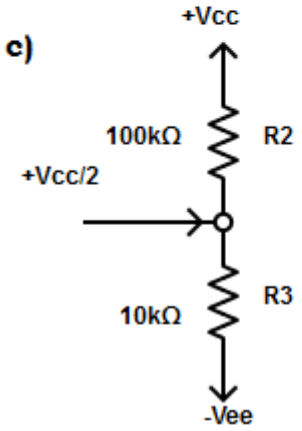
c) By inserting a voltage divider at the output

d) By inserting a voltage divider at the feedback circuit

50. Given below are the circuits connected to the non-inverting input terminal of AC amplifier. Choose the circuit which produces

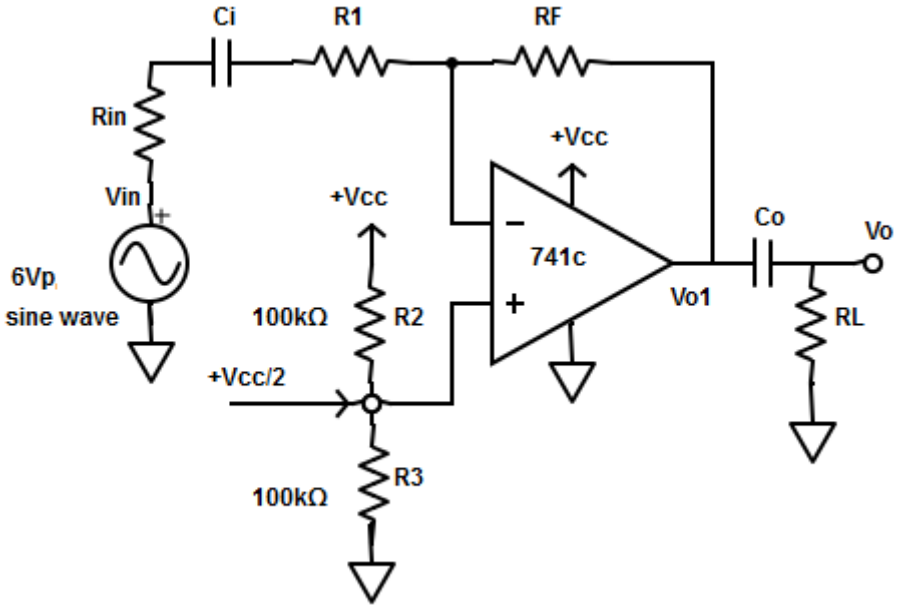


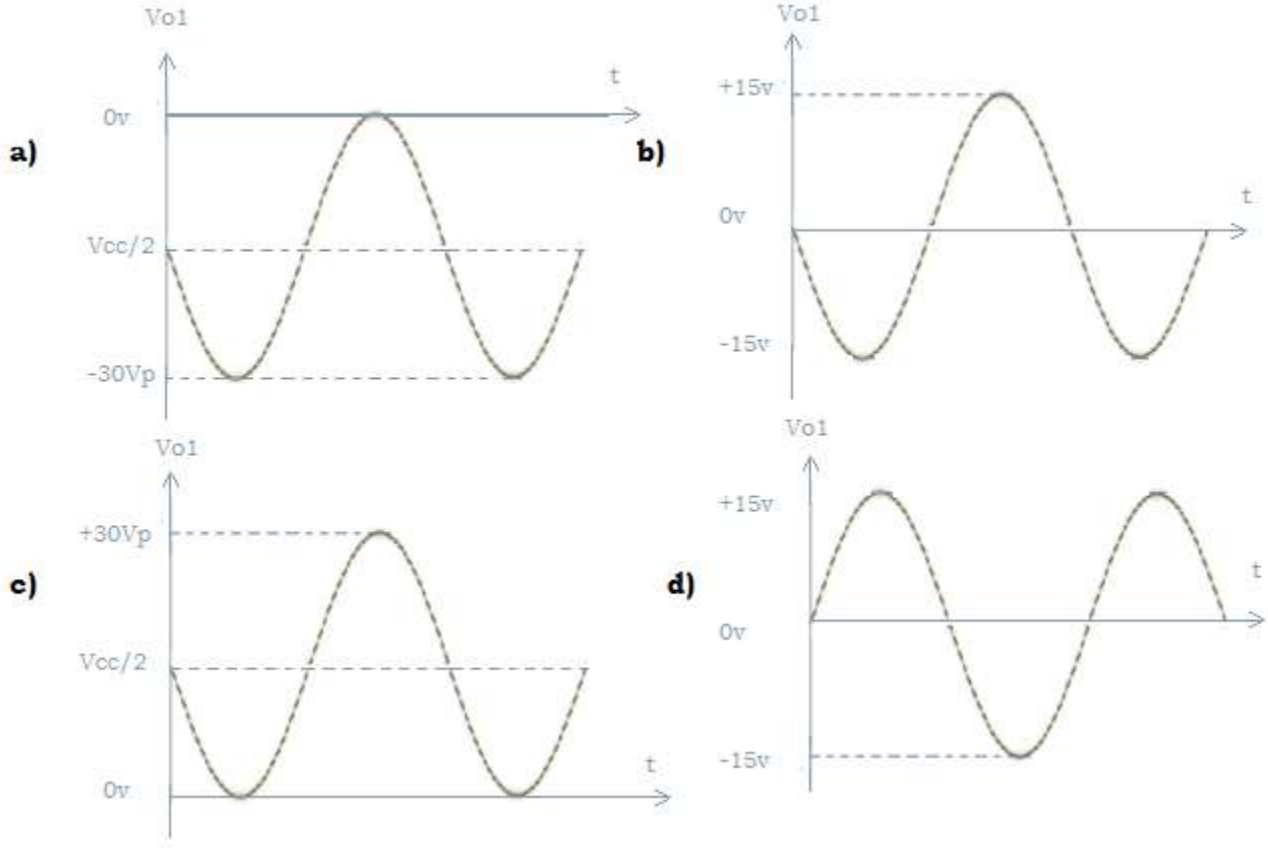




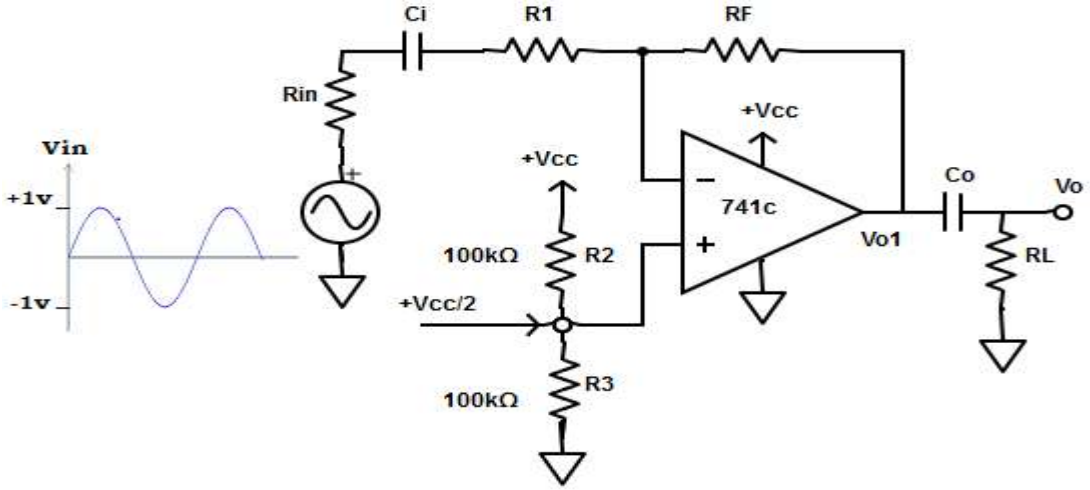
d) None of the mentioned

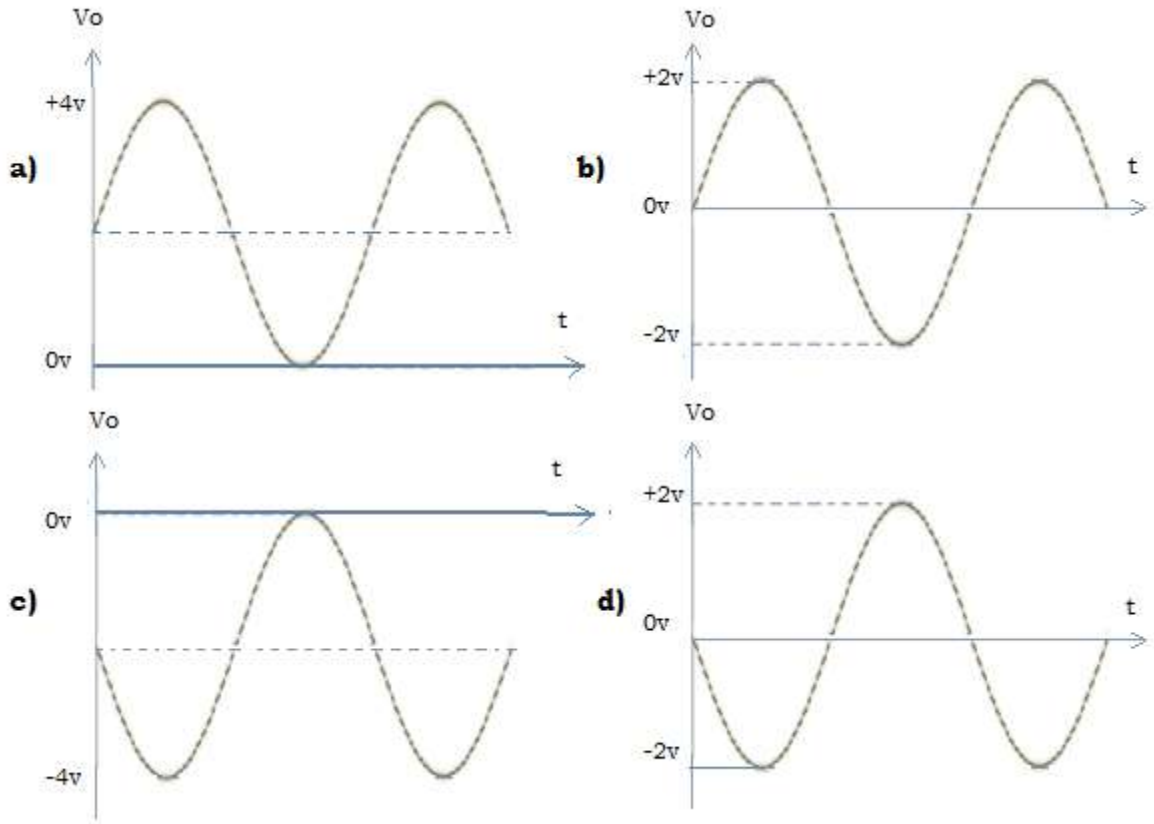
51. What is the output waveform at the point V_{O1} in the given circuit? (Take R_1=1kΩ and R_F=5kΩ)


Ci
R1
RF
Rin
Vin
6Vp
sine wave
+Vcc
+Vcc
741c
Co
Vo
Vo1
RL
100kΩ
R2
+Vcc/2
100kΩ
R3


a)
Vo1
t
0v
Vcc/2
-30Vp
b)
Vo1
+15v
0v
-15v
t
c)
Vo1
+30Vp
Vcc/2
0v
t
d)
Vo1
+15v
0v
-15v
t

52. The input waveform of an AC non-inverting amplifier with single supply is given below. Find the output waveform?



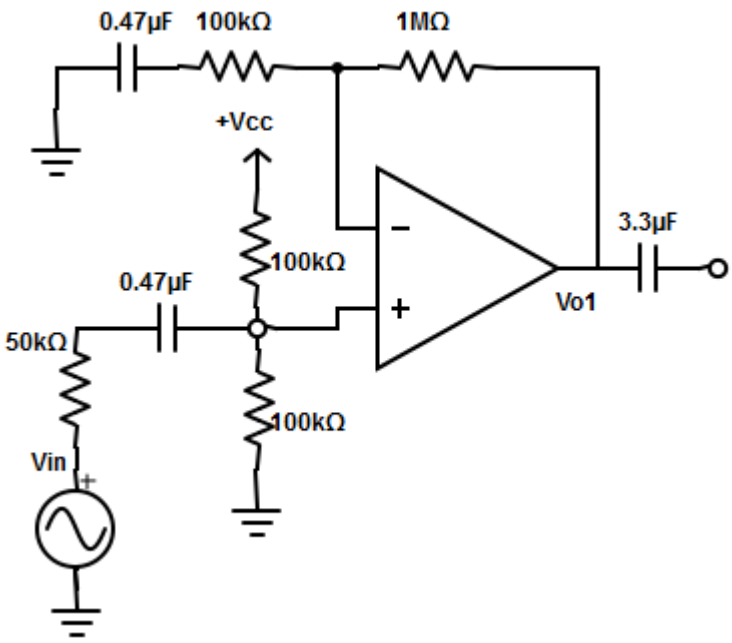


53. Find the maximum output voltage swing of an AC inverting amplifier using op-amp 741C?

a) $+15V_{pp}$ b) $\pm 15V_{pp}$

c) $\pm 13V_{pp}$ d) $+13V_{pp}$

54. Determine the lower cut-off frequency of the circuit.



a) 21.3Hz
b) 12.15Hz
c) 1.35Hz
d) None of the mentioned

55. In differential op-amp configuration a subtractor is called as

a) Summing amplifier

b) Difference amplifier

c) Scaling amplifier

d) All of the mentioned

56.How are the square wave output generated in op-amp?

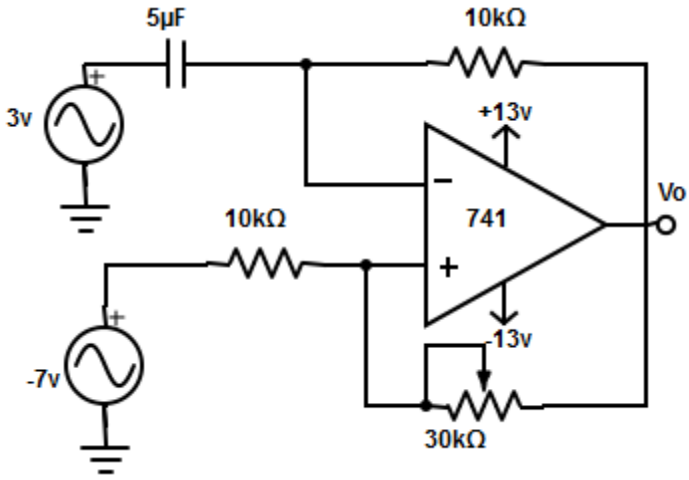
a) Op-amp is forced to operate in the positive saturation region

b) Op-amp is forced to operate in the negative saturation region

c) Op-amp is forced to operate between positive and negative saturation region

d) None of the mentioned

57. The following circuit represents a square wave generator. Determine its output voltage



a) -13 v

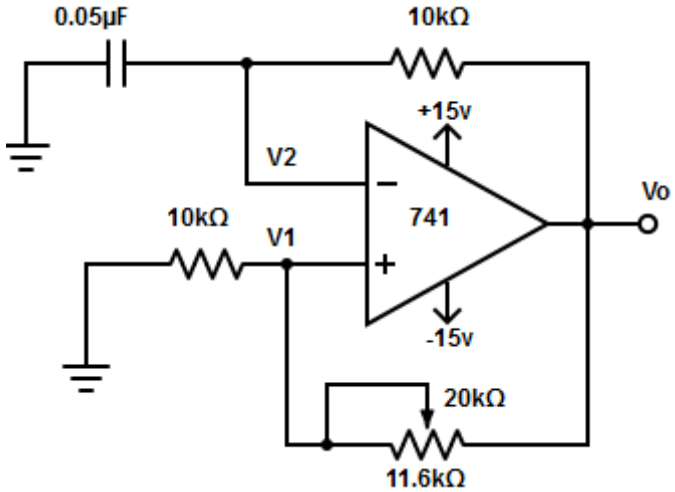
b) +13 v

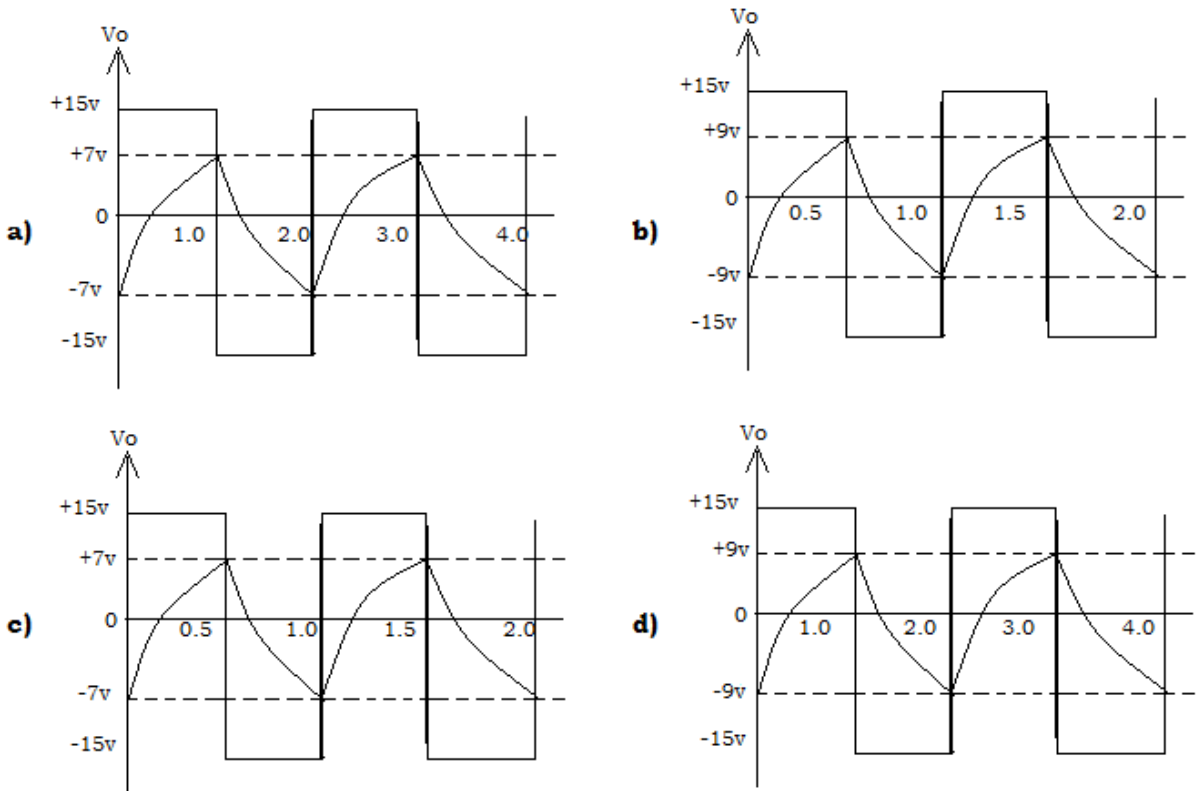
c) ± 13 v

d) None of the mentioned

58. Determine the expression for time period of a square wave generator
a) T= 2RC ln×[(R_1+ R_2) / (R_2)].
b) T= 2RC ln×[(2R_1+ R_2) / (R_2)].
c) T= 2RC ln×[(R_1+ 2R_2) / (R_2)].
d) T= 2RC ln×[(R_1+ R_2) / (2 R_2)].

59. Determine capacitor voltage waveform for the circuit





60. What will be the frequency of output waveform of a square wave generator if $R_2 = 1.16\ R_1$?
a) $f_o = (1/2RC)$
b) $f_o = (\ln/2RC)$
c) $f_o = (\ln /2 \times \sqrt{RC})$
d) $f_o = (\ln/\sqrt{(2\ RC)})$
1. _____to obtain symmetrical waveform in Astable multivibrator?

2._____ a desired amount of multiplication in frequency multiplier?

3. Calculate the output frequency in a frequency multiplier if, f_{in} = 200Hz is applied to a 7 divide by N-network.

4. For what kind of input signal, the frequency divider can be avoided frequency multiplier_____.

5.Free running multivibrator is also called as_____.

6. The output voltage of phase detector is_____.

7. At which state the phase-locked loop tracks any change in input frequency_____.

8. _____ is the function of low pass filter in phase-locked loop.

