K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

(Approved by AICTE, New Delhi, permanently affiliated to Anna University, Chennai)

(Accredited by NBA, New Delhi)

B.E. – EEE – III – Semester - Students Hand book – Odd Semester of 2016 – 2017

This book contains the following:

1. Vision and Mission of the College and Department, Program Educational Objectives, Program Specific Outcomes, Program Outcomes.
2. Outcome Based Education, Benefits and Significance of accreditation.
3. Engineering Ethics.
4. Blooms Taxonomy.
5. Academic Calendar – 2016 – 2017 (Odd semester).
6. Class Time Table.
7. B.E. – EEE – Syllabus – III Semester.
8. Lecture Schedule, Tutorial, Assignment questions.
9. Anna University question papers (Previous years).
10. Anna University - Malpractices and Punishment in University Examinations
11. OD Norms
12. About the College and Department
13. Faculty List, Mobile number, Mail ID
14. Placement Mock test paper.
15. GATE 2016 - Questions & Answers.
16. General tips for effective communication and Leadership skills.

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION AND MISSION OF THE COLLEGE

VISION:

To become a Premier Institute of National Repute by Providing Quality Education, Successful Graduation, Potential Employability and Advanced Research & Development through Academic Excellence.

MISSION:

To Develop and Make Students Competent Professional in the Dynamic Environment in the field of Engineering, Technology and Management by emphasizing Research, Social Concern and Ethical Values through Quality Education System.

VISION AND MISSION OF THE DEPARTMENT

VISION:

To become a high standard of excellence in Education, Training and Research in the field of Electrical & Electronics Engineering and allied applications.

MISSION:

To produce excellent, innovative and Nationalistic Engineers with Ethical Values and to advance in the field of Electrical & Electronics Engineering and allied areas.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The Educational Objectives of the Electrical and Electronics Engineering (EEE) Programme represent major accomplishments that we expect our graduates to achieve after three to five years of graduation. More specifically our graduates are expected:

PEO1: to excel in industrial or graduate work in Electrical and Electronics Engineering and allied fields

PEO2: to practice their Professions conforming to Ethical Values and Environmentally friendly policies

PEO3: to work in international and multi-disciplinary Environments

PEO4: to successfully adapt to evolving Technologies and stay current with their Professions

PROGRAM SPECIFIC OUTCOMES (PSOs)

Electrical and Electronics Engineering Graduates will be able to:

PSO1:

Apply the fundamentals of mathematics, science and engineering knowledge to identify, formulate, design and investigate complex engineering problems of electric circuits, analog and digital electronic circuits, electrical machines and power systems.

PSO2:

Apply appropriate techniques and modern Engineering hardware and software tools in power systems to engage in life- long learning and to successfully adapt in multi disciplinary environments.

PSO3:

Understand the impact of Professional Engineering solutions in societal and environmental context, commit to professional ethics and communicate effectively.

PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

OUTCOME BASED EDUCATION (OBE)

In a traditional education system, students are given grades and rankings compared to each other. Content and performance expectations are based primarily on what was taught in the past to students of a given age. The goal of traditional education was to present the knowledge and skills of an older generation to the new generation of students, and to provide students with an environment in which to learn. The process paid little attention (beyond the classroom teacher) to whether or not students learn any of the material.

An outcome is a culminating demonstration of learning; it is what the student should be able to do, at the end of a course/program, in-terms of the knowledge, skill and behavior.

Outcome-based education is an approach to education in which decisions about the curriculum are driven by the exit learning outcomes that the students should display at the end of the course. In outcome-based education, product defines process. Outcome-based education can be summed up as results-oriented thinking and is the opposite of input-based education where the emphasis is on the educational process. Outcome-based education promotes fitness for practice and education for capability.

BENEFITS AND SIGNIFICANCE OF ACCREDITATION

The process of accreditation helps in realizing a number of benefits, such as:

- Helps the Institution to know its strengths, weaknesses and opportunities
- Initiates Institutions into innovative and modern methods of pedagogy
- Gives Institutions a new sense of direction and identity
- Provides society with reliable information on quality of education offered
- Promotes intra and inter-Institutional interactions

Accreditation signifies different things to different stakeholders. These are:

Benefits to Institutions

Accreditation is market-driven and has an international focus. It assesses the characteristics of an Institution and its programmes against a set of criteria established by National Board of Accreditation. NBA's key objective is to contribute to the significant improvement of the Institutions involved in the accreditation process. Accreditation process quantifies the strengths, weaknesses in the processes adopted by the Institution and provides directions and opportunities for future growth. NBA provides a quality seal or label that differentiates the Institutions from its peers at the national level. This leads to a widespread recognition and greater appreciation of the brand name of Institutions and motivates the Institutions to strive for more.

Benefits to Students

Students studying in NBA accredited Institutions can be assured that they will receive education which is a balance between high academic quality and professional relevance and that the needs of the corporate world are well integrated into programmes, activities and processes. It signifies that he has entered the portals of an Institution, which has the essential and desirable features of quality professional education.

Benefits to Employers

Accreditation assures prospective employers that students come from a programme where the content and quality have been evaluated, satisfying established standards. It also signifies that the students passing out have acquired competence based on well established technical inputs.

Benefits to the Public

Accredited status represents the commitment of the programme and the Institution to quality and continuous improvement.

Catalyst for International Accreditations

Due to accreditation from NBA, the Institution's systems and procedures get aligned with the Institution's Mission and Vision. All essential prerequisites for international accreditation are included in the accreditation process of NBA. Therefore, NBA acts as a catalyst for the Institutions planning to acquire International Accreditation.

Benefits to Industry and Infrastructure Providers

It signifies identification of quality of Institutional capabilities, skills and knowledge.

Benefits to Parents

It signifies that their ward goes through a teaching-learning environment as per accepted good practices.

Benefits to Alumni

It reassures alumni that alumni are products of an institute with a higher standing in terms of learning.

Benefits to Country

Accreditation helps in gaining confidence of stakeholders and in giving a strong message that as a country, our technical manpower is of international standards and can be very useful in enhancing the global mobility for our technical manpower.

ENGINEERING ETHICS

Engineering Ethics is the set of rules and guidelines that engineers adhere to as a moral obligation to their profession and to the world. Engineering is a professional career that impact lives. When ethics is not followed, disaster often occurs; these disasters not only include huge monetary costs and environmental impacts, but also often result in the loss of human life. Engineering Ethics applies to every engineer and is very important.