9. What is the need to generate corrective control voltage_____.

10. At what range the PLL can maintain the lock in the circuit_____.

11. Determine the output voltage of the differentiator_____.

OPERATING SYSTEMS:

Course Title	OPERATING SYSTEMS			
Course Code	CS402ES 4/0/0/4			
Regulation	R16-JNTUH			
Course Structure	Lectures	Tutorials	Practical's	Credits
	4	-	-	4
Course Coordinator	K KANTHI KUMAR			
COURSE AND YEAR	B-TECH _III-I SEM_2018-2019			

B.Tech. II Year II Sem. L/T/P/C

Course Code: CS402ES 4/0/0/4

3.1 COURSE OVERVIEW:

Operating systems course is intended as a general introduced to the techniques used to implement operating systems and related kinds of systems software. The topics covered will be functions and structure of operating systems, process management (creation, synchronization, and communication); processor scheduling; deadlock prevention, avoidance, and recovery; main-memory management; virtual memory management (swapping, paging, segmentation and page-replacement-algorithms); control of disks and other input/output devices; file-system structure and implementation; and protection and security

3.2 PRE-REQUISITE(S):

Level	Credits	Periods/ Week	Prerequisites
UG	4	4	Data Structures and Algorithms, Computer Architecture

3.3 MARKS DISTRIBUTION:

Session Marks	University End Exam Marks	Total Marks

Mid Semester Test • There shall be two midterm examinations. • Each midterm examination consists of subjective type and objective type tests. • The subjective test is for 10 marks of 60 minutes duration. • Subjective test of shall contain 4 questions; the student has to answer 2 questions, each carrying 5 marks. • The objective type test is for 10 marks of 20 minutes duration. It consists of 10 multiple choice and 10 objective type questions, the student has to answer all the questions and each carries half mark. • First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion. **Assignment** • Five marks are earmarked for assignments. • There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.	75	100

3.4 EVALUATION SCHEME:

S. No	Component	Duration	Marks
1	I Mid Examination	80minutes	20
2	I Assignment	-	5
3	II Mid Examination	80minutes	20
4	II Assignment	-	5
5	External Examination	3 hours	75

3.5 COURSE OBJECTIVES:

- Be familiar with the fundamental principles of the operating system, its services and functionalities.
- Master the concepts of processes, inter-process communication, synchronization and scheduling.

- Be familiar with different types of memory management viz. virtual memory, paging and segmentation.
- Be familiar with analyzing the performance of memory management techniques in various real-time scenarios.
- Master the concepts of data input/output, storage and file management.
- Be familiar with deadlocks and distinguish the techniques for deadlock detection, prevention, recovery.
- Be familiar with the need for protection in computer systems and the available techniques for protection.

3.6 COURSE OUTCOMES:

1. Apply optimization techniques for the improvement of system performance.

2. Ability to understand the synchronous and asynchronous communication mechanisms in their respective OS.

3. Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput with keeping CPU as busy as possible.

4. Ability to compare the different OS

3.7 HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency assessed by	Blooms Level
A	An ability to apply knowledge of mathematics, science and engineering	H	Assignments, Tutorials	Apply
B	An ability to design and conduct experiments, as well as to analyze and interpret data	H	Assignments	Apply and Analyze
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and	S	Mini Projects	Apply and Analyze

	sustainability.			
D	An ability to identify, formulate and solve engineering problems.	S	Projects, Group Activity	Analyze & Apply
E	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	S	Projects, Group Activity	Analyze & Apply
F	An ability to understand the special duty they owe to protect the public's health, safety and welfare by virtue of their professional status as engineers in society.	N	----	
G	An ability to understand and correctly interpret the impact of engineering solutions in global, societal and environmental contexts and demonstrate the knowledge of a need for sustainable development.	N	----	
H	An understanding of professional and ethical responsibility.	N	----	
I	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	N	----	
J	An ability to 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, give and receive clear instructions.	S	Seminars	Understand & Analyze
K	An ability to demonstrate knowledge and understanding of the engineering finance and management principles as a member and leader in a team to manage projects in multi-disciplinary environments.	N	----	
L	Recognition of the need for, and an ability to engage in life-long analyzing.	N	----	
M	An ability to design and implement	S	Projects, Group	Analyze & Apply

	projects in the areas including Signal Processing, Microwaves, Communication Systems, IC Technology and Embedded Systems.		Activity	
N	An ability to use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations.	S	Projects	Analyze & Apply

N = None S = Supportive H = Highly Related

3.8 SYLLABUS:

UNIT – I

Overview-Introduction-Operating system objectives, User view, System view, Operating system definition ,Computer System Organization, Computer System Architecture, OS Structure, OS Operations, Process Management, Memory Management, Storage Management, Protection and Security, Computing Environments. Operating System services, User and OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, OS Structure.

UNIT – II

Process and CPU Scheduling – Process concepts-The Process, Process State, Process Control Block, Threads, Process Scheduling-Scheduling Queues, Schedulers, Context Switch, Operations on Processes, System calls-fork(),exec(),wait(),exit(), Interprocess communication-ordinary pipes and named pipes in Unix. Process Scheduling-Basic concepts, Scheduling Criteria, Scheduling algorithms, Multiple Processor Scheduling, Real-Time Scheduling, Thread scheduling, Linux scheduling and Windows scheduling. Process Synchronization, Background, The Critical Section Problem, Peterson's solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization in Linux and Windows.

UNIT – III

Memory Management and Virtual Memory – Memory Management Strategies-Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of PageTable,IA-32 Segmentation, IA-32 Paging. Virtual Memory Management-Background,

Demand Paging, Copy-on-Write, Page Replacement, Page Replacement Algorithms, Allocation ofFrames,Thrashing,Virtual memory in Windows..

UNIT – IV

Storage Management-File System- Concept of a File, System calls for file operations –open(), read (), write (), close (), seek (), unlink (), Access methods, Directory and Disk Structure, File System Mounting, File Sharing, Protection. File System Implementation – File System Structure, File System Implementation, Directory Implementation, Allocation methods, Free-space Management, Efficiency, and Performance. Mass Storage Structure – Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap space

UNIT – V

Deadlocks – System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock. Protection – System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

TEXT BOOKS:

- Operating System Concepts , Abraham Silberschatz, Peter B. Galvin, Greg Gagne, 9th Edition, Wiley, 2016 India Edition
- Operating Systems – Internals and Design Principles, W. Stallings, 7th Edition, Pearson.

REFERENCE BOOKS:

- Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI
- Operating Systems: A concept-based Approach, 2nd Edition, D.M. Dhamdhere, TMH.
- Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
- An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
- Principles of Operating systems, Naresh Chauhan, Oxford University Press

3.9 COURSE PLAN:

S.No	Lecture	Description	Unit	Reference
1	L1	**Overview-Introduction**	1	A1,A2
2	L2	system definition ,Computer System Organization	1	A1,A2
3	L3	Computer System Architecture, OS Structure	1	A1,A2
4	L4	OS Operations, Process Management	1	A1,A2
5	L5	Memory Management, Storage Management	1	A1,A2
6	L6	Protection and Security, Computing Environments.	1	A1,A2
7	L7	Operating System services, User and OS Interface	1	A1,A2
8	L8	System Calls, Types of System Calls,	1	A1,A2
9	L9	System Programs	1	A1,A2
10	L10	Operating System Design and Implementation	1	A1,A2
11	L11	OS Structure.	1	A1,A2
12	L12	**Process and CPU Scheduling**	2	A1,A2
13	L13	Process concepts-The Process,	2	A1,A2
14	L14	Process State, Process Control	2	A1,A2
15	L15	Block, Threads,	2	A1,A2
16	L16	Process Scheduling-Scheduling Queues,	2	A1,A2
17	L17	Schedulers, Context Switch,	2	A1,A2
18	L18	Operations on Processes,	2	A1,A2
19	L19	System calls-fork(),exec(),wait(),exit(),	2	A1,A2
20	L20	Interprocess communication-ordinary pipes and named pipes in Unix.	2	A1,A2
21	L21	Process Scheduling-Basic concepts, Scheduling Criteria,	2	A1,A2
22	L22	Scheduling algorithms,	2	A1,A2
23	L23	Multiple Processor Scheduling,	2	A1,A2
24	L24	Real-Time Scheduling, Thread scheduling,	2	A1,A2
25	L25	Linux scheduling and Windows scheduling	2	A1,A2
26	L26	Process Synchronization, Background, The Critical Section Problem,	2	A1,A2
27	L27	Peterson's solution, Synchronization Hardware, Semaphores,	2	A1,A2
28	L28	Classic Problems of Synchronization, Monitors,	2	A1,A2
29	L29	Synchronization in Linux and Windows.	2	A1,A2
30	L30	**Memory Management** and Virtual Memory	3	A1,A2
31	L31	Memory Management Strategies- Background,	3	A1,A2
32	L32	Swapping, Contiguous Memory Allocation, Segmentation,	3	A1,A2
33	L33	Paging, Structure of Page Table,	3	A1,A2
34	L34	IA-32 Segmentation, IA-32 Paging.	3	A1,A2
35	L35	Virtual Memory Management-Background,	3	A1,A2

36	L36	Demand Paging, Copy-on-Write, Page Replacement,	3	A1,A2
37	L37	Page Replacement Algorithms, Allocation of Frames,	3	A1,A2
38	L38	Thrashing, Virtual memory in Windows	3	A1,A2
39	L39	**Storage Management**-File System- Concept of a File	4	A1,A2
40	L40	System calls for file operations open (), read (), write (), close (), seek (), unlink (),	4	A1,A2
41	L41	Access methods, Directory and Disk Structure,	4	A1,A2
42	L42	File System Mounting, File Sharing, Protection.	4	A1,A2
43	L43	File System Implementation, File System Structure, ,	4	A1,A2
44	L44	File System Implementation	4	A1,A2
45	L45	Directory Implementation,	4	A1,A2
46	L46	Allocation methods, Free-space Management	4	A1,A2
47	L47	Efficiency and Performance.	4	A1,A2
48	L48	Mass Storage Structure? Overview of Mass Storage Structure,	4	A1,A2
49	L49	Disk Structure, Disk Attachment, Disk Scheduling,	4	A1,A2
50	L50	Disk Management,	4	A1,A2
51	L51	Swap space Management	4	A1,A2
52	L52	**Deadlocks** System Model	5	A1,A2
53	L53	Deadlock Characterization	5	A1,A2
54	L54	Methods for Handling Deadlocks	5	A1,A2
55	L55	Deadlock Prevention, Deadlock Avoidance,	5	A1,A2
56	L56	Deadlock Detection, and Recovery from Deadlock.	5	A1,A2
57	L57	Protection ? System Protection, Goals of Protection,	5	A1,A2
58	L58	Principles of Protection, Domain of Protection,	5	A1,A2
59	L59	Access Matrix, Implementation of Access Matrix,	5	A1,A2
60	L60	Access Control, Revocation of Access Rights,	5	A1,A2
61	L61	Capability-Based Systems	5	A1,A2
62	L62	Language-Based Protection.	5	A1,A2
63	L63	Review of question papers		A1,A2
64	L64	Revision		A1,A2

3.10 MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objective	Course Outcomes			
	a	b	c	d
I	H			S
II				S
III	H	S		
IV	H	S		
V	H	S		

VI			S	
VII	S			

3.11 MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcomes	Program Outcomes													
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
a			S				S			S				S
b	S		S				S			H				S
c	S									S				
d	S		S											

S= Supportive H= Highly Related

3.12 QUESTION BANK:

UNIT-I		
INTRODUCTION TO OPERATING SYSTEMS		
Group – A (Short Answer Questions)		
S.No	**Question**	**Blooms Taxonomy Level**
1.	What is an operating system? What are the functions of the operating system?	Understand
2.	Describe the user's view of the operating system.	Understand
3.	Explain the difference between multi-programming and time sharing	Apply
4.	Explain the difference between platform and environment	Understand
5.	Give examples of at least two applications which in your opinion are real-time applications. Support your example with appropriate rationale.	Understand
6.	**Distinguish** between the client-server and peer-to-peer models of distributed systems	Knowledge
7.	When do we say a system is "multi-programming"? When do we say it is an "online" system?	Apply

8.	Name at least one device that can be used as an input as well as output device.	Understand
9	Define is an operating system.	Understand
10	Define kernel?	Understand
11	Discuss about kernel space and user space?	Understand
GROUP - B (LONG ANSWER QUESTIONS)		
1.	**List** and discuss the various services provided by the operating system?	Remember
2.	**Explain** the advantages and disadvantages of using the system calls	Understand
3.	**Explain** about context switching with necessary diagram?	Evaluate
4.	Briefly **Compare** the different operating system structures?	Understand
5.	**Compare** and contrast Multiprogramming, Multitasking and Multiprocessing	Apply
6.	**Define** the system structure of Modern Operating System?	Understand
7.	Briefly **Explain** various managements of operating systems and their responsibilities in detail?	Understand
UNIT-II		
PROCESS AND CPU SCHEDULING		
GROUP – A (SHORT ANSWER QUESTIONS)		
1	What is the difference between a program and a process?	Knowledge
2	What is CPU utilization?	Knowledge
3	What is “response time”?	Knowledge
4	Explain the architecture of the simple operating system employing queue data structures?	Analyze
5	Explain the difference between busy waiting and blocking	Understand
6	**Differentiate** I/O bound program and CPU bound program	Understand

7	**Define** semaphore? Explain the application of semaphore	Knowledge
8	Define throughput and turnaround time	Understand
9	**Differentiate** I/O bound program and CPU bound program?	Knowledge
10	**Describe** the following **a.** Race Condition **b.** Process Interaction	Knowledge
GROUP – B (LONG ANSWER QUESTIONS)		
1	Explain the role of a Process control block (PCB).	Knowledge
2	Show the changes in the process control Block(PCB) when a. A new process is created and b. A running process is suspended.	Analyze
3	With the help of block diagrams, explain the flow of control between two processes during process switching.	Understand
4	What happens when process context is switched? Is it an over-head?	Understand
5	Explain the function of the system calls along with the process state diagrams	Knowledge
6	Explain why real-time systems require a pre-emptive scheduling policy	Knowledge
7	Explain the concepts of multitasking	Knowledge
8	What are the motivations for short term, medium term and long term scheduling levels? Explain with block schematics.	Understand
9	Compare and contrast the round-robin, pre-emptive policy with shortest job first pre-emptive policy.	Analyze
10	Explain starvation. When and how starvation may occur?	Understand
11	Explain the procedure to kill a process	Understand
12	**List** out the various process states and briefly explain with a state diagram	Knowledge
13	**Describe** process scheduling? Explain the various levels of scheduling	Understand
GROUP - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		

<table>
<tr><td>1</td><td>Suppose we have a single processor system, and jobs arrive at a rate of 10 jobs a Seconds, suppose each job takes an average of 50 mille seconds to complete. Assure that both distributions are exponential. What is the expected number of jobs in the system and the average time in the system?</td><td>Analyze and Evaluate</td></tr>
<tr><td>2</td><td>Suppose the following jobs arrive for processing at the times indicated, each job will run the listed amount of time.
<table>
<tr><th>Jobs</th><th>Arrival time</th><th>Burst time (in secs.)</th></tr>
<tr><td>1</td><td>0.0</td><td>8</td></tr>
<tr><td>2</td><td>0.4</td><td>4</td></tr>
<tr><td>3</td><td>1.0</td><td>1</td></tr>
</table>
Give Gantt charts illustrating the execution of these jobs using the non preemptive FCFS and SJF scheduling algorithms. Compute the average turnaround time and average waiting time of each job for above algorithms.</td><td>Evaluate</td></tr>
<tr><td>3</td><td>Given the following information about jobs:
<table>
<tr><th>Job</th><th>Time</th><th>Arrival</th><th>Priority</th></tr>
<tr><td>1</td><td>8</td><td>0</td><td>3</td></tr>
<tr><td>2</td><td>4</td><td>0</td><td>2</td></tr>
<tr><td>3</td><td>6</td><td>0</td><td>1</td></tr>
<tr><td>4</td><td>1</td><td>0</td><td>4</td></tr>
</table>
All jobs arrive at time 0(but in the order 1, 2, 3&4).Draw charts and calculate the average time to complete (turn-around time) using the following scheduling algorithms: FCFS, SJF, Priority scheduling and round Robin (t=2)</td><td>Evaluate</td></tr>
<tr><td colspan="3">UNIT-III</td></tr>
<tr><td colspan="3">MEMORY MANAGEMENT</td></tr>
<tr><td colspan="3">GROUP - A (SHORT ANSWER QUESTIONS)</td></tr>
<tr><td>1</td><td>What is the motivation for main memory management?</td><td>Understand</td></tr>
<tr><td>2</td><td>What is the impact of fixed partitioning on fragmentation?</td><td>Understand</td></tr>
<tr><td>3</td><td>Give the relative advantages and disadvantages of load time dynamic linking and run-time dynamic linking. Differentiate them from static linking</td><td>Knowledge</td></tr>
</table>

4	What is meant by virtual memory? With the help of a block diagram explain the data structures used.	Understand
5	What is a page and what is a frame. How are the two related?	Knowledge
6	What is swapping? Why does one need to swap areas of memory?	Knowledge
7	Discuss virtual memory management scheme. Compare any two page replacement policies	Knowledge
8	Explain the software and hardware methods of implementing page lookup tables	Understand
9	Explain how segmented memory management works	Understand
10	What is thrashing? When does it happen and how does it affect performance?	Understand
11	What is a page fault? What action does the OS? Take when a page fault occurs?	Understand
Group - B (Long Answer Questions)		
1	Describe the actions taken by the operating system when a page fault occurs	Knowledge
2	What is portability? Differentiate between codes and object code portability.	Knowledge
3	Compare and contrast the paging with segmentation. In particular, describe issues related to fragmentation.	Knowledge
4	Explain the following memory management techniques: a Partitioned memory allocation b Segmented allocation.	Knowledge
5	Describe any two page replacement algorithms giving examples	Understand
6	What is the purpose of a TLB? Explain the TLB lookup with the help of a block diagram, explaining the hardware required.	Knowledge
7	Write short notes on a Segmentation b Free space management c Paging	Understand
8	Explain how segmented memory management works. Also explain in details address translation and relocation segmented memory management	Knowledge

9	Explain the software and hardware methods of implementing page lookup tables	Understand
10	**Discuss** briefly about Swapping concept with necessary Examples	Understand
11	**Explain** about addresses binding for a user program and discuss multi step processing of a user program	Understand
GROUP – C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	Suppose you have 16M bytes of main memory. Using the list method. You have an overhead of eight bytes per memory block. Using the bitmap method, you use an allocation granularity of 128 bytes. How many blocks are there when the space overhead of both methods is the same? What is the average block size for this many blocks?	Evaluate
2	Assume that we have a paging system with page table stored in memory a. If a memory reference takes 200 nanoseconds how long does a paged memory reference take b. If we add associative registers and 75% of all page table references are found in the associative registers, what is the effective memory reference time? Assume that finding a page table entry in the associative registers takes zero time, if the entry is there.	Evaluate
UNIT-IV		
STORAGE MANAGEMENT		
GROUP - A (SHORT ANSWER QUESTIONS)		
1	Describe the file system organization. Describe how file hierarchy is managed?	Understand
2	Describe at least three file operations	Understand
3	What is the short cut to move up one level from current directory?	Understand
4	What happens when you give a command: touch a_file?	Understand
5	What is the role of an inode?	Understand
6	What is a root file system?	Understand
7	Define external and internal fragmentation	Understand
8	**Define** buffering, caching and spooling	Understand
GROUP – B (LONG ANSWER QUESTIONS)		