The National Society of Professional Engineers (NSPE) decides the overall standards and codes of ethics for all the engineering professions. The Preamble of the NSPE *Code of Conduct for Engineers* (2007) states: "*Engineers shall at all times recognize that their primary obligation is to protect the safety, health, property, and welfare of the public. If their professional judgment is overruled under circumstances where the safety, health, property, or welfare of the public are endangered, they shall notify their employer or client and such other authority as may be appropriate.*"

Electrical Engineering Ethics

Electrical Engineering is a type of engineering profession that deals with the creation of better electronics. Since our society is heading towards an era of technology, where all members of society will be affected, it is especially important for electrical engineers to follow a code of engineering ethics. For electrical engineers, an important set of guidelines is the *Electrical Engineering Code of Ethics*, published by IEEE.

IEEE code of Ethics

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. to accept responsibility in making decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;

2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology; its appropriate application, and potential consequences;
6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons and to not engage in acts of discrimination based on race, religion, gender, disability, age, national origin, sexual orientation, gender identity, or gender expression;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Engineering Ethics in College/Education

The main engineering ethics problem that college students are face with is academic integrity. Academic integrity can show itself in the form of cheating by copying someone's work, intentional cheating, plagiarism, and/or self-plagiarism.

However, professional ethics is something that can be learned even when it conflicts with personal ethics, as for example, a situation where you are personally okay with building a product that can harm the environment, yet save lives. You can learn professional ethics and realize that something that is harmful to the environment is not okay. Ethics codes can even help you see the bigger picture. For example, in the previous scenario, these codes can help you re-evaluate your ethics and realize that something that is harmful to the environment will eventually be harmful to the people around you and yourself.

Engineering Ethics in the Professional World

In the professional world, ethical engineering problems come up in many cases. One of these includes the case of a professional using someone else's work that is published in the widespread market of publication. Another is the case of a professional using someone else's work that is not published yet and stealing their idea. Engineers who have good engineering ethics often have a good sense of the value of life. They don't hesitate to admit that they made a mistake because they know that the cost of not owning up to your mistakes can have disastrous consequences. It might even cost a human life.

Engineering Ethics in Companies

Not only do individual engineers have to be conscious of engineering ethics, but also companies. Companies have to be aware of their Corporate Social Responsibility and Environmental Responsibility. Corporate Social Responsibility is a company's responsibility to give back to the community that they profit from and to behave ethically so that both they and their community can benefit. Environmental Responsibility is a business's initiative to leave the environment (where it is taking its resources from) the same, if not better, that it is found it.

BLOOM'S TAXONOMY

Definitions of the different levels of thinking skills in Bloom's taxonomy

1. **Remember** – recalling relevant terminology, specific facts, or different procedures related to information and/or course topics. At this level, a student can remember something, but may not really understand it.

2. **Understand** – the ability to grasp the meaning of information (facts, definitions, concepts, etc.) that has been presented.

3. **Apply** – being able to use previously learned information in different situations or in problem solving.

4. **Analyze** – the ability to break information down into its component parts. Analysis also refers to the process of examining information in order to make conclusions regarding cause and effect, interpreting motives, making inferences, or finding evidence to support statements/arguments.

5. **Evaluate** – being able to judge the value of information and/or sources of information based on personal values or opinions.

6. **Create** – the ability to creatively or uniquely apply prior knowledge and/or skills to produce new and original thoughts, ideas, processes, etc. At this level, students are involved in creating their own thoughts an ideas.

List of Action Words Related to Critical Thinking Skills

REMEMBER	UNDERSTAND	APPLY	ANALYZE	EVALUATE	CREATE
Count	Associate	Add	Analyze	Appraise	Categorize
Define	Compute	Apply	Arrange	Assess	Combine
Describe	Convert	Calculate	Breakdown	Compare	Compile
Draw	Defend	Change	Combine	Conclude	Compose
Identify	Discuss	Classify	Design	Contrast	Create
Label	Distinguish	Complete	Detect	Criticize	Drive
List	Estimate	Compute	Develop	Critique	Design
Match	Explain	Demonstrate	Diagram	Determine	Devise
Name	Extend	Discover	Differentiate	Grade	Explain
Outline	Extrapolate	Divide	Discriminate	Interpret	Generate
Point	Generalize	Examine	Illustrate	Judge	Group
Quote	Give	Graph	Infer	Justify	Integrate
Read	examples	Interpolate	Outline	Measure	Modify
Recall	Infer	Manipulate	Point out	Rank	Order
Recite	Paraphrase	Modify	Relate	Rate	Organize
Recognize	Predict	Operate	Select	Support	Plan
Record	Rewrite	Prepare	Separate	Test	Prescribe
Repeat	Summarize	Produce	Subdivide		Propose
Reproduce		Show	Utilize		Rearrange
Select		Solve			Reconstruct
State Write		Subtract			Related
		Translate			Reorganize
		Use			Revise
					Rewrite
					Summarize
					Transform
					Specify

S.No	Date	Programme / Events	Day
		June 2016	
1.	27.06.2016(Mon)	Faculty Meeting – I - Student development and training programmes : III Year B.E./B.Tech &PG Courses.(27 June-1st July 2016)	
2.	29.06.2016(Wed)	Student development and training programmes : IV Year B.E./B.Tech Courses 29th June – 2nd July2016	
3.	04.07.2016(Mon)	Reopening Day-III,V&VII Semester B.E / B.Tech, M.E classes Class Committee Meeting – I (4-9 July 2016)	01
4.	05.07.2016(Tues)	Student Counselor Meeting – I –	02
5.	06.07.2016(Wed)	IIPC & IDCA review meeting-I	03
6.	07.07.2016(Thu)	*Ramzan – Holiday*	
7.	09.07.2016(Sat)	Grievance redressal Committee Meeting.	05
8.	22.07.2016.(Fri)	Class Test-I- (22nd – 28th July 2016)	15
9.	27.07.2016(Wed)	Anti-Ragging Committee Meeting. Faculty Meeting – II -	19
		August 2016	
10.	01.08.2016(Mon)	*Commencement of Classes-First year B.E./B.Tech.*	22
11.	10.08.2016(Wed)	CIT – I – 10th – 17th August 2016	29
12.	15.08.2016(Mon)	*Independence Day – Holiday*	
13.	19.08.2016(Fri)	Student Counselor Meeting – II-	36
14.	23.08.2016(Tues)	Class Committee Meeting – II-	38
15.	25.08.2016(Thur)	*Krishna Jeyanthi – Holiday*	
16.	27.08.2016(Sat)	Parents – Teachers Meeting	41
17.	30.08.2016(Tues)	Class Test II – 30th Aug- 7th Sep 2016	43
		September 2016	
18.	02.09.2016(Fri)	Faculty Meeting – III-	46
19.	05.09.2016(Mon)	*Vinayagar Chathurthi – Holiday*	
20.	13.09.2016(Tues)	*Bakrid – Holiday*	
21.	20.09.2016(Tues)	CIT – II– 20th – 26th Sep 2016.	57
22.	28.09.2016 (Wed)	Model Practical Examinations 28th Sep – 4th Oct. 2016.	64
23.	30.09.2016(Fri)	NBA-CO attainment-Even semester of 2015-2016-Last date for submission.	66
		October 2016	
24.	02.10.2016(Sun)	*Gandhi Jeyanthi & Holiday*	
25.	03.10.2016 (Mon)	Anna University Practical Examinations – Tentative – Slot – I-Tentative Students feedback on faculty, college facility, Course Outcome Survey	67
26.	06.10.2016 (Thurs)	Class Test-III-6th -8th Oct 2016	70
27.	08.10.2016(Sat)	Class Committee Meeting – III- Faculty Meeting – IV	72
28.	10.10.2016(Mon)	*Ayutha Pooja- Holiday*	
29.	11.10.2016(Tue)	*Vijaya Thasami – Holiday*	
30.	12.10.2016(Wed)	*Moharam - Holiday*	
31.	13.10.2016 (Thurs)	Anna University Practical Examinations – Slot – II- Tentative	73
32.	19.10.2016(Wed)	Program Assessment Committee meeting-PO-Assessment-2012-2016 Batch- Planning for DAC meeting-	77
33.	20.10.2016 (Thurs)	Last Working Day-III,V,VII Semester B.E./B.Tech,	78
34.	24.10.2016(Mon)	Commencement of end semester Examinations (III,V & VII semester B.E./B.Tech)	81
35.	29.10.2016(Sat)	*Deepavali – Holiday*	
		November 2016	
36.	08.11.2016(Tues)	*Last Working Day – III , V semester ,M.E / MCA*	92
37.	14.11.2016 (Mon)	*Commencement of end semester Examinations – III , V semester M.E/ MCA*	97
38.	15.11.2016 (Tues)	Last Working Day – III semester MBA	98
39.	21.11.2016 (Mon)	Commencement of end semester Examinations – III semester MBA	102

Reopening day for the staff after Winter Vacation: 19.12.2016 (Monday)
Student Development and Training Programmes - II, III year UG: 19-23 Dec'2016
Reopening day for the Even semester of 2016 – 2017: 26.12.2016 (Monday).

K.L.N.COLLEGE OF ENGINEERING, POTTAPALAYAM-630612.

Department of Electrical and Electronics Engineering

CLASS WISE TIME TABLE -2016-2017 (ODD)

Year/Sem/Sec : II / III / A **Faculty In-charge :S.Rajalingam**

TIME DAY	09.00 – 09.50	09.50 – 10.40		10.55-11.45	11.45-12.35		01.15-02.05	02.05-02.55	02.55-03.45
MON	**DLC** TG	**EMT** ASSM	**B**	**EDC** MJM	**ESE** AMJ	***L***	**E LAB / LDIC LAB** TG, AMJ / SR, MML		
TUE	**LICA** SR	**EDC** MJM	**R**	**ESE** AMJ	**DLC** TG	***U***	**TPDE** MR	**TPDE** MR	**ESE/LICA** AMJ,SR
WED	**EMT** ASSM	**LICA** SR	**E**	**TPDE** MR	**EDC(T)** MJM,TG	***N***	**E LAB / LDIC LAB** TG, AMJ / SR, MML		
THU	**TPDE** MR	**DLC** TG	**A**	**LICA** SR	**EDC** MJM	***C***	**EMT** ASSM	**EMT** ASSM	**ESE** AMJ
FRI	**ESE** AMJ	**TPDE** MR	**K**	**DLC** TG	**LICA** SR	***H***	**EMT(T)** ASSM,TG	**EDC** MJM	**DLC(T)** TG,CVR

Year/Sem/Sec : II / III / B **Faculty In-charge :M.Jeyamurugan**

TIME DAY	09.00 – 09.50	09.50 – 10.40		10.55-11.45	11.45-12.35		01.15-02.05	02.05-02.55	02.55-03.45
MON	**EMT** AM	**DLC** RJPP	**B**	**ESE** MML	**LICA** RD	***L***	**EDC** MJM	**LICA** RD	**TPDE** PB
TUE	**LICA** RD	**TPDE** PB	**R**	**EDC** MJM	**DLC** RJPP	***U***	**E LAB / LDIC LAB** MJM,TG / RJPP, MML		
WED	**DLC** RJPP	**ESE** MML	**E**	**TPDE** PB	**EMT(T)** AM,ASSM	***N***	**DLC** RJPP	**EDC** MJM	**EMT** AM
THU	**ESE** MML	**EDC** MJM	**A**	**DLC(T)** RJPP,ASSM	**TPDE** PB	***C***	**E LAB / LDIC LAB** MJM,TG / RJPP, SR		
FRI	**TPDE** PB	**ESE/LICA** MML,RD	**K**	**EMT** AM	**EDC(T)** MJM,MBL	***H***	**LICA** RD	**EMT** AM	**ESE** MML

STAFF NAME		**SUB CODE**	**SUBJECT NAME**	**ABBREVIATION**
A -Sec	**B – Sec**			
M. Ramya	P. Brindha	MA6351	Transforms and Partial Differential Equations	TPDE
T.Gopu	R.Jeyapandi prathap	EE6301	Digital Logic Circuits	DLC
A.S.S.Murugan	A. Marimuthu	EE6302	Electromagnetic Theory	EMT
A.Manoj	M. Mahalakshmi	GE6351	Environmental Science and Engineering	ESE
M.Jeyamurugan	M.Jeyamurugan	EC6202	Electronic Devices and Circuits	EDC
S.Rajalingam	R. Divya	EE6303	Linear Integrated Circuits and Applications	LICA
T.Gopu	M.Jeyamurugan	EC6361	Electronics Laboratory	E LAB
S.Rajalingam	R.Jeyapandiprathap	EE6311	Linear and Digital Integrated Circuits Laboratory	LDIC LAB

SEMESTER III

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
1	MA6351	Transforms and Partial Differential Equations	3	1	0	4
2	EE6301	Digital Logic Circuits	3	1	0	4
3	EE6302	Electromagnetic Theory	3	1	0	4
4	GE6351	Environmental Science and Engineering	3	0	0	3
5	EC6202	Electronic Devices and Circuits	3	1	0	4
6	EE6303	Linear Integrated Circuits and Applications	3	0	0	3
7	EC6361	Electronics Laboratory	0	0	3	2
8	EE6311	Linear and Digital Integrated Circuits Laboratory	0	0	3	2
		TOTAL	**18**	**4**	**6**	**26**

MA6351 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C

3 1 0 4

OBJECTIVES:

To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.