1	Compare and contrast chained allocation with indexed allocation technique of file allocation	Analyze
2	List the various disk space allocation strategies. Explain clearly the contiguous allocation technique	Understand
3	What are the different types of files? What are the tasks of the file management system?	Understand
4	List some (at least two) file system related commands in UNIX? How does OS ensure security in file system?	Understand
5	Describe briefly a. The methods of file accessing. b. Two level directory structure.	Understand
6	Describe an encryption method provided in Unix to secure files. How does one retrieve an encrypted file using an encryption command? Explain the basic principle.	Knowledge
7	**Discuss** about Disk Management Swap -Space Management	Understand
8	**Explain** the following File concepts: **a.** File Attributes **b.** File Operations **c.** File Types **d.** Internal File Structure	Understand
9	**Discuss** the Criteria for choosing file origination?	Understand
10	**Explain the** relationship between a pathname and a working directory?	Understand
11	**List** and Explain three Blocking Methods?	Knowledge
12	Discuss in detail the performances issues of secondary storage management	Understand
GROUP - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	Suppose we have files F1 to F4 in sizes of 7178, 572, 499 and 1195 bytes. Our disks have fixed physical block size of 512 bytes for allocation. How many physical blocks would be needed to store these four files if we were to use a chained allocation strategy assuming that we need 5 bytes of information to determine the next block in the link? Which file results in the maximum internal fragmentation (measured as a percentage of the file size itself)?	Evaluate
2	We have a disc that has 8 tracks per platter with 10 writeable surfaces. The sectors store 512 byte blocks. There is a read/write head for every	Evaluate

	platter which can be switched in 1 ms. Track traversal is at the rate of 10 ms per track. Now reflect on the following. a. Draw a small figure to show how a 7.5 KB file could be stored ideally. b. What is the time of retrieval for the file in a. assuming that the head needs to be switched and the track needs to be traversed half-way? c. What is the worst case response time for this disk?	
	UNIT- V	
	DEADLOCKS	
	GROUP – A (SHORT ANSWER QUESTIONS)	
1	Define deadlock?	Understand
2	Discuss about the different methods of handling deadlocks?	Apply
3	Give the difference between mutex and semaphores?	Evaluate
4	Analyze the critical section problem?	Analyze
5	Define device driver?	Understand
6	What is Inter process communication?	Understand
7	What is mean by test and set lock?	Understand
8	Define semaphore?	Understand
9	Define message passing?	Understand
10	Define shared memory?	Understand
11	What is mean by remote procedure call?	Understand
	Group – B (Long Answer Questions)	
1	What is mutual exclusion? Depict a scenario where mutual exclusion is required	Understand

2	Bring out the difference between Deadlock avoidance and deadlock prevention scheme.	Understand
3	Define the critical section problem and explain the necessary characteristics of a correct solution.	Understand
4	With the help of the model of resource management, explain the tasks and goals of the resource manager.	Knowledge
5	When does deadlock happen? How does Banker's algorithm avoid the deadlock condition?	Analyze
6	Write the algorithms for wait() and signal() functions. Explain their usage in an example.	Understand
7	What is dining philosopher problem? Explain monitor solution to dining philosopher problem.	Understand
8	Suggest one method each to avoid "Hold and wait" and "Circular Wait" condition.	Analyze
9	What is a thread control block? How is it different from the process control block? Mention some (two) of the parameters in TCB.	Understand
10	Explain reader/writers problem and protocol.	Understand
Group – C (Problem solving &Analytical Questions)		
1	Suppose we have two printers connected to a system. For a print job we may allocate any of the two printers. We wish to use semaphores. Describe your design and explain how the scheme shall work. Give a brief sketch of the script that would control printer operation.	Analyze

PROGRAMME: B.Tech ECE AC:YEAR: **2018-2019**	DEGREE: **B.TECH III YEAR**
COURSE: **DIGITAL COMMUNICATIONS**	SEMESTER: **I** CREDITS: 4 COURSE COORDINATOR: Mr.B.Satyanarayana
COURSE CODE: **EC503PC** REGULATION:**R16**	COURSE TYPE: **REGULAR**
COURSE AREA/DOMAIN: ECE	CONTACT HOURS: 4 hours/Week.
CORRESPONDING LAB COURSE CODE : **EC507PC**	LAB COURSE NAME: **DIGITAL COMMUNICATIONS LAB**

4.1 COURSE OVERVIEW:

Digital Communication Engineering focuses on providing a sound theoretical background as well as good practical exposure to students in the communication and networking areas. It is intended to provide a modern, industry-oriented education in communication applications. It aims at producing trained professionals who can successfully meet the demands of the fast-growing Telecommunication industry. Telecommunication Engineers manage different types of technologies that allow us to communicate. They research, design and develop satellite and cable systems, mobile phones, radio waves, the Internet and e-mail.

4.2 PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
1	Signals and systems	A **signal** is a **description** of how one parameter varies with another parameter. For instance, voltage changing over time in an electronic circuit, or brightness varying with distance in an image. A**system** is any process that produces an output**signal** in response to an input **signal**.	II-I
2	Analog Communications	A **communication** format in which information is transmitted by modulating a continuous signal, such as a sound wave. Current TV and radio signals are **analog**, as are many telephone lines.	III-I

4.3 MARKS DISTRIBUTION:

Session Marks	University End Exam Marks	Total Marks
Mid Semester Test • There shall be two midterm examinations. • Each midterm examination consists of subjective type and objective type tests. • The subjective test is for 10 marks of 60 minutes duration. • Subjective test of shall contain 4 questions; the student has to answer 2 questions, each carrying 5 marks. • The objective type test is for 10 marks of 20 minutes duration. It consists of 10 multiple choice and 10 objective type questions, the student has to answer all the questions and each carries half mark. • First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion. **Assignment** • Five marks are earmarked for assignments. • There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.	75	100

4.4 EVALUATION SCHEME:

S. No	Component	Duration	Marks
1	I Mid Examination	80minutes	20
2	I Assignment	-	5
3	II Mid Examination	80minutes	20
4	II Assignment	-	5
5	External Examination	3 hours	75

4.5 COURSE OBJECTIVES & OUTCOMES:

Course Objectives	Course Outcomes	Blooms Level
To understand the functional block diagram of Digital communication system.	Understand basic components of Digital Communication Systems.	BL1,2
To understand the need for source and channel coding.	Design optimum receiver for Digital Modulation techniques.	BL 1,2,4
To study various source and channel coding techniques.	Analyze the error performance of Digital Modulation Techniques.	BL 1,2,3
To understand a mathematical model of digital communication system for bit error	Understand the redundancy present in Digital Communication by using various source	BL 1,2,5

BLOOMS LEVEL (BL)

BL 1: Remember / knowledge BL2: Understanding BL3: Apply
BL 4: Analyze BL 5: Evaluate BL 6: Create

4.6 HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency assessed by	Blooms Level
A	An ability to apply knowledge of mathematics, science and engineering	S	Solving Gate and Text book Problems	APPLY
B	An ability to design and conduct experiments, as well as to analyze and interpret data	S	Solving Gate and Text book Problems	APPLY
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	H	Assignment and Gate questions	Apply and Analyze
D	An ability to identify, formulate and solve engineering problems.	S	Class Test & Group Activity	Apply
E	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	S	Mini and Micro Projects	Apply
F	An ability to understand the special duty they owe to protect the public's health, safety and welfare by virtue of their professional status as engineers in society.	N	--	--
G	An ability to understand and correctly interpret the	H	Mini /	Analyze

	impact of engineering solutions in global, societal and environmental contexts and demonstrate the knowledge of a need for sustainable development.		Micro Projects and GATE questions	and Justify
H	An understanding of professional and ethical responsibility.	N	--	--
I	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	S	Class Test & Seminar	Analyze
J	An ability to 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, give and receive clear instructions.	S	Seminars	Understand & Analyze
K	An ability to demonstrate knowledge and understanding of the engineering finance and management principles as a member and leader in a team to manage projects in multi-disciplinary environments.	S	Mini and Micro Projects	Apply
L	Recognition of the need for, and an ability to engage in life-long analyzing.	S	Group Activity	Analyze
M	An ability to design and implement projects in the areas including Signal Processing, Microwaves, Communication Systems, IC Technology and Embedded Systems.	H	Mini and Micro Projects	Apply
N	An ability to use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations.	S	Seminars & Projects	Analyze & Apply

N = None S = Supportive H = Highly Related

4.7 SYLLABUS:

UNIT - I

Elements of Digital Communication Systems: Model of Digital Communication Systems, Digital Representation of Analog Signal, Certain Issues in Digital Transmission, Advantages of Digital Communication Systems, Sampling Theorem, Types of Sampling – Impulse Sampling , Natural Sampling , Flat – Top Sampling. Introduction to Baseband Sampling.

Waveform Coding Techniques: PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT - II

Information theory: Information and Entropy, Conditional Entropy and Redundancy, Shannon-Fano Coding Mutual information, Information Loss due to Noise, Source coding- Huffman Code, Variable Length Coding, Lempel-ziv coding, Source coding to increase average information per bit, Lossy Source coding, Bandwidth-S/N Trade off, Hartley Shannon Law.

Error Control Codes

Linear Block Codes: Matrix Description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes. Cyclic Codes**:** Algebraic Structure, Encoding, Syndrome Calculation, Decoding. **Convolution Codes:** Encoding, Decoding,

UNIT - III

Baseband Pulse Transmission: Introduction, Matched Filter, Error Rate Due to Noise, intersymbol interference Nyquist's criterion for Distortion less Baseband Binary Transmission, Correlative -Level Coding Baseband M-Array PAM Transmission PAM Transmission, Digital subscriber Lines, Optimal Liner Receiver, Adaptive Equalization, Eye patterns.

Digital pass band transmission: pass band transmission model, Gram-Schmidt orthogonalization procedure, Geometric interpretation of signals Coherent detection of signals in noise, probability of error, Correlation receiver.

UNIT - IV

Digital Modulation Techniques: Introduction, ASK, ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and Frequency Spectrum of FSK, Non Coherent FSK Detector, Coherent FSK Detector, FSK Detection using PLL, BPSK, Coherent PSK Detection, QPSK, 8-PSK, 16-PSK Differential PSK, QAM .

UNIT - V

Spread Spectrum Modulation: Use of Spread Spectrum, Direct Sequence Spread (DSSS), and Code Division Multiple Access, Ranging using DSSS, Frequency Hopping Spread Spectrum, PN - Sequence: Generation and characteristics, Synchronization in Spread Spectrum Systems.

TEXT BOOKS:

1. Communications system, S. Haykin, Wiley, 4 edition 2009.

2. Digital and Analog Communication Systems – Sam Shanmugam, John Wiley, 2005.

REFERENCES:

1. Principles of Communication Systems - Herbert Taub, Donald L Schiling, Goutam Saha, 3rd Edition, McGraw-Hill, 2008

2. Electronic communication systems, Wayne Tomasi, 5 edition, Pearson

3. Communication Systems: Analog and Digital, R. P. Singh , S. Sapre, McGraw-Hill Education, 2012

4. Digital Communications – John G. Proakis , Masoud Salehi – 5th Edition, McGraw- Hill, 2008.

4.8 COURSE PLAN:

Lecture Number	Unit	Topics to be Covered	Reference
1	I	Model of Digital Communication Systems	A1,A3
2	I	Digital Representation of Analog Signal	A1,A3
3	I	Certain Issues in Digital Transmission	A1,A3
4	I	Advantages of Digital Communication Systems	A1,A3
5	I	Sampling Theorem	A1,A3
6	I	Types of Sampling? Impulse Sampling	A1,A3
7	I	Natural Sampling, Flat ? Top Sampling	A1,A3
8	I	Introduction to Baseband Sampling	A1,A3
9	I	PCM Generation and Reconstruction	A1,A3
10	I	Quantization Noise	A1,A3
11	I	Non Uniform Quantization and Companding	A1,A3
12	I	DPCM	A1,A3
13	I	Adaptive DPCM	A1,A3
14	I	DM and Adaptive	A1,A3
15	I	DM, Noise in PCM and DM	A1,A3
16	II	Information theory- Information and Entropy	A1,A3
17	II	Conditional Entropy and Redundancy	A1,A3
18	II	Shannon-Fano Coding Mutual information	A1,A3
19	II	PROBLEMS ON Shannon-Fano Coding Mutual information	A1,A3
20	II	Information Loss due to Noise	A1,A3
21	II	Source coding-Huffman Code	A1,A3

22	II	Variable Length Coding,	A1,A3
23	II	Lempel-ziv coding	A1,A3
24	II	Source coding to increase average information per bit	A1,A3
25	II	Lossy Source coding	A1,A3
26	II	Bandwidth-S/N Trade off,	A1,A3
27	II	Hartley Shannon Law	A1,A3
28	II	Matrix Description of Linear Block Codes	A1,A3
29	II	PROBLEMS ON ERROR CONTROL CODES	A1,A3
30	II	Error Detection and Error	A2
31	II	Correction Capabilities of Linear Block Codes	A2
32	II	Cyclic Codes	A2
33	II	Algebraic Structure, Encoding	A2
34	II	Syndrome Calculation, Decoding	A2
35	II	Convolution Codes, Encoding, Decoding	A2
36	II	PROBLEMS ON Convolution Codes, Encoding, Decoding	A2
37	III	Introduction, Matched Filter, Error Rate Due to Noise	A2
38	III	intersymbol interference Nyquist's criterion for Distortion less Baseband Binary	A2
39	III	Transmission	A2
40	III	Correlative -Level Coding Baseband M-Array PAM Transmission PAM	A2
41	III	Transmission, Digital subscriber Lines	A2
42	III	Optimal Liner Receiver, Adaptive Equalization, Eye patterns	A2
43	III	Digital pass band transmission: pass band transmission model	A2
44	III	Gram-Schmidt orthogonalization procedure	A2
45	III	Geometric interpretation of signals Coherent detection of signals in noise	A2
46	III	probability of error, Correlation receiver	A1,A3
47	IV	Digital Modulation Techniques: Introduction, ASK, ASK Modulator	A1,A3
48	IV	Coherent ASKDetector, Non-Coherent ASK Detector	A1,A3
49	IV	FSK, Bandwidth and Frequency Spectrum of FSK	A1,A3
50	IV	Non Coherent FSK Detector, Coherent FSK Detector	A1,A3
51	IV	FSK Detection using PLL	A1,A3
52	IV	BPSK	A1,A3
53	IV	Coherent PSK Detection	A1,A3
54	IV	QPSK, 8-PSK	A1,A3
55	IV	16-PSK Differential PSK	A1,A3
56	IV	QAM	A1,A3

57	V	Spread Spectrum Modulation: Use of Spread Spectrum	A1,A3
58	V	Direct Sequence Spread (DSSS)	A1,A3
59	V	Code Division Multiple Access, Ranging using DSSS	A1,A3
60	V	Frequency Hopping Spread Spectrum	A1,A3
61	V	PN - Sequence: Generation and characteristics	A1,A3
62	V	Synchronization in Spread	A1,A3
63	V	Spectrum Systems	A1,A3

4.9 MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objective	Course Outcomes				
	a	b	c	d	e
I	S		S		
II	S				
III		H			
IV			H		S
V				S	

S= Supportive H= Highly Related

4.10 MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcomes	Program Outcomes													
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
a	S													
b	S	S									S		S	S
c	S	S												
d		S					S				S		H	S
e	S		S		S		S				S		S	

S= Supportive H= Highly Related

4.11 QUESTION BANK

UNIT-I		
Elements of Digital Communication Systems & Waveform Coding Techniques		
GROUP – A (SHORT ANSWER QUESTIONS)		
S.No	**Question**	**Blooms Taxonomy Level**
1.	Explain the simplified Block diagram of an Electronic communication system with the help of diagram.	Understand
2.	List two examples each for analog and digital signals (in mathematical form).	Understand
3.	Define Nyquist Sampling theorem.	Apply
4.	Construct the mathematical expression for Minimum sampling rate (fs).	Understand
5.	Examine Aliasing Effect (or) Fold-over distortion? How it can be removed.	Understand
6.	List the advantages of digital communication systems	Remember
7.	Summarize differential encoding signaling? Explain with an example.	Apply
8.	Define quantization in PCM.	Apply
9.	Explain a simple model of non uniform qunatizer.	Apply
10.	Define the term quantization noise.	Understand
11.	Compare the features of PCM and DPCM.	Apply
12.	List the advantage gained by the use of robust quantization.	Apply
13.	Define an output signal-to-quantization ratio.	Apply
14.	Mention two major sources of noise which influence the performance of a PCM system.	Understand
15.	Discuss the advantages of DM over PCM.	Understand
GROUP - B (LONG ANSWER QUESTIONS)		
1.	Explain the different types of Sampling.	Remember
2.	Distinguish between natural sampling and flat top sampling with neat schematics, listing out their merits and demerits.	Understand

3.	Explain the principle of working a sample and hold circuit. List out its applications with neat diagrams.	Evaluate
4.	Define the sampling theorem as applicable to voice signals on telephone lines.	Understand
5.	Discuss the advantages and disadvantages of digital communication system.	Remember
6.	Discuss and prove sampling theorem in time domain.	Understand
7.	Define natural sampling? Explain it with sketches.	Understand
8.	Explain the Model of Digital Communication Systems with neat diagrams.	Understand
9.	Explain Bandwidth-S/N Tradeoff	Evaluate
10.	Illustrate the working of DPCM transmitter and receiver with the help of diagram.	Evaluate
11.	Enumerate the quantization error in delta modulation.	Evaluate
12.	List the comparison between PCM and DM systems.	Evaluate
13.	Elaborate how to avoid slope overload distortion in DM.	Evaluate
14.	Illustrate the working of Adaptive DPCM with the help of diagram.	Evaluate
15.	Illustrate the working of Adaptive DM with the help of diagram.	Evaluate
16	Explain the Companding.	Understand
17	Explain the need for non-uniform quantization in digital communications.	Understand
18	Explain the Block diagram of DPCM system.	Understand
GROUP - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	Explain a) Channel Noise b) Quantization noise in DM and derive expression for them?	Apply
2	Discuss quantization error? How does it depend upon the step size? Suggest some methods to overcome the difficulties encountered depending on the modulating Amplitude swing?	Analyze
UNIT-II		
INFORMATION THEORY & ERROR CONTROL CODES		
GROUP – A (SHORT ANSWER QUESTIONS)		
1	What is meant by distortion less transmission?	Understand

2	Discuss entropy and give the expression for it.	Understand
3	Explain the channel capacity theorem.	Understand
4	Let X represents the outcome of a single roll of a fair die. What is the entropy of X?	Understand
5	What is transition probability and when it does it will occur?	Understand
6	Explain the two properties of Mutual information.	Analyze
7	State the properties of Entropy	Analyze
8	What is discrete memory less channel and give the channel matrix expression	Analyze
9	What is channel coding theorem and how it is different from source coding theorem?	Apply
10	What is entropy? Show that the entropy is maximum when all the symbols are equi probable. Assume M=2.	Understand
11	Define information. Show that information contained by a symbol is inversely proportional to the probability of that symbol.	Understand
12	Explain Shannon & Hartley's Law.	Understand
13	Construct the equation for Shannon limit on Information capacity	Understand
14	Explain about trade-off between bandwidth and SNR in a communication signal.	Understand
15	Define bandwidth.	Evaluate
16	What is linear code?	Understand
17	Discuss code rate?	Understand
18	Define code efficiency	Understand
19	Explain hamming distance?	Understand
20	What is meant by systematic & non-systematic code?	Understand
21	Explain how syndrome is calculated in Hamming codes and cyclic codes?	Apply
22	What are the conditions to satisfy the hamming code?	Apply
23	Define code word & block length.	Apply
24	What are the advantages of cyclic codes?	Analyze
25	What is linear code?	Analyze

26	What is constraint length of convolution code.	Analyze
27	List advantages of convolutional codes	Analyze
28	Discuss the difference between convolutional code and block code.	Analyze
29	Construct the graphical representations of convolutional codes.	Analyze
30	Construct the encoding diagram for (3, 2, 1) convolutional encoder.	Analyze
31	What is sequential decoding?	Evaluate
32	Explain about the Convolutional interleaving.	Evaluate
33	Compare coded and uncoded transmission techniques with respect to Probability of error.	Understand
34	What is the code length of a convolution code?	Evaluate
35	Examine the time-domain approach in convolution code.	Evaluate
36	What is the importance of code tree?	Evaluate
37	Define the term trellis in convolution code.	Understand
38	Explain Viterbi algorithm.	Understand
39	Discuss maximum-likelihood decoding rule for the binary symmetric channel	Understand
GROUP – B (LONG ANSWER QUESTIONS)		
1	Show that the entropy for a discrete source is a maximum when the output symbols are equally probable.	Evaluate
2	Show that the mutual information of a channel is related to the joint entropy of the channel input and channel output.	Understand
3	Explain the Huffman coding algorithm using an example	Evaluate
4	Explain the Conditional Entropy.	Evaluate
5	Explain the Redundancy.	Understand
6	Explain the Mutual Information	Analyze
7	Explain the Variable length Coding with an example	Analyze
8	Explain the Lossy Source Coding	Understand
9	Explain syndrome decoding for cyclic code expression.	Evaluate