To acquaint the student with Fourier transform techniques used in wide variety of situations.

To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation of partial differential equations – Singular integrals -- Solutions of standard types of first order partial differential equations - Lagrange's linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II FOURIER SERIES 9+3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3

Classification of PDE – Method of separation of variables - Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (excluding insulated edges).

UNIT IV FOURIER TRANSFORMS 9+3

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 9+3

Z- transforms - Elementary properties – Inverse Z - transform (using partial fraction and residues) – Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

TEXT BOOKS:

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Grewal B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.

REFERENCES:

1. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007.
2. Ramana. B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, Wiley India, 2007.
5. Ray Wylie C and Barrett.L.C, "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
6. Datta K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd, Delhi, 2013.

EE6301 **DIGITAL LOGIC CIRCUITS** **LT P C**
3 1 0 4

OBJECTIVES:

To study various number systems , simplify the logical expressions using Boolean functions
To study implementation of combinational circuits
To design various synchronous and asynchronous circuits.
To introduce asynchronous sequential circuits and PLCs
To introduce digital simulation for development of application oriented logic circuits.

UNIT I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES 9

Review of number systems, binary codes, error detection and correction codes (Parity and Hamming code0- Digital Logic Families ,comparison of RTL, DTL, TTL, ECL and MOS families -operation, characteristics of digital logic family.

UNIT II COMBINATIONAL CIRCUITS 9

Combinational logic - representation of logic functions-SOP and POS forms, K-map representations-minimization using K maps - simplification and implementation of combinational logic - multiplexers and demultiplexers - code converters, adders, subtractors.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Melay models- Counters, state diagram; state reduction; state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABLE LOGIC DEVICES 9

Asynchronous sequential logic circuits-Transition table, flow table-race conditions, hazards &errors in digital circuits; analysis of asynchronous sequential logic circuits-introduction to Programmable Logic Devices: PROM – PLA –PAL.

UNIT V VHDL 9

RTL Design – combinational logic – Sequential circuit – Operators – Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, flipflops, FSM, Multiplexers /Demultiplexers).

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Ability to understand and analyse, linear and digital electronic circuits.

TEXT BOOKS:

1. Raj Kamal, ' Digital systems-Principles and Design', Pearson Education 2nd edition, 2007.
2. M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education, 2013.
3. Comer "Digital Logic & State Machine Design, Oxford, 2012.

REFERENCES:

1. Mandal "Digital Electronics Principles & Application, McGraw Hill Edu,2013.
2. William Keitz, Digital Electronics-A Practical Approach with VHDL,Pearson,2013.
3. Floyd and Jain, 'Digital Fundamentals', 8th edition, Pearson Education, 2003.
4. Anand Kumar, Fundamentals of Digital Circuits,PHI,2013.
5. Charles H.Roth,Jr,Lizy Lizy Kurian John, 'Digital System Design using VHDL, Cengage, 2013.
6. John M.Yarbrough, 'Digital Logic, Application & Design', Thomson, 2002.
7. Gaganpreet Kaur, VHDL Basics to Programming, Pearson, 2013.
8. Botros, HDL Programming Fundamental, VHDL& Verilog, Cengage, 2013.

EE6302 ELECTROMAGNETIC THEORY L T P C

3 1 0 4

OBJECTIVES:

To introduce the basic mathematical concepts related to electromagnetic vector fields

To impart knowledge on the concepts of electrostatics, electrical potential, energy density and their applications.

To impart knowledge on the concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications.

To impart knowledge on the concepts of Faraday's law, induced emf and Maxwell's equations

To impart knowledge on the concepts of Concepts of electromagnetic waves and Pointing vector.

UNIT I ELECTROSTATICS – I 9

Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields –Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications.

UNIT II ELECTROSTATICS – II 9

Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization - Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

UNIT III MAGNETOSTATICS 9

Lorentz force, magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundary conditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications.

UNIT IV ELECTRODYNAMIC FIELDS 9

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current - Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.

UNIT V ELECTROMAGNETIC WAVES 9

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction – Standing Wave – Applications.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Ability to understand and apply basic science, circuit theory, Electro-magnetic field theory control theory and apply them to electrical engineering problems.

TEXT BOOKS:

1. Mathew N. O. Sadiku, 'Principles of Electromagnetics', 4 th Edition ,Oxford University Press Inc. First India edition, 2009.
2. Ashutosh Pramanik, 'Electromagnetism – Theory and Applications', PHI Learning Private Limited, New Delhi, Second Edition-2009.
3. K.A. Gangadhar, P.M. Ramanthan ' Electromagnetic Field Theory (including Antennaes and wave propagation', 16th Edition, Khanna Publications, 2007**.**

REFERENCES:

1. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Third Edition (Schaum's Outline Series), Tata McGraw Hill, 2010
2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', Tata McGraw Hill 8th Revised edition, 2011.
3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010.
4. Bhag Singh Guru and Hüseyin R. Hiziroglu "Electromagnetic field theory Fundamentals", Cambridge University Press; Second Revised Edition, 2009.

GE6351 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

To the study of nature and the facts about environment.

To finding and implementing scientific, technological, economic and political solutions to environmental problems.

To study the interrelationship between living organism and environment.

To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

To study the dynamic processes and understand the features of the earth's interior and surface. To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 12

Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 10

Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry- Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO_2, NO_X, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies –

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Introduction to Environmental Biochemistry: Proteins –Biochemical

degradation of pollutants, Bioconversion of pollutants.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – 12 Principles of green chemistry- nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Ecomark). enforcement machinery involved in environmental legislation- central and state pollution control boards- disaster management: floods, earthquake, cyclone and landslides.

Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA)- -GIS-remote sensing-role of information technology in environment and human health – Case studies.

TOTAL : 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions

Development and improvement in std. of living has lead to serious environmental disasters

TEXT BOOKS :

1. Gilbert M.Masters, ‘Introduction to Environmental Engineering and Science’, 2nd edition, Pearson Education, 2004.
2. Benny Joseph, ‘Environmental Science and Engineering’, Tata McGraw-Hill, New Delhi, 2006.

REFERENCES :

1. R.K. Trivedi, ‘Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards’, Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, ‘Environmental Encyclopedia’, Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, ‘Environmental law’, Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, ‘Environmental Studies-From Crisis to Cure’, Oxford University Press 2005.

EC6202 ELECTRONIC DEVICES AND CIRCUITS L T P C
3 1 0 4

OBJECTIVES:

The student should be made to:

Be familiar with the structure of basic electronic devices.

Be exposed to the operation and applications of electronic devices.

UNIT I PN JUNCTION DEVICES 9

PN junction diode –structure, operation and V-I characteristics, diffusion and transient capacitance - Rectifiers – Half Wave and Full Wave Rectifier,– Display devices- LED, Laser diodes- Zener diode-characteristics-Zener Reverse characteristics – Zener as regulator

UNIT II TRANSISTORS 9

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristor and IGBT - Structure and characteristics.

UNIT III AMPLIFIERS 9

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response – MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response- High frequency analysis.

UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER 9

BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).

UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS 9

Advantages of negative feedback – voltage / current, series , Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

To explain the structure of the basic electronic devices.

To design applications using the basic electronic devices.

TEXT BOOKS:

1. David A. Bell ,"Electronic Devices and Circuits", Prentice Hall of India, 2004.
2. Sedra and smith, "Microelectronic Circuits " Oxford University Press, 2004.

REFERENCES:

1. Rashid, "Micro Electronic Circuits" Thomson publications, 1999.
2. Floyd, "Electron Devices" Pearson Asia 5th Edition, 2001.
3. Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2003.
4. Robert L.Boylestad, "Electronic Devices and Circuit theory", 2002.
5. Robert B. Northrop, "Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation", CRC Press, 2004.

EE6303 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS L T P C
3 0 0 3

OBJECTIVES:

To study the IC fabrication procedure.

To study characteristics; realize circuits; design for signal analysis using Op-amp ICs. To study the applications of Op-amp.

To study internal functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits, ADCs.

UNIT I IC FABRICATION 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance and FETs.

UNIT II CHARACTERISTICS OF OPAMP 9

Ideal OP-AMP characteristics, DC characteristics, AC characteristics,, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – Inverting and Non-inverting Amplifiers-V/I & I/V converters ,summer, differentiator and integrator.

UNIT III APPLICATIONS OF OPAMP 9

Instrumentation amplifier, Log and Antilog Amplifiers, first and second order active filters, , comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps.

UNIT IV SPECIAL ICs 9

Functional block, characteristics & application circuits with 555 Timer Ic-566 voltage controlled oscillator Ic; 565-phase lock loop Ic ,Analog multiplier ICs.

UNIT V APPLICATION ICs 9

IC voltage regulators –LM78XX,79XX Fixed voltage regulators - LM317, 723 Variable voltage regulators, switching regulator- SMPS- LM 380 power amplifier- ICL 8038 function generator IC.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and analyse, linear and digital electronic circuits.

TEXT BOOKS:

1. David A.Bell, ‘Op-amp & Linear ICs’, Oxford, 2013.
2. D.Roy Choudhary, Sheil B.Jani, ‘Linear Integrated Circuits’, II edition, New Age, 2003.
3. Ramakant A.Gayakward, ‘Op-amps and Linear Integrated Circuits’, IV edition, Pearson Education, 2003 / PHI. 2000.

REFERENCES:

1. Fiore,”Opamps & Linear Integrated Circuits Concepts & Applications”,Cengage,2010.
2. Floyd ,Buchla,”Fundamentals of Analog Circuits, Pearson, 2013.
3. Jacob Millman, Christos C.Halkias, ‘Integrated Electronics - Analog and Digital circuits system’,Tata McGraw Hill, 2003.
4. Robert F.Coughlin, Fredrick F. Driscoll, ‘Op-amp and Linear ICs’, PHI Learning, 6th edition,2012.

EC6361 **ELECTRONICS LABORATORY** **L T P C**

0 0 3 2

OBJECTIVES:

To enable the students to understand the behavior of semiconductor device based on experimentation

LIST OF EXPERIMENTS:

1. Characteristics of Semi conductor diode and Zener diode
2. Characteristics of a NPN Transistor under common emitter , common collector and common base configurations
3. Characteristics of JFET(Draw the equivalent circuit)
4. Characteristics of UJT and generation of saw tooth waveforms
5. Design and Frequency response characteristics of a Common Emitter amplifier
7. Characteristics of photo diode & photo transistor, Study of light activated relay circuit
8. Design and testing of RC phase shift, LC oscillators
9. Single Phase half-wave and full wave rectifiers with inductive and capacitive filters
10. Differential amplifiers using FET
11. Study of CRO for frequency and phase measurements
12. Astable and Monostable multivibrators
13. Realization of passive filters

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and analyse, linear and digital electronic circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1.Semiconducter devices like Diode, Zener Diode, NPN Transistors, JFET, UJT, Photo diode, Photo Transistor
2. Resistors, Capacitors and inductors
3. Necessary digital IC 8
4. Function Generators 10
5. Regulated 3 output Power Supply 5, ± 15V 10
6. CRO 10
7. Storage Oscilloscope 1
8. Bread boards 10
9. Atleast one demo module each for the listed equipments.
10. Component data sheets to be provided

EE6311 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY L T P C
0 0 3 2

OBJECTIVES:

Working Practice in simulators / CAD Tools / Experiment test bench to learn design, testing and characterizing of circuit behaviour with digital and analog ICs.

LIST OF EXPERIMENTS:

1. Implementation of Boolean Functions, Adder/ Subtractor circuits.
2. Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa
3. Parity generator and parity checking
4. Encoders and Decoders
5. Counters: Design and implementation of 4-bit modulo counters as synchronous and Asynchronous types using FF IC's and specific counter IC.
6. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's.
7. Study of multiplexer and demultiplexer
8. Timer IC application: Study of NE/SE 555 timer in Astable, Monostable operation.
9. Application of Op-Amp: inverting and non-inverting amplifier, Adder, comparator, Integrator and Differentiator.
10. Study of VCO and PLL ICs:
    i. Voltage to frequency characteristics of NE/ SE 566 IC.
    ii. Frequency multiplication using NE/SE 565 PLL IC.

TOTAL : 45 PERIODS

OUTCOMES:

Ability to understand and analyse, linear and digital electronic circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

(3 per Batch)

S.No	Name of the equipments / Components	Quantity Required	Remarks
1	Dual ,(0-30V) variable Power Supply	10	-
2	CRO	9	30MHz
3	Digital Multimeter	10	Digital
4	Function Generator	8	1 MHz
5	IC Tester (Analog)	2	
6	Bread board	10	
7	Computer (PSPICE installed)	1	

Format No.:11
Issue No.: 02
Revision No.: 01
Date: 23/06/12

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM - 630 612

Lecture Schedule

Course/Branch: B.E/ EEE **Subject Name: Transforms& PDE**
Duration : 04.07.16-20.10.16 **Subject Code: MA6351**
Semester : III Section: 'A,B' **Staff handling: R. Ramya, P.BRINDHA**
Regulation : 2013 / AUC

AIM : To impart basic Mathematical knowledge required for the better understanding of all engineering subjects of various branches.