10	What is parity check matrix and how it is used?	Evaluate
11	Explain systematic cyclic code generation formula	Apply
12	What are minimum distance considerations?	Understand
13	Show that the minimum distance of a linear block code is equal to the minimum number of rows of HT that sum to zero.	Apply
14	Analyze and prove the fundamental properties of cyclic code.	Apply
15	Show that if ci and cj are two code vectors in an (n,k) linear block code, then their sum is also a code vector.	Analyze
16	Compare the linear block codes, cyclic codes and the convolution codes?	Apply
17	Draw an (n-k) syndrome calculation circuit for an (n, k) cyclic code?	Understand
18	What is meant by random errors and burst errors? Explain about a coding technique which can be used to correct both the burst and random errors simultaneously.	Analyze
19	Discuss about the various decoders for convolutional codes.	Understand
20	Explain how the channel coding reduces the probability of error.	Understand
21	Explain the systematic code form for the binary cyclic codes?	Understand
22	Explain about block codes in which each block of k message bits encoded into block of n>kbits with an example.	Apply
23	Demonstrate the Viterbi algorithm for maximum-likelihood decoding of convolutional codes.	Analyze
24	What is a convolutional code?Howis it different from a block code?	Understand
25	Compare the Error Rates in Coded and Uncoded Transmission	Apply
GROUP - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	Explain Shannon-fano coding algorithm using an example.	Apply
2	Show that the syndrome depends only on the error pattern, and not on the transmitted code word.	Evaluate
3	The generator polynomial of (15,11) cyclic code is g(x)= 1+x+x4.Determine the parity polynomial h(x) of this code.	Evaluate
UNIT-III		
BASEBAND PULSE TRANSMISSION& DIGITAL PASS BAND TRANSMISSION		

GROUP - A (SHORT ANSWER QUESTIONS)		
1	What is a matched filter?	Remember
2	List two applications for eye pattern.	Remember
3	What are eye pattern?	Understand
4	Discuss the performance of data transmission system using eye pattern technique?	Understand
5	Discusthe need of optimum transmitting and receiving filter in baseband data transmission.	Analyze
6	What is the value of maximum signal to noise ratio of the matched filter? When it becomes maximum?	Analyze
7	Construct the block diagram of Base band System.	Understand
8	Examine Crosstalk	Understand
9	Explain Optimum Receiver.	Understand
10	Explain Signal Space Representation.	Understand
11	What does the width of the eye define?	Analyze
12	Make use of the eye pattern and how the sensitivity on the system can be determined?	Understand
GROUP - B (LONG ANSWER QUESTIONS)		
1	Explain Pulse Shaping for Optimum Transmission.	Understand
2	Explain A Baseband Signal Receiver.	Analyze
3	Explain Optimum Receiver	Analyze
4	Explain Optimal of Coherent Reception	Evaluate
5	Explain Signal Space Representation	Evaluate
6	With Neat diagram, explain Eye Diagrams	Evaluate
7	Explain Cross Talk	Evaluate
8	Why equalization is necessary in Baseband transmission? Give the block diagram of adaptive filter and explain about each element.	Apply
9	What is matched filter? Derive the expression for its output SNR.	Evaluate

10	What is an inter symbol interference in baseband binary PAM system? Explain.	Understand
GROUP – C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	Give the basic components of a filter in baseband data transmission and explain	Apply
2	Explain the base band transmission of M-ary data with suitable diagrams.	Apply
UNIT-IV		
DIGITAL MODULATION TECHNIQUES		
GROUP - A (SHORT ANSWER QUESTIONS)		
1	Construct the ASK and FSK waveforms for 011011.	Understand
2	Sketch the block diagram of ASK generation.	Understand
3	Examine how does pulse shaping reduce inter symbol interference?	Understand
4	Show the space representation of BPSK and QPSK	Understand
5	Explain the Bandwidth, power and energy calculations for PSK signal.	Understand
6	Explain why PSK is always preferable over ASK in coherent detection?	Understand
7	Distinguish between Coherent and Non coherent detection?	Analyze
8	Explain Phase shift keying with relevant equations and waveforms.	Understand
9	Estimate the band width required for frequency shift keying and draw its spectrum.	Understand
10	Explain non coherent detection of Amplitude shift keying.	Analyze
11	Construct the constellation diagram for Quadrature phase shift Keying	Understand
12	Explain coherent detection of frequency shift keying .what should be the relationship between bit rate and frequency shift for a better performance?	Analyze
13	Construct the FSK waveforms for a given input data “1101”.	Evaluate
14	Define the probability of error.	Understand
15	Construct the ASK and FSK waveforms for 011011.	Evaluate

GROUP – B (LONG ANSWER QUESTIONS)		
1	Explain in detail about. i)FSK. ii)PSK with waveforms and equations	Understand
2	Determine probability of error fora) ASK andb) PSK systems.	Analyze
3	Explain the generation of PSK signals.	Apply
4	Discuss QPSK signaling. Derive the bit error probability due to PSK receiver.	Evaluate
5	Solve that the maximum output signal to noise ratio of a matched filter is (SNR) = 2E/N0	Understand
6	Explain Differential phase shift keying modulation with neat block diagram. Draw the wave forms.	Understand
7	Show that the probability of error for phase shift keying is Pe= Q(2Sav Tb/ N0)1/2 and the threshold levelis zero.	Apply
GROUP - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	The bit stream 11011100101 is to be transmitted using DPSK. Determine the encoded sequence and the transmitted phase sequence.	Analyze
2	Explain the demodulation of FSK using coherent detection. Draw the block diagram of QPSK receiver	Evaluate
UNIT- V		
SPREAD SPECTRUM MODULATION		
GROUP – A (SHORT ANSWER QUESTIONS)		
1	Define spread spectrum communication	Understand
2	Explains pseudo noise sequence?	Understand
3	Discuss direct sequence spread spectrum modulation	Apply
4	What is frequency hap spread spectrum modulation?	Analyze
5	What is processing gain?	Understand
6	State four applications of spread spectrum.	Evaluate
7	When is the PN sequence called as maximal length sequence?	Analyze
8	What is meant by processing gain of DS spread spectrum system?	Understand

9	Discuss the applications of spread spectrum modulation?	Apply
10	Define frequency hopping.	Understand
11	What are the Advantages of DS-SS systems?	Understand
12	What are the Disadvantages of DS-SS systems?	Understand
13	List the Advantages of FH-SS System	Understand
14	List the Disadvantages of FH-SS System	Understand
GROUP – B (LONG ANSWER QUESTIONS)		
1	Explain the spread spectrum modulation and demodulation.	Analyze
2	Explain the frequency hopping spread spectrum modulation.	Evaluate
3	Examine spread spectrum modulation using DSSS. Explain the spread spectrum modulation.	Analyze
4	Explain the frequency hopping spread spectrum modulation.	Apply
5	Explain how PN sequences are generated. What are maximal-length sequences? What are their properties and why are they preferred?	Understand
6	What are the advantages of spread spectrum technique.	Understand
7	Compare direct sequence spread spectrum and frequency hopped spread spectrum techniques and draw the important features of each.	Analyze
8	What the PN sequences? Discuss the characteristics.	Understand
9	What are the two basic types of spread-spectrums systems? Explain the basic principle of each of them.	Understand
10	Explain the spread spectrum modulation.	Evaluate
11	Explain the frequency hopping spread spectrum modulation.	Understand
GROUP – C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	With the help of a neat block diagram, explain the working of a DS spread spectrum based CDMA system.	Analyze
2	Explain how PN sequences are generated. What are maximal-length sequences? What are their properties and why are they preferred?	Apply

4.12 ASSIGNMENT TOPICS:

S. No	Questions	Blooms Taxonomy Level
	UNIT-I **ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS & WAVEFORM CODING TECHNIQUES**	
1	Explain the Model of Digital Communication Systems with neat diagrams.	
2	Explain the need for non-uniform quantization in digital communications.	Understand
3	PCM generation and reconstruction	Evaluate
4	Quantization noise, Differential PCM systems (DPCM)	
5	Delta modulation	Understand
	UNIT II	
	INFORMATION THEORY & ERROR CONTROL CODES	
1	Conditional entropy and redundancy	Understand
2	Shannon Fano coding	Evaluate
3	Mutual information.	Evaluate
4	Matrix description of linear block codes	Understand
5	Error detection and error correction capabilities of linear block codes	Analyze
6	Encoding,	Evaluate
7	decoding using state Tree and trellis diagrams	Evaluate
8	Decoding using Viterbi algorithm	Understand
	UNIT- III	
	BASEBAND PULSE TRANSMISSION& DIGITAL PASS BAND TRANSMISSION	
1.	Why equalization is necessary in Baseband transmission? Give the block diagram of adaptive filter and explain about each element.	Understand
2.	Exlain the base band transmission of M-ary data with suitable diagrams.	Analyze
3.	What is matched filter? Derive the expression for its output SNR.	Analyze
4.	Explain Pulse Shaping for Optimum Transmission.	Evaluate

5.	Explain A Baseband Signal Receiver.	Evaluate
6.	Explain Optimum Receiver	Evaluate
	UNIT- IV	
	DIGITAL MODULATION TECHNIQUES	
1.	Explain Differential phase shift keying modulation with neat block diagram. Draw the wave forms.	Analyze
2.	Show that the probability of error for phase shift keying is Pe= Q(2Sav Tb/ N0)1/2 and the threshold levels zero.	Understand
3.	Explain the working of DPSK modulator and demodulator	Apply
4.	Explain Differential phase shift keying modulation with neat block diagram. Draw the wave forms.	Evaluate
5.	The bit stream 11011100101 is to be transmitted using DPSK. Determine the encoded sequence and the transmitted phase sequence.?	Evaluate
6.	Explain the generation of PSK signals.	Understand
	UNIT-V	
	SPREAD SPECTRUM MODULATION	
1.	Explain the spread spectrum modulation.	Analyze
2.	Explain the frequency hopping spread spectrum modulation	Evaluate
3.	With the help of a neat block diagram, explain the working of a DS spread spectrum based CDMA system.	Apply
4.	Explain how PN sequences are generated. What are maximal-length sequences? What are their properties and why are they preferred?	Understand
5	Examine spread spectrum modulation using DSSS.	Understand

4.13 OBJECTIVE QUESTIONS:

UNIT – I

UNIT-I ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS

1) In uniform quantization process
   a. The step size remains same
   b. Step size varies according to the values of the input signal
   c. The quantizer has linear characteristics
   d. Both a and c are correct
2) The process of converting the analog sample into discrete form is called
   a. Modulation
   b. Multiplexing
   c. Quantization
   d. Sampling
3) The characteristics of compressor in μ-law companding are
   a. Continuous in nature

b. Logarithmic in nature
c. Linear in nature
d. Discrete in nature

4) The modulation techniques used to convert analog signal into digital signal are
   a. Pulse code modulation
   b. Delta modulation
   c. Adaptive delta modulation
   d. All of the above
5) The sequence of operations in which PCM is done is
   a. Sampling, quantizing, encoding
   b. Quantizing, encoding, sampling
   c. Quantizing, sampling, encoding
   d. None of the above
6) In PCM, the parameter varied in accordance with the amplitude of the modulating signal is
   a. Amplitude
   b. Frequency
   c. Phase
   d. None of the above
7) One of the disadvantages of PCM is
   a. It requires large bandwidth
   b. Very high noise
   c. Cannot be decoded easily
   d. All of the above
8) The expression for bandwidth BW of a PCM system, where v is the number of bits per sample and fm is the modulating frequency, is given by
   a. $BW \geq vfm$
   b. $BW \leq vfm$
   c. $BW \geq 2\ vfm$
   d. $BW \geq 1/2\ vfm$
9) The error probability of a PCM is
   a. Calculated using noise and inter symbol interference
   b. Gaussian noise + error component due to inter symbol interference
   c. Calculated using power spectral density
   d. All of the above
10) In Delta modulation,
   a. One bit per sample is transmitted
   b. All the coded bits used for sampling are transmitted
   c. The step size is fixed
   d. Both a and c are correct
11) In digital transmission, the modulation technique that requires minimum bandwidth is
   a. Delta modulation
   b. PCM
   c. DPCM
   d. PAM
12) In Delta Modulation, the bit rate is

a. N times the sampling frequency
b. N times the modulating frequency
c. N times the nyquist criteria
d. None of the above

13) In Differential Pulse Code Modulation techniques, the decoding is performed by
a. Accumulator
b. Sampler
c. PLL
d. Quantizer

14) DPCM is a technique
a. To convert analog signal into digital signal
b. Where difference between successive samples of the analog signals are encoded into n-bit data streams
c. Where digital codes are the quantized values of the predicted value
d. All of the above

15) DPCM suffers from
a. Slope over load distortion
b. Quantization noise
c. Both a & b
d. None of the above

16) The noise that affects PCM
a. Transmission noise
b. Quantizing noise
c. Transit noise
d. Both a and b are correct

17) The factors that cause quantizing error in delta modulation are
a. Slope overload distortion
b. Granular noise
c. White noise
d. Both a and b are correct

18) Granular noise occurs when
a. Step size is too small
b. Step size is too large
c. There is interference from the adjacent channel
d. Bandwidth is too large

19) The crest factor of a waveform is given as –
a. 2Peak value/ rms value
b. rms value / Peak value
c. Peak value/ rms value
d. Peak value/ 2rms value

20) The digital modulation technique in which the step size is varied according to the variation in the slope of the input is called
a. Delta modulation
b. PCM
c. Adaptive delta modulation
d. PAM

21) The digital modulation scheme in which the step size is not fixed is
    a. Delta modulation
    b. Adaptive delta modulation
    c. DPCM
    d. PCM
22) In Adaptive Delta Modulation, the slope error reduces and
    a. Quantization error decreases
    b. Quantization error increases
    c. Quantization error remains same
    d. None of the above
23) The number of voice channels that can be accommodated for transmission in T1 carrier system is
    a. 24
    b. 32
    c. 56
    d. 64
24) The maximum data transmission rate in T1 carrier system is
    a. 2.6 megabits per second
    b. 1000 megabits per second
    c. 1.544 megabits per second
    d. 5.6 megabits per second
25) T1 carrier system is used
    a. For PCM voice transmission
    b. For delta modulation
    c. For frequency modulated signals
    d. None of the above

UNIT-II DIGITAL MODULATION TECHNIQUES:

1. Matched filter may be optimally used only for
    a. Gaussian noise
    b. Transit time noise
    c. Flicker
    d. All of the above
2. Characteristics of Matched filter are
    a. Matched filter is used to maximize Signal to noise ratio even for non Gaussian noise
    b. It gives the output as signal energy in the absence of noise
    c. They are used for signal detection
    d. All of the above
3. Matched filters may be used
    a. To estimate the frequency of the received signal
    b. In parameter estimation problems
    c. To estimate the distance of the object
    d. All of the above

4. The process of coding multiplexer output into electrical pulses or waveforms for transmission is called
    a. Line coding
    b. Amplitude modulation
    c. FSK
    d. Filtering
5. For a line code, the transmission bandwidth must be
    a. Maximum possible
    b. As small as possible
    c. Depends on the signal
    d. None of the above
6. Regenerative repeaters are used for
    a. Eliminating noise
    b. Reconstruction of signals
    c. Transmission over long distances
    d. All of the above
7. Scrambling of data is
    a. Removing long strings of 1's and 0's
    b. Exchanging of data
    c. Transmission of digital data
    d. All of the above
8. In polar RZ format for coding, symbol '0' is represented by
    a. Zero voltage
    b. Negative voltage
    c. Pulse is transmitted for half the duration
    d. Both b and c are correct
9. In a uni-polar RZ format,
    a. The waveform has zero value for symbol '0'
    b. The waveform has A volts for symbol '1'
    c. The waveform has positive and negative values for '1' and '0' symbol respectively
    d. Both a and b are correct
10. Polar coding is a technique in which
    a. 1 is transmitted by a positive pulse and 0 is transmitted by negative pulse
    b. 1 is transmitted by a positive pulse and 0 is transmitted by zero volts
    c. Both a & b
    d. None of the above
11. The polarities in NRZ format use
    a. Complete pulse duration
    b. Half duration
    c. Both positive as well as negative value
    d. Each pulse is used for twice the duration
12. The format in which the positive half interval pulse is followed by a negative half interval pulse for transmission of '1' is
    a. Polar NRZ format
    b. Bipolar NRZ format

c. Manchester format
d. None of the above

13. The maximum synchronizing capability in coding techniques is present in
    a. Manchester format
    b. Polar NRZ
    c. Polar RZ
    d. Polar quaternary NRZ
14. The advantage of using Manchester format of coding is
    a. Power saving
    b. Polarity sense at the receiver
    c. Noise immunity
    d. None of the above
15. Alternate Mark Inversion (AMI) is also known as
    a. Pseudo ternary coding
    b. Manchester coding
    c. Polar NRZ format
    d. None of the above
16. In DPSK technique, the technique used to encode bits is
    a. AMI
    b. Differential code
    c. Uni polar RZ format
    d. Manchester format
17. The channel capacity according to Shannon's equation is
    a. Maximum error free communication
    b. Defined for optimum system
    c. Information transmitted
    d. All of the above
18. For a binary symmetric channel, the random bits are given as
    a. Logic 1 given by probability P and logic 0 by (1-P)
    b. Logic 1 given by probability 1-P and logic 0 by P
    c. Logic 1 given by probability P2 and logic 0 by 1-P
    d. Logic 1 given by probability P and logic 0 by (1-P)2
19. The technique that may be used to increase average information per bit is
    a. Shannon-Fano algorithm
    b. ASK
    c. FSK
    d. Digital modulation techniques

UNIT-III

BASE BAND TRANSMISSION AND OPTIMAL RECEPTION OF DIGITAL SIGNAL

1) Code rate r, k information bits and n as total bits, is defined as
    a. r = k/n
    b. k = n/r
    c. r = k * n
    d. n = r * k
2) The information rate R for given average information H= 2.0 for analog signal band limited to B Hz is
    a. 8 B bits/sec
    b. 4 B bits/sec
    c. 2 B bits/sec
    d. 16 B bits/sec
3) Information rate is defined as
    a. Information per unit time
    b. Average number of bits of information per second
    c. rH
    d. All of the above
4) The mutual information
    a. Is symmetric
    b. Always non negative
    c. Both a and b are correct
    d. None of the above
5) The relation between entropy and mutual information is
    a. I(X;Y) = H(X) – H(X/Y)
    b. I(X;Y) = H(X/Y) – H(Y/X)
    c. I(X;Y) = H(X) – H(Y)
    d. I(X;Y) = H(Y) – H(X)
6) Entropy is
    a. Average information per message
    b. Information in a signal
    c. Amplitude of signal
    d. All of the above
7) The memory less source refers to
    a. No previous information
    b. No message storage
    c. Emitted message is independent of previous message
    d. None of the above
8) The information I contained in a message with probability of occurrence is given by (k is constant)
    a. I = k log21/P
    b. I = k log2P
    c. I = k log21/2P
    d. I = k log21/P2

9) The expected information contained in a message is called
   a. Entropy
   b. Efficiency
   c. Coded signal
   d. None of the above
10) Overhead bits are
   a. Framing and synchronizing bits
   b. Data due to noise
   c. Encoded bits
   d. None of the above
11) ISI may be removed by using
   a. Differential coding
   b. Manchester coding
   c. Polar NRZ
   d. None of the above
12) Timing jitter is
   a. Change in amplitude
   b. Change in frequency
   c. Deviation in location of the pulses
   d. All of the above
13) Probability density function defines
   a. Amplitudes of random noise
   b. Density of signal
   c. Probability of error
   d. All of the above
14) Impulse noise is caused due to
   a. Switching transients
   b. Lightning strikes
   c. Power line load switching
   d. All of the above
15) In coherent detection of signals,
   a. Local carrier is generated
   b. Carrier of frequency and phase as same as transmitted carrier is generated
   c. The carrier is in synchronization with modulated carrier
   d. All of the above
16) Synchronization of signals is done using
   a. Pilot clock
   b. Extracting timing information from the received signal
   c. Transmitter and receiver connected to master timing source
   d. All of the above