OBJECTIVE: The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of Engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

Unit	Course Outcomes	POs	PSOs
CO1	Solve First, Second order homogeneous and non homogeneous partial differential equations	1,2,4	1,2
CO2	Find the Fourier series of a given function satisfying Dirchlet's condition.	1,2,4	1,2
CO3	Apply Fourier series to solve one dimensional way, one and two dimensional heat equations.	1,2,4	1,2
CO4	Determine Fourier transform for a given function and use them to evaluate certain definite Integrals	1,2,4	1,2
CO5	Determine z transforms of standard functions and use them to solve difference equations	1,2,4	1,2

S.No	Date	Period	Topics to be covered	Book No (Page No)
Unit-I : PARTIAL DIFFERENTIAL EQUATIONS				**Target Periods: 12(as per AUC) Scheduled Periods:14**
1			Formation of Partial Differential Equations	T1: 1.1 – 1.19 T2: 534 - 536
2			Eliminating arbitrary constants and functions	T1: 1.1 – 1.19 T2: 534 - 536
3			Solutions of standard types of I Order Equations, Equations of the form F(p,q)=0	T1: 1.23 – 1.29 T2: 540 - 543
4			Clairaut's Form	T1: 1.24 – 1.30 T2:543& 414-415
5			Tutorial-I	
6			Equations of the form F(z,p,q)=0 Equations of the form F(x,p)=F(y,q)	T1: 1.24 – 1.37 T2: 541 - 542
7			Problem solving session	T1: 1.24 – 1.37 T2: 541 - 542
8			Langrange's Linear Equations - Method of grouping	T1: 1.51 – 1.68 T2: 538 - 540
9			Langrange's Linear Equations - Method of Multipliers	T1: 1.51 - 1.68 T2: 538 - 540
10			Tutorial-II	
11			Linear PDE of Second & Higher Order with constant coefficients	T1: 1.71 – 1.75 T2: 546 - 551
12			Problem solving session	
13			Non Homogeneous of second and higher order with constant coefficients.	T2: 551 - 575
14			Tutorial-III	
CT 1 (22.07.16 to 28.07.16)				
Unit: II – FOURIER SERIES				**Target Periods: 12(as per AUC) Scheduled Periods :14**

15			Continuity, discontinuity , limits, periodic functions &Dirichlet's condition	T1: 2.1 - 2.2 T2: 368 & 372
16			Fourier series of periodicity 2π	T1: 2.5 - 2.39 T2: 370 – 372
17			Fourier Series of periodicity 2l	T1: 2.5 - 2.39 T2: 375 – 376
18			Tutorial-I	
19			Fourier Series of Odd & Even functions	T1: 2.8 – 2.39 T2: 377 – 381
20			Problem solving session	
21			Half Range Sine Series	T1: 2.42 – 2.70 T2: 382 – 384
22			Half Range Cosine Series	T1: 2.42 – 2.70 T2: 382 – 384
23			Problem solving session	
24			Tutorial-II	
25			Complex form of Fourier series	T1: 2.75 – 2.89 T2: 388 – 389
26			RMS Value, Parseval's Identity	T1: 2.45 – 2.70 T2: 386 – 387
27			Harmonic Analysis	T1: 2.73 – 2.86 T2: 389 – 392
28			Tutorial-III	
CIT1(10.08.16-17.08.16)				
Assignment:1 Date of announcement: 01.08.16				Date of Submission:10.8.16
Unit-III : APPLICATIONS OF P.D.E.'S				**Target Periods: 12(as per AUC)** **Scheduled Periods:14**
29			Classification of PDE – Method of separation of variables	T1: 3.2 - 3.38 T2: 557- 563
30			Solutions of one dimensional wave equations With initial velocity is zero	T1: 3.2 – 3.38 T2: 557- 563
31			Solutions of one dimensional wave equations With initial displacement is zero	T1: 4.1 – 4.23 T2: 564 – 571
32			Solutions of one dimensional-Heat equation	T1: 4.1 – 4.23 T2: 564 - 571
33			Solutions of one dimensional-Heat equation	T1: 4.1 – 4.23 T2: 564 - 571
34			Tutorial-I	
35			Steady state condition with Zero boundary condition of ODHW	T1: 4.5 – 4.26 T2: 572 - 575
36			Steady state condition with Non-zero boundary condition Of ODHE	T1: 4.27 – 4.40 T2: 572 - 575
37			Introduction to two dimensional Heat flow equations	T1: 5.18 – 5.47 T2: 572 - 573
38			Solutions of two dimensional Heat flow equations	T1:5.18 – 5.47 T2: 572 - 573
39			Tutorial-II	
40			Infinite Plates	T1: 5.6 – 5.18 T2: 574 - 575
41			Problem solving sessions	
42			Tutorial-III	
Content beyond the syllabus- Solution of Telegraph equation on 26.08.16 (1st period)				
CT2(30.08.16-07.09.16)				
Unit-IV: FOURIER TRANSFORMS				**Target Periods: 12(as per AUC)** **Scheduled Periods :14**
43			Statement of Fourier Integral Theorem	T1: 6.1 – 6.6 T2: 709 – 712
44			Fourier Sine Transforms & Properties - Problems	T1: 6.5 – 6.22 &6.26 – 6.31 T2: 711 - 717