UNIT-IV LINEAR BLOCK CODES & CYCLIC CODES:

1) Graphical representation of linear block code is known as
   a. Pi graph
   b. Matrix
   c. Tanner graph
   d. None of the above
2) A linear code
   a. Sum of code words is also a code word
   b. All-zero code word is a code word
   c. Minimum hamming distance between two code words is equal to weight of any non zero code word
   d. All of the above
3) For decoding in convolution coding, in a code tree,
   a. Diverge upward when a bit is 0 and diverge downward when the bit is 1
   b. Diverge downward when a bit is 0 and diverge upward when the bit is 1
   c. Diverge left when a bit is 0 and diverge right when the bit is 1
   d. Diverge right when a bit is 0 and diverge left when the bit is 1
4) The code in convolution coding is generated using
   a. EX-OR logic
   b. AND logic
   c. OR logic
   d. None of the above
5) Interleaving process permits a burst of B bits, with l as consecutive code bits and t errors when
   a. $B \leq 2tl$
   b. $B \geq tl$
   c. $B \leq tl/2$
   d. $B \leq tl$
6) For a (7, 4) block code, 7 is the total number of bits and 4 is the number of
   a. Information bits
   b. Redundant bits
   c. Total bits- information bits
   d. None of the above
7) Parity bit coding may not be used for
   a. Error in more than single bit
   b. Which bit is in error
   c. Both a & b
   d. None of the above
8) Parity check bit coding is used for
   a. Error correction
   b. Error detection
   c. Error correction and detection
   d. None of the above

9) For hamming distance dmin and t errors in the received word, the condition to be able to correct the errors is
   a. $2t + 1 \leq dmin$
   b. $2t + 2 \leq dmin$
   c. $2t + 1 \leq 2dmin$
   d. Both a and b
10) For hamming distance dmin and number of errors D, the condition for receiving invalid codeword is
   a. $D \leq dmin + 1$
   b. $D \leq dmin - 1$
   c. $D \leq 1 - dmin$
   d. $D \leq dmin$
11) Run Length Encoding is used for
   a. Reducing the repeated string of characters
   b. Bit error correction
   c. Correction of error in multiple bits
   d. All of the above
12) The prefix code is also known as
   a. Instantaneous code
   b. Block code
   c. Convolutional code
   d. Parity bit
13) The minimum distance for unextended Golay code is
   a. 8
   b. 9
   c. 7
   d. 6
14) The Golay code (23,12) is a codeword of length 23 which may correct
   a. 2 errors
   b. 3 errors
   c. 5 errors
   d. 8 errors
15) Orthogonality of two codes means
   a. The integrated product of two different code words is zero
   b. The integrated product of two different code words is one
   c. The integrated product of two same code words is zero
   d. None of the above
16) The probability density function of a Markov process is
   a. p(x1,x2,x3…….xn) = p(x1)p(x2/x1)p(x3/x2)…….p(xn/xn-1)
   b. p(x1,x2,x3…….xn) = p(x1)p(x1/x2)p(x2/x3)…….p(xn-1/xn)
   c. p(x1,x2,x3……xn) = p(x1)p(x2)p(x3)…….p(xn)
   d. p(x1,x2,x3……xn) = p(x1)p(x2 * x1)p(x3 * x2)……..p(xn * xn-1)
17) The capacity of Gaussian channel is
   a. C = 2B(1+S/N) bits/s
   b. C = B2(1+S/N) bits/s
   c. C = B(1+S/N) bits/s

d. C = B(1+S/N)2 bits/s

18) For M equally likely messages, the average amount of information H is
   a. H = log10M
   b. H = log2M
   c. H = log10M2
   d. H = 2log10M
19) The channel capacity is
   a. The maximum information transmitted by one symbol over the channel
   b. Information contained in a signal
   c. The amplitude of the modulated signal
   d. All of the above
20) The capacity of a binary symmetric channel, given H(P) is binary entropy function is
   a. 1 – H(P)
   b. H(P) – 1
   c. 1 – H(P)2
   d. H(P)2 – 1
21) According to Shannon Hartley theorem,
   a. The channel capacity becomes infinite with infinite bandwidth
   b. The channel capacity does not become infinite with infinite bandwidth
   c. Has a tradeoff between bandwidth and Signal to noise ratio
   d. Both b and c are correct
22) The negative statement for Shannon's theorem states that
   a. If R > C, the error probability increases towards Unity
   b. If R < C, the error probability is very small
   c. Both a & b
   d. None of the above
23) For M equally likely messages, M>>1, if the rate of information R ≤ C, the probability of error is
   a. Arbitrarily small
   b. Close to unity
   c. Not predictable
   d. Unknown
24) For M equally likely messages, M>>1, if the rate of information R > C, the probability of error is
   a. Arbitrarily small
   b. Close to unity
   c. Not predictable
   d. Unknown
25) In Alternate Mark Inversion (AMI) is
   a. 0 is encoded as positive pulse and 1 is encoded as negative pulse
   b. 0 is encoded as no pulse and 1 is encoded as negative pulse
   c. 0 is encoded as negative pulse and 1 is encoded as positive pulse
   d. 0 is encoded as no pulse and 1 is encoded as positive or negative pulse
26) Advantages of using AMI
   a. Needs least power as due to opposite polarity

b. Prevents build-up of DC
c. May be used for longer distance
d. All of the above

27) The interference caused by the adjacent pulses in digital transmission is called
a. Inter symbol interference
b. White noise
c. Image frequency interference
d. Transit time noise

28) Eye pattern is
a. Is used to study ISI
b. May be seen on CRO
c. Resembles the shape of human eye
d. All of the above

29) The time interval over which the received signal may be sampled without error may be explained by
a. Width of eye opening of eye pattern
b. Rate of closure of eye of eye pattern
c. Height of the eye opening of eye pattern
d. All of the above

30) For a noise to be white Gaussian noise, the optimum filter is known as
a. Low pass filter
b. Base band filter
c. Matched filter
d. Bessel filter

31) Matched filters are used
a. For maximizing signal to noise ratio
b. For signal detection
c. In radar
d. All of the above

32) The number of bits of data transmitted per second is called
a. Data signaling rate
b. Modulation rate
c. Coding
d. None of the above

33) Pulse shaping is done
a. to control Inter Symbol Interference
b. by limiting the bandwidth of transmission
c. after line coding and modulation of signal
d. All of the above

34) The criterion used for pulse shaping to avoid ISI is
a. Nyquist criterion
b. Quantization
c. Sample and hold
d. PLL

35) The filter used for pulse shaping is
a. Raised – cosine filter

b. Sinc shaped filter
c. Gaussian filter
d. All of the above

36) Roll – off factor is defined as
a. The bandwidth occupied beyond the Nyquist Bandwidth of the filter
b. The performance of the filter or device
c. Aliasing effect
d. None of the above

37) Nyquist criterion helps in
a. Transmitting the signal without ISI
b. Reduction in transmission bandwidth
c. Increase in transmission bandwidth
d. Both a and b

38) The Nyquist theorem is
a. Relates the conditions in time domain and frequency domain
b. Helps in quantization
c. Limits the bandwidth requirement
d. Both a and c

39) The difficulty in achieving the Nyquist criterion for system design is
a. There are abrupt transitions obtained at edges of the bands
b. Bandwidth criterion is not easily achieved
c. Filters are not available
d. None of the above

40) Equalization in digital communication
a. Reduces inter symbol interference
b. Removes distortion caused due to channel
c. Is done using linear filters
d. All of the above

41) Zero forced equalizers are used for
a. Reducing ISI to zero
b. Sampling
c. Quantization
d. None of the above

UNIT-V SPREAD SPECTRUM MODULATION:

1) The transmission bandwidth of the raised cosine spectrum is given by
a. $Bt = 2w(1 + \alpha)$
b. $Bt = w(1 + \alpha)$
c. $Bt = 2w(1 + 2\alpha)$
d. $Bt = 2w(2 + \alpha)$

2) The preferred orthogonalization process for its numerical stability is
a. Gram- Schmidt process
b. House holder transformation
c. Optimization
d. All of the above

3) For two vectors to be orthonormal, the vectors are also said to be orthogonal. The reverse of the same
    a. Is true
    b. Is not true
    c. Is not predictable
    d. None of the above
4) Orthonormal set is a set of all vectors that are
    a. Mutually orthonormal and are of unit length
    b. Mutually orthonormal and of null length
    c. Both a & b
    d. None of the above
5) In On-Off keying, the carrier signal is transmitted with signal value '1' and '0' indicates
    a. No carrier
    b. Half the carrier amplitude
    c. Amplitude of modulating signal
    d. None of the above
6) ASK modulated signal has the bandwidth
    a. Same as the bandwidth of baseband signal
    b. Half the bandwidth of baseband signal
    c. Double the bandwidth of baseband signal
    d. None of the above
7) Coherent detection of binary ASK signal requires
    a. Phase synchronization
    b. Timing synchronization
    c. Amplitude synchronization
    d. Both a and b
8) The probability of error of DPSK is _____ than that of BPSK.
    a. Higher
    b. Lower
    c. Same
    d. Not predictable
9) In Binary Phase Shift Keying system, the binary symbols 1 and 0 are represented by carrier with phase shift of
    a. Π/2
    b. Π
    c. 2Π
    d. 0
10) BPSK system modulates at the rate of
    a. 1 bit/ symbol
    b. 2 bit/ symbol
    c. 4 bit/ symbol
    d. None of the above
11) The BPSK signal has +V volts and -V volts respectively to represent
    a. 1 and 0 logic levels
    b. 11 and 00 logic levels
    c. 10 and 01 logic levels

d. 00 and 11 logic levels

12) The binary waveform used to generate BPSK signal is encoded in
   a. Bipolar NRZ format
   b. Manchester coding
   c. Differential coding
   d. None of the above

13) The bandwidth of BFSK is _____ than BPSK.
   a. Lower
   b. Same
   c. Higher
   d. Not predictable

14) In Binary FSK, mark and space respectively represent
   a. 1 and 0
   b. 0 and 1
   c. 11 and 00
   d. 00 and 11

15) The frequency shifts in the BFSK usually lies in the range
   a. 50 to 1000 Hz
   b. 100 to 2000 Hz
   c. 200 to 500 Hz
   d. 500 to 10 Hz

16) The spectrum of BFSK may be viewed as the sum of
   a. Two ASK spectra
   b. Two PSK spectra
   c. Two FSK spectra
   d. None of the above

17) The maximum bandwidth is occupied by
   a. ASK
   b. BPSK
   c. FSK
   d. None of the above

18) QPSK is a modulation scheme where each symbol consists of
   a. 4 bits
   b. 2 bits
   c. 1 bits
   d. M number of bits, depending upon the requirement

19) The data rate of QPSK is _____ of BPSK.
   a. Thrice
   b. Four times
   c. Twice
   d. Same

20) QPSK system uses a phase shift of
   a. Π
   b. Π/2
   c. Π/4
   d. 2Π

21) Minimum shift keying is similar to
   a. Continuous phase frequency shift keying
   b. Binary phase shift keying
   c. Binary frequency shift keying
   d. QPSK

22) In MSK, the difference between the higher and lower frequency is
   a. Same as the bit rate
   b. Half of the bit rate
   c. Twice of the bit rate
   d. Four time the bit rate

23) The technique that may be used to reduce the side band power is
   a. MSK
   b. BPSK
   c. Gaussian minimum shift keying
   d. BFSK

PROGRAMME: B.Tech ECE AC:YEAR: **2018-2019**	DEGREE: **B.TECH III YEAR**
COURSE: **FUNDAM ENTALS OF MANAGEMENT**	SEMESTER: **I** CREDITS: 4 COURSE COORDINATOR: Mr.M. Radhakrishna
COURSE CODE: **SM504MS** REGULATION:**R16**	COURSE TYPE: **REGULAR**
COURSE AREA/DOMAIN: ECE	CONTACT HOURS: 4 hours/Week.
CORRESPONDING LAB COURSE CODE : NA	LAB COURSE NAME: **NA**

5.1 COURSE OVERVIEW:

The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

5.2 PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
1	BEFA	**Business Economics** and **Financial Accounting** in which students acquired basic skills about economics and business functions. Financial accounting is a subject helps the students about preparation of company accounts.	II-II

5.3 MARKS DISTRIBUTION:

Session Marks	University End Exam Marks	Total Marks
Mid Semester Test • There shall be two midterm examinations. • Each midterm examination consists of subjective type and objective type tests. • The subjective test is for 10 marks of 60 minutes duration. • Subjective test of shall contain 4 questions; the student has to answer 2 questions, each carrying 5 marks. • The objective type test is for 10 marks of 20 minutes duration. It consists of 10 multiple choice and 10 objective type questions, the student has to answer all the questions and each carries half mark. • First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion. **Assignment** • Five marks are earmarked for assignments. • There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.	75	100

5.4 EVALUATION SCHEME:

S. No	Component	Duration	Marks
1	I Mid Examination	80minutes	20
2	I Assignment	-	5
3	II Mid Examination	80minutes	20
4	II Assignment	-	5
5	External Examination	3 hours	75

5.5 COURSE OBJECTIVES & OUTCOMES:

Course Objectives	Course Outcomes	Blooms Level
To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills.	The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.	BL1,2,4
To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.	The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt.	BL 1,2,5

BLOOMS LEVEL (BL)

BL 1: Remember / knowledge BL2: Understanding BL3: Apply

BL 4: Analyze BL 5: Evaluate BL 6: Create

5.6 HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency assessed by	Blooms Level
A	Understand the basics of Management functions and structure of Organizations and Procedure for recruitment and selection.	S	Assignments and text book case studies	Apply
B	Understanding the market dynamics namely, demand and supply, demand forecasting, elasticity of demand	H	Assignments and text	Apply &

	and supply, pricing methods and pricing in market structures.		book problems	Analyze
C	Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis	S	Seminars and group Discussions	Apply
D	Understand the importance of Human Resource management system and its importance.	S	Text books and Magazines	Apply & Justify
E	Know how to analyze the performance of organizations and their problem solving procedures	S	Group discussions and Assignments	Apply & Analyze
F	To know the procedure and importance of Budget and forms of budgetary and non budgetary plans and their implementation procedure	S	Text books and Business magazines	Apply
G	To understand the motivational theories and importance of motivational theories. To analyze the effectiveness of motivational theories in decision making policy.	H	Seminars and group discussions	Apply & Justify
H	To understand various forms of leadership styles and asses the performance of organization	S	Seminars & Presentations	Apply

N = None S = Supportive H = Highly Related

5.7 SYLLABUS:

UNIT - I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management- Classical Approach- Scientific and Administrative Management; The Behavioral approach; The Quantitative approach; The Systems Approach; Contingency Approach, IT Approach.

UNIT - II

Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans, Management by Objectives; Development of Business Strategy. Decision making and Problem Solving - Programmed and Non Programmed Decisions, Steps in Problem Solving and Decision Making; Bounded Rationality and Influences on Decision Making; Group Problem Solving and Decision Making, Creativity and Innovation in Managerial Work.

UNIT - III

Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization; Organizational Culture; Organizational Climate and Organizational Change.

Human Resource Management & Business Strategy: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

UNIT - IV

Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during adversity and Crisis; Handling Employee and Customer Complaints, Team Leadership.

Motivation - Types of Motivation; Relationship between Motivation, Performance and Engagement, Content Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT - V

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non- Budgetary Controls. Characteristics of Effective Controls, Establishing control systems, Control frequency and Methods.

TEXT BOOKS:

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.

2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

REFERENCES:

1. Essentials of Management, Koontz Kleihrich, Tata McGraw Hill.

2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012

5.8 COURSE PLAN:

Lecture Number	Unit	Topics to be covered	Reference
1	I	Definition and nature of management	A1,A2
2	I	Scope of management	A1
3	I	Functions of management	A1
4	I	Managerial roles	A1
5	I	Levels of Management, Managerial Skills, Challenges of Management	A1
6	I	Evolution of Managerial skills	A1
7	I	Challenges of management	A1
8	I	Evolution of Management	A1,A2
9	I	Scientific and adminstrative management	A2
10	I	The behavioural approach, Quantitave approach	A2
11	I	The systems approach, contigency approach, IT Approach	A2
12	II	General frame work for planning	A2
13	II	Plananing process, types	A2
14	II	Management by objectives	A1,A2
15	II	Development of business strategy	A1,A2

16	II	Decision making and problem solving	A1,A2
17	II	Programmed and non programmed decisions	A1,A2
18	II	Steps in problem solving and decision making	A1,A2
19	II	Bounded rationality and the influence on decision making	A1
20	II	Group problem solving and decision making	A1
21	II	Creativity and innovation in managerial work	A1
22	III	Principles of organization	A1
23	III	Organization Design	A1
24	III	Organization structures	A1
25	III	Departmentization	A1
26	III	Delegation	A2
27	III	Empowerment, Centralization	A2
28	III	Decentralization, Recentralization	A2
29	III	Orgnaizational culture	A2
30	III	Orgnaizational climate	A2
31	III	orgnaizational change	A2
32	III	Humana resource management and business strategy	A2
33	III	Talent management	A2
34	III	talement management models	A2
35	III	Talent management models and strategic human resource planning	A1,A2
36	III	Recruitment and Selection	A1,A2
37	III	Training and development	A1,A2
38	III	Performance Appraisal	A1,A2

39	IV	Leadership styles	A1,A2
40	IV	Behavioural Leadership	A1,A2
41	IV	Situational Leadership	A1,A2
42	IV	Leadership skills	A1,A2
43	IV	Leader as Mentor and coach	A1,A2
44	IV	Leadership during adversity and crisis	A1,A2
45	IV	Handling Employee and customer complaints	A1,A2
46	IV	Team leadership	A1,A2
47	IV	Types of motivation	A2
48	IV	Relationship between motivation	A2
49	IV	performance and Engagement	A2
50	IV	Content Motivational Theories	A2
51	IV	need and Hierarchy theory	A2
52	IV	Two Factor Theory	A2
53	IV	Theory X and Theory Y.	A2
54	V	Controlling and types and strategies for controlling	A2
55	V	Steps in control process	A1,A2
56	V	Budgetary and Non- Budgetary controls	A1,A2
57	V	Characteristics of effective controls	A1,A2
58	V	Establishing control systems	A1,A2
59	V	Control frequency	A1,A2
60	V	Control methods	A1,A2

5.9 MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Objective	Course Outcomes				
	a	b	c	d	e
I	S		S		
II	H				
III		H			
IV			S		H
V				S	

S= Supportive H= Highly Related

5.10 MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcomes	Program Outcomes													
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
a	S													
b	S	H									S		S	S
c	H	S												
d		S					H				S		H	H
e	S		S		S		S				S		S	

S= Supportive H= Highly Related

5.11 QUESTION BANK:

UNIT-I		
INTRODUCTION TO MANAGEMENT		
GROUP – A (SHORT ANSWER QUESTIONS)		
S.No	**Question**	**Blooms Taxonomy Level**
1.	Define Management	Understand
2.	Objectives of Management	Understand
3.	Importance of Management	Apply
4.	Limitations of Management	Understand
5.	Challenges of Management	Understand
6.	Principles of Management	Remember
7.	Role of Managers in Organizations	Apply
8.	Define Scientific management process	Apply
9.	Define Administrative management process	Apply
10.	Importance of Evolution of management	Understand
11.	Quantitative Approach in Management process	Apply
12.	Importance of information technology in management process	Apply
13.	Explain Social needs of workers in an organization	Understand

14.	Discuss the challenges of manager	Understand
15.	Importance of Contingency Approach	Understand
GROUP - B (LONG ANSWER QUESTIONS)		
1.	Explain Nature, objectives and importance of Management functions	Remember
2.	Discuss the various levels involved in Management process	Understand
3.	Discuss the important roles and responsibilities of Manager in an organization	Evaluate
4.	Discuss the Role played by the manager in crisis situation in an organization	Understand
5.	Discuss the Functions or Principles of Henry Fayol in modern management.	Remember
6.	Discuss the importance of F.W Taylor'r Management functions	Understand
7.	Discuss the various challenges and Managerial functions of an organization	Understand
8.	Discuss the Importance of Evolution process in management	Understand
9.	Discuss the Importance of Behavioral Approach	Evaluate
10.	Discuss the Evaluation process in Modern Approach	Evaluate
GROUP - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	Explain Evaluation of Quantitative Approach with Numerical Example	Apply
2	Case studies related to Modern management practices	Analyze
UNIT-II		