45			Fourier Cosine Transforms & Properties - Problems	T1: 6.5 – 6.22 & 6.26 – 6.31 T2: 711 - 717
46			Tutorial-I	
47			Complex Fourier Transforms and its Inversion Formula	T1: 6.6 – 6.7 T2: 721 - 723
48			Problem solving session	T1: 6.6 – 6.7 T2: 721 - 723
49			Convolution Theorem and problems	T1: 6.31 – 6.39 T2: 718 - 720
50			Convolution Theorem and problems	T1: 6.31 – 6.39 T2: 718 - 720
51			Problem solving session	
52			Tutorial-II	
53			Parseval's Identity- Introduction	T1: 6.32 - 6.39 T2: 719 - 720
54			Application of Parseval's Identity	T1: 6.32 - 6.39 T2: 719 - 720
55			Tutorial-III	
56			Problem solving session	
Content beyond the syllabus – Application of Fourier Transform in DSP on 21.09.16(3rd period)				
CIT2(20.09.16 – 26.09.16)				
Assignment :2 Date of Announcement : 22.09.16 Date of Submission: 30.09.16				
Unit-V : Z-TRANSFORM & DIFFERENCE EQUATIONS Target Periods: 12(as per AUC) Scheduled hours :14				
57			Definition of Z –Transforms and Properties	T1: 7.1 – 7.5 T2: 929 - 931
58			Definition of Z –Transforms and Properties	T1: 7.1 – 7.5 T2: 929 - 931
59			Elementary functions of Z- Transforms	T1: 7.7 T2: 934
60			Problem Solving Session on S.No 62	T1: 7.4 – 7.5 T2: 936 - 937
61			Inverse Z- Transforms	T1: 7.29 – 7.32 T2: 941 - 943
62			Tutorial-I	
63			Method of Partial fractions	T1: 7.26 – 7.29 T2: 940 - 943
64			Method of Residues	T1: 7.32 – 7.34 T2: 942 - 943
65			Tutorial-II	
66			Formation of Difference Equations	T1: 7.34 – 7.38 T2: 943 - 946
67			Solution of Difference Equations using Z - transforms	T1: 7.34 – 7.38 T2: 943 - 946
68			Convolution Theorem	T1: 7.5 – 7.6 T2: 939
69			Tutorial-III	
70			Anna university questions revision	
CT3 (06.10.16 – 08.10.16)				
Assignment :3 Date of Announcement : 08.10.16 Date of Submission: 18.10.16				
NPTEL : Video Session about Applications of Partial Differential Equations in various branches of Engineering. Reference site : http:// www.bing.com				

Text Books/ Reference Books:

S. No		Title of the Book	Author	Publisher	Year
1	T1	Transforms and Partial Differential Equations	T.Veerarajan (T1)	Tata MC-Graw Hill	2009
2	T2	Higher Engineering Mathematics	Grewal, B.S (T2)	Khanna publishers	2007
3	R1	Higher Engineering Mathematics	Ramana.B.V	Tata MC Graw-Hill	2007
4	R2	Advanced Modern Engineering Mathematics	Glyn James	Pearson Education	2007
5	R3	Engineering Mathematics Volume III	Kandasamy.P, Thilagavathy.K and Gunavathy.K	S.Chand& Company Ltd.	1996

Course Outcomes (CO)	Program Outcome (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C201.1	2	2	-	1	-	-	-	-	-	-	-	-	1	-	-
C201.2	2	2	-	1	-	-	-	-	-	-	-	-	1	-	-
C201.3	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-
C201.4	2	2	-	1	-	-	-	-	-	-	-	-	1	-	-
C201.5	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-
C201	2	2	-	1	-	-	-	-	-	-	-	-	1	-	-

Content Beyond Syllabus Added(CBS)	POs	Unit
Content beyond the syllabus- Solution of Telegraph equation	PO4	III
Content beyond the syllabus – Application of Fourier Transform in DSP	PO5	IV

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM - 630 612

Lecture Schedule

Degree/Programme : **B.E / EEE**

Course code & Name: **EE6301 & Digital Logic Circuits** Duration: **July-Oct 2016.**

Semester: **III** Section : **A,B** Staff: **T.Gopu, R.Jeyapandiprathap** Regulation: **2013/AUC**

AIM

- To understand and analyse the digital electronic circuits.

OBJECTIVES

- To study various number systems , simplify the logical expressions using Boolean functions
- To study implementation of combinational circuits
- To design various synchronous and asynchronous circuits.
- To introduce asynchronous sequential circuits and PLCs
- To introduce digital simulation for development of application oriented logic circuits.

Prerequisites: Computer Programming.

COURSE OUTCOMES: After the course, the student should be able to

CO	Course Outcomes	POs	PSOs
C202.1	List the various types of number system and compare the digital logic families.	1,2,3,4	1
C202.2	Apply K –Map for simplification and implementation of combinational logic circuit	1,2,3,4	1
C202.3	Explain the synchronous Sequential logic circuits, draw the block diagram of Shift Registers	1,2,3,4	1
C202.4	Design of asynchronous sequential circuits and describe the operation of Programmable Logic Devices	1,2,3,4	1
C202.5	Develop the VHDL coding for combinational logic and Sequential circuits	1,2,3,4	1

S. No	Date	Period Number	Topics to be Covered	Book No [Page No]	
UNIT-I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES				**Target Period : 9+3=12**	
1			Review of number systems	T1[11]	-
2					
3			Tutorial	-	-
4			Binary codes, Error detection codes	R4[62,75]	-
5			Error correction codes (Parity and Hamming code)	R4[79]	-
6			Tutorial	-	-
7			Digital Logic Families: RTL-operation	T1[131]	R9[7.2]
8			DTL, ECL -operation	T1[134]	R9[7.28]
9			TTL -operation	T1[136]	R9[7.6]
10			MOS families -operation	T1[147]	R9[7.19]
11			Comparison of RTL, DTL, TTL, ECL and MOS families, characteristics of digital logic family, Revision.	T1[151]	R9[7.31] R9[7.2]
12			Tutorial	-	-
Total Periods:		**12**	***Assignment - I***	*Date of Submission :**29.7.16***	
23.7.15		***1***	***Test – I: Class Test-I*** *(22.7.16 – 28.7.16)*	***Portion :*** *Unit – 1*	
UNIT – II : COMBINATIONAL CIRCUITS				**Target Periods : 9+3=12**	
13			Combinational logic circuits	T1[53]	R9[1.2]
14			Representation of logic functions	T1[57]	R9[1.4]
15			SOP and POS forms	T1[60,64]	R9[1.8]
16			Tutorial	-	-
17			K-map representations	T1[76]	R9[1.18]
18			Minimization using K maps	T1[78]	R9[1.56]
19			Simplification and implementation of combinational logic	T1[89]	R9[1.69]
20			Tutorial	-	-
21			Multiplexers and demultiplexers	T1[227]	R9[2.40]
22			Code converters	T1[249]	R9[2.19]
23			Adders, subtractors.	T1[214]	R9[2.5]
24			Tutorial, Revision	-	-
Total Periods:		**12**	***Assignment - II***	*Date of Submission :**18.8.16***	
11.8.16		***1,2***	***Test – II: CIT-I*** *(10.8.16 – 17.8.16)*	***Portion :*** *Unit – 1,II*	
UNIT – III : SYNCHRONOUS SEQUENTIAL CIRCUITS				**Target Periods : 9+3=12**	
25			Sequential logic- SR, JK flip flops	T1[312]	R9[3.2]
26			D and T flip flops -	T1[326]	R9[3.9]