PLANNING AND DECISION MAKING		
GROUP – A (SHORT ANSWER QUESTIONS)		
1	Define planning	Understand
2	Importance of Planning	Understand
3	What is Planning process	Understand
4	Functions of Planning	Understand
5	Define Business Strategy	Understand
6	What is Decision making	Analyze
7	Defined programmed decisions	Analyze
8	What is Non programmed decisions	Analyze
9	Define Rationality in management	Apply
10	What is group problem solving	Understand
11	Define Creativity	Understand
12	Factors influencing creativity process	Understand
13	Managerial work	Understand
14	Objectives of planning	Understand
15	What is MBO	Evaluate
GROUP – B (LONG ANSWER QUESTIONS)		
1	Discuss the nature, objectives and importance of Planning	Evaluate

2	Explain the factors influencing the planning process	Understand
3	Explain the steps involved in Planning process	Evaluate
4	What is MBO and explain the steps involved in MBO	Evaluate
5	What are the advantages and disadvantages of planning process	Understand
6	Discuss the decision making process in planning	Analyze
7	Discuss the importance of group problem solving in planning process	Analyze
8	Explain the bounded rationality and Influence on Decision making	Understand
9	Explain the problem solving process in Decision making	Evaluate
10	Explain the Importance of creativity and innovation in managerial work	Evaluate
UNIT-III		
ORGANIZATION AND HRM		
GROUP - A (SHORT ANSWER QUESTIONS)		
1	Define organization	Remember
2	Discuss organization structure	Remember
3	What is Departmentation	Understand
4	What is Delegation	Understand
5	What is Empowerment	Analyze
6	Discuss Centralization and Decentralization	Analyze
7	What is Recentralization	Understand

8	Discuss organizational Culture	Understand
9	What is organizational climate	Understand
10	Discuss organizational Change	Understand
11	What is Talent management	Analyze
12	What strategic human resource management	Understand
GROUP - B (LONG ANSWER QUESTIONS)		
1	Define organization and explain the functions of organization	Understand
2	Discuss the process of organizational design and explain the factors influencing organizational design	Analyze
3	Discuss the Advantages and Disadvantages of Organizational design	Analyze
4	Explain the various factors influencing organizational culture	Evaluate
5	Discuss the Importance of Centralization, Decentralization and Recentralization	Evaluate
6	Discuss the objectives and functions of Human Resource management	Evaluate
7	Explain the various models in Talent management	Evaluate
8	Explain the importance and objectives of Recruitment and Selection	Apply
9	Discuss the importance of Training and Development	Evaluate
10	What is Performance Appraisal and explain the factors influencing Performance Appraisal	Understand
UNIT-IV		
LEADING AND MOTIVATION		

GROUP - A (SHORT ANSWER QUESTIONS)		
1	Define Leadership	Understand
2	Discuss power and Authority	Understand
3	Discuss leadership skills	Understand
4	Define leader	Understand
5	Discuss the importance of Mentor	Understand
6	Discuss the importance of Customer complaints	Understand
7	What is Team leadership	Analyze
8	Define motivation	Understand
9	Define Performance management	Understand
10	What is Hierarchy theory	Analyze
GROUP – B (LONG ANSWER QUESTIONS)		
1	Define leadership and explain the factors influencing leadership	Understand
2	Discuss the objectives and functions of Power and Authority	Analyze
3	Discuss the various forms of leadership styles	Apply
4	Explain the functions of leadership during Adversity and Crisis	Evaluate
5	Define motivation and explain the theories of motivation	Understand
6	Discuss the procedure for customer handling system	Understand
7	Discuss the objectives and importance of two factors theory	Apply

UNIT- V		
CONTROLLING		
GROUP – A (SHORT ANSWER QUESTIONS)		
1	Define Control	Understand
2	What is Control process	Understand
3	Define Budget	Apply
4	Define factors influencing budget	Analyze
5	What is Effective controlling system	Understand
6	What is control frequency	Evaluate
7	Explain the factors influencing controlling process	Analyze
8	Define strategy	Understand
GROUP – B (LONG ANSWER QUESTIONS)		
1	Explain the types of Control systems in an organization	Analyze
2	Discuss the objectives and procedure to design control system in an organization	Evaluate
3	Discuss Budgetary and non budgetary control systems	Analyze
4	Discuss the characteristics of effective control systems	Apply
5	What are the advantages and disadvantages of Control system in organization	Understand
6	Define Control frequency and explain the importance of control frequency	Understand

7	Discuss the Advantages and limitations of Control frequency	Analyze
8	Discuss the steps involved in controlling process	Understand

5.12 ASSIGNMENT TOPICS:

UNIT-I INTRODUCTION TO MANAGEMENT		
S. No	**Questions**	**Blooms Taxonomy Level**
1	Explain Nature, objectives and importance of Management functions	Understand
2	Discuss the various levels involved in Management process	Understand
3	Discuss the important roles and responsibilities of Manager in an organization	Evaluate
4	Discuss the various challenges and Managerial functions of an organization	Analyze
5	Discuss the Importance of Evolution process in management	Understand
UNIT II		
PLANNING AND DECISION MAKING		
1	Explain the factors influencing the planning process	Understand
2	Explain the steps involved in Planning process	Evaluate
3	What is MBO and explain the steps involved in MBO	Evaluate
4	What are the advantages and disadvantages of planning process	Understand
5	Explain the bounded rationality and Influence on Decision making	Analyze
6	Explain the problem solving process in Decision making	Evaluate
7	Explain the Importance of creativity and innovation in managerial	Evaluate

	work	
UNIT- III		
ORGANIZATION AND HRM		
1.	Define organization and explain the functions of organization	Understand
2.	Discuss the process of organizational design and explain the factors influencing organizational design	Analyze
3.	Discuss the Advantages and Disadvantages of Organizational design	Analyze
4.	Explain the various factors influencing organizational culture	Evaluate
5.	Discuss the importance of Training and Development	Evaluate
6.	What is Performance Appraisal and explain the factors influencing Performance Appraisal	Evaluate
UNIT-V		
LEADING AND MOTIVATION		
1.	Discuss the objectives and functions of Power and Authority	Analyze
2	Explain the functions of leadership during Adversity and Crisis	Understand
3.	Discuss the procedure for customer handling system	Apply
4.	Discuss the objectives and importance of two factors theory	Evaluate
5.	Discuss the importance of Customer complaints	Evaluate
UNIT-V		
CONTROLLING		
1.	Discuss the objectives and procedure to design control system in an organization	Analyze
2.	Discuss Budgetary and non budgetary control systems	Evaluate
3.	Discuss the characteristics of effective control systems	Apply
4.	What are the advantages and disadvantages of Control system in organization	Understand
5	Discuss the Advantages and limitations of Control frequency	Understand

5.13 OBJECTIVE QUESTIONS:

UNIT – I

UNIT-I INTRODUCTION TO MANAGEMENT :

1. **Who is a person who advanced early scientific management principles?**

(a) Weber

(b) Taylor

(c) Vest

(d) Fayol

2. **A reporting relationship in which an employee receives orders from, and reports to, only one supervisor is known as:**

(a) Line of authority.

(b) Centralization.

(c) Unity of direction.

(d) Unity of command.

3. **Which worked on administrative management theory:**

I. **Fayol**

II. **Parker**

III. **Weber**

(a) I and III

(b) II and III

(c) none of these worked on administrative management theory

(d) I, II, and III

4. **_____ is the study of how to create an organizational structure that leads to high efficiency and effectiveness.**

(a) Scientific management

(b) Job specialization

(c) Administrative management

(d) Allocation management

5. **_____is the singleness of purpose that makes possible the creation of one plan of action to guide managers in resource allocations.**

(a) Unity of direction

(b) Unity of command

(c) Unity of authority

(d) Unity of resources

6. **Which is an organizational - environmental theory?**

I. The open-systems view

II. Contingency theory

III. The Theory of Bureaucracy

IV. Theory Z

(a) I and II

(b) I, III, and IV

(c) II, III, and IV

(d) I, II, and III

7. **Theory is based on positive assumptions about workers.**

(a) Z

(b) X

(c) **Y**

(d) C

8. **The_____theory states a manager's choice of organizational structures and control systems depends on characteristics of the external environment.**

(a) Mechanistic

(b) Management science

(c) Organic

(d) Contingency

9. **Which is not one of Fayol's principles:**

(a) Authority and responsibility

(b) Line of authority

(c) Globalization

(d) Unity of command

10. **Which is not a management science theory:**

(a) Operations Management

(b) TQM

(c) MIS

(d) None of these

11. **Theory states that the average employee is lazy and will try to do as little as possible.**

(a) X

(b) Y

(c) Z

(d) None

12. **In recent history, workers have felt that they should be empowered in the workplace. This is an example of**

(a) social influences

(b) political influences

(c) technological influences

(d) global influences

13. **Scientific management, administrative management, and bureaucratic management belong to the management viewpoint known as the**

(a) classical perspective

(b) behavioral perspective

(c) quantitative perspective

(d) systems perspective

14 The theorist that advocated standard methodology for doing a task and suggested that workers were motivated by pay according to output (piecework) is

(a) Elton Mayo

(b) Max Weber

(c) Frederick Taylor

(d) Henri Fayol

14. **As a Theory Y manager, you believe that your employees**

(a) Dislike work and will avoid it if possible.

(b) need a hierarchy of authority and lots of rules and regulations.

(c) should be trained to standard methodology in all their tasks.

(d) are self-motivated and self-directed toward achieving organizational goals.

15.What does the case, 'Scientific management in action' illustrate?

(a) Scientific management theory is an outdated management theory.

(b) Managers should apply classical management theory to their everyday work if they want to be more effective.

(c) A traditional approach to management can be successfully applied to the problems of a modern organization.

(d) Quality usually suffers as productivity increases.

16. **According to Frederick Taylor, who was to blame for the inefficiency in organisations?**

(a) The unions.

(b) The managers.

(c) The organization as a whole.

(d) The workers

17. **Which of these was not an integral part of scientific management?**

(a) Differential pay rates.

(b) Worker control of production.

(c) Systematic selection of workers.

(d) Work specialisation

18. **Which of the following is not a valid criticism of scientific management theory?**

(a) Increases in pay for workers were not proportional to increases in productivity.

(b) Worker discretion over the execution of the task was reduced.

(c) Jobs became too complex for workers to handle.

(d) Fear of redundancy was increased.

19. **Which of the following is not a fundamental characteristics of Bureaucratic Management?**

(a) Specialization of labor

(b) Well defined hierarchy

(c) Striving to be a 'first-class worker'

(d) Formal rules and regulations.

20. **Which of these statements concerning Weber's concept of Bureaucracy is not correct?**

(a) It is based on rules and procedures rather than personal preference and judgment.

(b) It is still a relevant concept in today's organization.

(c) It has acquired a negative reputation for inefficiency and rigidity.

(d) It rejects rational approaches to managing organizations

21. **Which of the following was an early key management idea, pre-dating the work of Frederick Taylor and Max Weber?**

(a) Differential pay rates.

(b) Rule-by-the-office.

(c) Work specialization.

(d) Classical management theory.

22. **Which of the following was the key aim of scientific management?**

(a) To increase worker control of production.

(b) To increase productivity.

(c) To decrease absenteeism.

(d) To develop time-and-motion studies.

23. **Which of the following is NOT a key concept associated with scientific management?**

(a) One best way.

(b) Formalisation.

(c) Time-and-motion studies.

(d) Systematic selection.

24. **Contingency theory suggests which of the following as a limitation of classical management theory?**

(a) Management approaches need to take into account the informal social life of workers at work.

(b) Management approaches need to take into account complexity and instability in the environment.

(c) Everything is contingent upon the workers in an organisation.

(d) Management practices need to recognise stability in the environment

(e)

UNIT-II PLANNING AND DECISION MAKING:

1. **Planning is:**

(a) looking ahead,

(b) guiding people,

(c) delegation of authority,

(d) fundamentals of staffing

2. **Single use plans are:**

(a) applicable in non-recurring situation,

(b) deals with recurring situations,

(c) budgets,

(d) strategic

3. **Programs are a complex of:**

(a) budgets,

(b) goals & policies,

rules,

(c) None of the above.

[**Hint:** Programs are complex of goals, policies, rules, procedures, tasks.]

4. **The limitations of planning are:**

(a) proper environment,

(B) planning premises,

(c) wrong information,

(d)feasibility.

[**Hint:** Wrong information and time involved are the limitations of planning.]

5. **What are the three levels of planning?**

(a) Operational, intermediate and strategic

(b) Headquarters, divisional and local

(c) Top, middle and bottom

(d) None of the above

6. **All of the following would be steps or concerns in the process of strategic planning except:**

(a) Designing a sound business portfolio.

(b) Checking to see if an advertising spot had been run in its allotted time slot.

(c) Setting supporting objectives.

(d) Defining a clear company mission.

7. **Identify the best definition of planning.**

(a) An integrated process in which plans are formulated, carried out and controlled.

(b) The core activity of planners and planning departments.

(c) Setting an organisation's objectives and the means of reaching them.

(d) Devising ways of achieving the objectives of an organisation.

8. Budget refers to

(a) Planned target ofperformance

(b) Steps of handling future activities

(c) Systematic action and allocation of resources

(d) Statement of expected results expressed in numerical terms

9. Which of the following indicates the importance of planning?

(a) Makes way for orderly activities

(b) Provides a basic for control in an organization

(c) Reduces risk ofuncertainty

(d) All of the above.

10. Which of the following is not a technique of planning?

(a) Budgeting

(b) Balanced score card

(c) PERT CPM

(d) Management by Objectives.

11. _____plans have clearly defined objectives

(a) Directional

(b) Flexible

(c) Specific

(d) Standing.

12. Organizing refers to:

(a) planning,

(b) delegation of authority,

(c) training,

(d) selection

13. Organizing aims to serve:

(a) common purpose,

(b) corruption,

(c) authority structure,

(d) All of the above.

14. Organizing destroys:

(a) individual relationships,

(b) plans,

(c) simplicity in the organization,

(d) environment.

15. The principle of objective states:

(a) delegation of authority,

(b) existence for a purpose,

(c) formal organization,

(d) none of the above.[**Hint:** An organization must exist for a purpose is the principle of objective.]

16. For effective organizing, an organization required:

(a) principle of balance,

(b) span of management,

(c) organization process,

(d) planning and forecasting.

17. The structure of organization includes:

(a) identification and classification of required activities,

(b) informal organization,

(c) establishing enterprise objectives,

(d) authority relationships.

(e)

18. The degree to which an organization relies on rules and procedures to direct the behaviour of employees is:

(a) complexity,

(b) formalization,

(c) centralization,

(d) motivation.

19. In a formal organization, "power" is associated with:

(a) an individual,

(b) position,

(c) relationship,

(d) control

20. Delegation is:

(a) a continuous process,

(b) unfolding talents,

(c) granting the right to command.

[**Hint:** Delegation is the act of granting of conferring something and the term authority means right to command.]

21. Unity of command means:

(a) parity of authority and responsibility,

(b) flow of command from subordinate to superior,

(c) flow of command from superior to subordinate,

(d) parity in controlling.

22. Defective delegation:

(a) hampers coordination

(b) size of the organization,

(c) establish proper controls,

(d) establish sources of powers.

23. Indicate which of the following is NOT among the six main types of organization structure–

(a) Line organization

(b) Functional structure

(c) Committees

(d) Department

24. Organization structure is primarily concerned with_____and_____of tasks and authority.

(a) Allocation and Delegation

(b) Allocation and apportionment

(c) Reporting and delegating

(d) Setting standards and delegation

25. Line organization is also known as_____organization.

(a) Scalar

(b) Chain

(c) Matrix

(d) Project

UNIT –III ORGANIZATION & HRM:

1. Selection devices must:

(a) be explained,

(b) match the job in question,

(c) to be cost-effective

(d) none of the above.

2. The popular on-the-job training methods include:

(a) job rotation,

(b) classroom lectures,

(c) films.

(d) description and displays

[**Hint:** On-the-job training methods allow the workers to work in a realistic work environment and

gather experiences.]

3. Need refers to:

(a) control information and performance review,

(b) key result areas and statement of objectives,

(c) agree what you expect from me,

(d) All of the above.

[**Hint:** Need states agree what you refer from me and give me an opportunity to perform.]

4. Staffing refers to:

(a) measuring performance,

(b) managing the positions,

(c) management in action,

(d) making strategic plans.

[**Hint:** Staffing refers to appointing the right person for the right job.]

5. Non-financial incentives have many things to do with:

(a) Directing,

(b) Motivation,

(c) Planning,

(d) organising.

6. Staffing needs:

(a) man power planning,

(b) authority,

(c) communication,

(d) coordination.

[**Hint:** Staffing needs estimates of present and future needs of managerial man power and therefore it needs some pre-thinking.]

7. HRD refers to:

(a) remuneration,

(b) development,

(c) controlling,

(d) planning

8. Recruitment covers:

(a) selection,

(b) job analysis,

(c) time,

(d) none of the above.

[**Hint:** Recruitment covers job analysis, job design and job descriptions.]

9. Training is the process of:

(a) motivation

(b) increasing knowledge and skill

(c) testing.

(d) employee recommendations.

10. Vestibule training provides the worker with:

(a) on the job training,

(b) off the job training,

(c) real life presentations off the job

(d) demonstration

[**Hint:** The worker is provided with a real life presentation but not on the job directly.]

11. Which of the following is not a characteristic of formal organization:

Able to communicate with one another

Willing to act in an atmosphere of cooperation

Share a common implicit purpose

Share a common explicit purpose

12. :**The obligation on the part of subordinate to complete the given job is called**

Authority

Power

Reliability

Responsibility

13: **The process of transferring the authority from top to the lower levels in the organization is called**

Authority

Delegation

Power

Responsibility

14: **What is the type of organization when the authority is delegated to the regional offices**

Centralized

Decentralized

Both

None

15: **Which of the following is not defined by V.A.Graicunas classification for superior-subordinate relationships**?

Group Relationships

Direct single relationships

Direct group relationships

Cross relationships

16: **Which one of the following is a disadvantage for wide span of control?**

Fewer levels of management

Difficult to supervise the subordinates directly

Lower supervision costs

Fewer levels of decision making

17: Which one of the following is not a cardinal principal of sound organization?

Flow of authority

Maximum number of subordinates

Attain balance

Specialization

18: The line organization is favoured because?

More scope for favoritism

No scope for specialization

Flexibility

No scope for Nepotism

19: Which one of the following refers to a project organization

Line organization

Military organization

Scalar organization

Matrix organization

20: Which of the following process of classifying the organization on the basis of similar activities?

formulation

Departmentation

Execution

Implementation

21: Which of the following is a merit for functional organization?

Calls for more coordination

Delayed decision making

Offers better control

Expensive in terms of time

22: Which one of the following is a merit for matrix organization?

Calls for greater degree of coordination

Difficult to define authority

Offers operations freedom

Difficult to define authority

23: Which of the following is a demerit for matrix organization?

Focuses on end results

Employees may find it frustrating to work with two bosses

Maintains professional identity

Seeks to optimize the utilization of resources

24: Which of the following allows an easy reallocation of resources?

Line and staff organization

Product organization

Matrix organization

UNIT IV (LEADERSHIP & MOTIVATION):

1. What does the case scientific management inaction illustrate?

(e) Scientific management theory is an outdated management theory.

(f) Managers should apply classical management theory to their everyday work if they want to be more effective.

(g) A traditional approach to management can be successfully applied to the problems of a modern organisation.

(h) Quality usually suffers as productivity increases.

2. **According to Frederick Taylor, who was to blame for the inefficiency in organisations?**

(e) The unions.

(f) The managers.

(g) The organisation as a whole.

(h) The workers

3. **Which of these was not an integral part of scientific management?**

(e) Differential pay rates.

(f) Worker control of production.

(g) Systematic selection of workers.

(h) Work specialisation

4. **Which of the following is not a valid criticism of scientific management theory?**

(e) Increases in pay for workers were not proportional to increases in productivity.

(f) Worker discretion over the execution of the task was reduced.

(g) Jobs became too complex for workers to handle.

(h) Fear of redundancy was increased.

5. **Which of the following is not a fundamental characteristics of Bureaucratic Management?**

(e) Specialisation of labour

(f) Well defined hierarchy

(g) Striving to be a 'first-class worker'

(h) Formal rules and regulations.

6. **Which of these statements concerning Weber's concept of Bureaucracy is not correct?**

(e) It is based on rules and procedures rather than personal preference and judgement.

(f) It is still a relevant concept in today's organisation.

(g) It has acquired a negative reputation for inefficiency and rigidity.

(h) It rejects rational approaches to managing organizations

7. **Which of the following was an early key management idea, pre-dating the work of Frederick Taylor and Max Weber?**

(e) Differential pay rates.

(f) Rule-by-the-office.

(g) Work specialization.

(h) Classical management theory.

8. **Which of the following was the key aim of scientific management?**

(e) To increase worker control of production.

(f) To increase productivity.

(g) To decrease absenteeism.

(h) To develop time-and-motion studies.

9. **Which of the following is NOT a key concept associated with scientific management?**

(e) One best way.

(f) Formalization.

(g) Time-and-motion studies.

(h) Systematic selection.

10. **Contingency theory suggests which of the following as a limitation of classical management theory?**

(f) Management approaches need to take into account the informal social life of workers at work.

(g) Management approaches need to take into account complexity and instability in the environment.

(h) Everything is contingent upon the workers in an organization.

(i) Management practices need to recognize stability in the environment

11. **Unity of command means:**

(e) parity of authority and responsibility,

(f) flow of command from subordinate to superior,

(g) flow of command from superior to subordinate,

(h) parity in controlling.

12. **Defective delegation:**

(e) hampers coordination

(f) size of the organization,

(g) establish proper controls,

(h) establish sources of powers.

13. **Indicate which of the following is NOT among the six main types of organization structure–**

(e) Line organization

(f) Functional structure

(g) Committees

(h) Department

14. **Organisattion structure is primarily concerned with_____and_____of tasks and authority.**

(e) Allocation and Delegation

(f) Allocation and apportionment

(g) Reporting and delegating

(h) Setting standards and delegation

15. **Line organization is also known as_____organization.**

(e) Scalar

(f) Chain

(g) Matrix

(h) Project

UNIT V (CONTROLLING):

11. Which of the following is not a characteristic of formal organization:

Able to communicate with one another

Willing to act in an atmosphere of cooperation

Share a common implicit purpose

Share a common explicit purpose

12. The obligation on the part of subordinate to complete the given job is called

Authority

Power

Reliability

Responsibility

13. The process of transferring the authority from top to the lower levels in the organization is called

Authority

Delegation

Power

Responsibility

14. What is the type of organization when the authority is delegated to the regional offices

Centralized

Decentralized

Both

None

15. Which of the following is not defined by V.A.Graicunas classification for superior-subordinate relationships?

Group Relationships

Direct single relationships

Direct group relationships

Cross relationships

16.Which one of the following is a disadvantage for wide span of control?

Fewer levels of management

Difficult to supervise the subordinates directly

Lower supervision costs

Fewer levels of decision making

17. Which one of the following is not a cardinal principal of sound organization?

Flow of authority

Maximum number of subordinates

Attain balance

Specialization

18.The line organization is favored because?

More scope for favoritism

No scope for specialization

Flexibility

No scope for Nepotism

19.Which one of the following refers to a project organization

Line organization

Military organization

Scalar organization

Matrix organization

20. Which of the following process of classifying the organization on the basis of similar activities?

formulation

Departmentation

Execution

Implementation

21. Which of the following is a merit for functional organization?

Calls for more coordination

Delayed decision making

Offers better control

Expensive in terms of time

22.Which one of the following is a merit for matrix organization?

Calls for greater degree of coordination

Difficult to define authority

Offers operations freedom

Difficult to define authority

23. Which of the following is a demerit for matrix organization?

Focuses on end results

Employees may find it frustrating to work with two bosses

Maintains professional identity

Seeks to optimize the utilization of resources

24. Which of the following allows an easy reallocation of resources?

Line and staff organization

Product organization

Matrix organization

Virtual organization

25.Which of the following refers to the policies and procedures of an organization:

Manual

Book

Journal

Record

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES:

Course Code	**:**	**EC501PC**				
Course Title	**:**	**ELECTROMAGNETIC THEORY AND TRANSMISSION LINES**				
Course Structure	**:**	Lectures 4	Tutorials 1	Practicals 0	Credits 4	
Course Coordinator	**:**	B.Karunaiah,Associate Professor, Dept of ECE				

6.1 COURSE OVERVIEW:

This course will enable students understanding time-varying electromagnetic fields and electromagnetic waves, and wave propagation phenomena, which are of essential importance in modern communications. The course focuses on the fundamental concepts of electromagnetic theory that are presented by the general form of time-varying Maxwell's equations, physical significance of these equations, how fields are related, and how are they related to the medium properties. Students will be able to apply boundary conditions for fields at the interface of two different media, to use wave equation to find solutions to Maxwell's equations, and especially, to study plane wave properties and characteristics as a solution, and medium properties of different types: dielectric (lossless and lossy), conductor and perfect conductor. Students will be able to understanding wave propagation mechanisms at interfaces, Poynting theorem and power and energy considerations, and the concept of stored energy and radiated power. This course will also provide students with the basic theory of transmission lines, and focuses on the basic properties of the most commonly used transmission lines .Students will be able to understanding the key differences between circuit theory and transmission line theory. Intended Learning Outcomes: - Understanding time-varying electromagnetic fields and electromagnetic waves. - List Maxwell's equations, identifying the plane wave as a solution of Maxwell's equations, and understanding of general electromagnetic wave propagation phenomena. - Interpreting of the dielectric and magnetic properties of given materials, and listing the constitutive relations that relate the electromagnetic fields in that material. - Applying the boundary conditions for electric and

magnetic fields at different interfaces. - Understanding Poynting theorem and its application to find received power and power loss - Comprehension of the key differences between circuit theory and transmission line theory. - Identifying the transmission line as an element in a circuit, naming its parameters, and using Smith chart to solve transmission line problems. Identifying various types of transmission lines and waveguides, their performance, characteristics, and practical applications. - Comprehension of the maximum power transfer, and identifying different types of power in aa electrical circuit with transmission line.

II. Prerequisite(s):

Level	Credits	Periods / Week	Prerequisites
UG	**3**	**4**	Mathematics-I (A10002)

6.2 MARKS DISTRIBUTION:

Sessional Marks	University End Exam Marks	Total Marks
There shall be 2 midterm examinations. Each midterm examination consists of subjective test. The subjective test is for 10 marks, with duration of 1 hours. Subjective test of each semester shall contains 4 questions, the student has to answer 2 questions, each carrying 5 marks. The objective test is for 10 marks, with duration of 1/2 hour. Objective test of each semester shall contains part I and II.Part I contains 10 multiple choice questions and part II contains 10 fill in the blanks. Each one carries half mark. First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion. Five marks are earmarked for assignments. There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.Sessional marks 25.	75	100

6.3 EVALUATION SCHEME:

S. No	Component	Duration (hours)	Marks
1	I Mid Examination	90minutes	20
2	I Assignment	-	05
3	II Mid Examination	90minutes	20
4	II Assignment	-	05
5	External Examination	3	75

6.4 COURSE OBJECTIVES:

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
4. To conceptually understand the UPW Polarization features and Poynting Theorem, and apply them for practical problems.
5. To determine the basic Transmission Line Equations and telephone line parameters and estimate the distortions present.
6. To understand the concepts of RF Lines and their characteristics, Smith Chart and its applications, acquire knowledge to configure circuit elements, QWTs and HWTs, and to apply the same for practical problems.

6.5 COURSE OUTCOMES:

Upon successful completion of this course, the student will be able to:

CO1.Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions, and use them for solving engineering problems.

CO2. Analyze the Wave Equations for good conductors and good dielectrics, and evaluate the UPW Characteristics for several practical media of interest.

CO3. Establish the proof and estimate the polarization features, reflection and transmission

coefficients for UPW propagation, distinguish between Brewster and Critical Angles, and acquire knowledge of their applications.

CO4. Determine the Transmission Line parameters for different lines, characterize the distortions and estimate the characteristics for different lines.

CO5. Analyze the RF Line features and configure them as SC, OC Lines, QWTs and HWTs, and design the same for effective impedance transformation.

CO6. Study the Smith Chart profile and stub matching features, and gain ability to practically use the same for solving practical problems.

VII. How Course Outcomes are assessed:

6.6 HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency assessed by	Blooms Level
A	An ability to apply knowledge of mathematics, science and engineering	S	Solving Gate and Text book Problems	APPLY
B	An ability to design and conduct experiments, as well as to analyze and interpret data	S	Solving Gate and Text book Problems	APPLY
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	H	Assignment and Gate questions	Apply and Analyze
D	An ability to identify, formulate and solve engineering problems.	S	Class Test & Group Activity	Apply
E	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	S	Mini and Micro Projects	Apply
F	An ability to understand the special duty they owe to protect the public's health, safety and welfare by virtue of their professional status as engineers in society.	N	--	--
G	An ability to understand and correctly interpret the impact of engineering solutions in global, societal and environmental contexts and demonstrate the knowledge of a need for sustainable development.	H	Mini / Micro Projects and GATE questions	Analyze and Justify
H	An understanding of professional and ethical	N	--	--

	responsibility.			
I	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	S	Class Test & Seminar	Analyze
J	An ability to 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, give and receive clear instructions.	S	Seminars	Understand & Analyze
K	An ability to demonstrate knowledge and understanding of the engineering finance and management principles as a member and leader in a team to manage projects in multi-disciplinary environments.	S	Mini and Micro Projects	Apply
L	Recognition of the need for, and an ability to engage in life-long analyzing.	S	Group Activity	Analyze
M	An ability to design and implement projects in the areas including Signal Processing, Microwaves, Communication Systems, IC Technology and Embedded Systems.	H	Mini and Micro Projects	Apply
N	An ability to use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations.	S	Seminars & Projects	Analyze & Apply

N = None S = Supportive H = Highly Related

6.7 SYLLABUS:

UNIT – I

Electrostatics: Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT – II

Magnetostatics: Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Illustrative Problems.

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface : Dielectric Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems .

UNIT – III

EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics– Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Illustrative Problems.

EM Wave Characteristics – II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Pointing Vector and Pointing Theorem – Applications, Illustrative Problems.

UNIT – IV

Transmission Lines - I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization,Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading, Illustrative Problems.

UNIT – V

Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; λ/4, λ/2, λ/8 Lines – Impedance Transformations, Significance of Zmin and Zmax , Smith Chart – Configuration and Applications, Single Matching, Illustrative Problems. .

TEXT BOOKS:

1. Principles of Electromagnetic – Matthew N.O. sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Aisan Edition, 2015.

2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2nd Ed. 2000, PHI.

3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan, 2001, (Tech. India Publications), New Delhi.

REFERENCE BOOKS:

1. Engineering Electromagnetics – Nathan Ida, 2nd Ed., 2005, Springer (India) Pvt. Ltd., New Delhi.

2. Networks, Lines and Fields – John D. Ryder, 2nd Ed., 1999, PHI.

3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 7th Ed., 2006, MC GRAW HILL EDUCATION.

6.8 COURSE PLAN:

S.No	Name of the Topic	Unit.No	Week	No of sessions planned	Mode of teaching BB/PPT/OHP/MM	Reference *
U-1	Electrostatics:	I			BB	A1
1	Coulomb's Law,Electric Field Intensity			1	BB	A1
	Fields due to Different Charge Distributions, Electric Flux Density			1	BB	A1
	Gauss Law and Applications, Electric Potential, Relations Between E and V			1	BB	A1
	Maxwell's Two Equations for Electrostatic Fields,Energy Density, Related Problems			1	BB	A1
	Convection and conduction currents			1	BB	A1
	Convection and Conduction Currents, Dielectric Constant			1	BB	A1
	Isotropic and Homogeneous Dielectrics			1	BB	A1
	Continuity Equation, Relaxation Time			1	BB	A1
	Poisson's and Laplace's Equations,Capacitance – Parallel Plate			2	BB	A1
	poissons and laplas equations.			1	BB	A1
	coaxial,sperical			2	BB	A1

	capacitors.Illustrative problems					
U-2	Magneto Statics:	II			BB	A1
2	Biot-Savart Law,			1	BB	A1
	Ampere's Circuital Law, Applications , Magnetic Flux Density			2	BB	A1
	Ampere's Circuital Law and Applications			1	BB	A1
	Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields			2	BB	A1
	Magnetic Scalar,Vector Potentials			1	BB	A1
	Forces due to Magnetic Fields, Ampere's Force Law			1	BB	A1
	Inductances and Magnetic Energy.Related Problems			2	BB	A1
	Faraday's Law and Transformer emf,Inconsistency of Ampere's Law			2	BB	A1
	Displacement Current Density,Maxwell's Equations in Different Final Forms ,Word Statements			2	PPT	A1
	Introduction Conditions at a Boundary Surface ,Dielectric-Dielectric			2	PPT	A1
	Dielectric-Conductor Interfaces			1	PPT	A1
	Properties of Dielectric-Conductor Interfaces,Problems on Maxwell Equations, Related Problems			2	BB	A1
U-3	EM Wave characteristics I:	III			BB	A2
3	Wave Equations for Conducting ,Perfect Dielectric Media, Uniform Plane Waves, All Relations Between E & H			2	BB	A2

	Sinusoidal Variations,Wave Propagtion in Lossless ,Conducting Media,Conductors & Dielectrics – Characterization			2	BB	A2
	Wave Propagation in Good Conductors ,Good Dielectrics,Polarization.Related Problems			2	BB	A2
	EM Wave characteristics II:				BB	A2
	Reflection and Refraction of Plane Waves			1	PPT	A2
	Normal and Oblique Incidences, for both Perfect Conductor,Perfect Dielectrics			1	PPT	A2
	Brewster Angle,Critical Angle			2	PPT	A2
	Total Internal Reflection,Surface Impedance			2	BB	A2
	Poynting Vector ,Poynting Theorem ,Applications			2	BB	A2
	Power Loss in a Plane Conductor,Related Problems			2	BB	A2
U-4	Transmission Lines I:	IV			BB	A3
	Types of Transmission Lines,Parameters			1	BB	A3
	Transmission Line Equations, Primary & Secondary Constants			1	BB	A3
4	Expressions for Characteristic Impedance			1	BB	A3
	Propagation Constant,Phase and Group Velocities			1	BB	A3
	Infinite Line Concepts,problems			1	BB	A3
	Losslessness/Low Loss Characterization			1	BB	A3
	Distortion – Condition for Distortionlessness			1	BB	A3
	Minimum Attenuation,Types of Loading,			1	BB	A3

	Related Problems			1	BB	A3
U-5	Transmission Lines II:	V			BB	A3
	Input Impedance Relations			1	BB	A3
	SC and OC Lines			1	BB	A3
	Reflection Coefficient, VSWR			1	PPT	A3
5	UHF Lines as Circuit Elements			1	BB	A3
	λ/4 , λ/2 , λ/8 Lines			1	BB	A3
	Impedance Transformations			1	BB	A3
	Smith Chart – Configuration			1	PPT	A3
	Applications,Related Problems			1	BB	A3
	Gradient, divergence, curl and Laplacian Operations,			1	BB	A3
	Stoke's and divergence theorems,Impedance circle diagram				BB	A3

6.9 MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF THE PROGRAM OUTCOMES:

Course Objectives	Program Outcomes													
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
I	✔		✔											
II							✔				✔	✔		
III		✔	✔											
IV							✔			✔				
V	✔	✔									✔			
VI							✔			✔				

6.10 MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF THE PROGRAM OUTCOMES:

EC501PC	EMTL	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	CO1		✔								✔				
	CO2			✔		✔									
	CO3			✔		✔									
	CO4										✔	✔			
	CO5		✔	✔		✔									
	CO6										✔	✔			

6.11 QUESTION BANK:

UNIT-I		
ELECTROSTATICS		
GROUP – A (SHORT ANSWER QUESTIONS)		
S.No	**Question**	**Blooms Taxonomy Level**
1.	State stokes theorem.	Understand
2.	State the condition for the vector F to be solenoidal.	Understand
3.	State the condition for the vector F to be irrotational	Apply
4.	Give the relationship between potential gradiant and electric field	Understand
5.	What is the physical significance of div D	Understand
6.	What are the sources of electric field and magnetic field	Remember
7.	State Divergence Theorem	Apply
8.	Define divergence	Apply
9.	State coulombs law	Apply

10.	State Gauss law for electric fields	Understand
11.	Define electric flux	Apply
12.	Define electric flux density	Apply
13.	Define electric field intensity	Apply
14.	Name few applications of Gauss law in electrostatics	Understand
15.	What is a capacitor?	Understand
GROUP - B (LONG ANSWER QUESTIONS)		
1.	State and prove Coulomb's law.	Remember
2.	State and prove Gauss law.	Understand
3.	Explain applications of Gauss law.	Evaluate
4.	Derive continuity equation and define relaxation time.	Understand
5.	Derive poission's and Laplace equations	Remember
6.	Explain linear, isotropic and homogeneous dielectrics.	Understand
7.	Explain various types of capacitors.	Understand
8.	State and proof divergence theorem and strokes theorem.	Understand
9.	Drive an expression for energy stored and energy density in an electrostatic field	Evaluate
10.	Explain and derive the polarization of a dielectric materials	Evaluate
GROUP - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	Point charges 1mc and -2mc are located at (3, 2,-1) and (-1,-1, 4) respectively. Calculate the electric force on a 10nc charge at (0, 3, 1) and the electric field intensity at that point.	Remember
2	The electric field intensity in polystyrene (εr=2.55) filling the space between the plates of a parallel plate capacitor is 10KV/m. The distance between the plates is 1.5mm.Calculate (i). D (ii).P (iii).The surface charge density of free charge on the plates,(iv).The surface density of polarization on charge.(v).The potential difference the plates.	Understand

3	Check validity of the divergence theorem considering the field D=2xy ax +x2ay c/m2 and the rectangular parallelepiped formed by the planes x=0,x=1,y=0,y=2 & z=0,z=3.	Analyze
4	A vector field D=[5r2/4]Ir is given in spherical co-ordinates. Evaluate both sides of divergence theorem for the volume enclosed between r=1&r=2.	Evaluate

UNIT-II

MAGNETO STATICS

GROUP – A (SHORT ANSWER QUESTIONS)

1	Define current density	Understand
2	What is meant by displacement current?	Understand
3	State point form of ohms law.	Understand
4	Define magnetic vector potential.	Understand
5	Give the relation between magnetic flux density and magnetic field intensity	Understand
6	Give the force(F) on a current element (dl).	Analyze
7	Define magnetic moment.	Analyze
8	State Gauss law for magnetic field.	Analyze
9	Give the expression for torque experienced by a current carrying loop situated in a magnetic field.	Apply
10	What is lorentz force?	Understand
11	Write the expression for field intensity due to a toroid carrying a filamentary current I.	Understand
12	What are equipotential surfaces?	Apply
13	Define loss tangent.	Analyze
14	What is energy density in magnetic field?	Understand
15	Distinguish between solenoid and toroid.	Apply

GROUP – B (LONG ANSWER QUESTIONS)

1	Explain Biot-Savart's law?	Evaluate
2	Analogy between electric and magnetic fields.	Understand
3	Explain Lorenrz force equation?	Understand
4	Explain Faraday's laws?	Evaluate
5	Explain inconsistency of Ampere's law?	Evaluate
6	Explain displacement current density?	Understand
7	Write Maxwell's equations in point form .	Analyze
8	Write Maxwell's equations in word statements.	Analyze
9	Derive the boundary conditions between dielectric- dielectric.	Understand
10	Write Maxwell's equations in integral form.	Evaluate
GROUP - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	A capacitor of squared two metal plates each 200cm side placed parallel and 4mm apart. The space between the plates is filled with a dielectric having a relative permittivity of 6.5.A potential drop of 1000V is maintained between the plates. Calculate C,Q ,D and E.	Evaluate
UNIT-III		
EM WAVE CHARACTERISTICS I& EM WAVE CHARACTERISTICS II		
GROUP - A (SHORT ANSWER QUESTIONS)		
1	Define Brewster angle	Remember
2	What is pointing theorem.	Remember
3	Define critical angle.	Understand
4	What is pointing vector.	Understand
5	Define total internal reflection.	Analyze
6	Define skin depth.	Analyze

7	What is wave equation for conducting medium?	Understand
8	What is wave equation for free space medium?	Understand
GROUP - B (LONG ANSWER QUESTIONS)		
1	Derive the wave equation for conducting medium.	Understand
2	Define uniform plane wave and what are the properties uniform plane waves.	Analyze
3	Derive the relation between E and H.	Analyze
4	Derive the wave equation for free space.	Evaluate
5	Explain wave propagation in good conductors.	Evaluate
6	Explain about polarization.	Evaluate
7	Derive reflection coefficient when the wave incident normally on a perfect dielectrics.	Evaluate
8	Explain Brewster angle and critical angle.	Apply
9	State and prove poynting theorem.	Apply
10	Explain total internal reflection and skin depth.	Evaluate
GROUP – C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	If $\varepsilon r=9$ and $\mu=\mu 0$ for the medium in which a wave with a frequency f=0.3 GHZ is propagating ,determine propagation constant and intrinsic impedance when (i).$\sigma=0$ and (ii).$\sigma=10$mho/m.	Apply
2	The magnetic field H of a plane wave has a magnitude of 5Ma/m in a medium defined by $\varepsilon r=4, \mu r=1$.Determine the average power flow and the maximum energy density in plane wave.	Apply
3	A uniform plane wave of 200 MHz, traveling in free space Impinges normally on a large block of material having $\varepsilon r=4$, $\mu r=9$ and $\sigma=0$. Calculate transmission and reflection coefficient of interface.	Apply
UNIT-IV		
TRANSMISSION LINES I		
GROUP - A (SHORT ANSWER QUESTIONS)		

1	Define transmission lines?	Understand
2	Define phase velocity?	Understand
3	Define group velocity?	Understand
4	What is the relation between phase velocity & group velocity?	Understand
5	What is minimum attenuation?	Understand
6	Define loading.	Understand
7	What is the condition for the lossless transmission line.	Analyze
8	What is the condition for the distortion less transmission line.	Understand
9	What are the applications of transmission lines?	Understand
GROUP – B (LONG ANSWER QUESTIONS)		
1	List out types of transmission lines and draw their schematic diagrams.	Understand
2	Draw the directions of electric and magnetic fields in parallel plates and coaxial lines.	Analyze
3	List out applications of transmission lines.	Understand
5	Define phase velocity , group velocity and derive the relation between them.	Apply
6	Derive the condition for the lossless transmission line.	Evaluate
7	Derive the condition for the distortion less transmission line.	Evaluate
8	Draw an equivalent circuit of a two wire transmission line.	Understand
9	Explain about minimum attenuation.	Understand
10	Explain types of loading.	Apply
Group - C (Problem solving &Analytical Questions)		
1	A transmission line in which no distortion is present has the following parameters z0=50Ω,α=20Mnp/M,V- 0.6.Determine R ,L,G,C and wave length at 0.1GHZ.	Analyze

2	A lossy cable which has R=2.25 Ω/m,L=1.0μH/m ,G=0 and C=1PF operates at f=0.5GHZ.Find out the attenuation constant of the line.	Evaluate
UNIT- V		
Transmission Lines II		
Group – A (Short Answer Questions)		
1	What is input impedance	Understand
2	Define VSWR?	Understand
3	Define CSWR?	Apply
4	Define current reflection coefficient?	Analyze
5	Define voltage reflection coefficient?	Understand
6	What is the difference between single and double stub	Evaluate
7	What is smith Chart	Analyze
8	What are the applications of smith Chart	Understand
9	What is the input impedance of open circuit TL	Apply
10	What is the input impedance of short circuit TL	Understand
GROUP – B (LONG ANSWER QUESTIONS)		
1	Define input impedance of a transmission line and derive the expression for it	Analyze
2	Define reflection coefficient and derive expression for the input impedance in terms of reflection coefficient.	Analyze
3	Explain how the input impedance varies the frequency with diagram.	Apply
4	Explain clearly why the short circuited stubs are preferred over to a open circuited stubs.	Understand
5	Derive the expression for the input impedance of a lossless transmission line. Derive Z_{OC} and $Z_{SC.}$	Evaluate
6	Explain the principle of impedance matching with Quarter wave	Understand

	transformer.	
7	Explain the significance and utility of λ/8, λ/4 and λ/2 lines.	Understand
8	What is the significance of SWR in a TL.	Understand
GROUP – C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)		
1	The characteristic impedance of a certain line is 710 L14 Ω and ϒ=0.007+j0.028 per KM. The line is terminated in a 300 Ω resistor. Calculate the input impedance of the if its length is 100KM.	Analyze
2	A 100Ω lossless line connects a signal of 100KHZ to a load of 140Ω.The load power is 100mw.Calculate (i).voltage reflection coefficient (ii).VSWR	Apply
3.	Calculate the reflection coefficient and VSWR for 50Ω line, terminated with (i).matched load (ii).SC (iii).OC (iv).+j50Ω load (v). -j50Ω load	Evaluate
4.	The characteristic impedance of a certain line is 710 L14 Ω and ϒ=0.007+j0.028 per KM. The line is terminated in a 300 Ω resistor. Calculate the input impedance of the if its length is 100KM.	Evaluate

6.12 ASSIGNMENT TOPICS:

UNIT-I	**ELECTROSTATICS**	
S. No	**Questions**	**Blooms Taxonomy Level**
1	State and prove Coulomb's law.	Remember
2	Point charges 1mc and -2mc are located at (3, 2,-1) and (-1,-1, 4) respectively. Calculate the electric force on a 10nc charge at (0, 3, 1) and the electric field intensity at that point.	
3	Explain various types of capacitors.	Understand
4	A capacitor of squared two metal plates each 200cm side placed parallel and 4mm apart. The space between the plates is filled with a dielectric having a relative permittivity of 6.5.A potential drop of 1000V is maintained between the plates. Calculate C,Q ,D and E.	
5	State and prove Gauss law.	
6	Explain applications of Gauss law.	Understand

7	Derive continuity equation and define relaxation time.	Understand
8	Derive poission's and Laplace equations	
9	Explain linear, isotropic and homogeneous dielectrics.	
10	Explain various types of capacitors.	Understand
11	State and proof divergence theorem and strokes theorem.	Understand
12	Drive an expression for energy stored and energy density in an electrostatic field	
13	Explain and derive the polarization of a dielectric materials	Evaluate
	UNIT II	
	Magneto Statics	
1.	Write Maxwell's equations in point form and integral form.	Understand
2.	Write Maxwell's equations in word statements.	Evaluate
3.	Explain Biot-savart's law.	Evaluate
4.	Explain Ampere's law and what are applications.	Understand
5.	Analogy between electric and magnetic fields.	Analyze
6.	Explain Lorenrz force equation?	Evaluate
7.	Explain Faraday's laws?	Evaluate
8.	Explain inconsistency of Ampere's law? Explain displacement current density?	Apply
9.	Write Maxwell's equations in point form .	Apply
10.	Derive the boundary conditions between dielectric- dielectric.	Evaluate
	UNIT- III	
	EM WAVE CHARACTERISTICS I& EM WAVE CHARACTERISTICS II	
1.	State and prove pointing theorem.	Understand
2.	A plane wave with a frequency of 2MHZ is incident upon a copper conductor normally. The	Analyze
3.	Derive the EM wave equation for conducting medium.	Analyze
4.	Explain about Brewster angle.	Evaluate
5.	Derive the relation between E and H.	Evaluate
6.	Derive the wave equation for free space.	Evaluate
7.	Explain wave propagation in good conductors.	Evaluate

8.	Explain about polarization.	Apply
9.	Derive reflection coefficient when the wave incident normally on a perfect dielectrics.	Apply
10.	Explain Brewster angle and critical angle.	Apply
	UNIT- IV	
	TRANSMISSION LINES I	
1.	Define primary and secondary constants.	Analyze
2.	An open wire telephone has R=10Ω /Km, L=0.0037H/Km,C=0.0083x10^{-6}F/Km, G=0.4x10^{-6}.Determine Z0 , P, α and β at 1000Hz.	Understand
3.	What are the properties of lossless transmission line?	Apply
4.	What are the properties of distortion less transmission line?	Evaluate
5.	List out types of transmission lines and draw their schematic diagrams.	Evaluate
6.	Draw the directions of electric and magnetic fields in parallel plates and coaxial lines.	Understand
7	List out applications of transmission lines.	Understand
8	Define phase velocity , group velocity and derive the relation between them.	Apply
9	Derive the condition for the lossless transmission line.	Understand
10	Derive the condition for the distortion less transmission line.	Understand
11	Draw an equivalent circuit of a two wire transmission line.	Analyze
12	Explain about minimum attenuation.	Understand
13	Explain types of loading.	Analyze
	UNIT-V	
	TRANSMISSION LINES II	
1.	Define the reflection coefficient and SWR	Analyze
2.	Calculate reflection coefficient and VSWR for a 50Ω line terminated with (i) Matched load (ii). Short circuit (iii). Open circuit (iv). + j50Ω load (v) –j50Ω load	Evaluate
3.	Derive the reflection coefficient when the wave incident obliquely on a perfect dielectric for parallel polarization.	Apply

4.	Define input impedance of a transmission line and derive expression for it	Understand
5.	Define reflection coefficient and derive expression for the input impedance in terms of reflection coefficient.	Evaluate
6.	Explain how the input impedance varies the frequency with diagram.	Analyze
7.	Explain clearly why the short circuited stubs are preferred over to a open circuited stubs.	Understand
8.	Derive the expression for the input impedance of a lossless transmission line. Derive Z_{OC} and $Z_{SC.}$	Evaluate
9.	Explain the principle of impedance matching with Quarter wave transformer.	Understand
10.	Explain the significance and utility of $\lambda/8$, $\lambda/4$ and $\lambda/2$ lines.	Evaluate
11	What is the significance of SWR in a TL.	Understand
12	Define input impedance of a transmission line and derive the expression for it	Analyze

6.13 OBJECTIVE QUESTIONS:

1.Coulomb's force is proportional to **[d]**
a). r b).r c).1/r d). 1/r2

2.The unit of electric field is _____ **[c]**
a). Newton b).Coulombs/Newton
c).Newton/coulomb d).Coulomb/mt

3.The unit of electric flux is _____ **[a]**
a).coulomb b).coulomb/mt c).weber d).weber/m2

4.electrostatic field due to dipole consists of [c]
a).1/r term b).1/r2 term c).1/r3term d).r term

5).Potential at all the points on the surface of a conductor is [a]
a).the same b).not the same
c).zero d).infinity

6).Point term of Gauss's law is _____ [a]
a).∇.D= ρv b). ∇.D= ρs
c). ∇.D= ρv/ ε0 d). ∇.D=Q

7).The laplacian operator, ∇_____ [c]

a).has unit of m2 b).is a vector operator
c).has unit of 1/m2 d).has no unit

8).Relaxation time of a medium with εr=3.0 and σ=300 mho/m is _____ [a]
a).8.854 Ps b).9 Ps
c).7.9686 Ps d).1 Second

9.Poission's equation is _____ [b]
a). ∇
2v= ρv/ ε b). ∇ 2v=- ρv/ ε

c). ∇ 2v=-ρv d).∇ 2v=- ρv/ ε

10).Boundary condition for the normal component of E on the boundary of a dielectric is _____ [c]
a).E1n=E2n b).E1n-E2n=ρs
c).E1n= E1 E2 E2n d).E1n=0

11).Laplace equation is ∇ 2v=0 .
12).Relaxation time is ε/T=Tr .
13).Boundary condition for the tangential component of E on the boundary of a dielectric is E1t= E2t
14).Example for polar type of dielectric is Water.
15).Laplace's equation has only one solution.
16).When the force on 2 due to fixed change of 4C is 2N, the electric field at the charge of 2C is 1N/C.
17).If a potential of 1V is applied across a capacitor of 10Pf, the energy stored is 5PJ.
18).Two point charges Q1=1C and Q2=3C are separated by 1.0m, the force on Q1 is repulsive .

19).The surface charge density in a good dielectric is zero.
20).Equation of contuinity is ∇.J=.J=∂ρv
∂t .
II. Magnetostatics

1).If the flux density is 10 wb/m2 and the area of the coil is 2 m2 , the flux is _____ [b]

a).10wb b).20wb c).5wb d)40wb

2).The magnetic filed in an ideal conductor is [a]
a).Zero b).infinite c).finite d).the same

3).The unit of scalar magnetic potential is [a]
a).ampere b).volt c).amp/mt d).volt/mt

4). ∇*Ais _____ [b]
a).amp b).volt c).amp/m d).volt/m

5).∇*AVm is _____ [a]
a).zero b). ∇

2Vm c).J d).∇.∇Vm

6).The electric field in free state is [a]
a).D/E0 b).D/μ0 c).E0 d).σ/ E0

7).Magnetization , M is defined as _____ [a]
a).ΨmH b).Ψmμ0H c).ΨmB d).B/μ0

9).Displacement current density is _____ [c]

a).D b).J c).dD df d).).dJ df

10).Torque has the unit of _____ [a]
a).N-m b).N/m c).N-m2 d).N

11).Maxwell's equations give the relations between different fields.

12).A field can exist if it satisfies all Maxwell's equations.

13).EH is always equal to E2t.

14).The unit for vector magnitude potential is wb/mt.

15).If E=cos(6 t-0.2Z) az, B is 0.2.

16).The Maxwell's equation ,∇.B =0 is due to non-existence of a monopole.

17).For time varying fields, ∇J×H=J+dD/dt

18).The energy density in a magnetic field, WH= ½ B.H.

19).The energy stored in an inductor is WL=1/2LI^2

20).The relation between self inductance and mutual inductance is M=K√L1L2.

III.EM WAVE CHARACTERISTICS:

1).The relation between E and H is given by n=E
H=_____ [a]

a).√μ/E b).√μE c).√Eμ d).None

2).If σ WE >> 1, then it behaves like a _____ [b]
a).good dielectric b).good conductor c).quasielectric d).none

3).The wave propagation in a good conductor, α = β =_____ [c]
a). 2 √wμσ b).√ 2 wμσ c).√ wμσ2 d).none

4).The depth at which the wave attenuates to 37% of its original value is called _____ [a]
a).Skin depth b).α c).β d).γ

5).The depth penetration of an EM wave in copper at f=60Hz ,for copper σ=5.8×107 mho/m, μr=Er=1, is _____ [a]
a).8.53×10-3m b).8.53×10-1 m c).8.53×107 m d).none

6).The direction of the dielectric field at a given point as a function of time is known as_____[b]
a).Skin depth b).Polarization c).angle d).direction

7).Poynting vector is defined as _____ [c]
a).P=E+H b).P=E/H c).P=E×H d).P=E-H

8).Complex pointing vector is _____ [b]
a).Pc=1/2× (E + H*) b). Pc=1/2× (E × H*) c). Pc=1/2× (E − H*) d). Pc=1/2× (E/H*)

9.Snell's law is given by sinθisinθt= _____ [a]

a) E2/E1 b).√ E1E2 c).sin-1√E2E1 d).tan-1√E2E1

10).E.H of a uniform plane wave is _____ [c]
a).EH b)nH2c).0 d).nE2

11).Brewster angle is given by θi=tan-1√E2E1

12).Poynting vector gives note of energy flow.

13.Depth of penetration in free space is Infinity.

14.If the depth of penetration of a plane wave in a medium is 2 mm, the attenuation constant is 0.5×103 m-1.

15).The ratio of conduction current density to displacement current density is known as Dissipation Factor.

16).Intrinsic impedence of free space is 120π~377 ∩.

17).The ratio of reflected wave to incident wave is known as Reflection coefficient.

18).The ratio of transmitted wave to incident wave is known as Transmission coefficient.

19).The ratio of tangential electric field to the current density is known as Surface impedance.

20).The wave incidence normally on a perfect dielectric ,the reflection coefficient In terms of E isπe=n2−n1/n2+n1

IV.TRANSMISSION LINES – I

1).R, L, C and G are known as _____ [a]
a).Primary constants b).Secondary constants c).Both d).None

2).The time taken for the wave to travel from one end to the other is known as _____ [b]
a).Rise time b).Transit time c).Peak time d).Settling time

3).A practical transmission time has propagation constant equal to _____ [c]
a).α-jβ b).α/jβ c).α+jβ d).None

4).The characteristic impedence of a loss less transmission line is Z0=_____ [d]
a).√LC b).√C/L c).√RC d).√LC

5).The condition for distortion less transmission line is _____ [a]
a).RL=GC b).LC=RG c).RL=CG d).None

6).Increasing inductance by inserting inductance in series with the line is called _____ [b]

a).Reflection b).Loading c).SWR d)None

7).Phase velocity is given by ,Vp=_____ [c]
a).dW/dB b).BW c).WB d).None

8).1 Neper=_____dB [d]
a).8.00 b).0.686 c).57.3 d).8.686

9).The efficiency of transmission is given b y , n=_____ [a]
a).PRPS×100 b).PSPR×100 c).PS×PR×100 d).None

10).The input impedance of infinite transmission line equal to its _____ [c]
a).Input value b).Output value c).Z0 d).None

11).The relation between phase velocity and group velocity is $Vp.Vg=Vc^2$
12).The condition for loss less transmission line is R=G=0.
13).The value of R and G for minimum attenuation as small as possible.
14).Loading is done by winding a type of iron around conductor in continuous loading.
15).The equivalent circuit of transmission line is
16).A transmission line is said to be distortion less whenα is independent of frequency, and dependent of frequency.
17).Lossless transmission line is a distortion less transmission line.
18).The characteristic impedance Z0=√R+jwL/G+jwC
19).The propagation constant ρ=√(R + jwL)(R + jwC).
20).For a distortionless transmission line, velocity of propagation, vp=1/√LC

UNIT-V:

1) Smith chart is a _____plot [a]
a) Polar b) Rectangular c) Semilog d) Bode

2) In an open circuited TL ≥ R = _____ [b]
a) 0 b) ∞ c) z0 d) None

3) z0 in terms of zsc and zoc is z0 = _____ [c]
a)√Zsc/Zoc b)√ZocZsc c)√Zsc d) None

4) The reflection will be zero when zR = _____ [d]
a) 0 b) ∞ c) None d) z0

5) The reflection coefficient, k = _____ [a]
a)ZR−Z0/ZR+Z0 b)ZR+Z0/ZR−Z0 c)ZR−Z0/2 d)ZR+Z0/2

6) Reflection factor, fr = _____ [b]
a)√1 + k2 b) √1 − k2 c)√1 + k d) None

7) Matched load means zR = _____ [a]
a) 0 b) ∞ c) z0 d) None

8) SWR(S) ranges between _____ [b]
a) 1<S<∞ b) 0<S<1 c) 0<S<∞ d) None

9) The ration of maximum voltage to minimum voltage is known as _____ [c]

a) CSWR b) VSWR c) CRC d) VRC

10) For a line which is quarter wavelength, l= _____ [d]

a)λ/2 b)λ/8 c)λ/4 d)3λ/4

11) For a quarter wave transformer, z0 = √ZIN × ZR.

12) The length of TL is λ/4 when it is shorted line, the equivalent circuit element is Tank circuit.

13) The length of TL is l<λ/4 when it is open line, the equivalent circuit element is Capacitor.

14) The input impedance of open circuited TL is z∞ = z0cothpl

15) The input impedance of short circuited TL is zsc = z0tanhpl

16) The input impedance of transmission line is zIN = z0 ZR+Z0tanhpl/Z0+ZRtanhpl

17) Relation between k and S is S=1+|k|/1−|k|

18) For matched load TL, S=1.

19) For an open circuit or short circuit TL, S=∞.

20) vmax is given by vmax=|vi|+|vr|.