27			Level triggering and edge triggering of flip flops	T1[335]	R9[3.3]
28			Tutorial	-	-
29			Counters - asynchronous type	T1[390]	R9[4.59]
30			Counters - synchronous type	T1[400]	R9[4.44]
31			Modulo counters	T1[395]	R9[4.62]
32			Shift registers	T1[385]	-
33			Tutorial	-	-
34			Design of synchronous sequential circuits – Moore and Melay models	T1[353]	R9[4.2]
35			Counters, state diagram; state reduction; state assignment.	T1[355]	R9[4.5]
36			Tutorial, Revision	-	-
Total Periods:		**12**	***Test – III [31.08.16]: Class Test-II*** *(30.08.16 – 07.09.16)*	***Portion :*** *Unit – III*	
UNIT – IV : Asynchronous Sequential Circuits and Programmable Logic Devices Target Periods : 9+3=12					
37			Asynchronous sequential logic circuits	T1[442]	R9[5.2]
38			Transition table, flow table	T1[459]	R9[5.24]
39			Race conditions	T1[456]	R9[5.30]
40			Tutorial	-	-
41			Hazards in digital circuits	T1[467]	R9[B.2]
42			Errors in digital circuits	T1[467]	-
43			Tutorial	-	-
44			Analysis of asynchronous sequential logic circuits	T1[448]	R9[5.4]
45			Tutorial	-	-
46			Introduction to Programmable Logic Devices: PROM	R4[582]	R9[6.5]
47			PLA	R4[608]	R9[6.19]
48			PAL, Revision	T1[509]	R9[6.33]
49			*Seminar-I*		
50			*Quiz-I*	-	-
Total Periods:		**14**	***Assignment - III***	*Date of Submission :**18.9.16***	
21.9.16		***1,2***	***Test – IV: CIT-II*** *(20.9.16 – 26.9.16)*	***Portion :*** *Unit – III, IV*	
UNIT – V : VHDL				**Target Periods : 9+3=12**	
51			RTL Design	R5[44]	R9[8.106]
52			Combinational logic circuit	R5[17]	R9[8.94]
53			Sequential circuit	R5[47]	R9[8.77]
54			Operators	R5[76]	R9[8.16]
55			Introduction to Packages	R5[76]	R9[8.3]
56			Subprograms	-	R9[8.69]
57			Test bench, Revision	-	R9[8.115]
58			Simulation /Tutorial Examples: adders	-	R9[8.98]
59			Simulation /Tutorial Examples: counters	-	R9[8.86]
60			Simulation /Tutorial Examples: flip-flops	R5[44]	R9[8.106]
61			Simulation /Tutorial Examples: FSM	-	R9[8.94]
62			Simulation /Tutorial Examples:Multiplexers/Demultiplexers	R5[54]	-
63			*Seminar-II*		
64			*Quiz-II*		
65			*Content Beyond Syllabus: Verilog code language for VLSI software based", designed specifically for use in digital electronics and logic circuits drive simulations*		
Total Periods:		**15**			
06.10.16(AN)		***5***	***Test – V: Class Test-III*** *(06.10.16 –08.10.16)*	***Portion :*** *Unit – V*	

Books: Text (T) / Reference(R):

S.No		Title of the Book	Author	Publisher	Year
1	T1	Digital Systems – Principles and Design	Raj Kamal	Pearson Edison, 2nd edition	2007
2	T2	Digital Design with an introduction to the VHDL	M. Morris Mano	Pearson Education	2013
3	T3	Digital Logic & State Machine Design,	Comer	Oxford	2012
4	R1	Digital Electronics Principles & Application	Mandal	McGraw Hill Edu	2013
5	R2	Digital Electronics-A Practical Approach with VHDL	William Keitz	Pearson	2013
6	R3	Digital Fundamentals	Floyd and Jain	8th edition, Pearson Education	2003
7	R4	Fundamentals of Digital Circuits	Anand Kumar	PHI	2013
8	R5	Digital System Design using VHDL	Charles H.Roth,Jr,Lizy Lizy Kurian John	Cengage	2013
9	R6	Digital Logic, Application & Design	John M.Yarbrough	Thomson	2002
10	R7	VHDL Basics to Programming	Gaganpreet Kaur	Pearson	2013
11	R8	HDL Programming Fundamental, VHDL& Verilog	Botros	Cengage	2013
12	*R9*	*Digital Logic Circuits*	*A.P.Godse & D.A.Godse*	*Technical Publications*	*2014*
13	*R10*	*Digital Circuits and Design*	*S.Salivahanan & S. Arivazhzgan*	*Vikas Publication 3rd Edition*	*2008*

Mapping of Course Outcomes (COs) , Course (C), Program Specific Outcomes (PSOs) with Program Outcomes. (POs) – Before CBS

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C202.1	3	2	1	1	-	-	-	-	-	-	-	-	2	-	-
C202.2	2	2	2	2	-	-	-	-	-	-	-	-	2	-	-
C202.3	2	2	2	2	-	-	-	-	-	-	-	-	2	-	-
C202.4	1	2	2	1	-	-	-	-	-	-	-	-	2	-	-
C202.5	1	1	1	1	-	-	-	-	-	-	-	-	1	-	-
C202	2	2	2	1	-	-	-	-	-	-	-	-	2	-	-

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
"Verilog code language for VLSI software based", designed specifically for use in digital electronics and logic circuits drive simulations.	PO5(2) strengthened	C202.5/V

NPTEL:

Unit	http://nptel.ac.in/courses/webcourse-contents/ digital electronics/	
I	**http://nptel.ac.in/courses/117103064/** NPTEL >> Electronics & Communication Engineering >> Digital Circuits (Web) >> Digital and Analog Signals	IIT Madras
II	**http://nptel.ac.in/courses/117106086/** NPTEL >> Electronics & Communication Engineering >> Digital Circuits and Systems (Video) >> Introduction To Digital Circuits	IIT Guwahati
III IV	**http://nptel.ac.in/courses/117105080/** NPTEL >> Electronics & Communication Engineering >> Digital Systems Design (Video) >> Introduction to Digital Systems Design	IIT Kharagpur
V	**http://nptel.ac.in/courses/117108040/** NPTEL >> Electronics & Communication Engineering >> Digital System design with PLDs and FPGAs (Video) >> Course Contents, Objective	IISc Bangalore

Staff In charge **HOD/EEE**

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

LECTURE SCHEDULE

Degree/ Program	**: B.E/ Electrical and Electronics Engineering**	Course code & Name	**: EE6302- Electromagnetic Theory (C203)**
Duration	**: July 2016 to Nov 2016**	Semester	**: III** Section : **A & B**
Regulation	**: 2013**	Staff handling	**: A.Marimuthu, A.S.S.Murugan**

AIM : To expose the students to the fundamentals of electromagnetic fields and their applications to Electrical Engineering.

OBJECTIVES

- To introduce the basic mathematical concepts related to electromagnetic vector fields
- To impart knowledge on the concepts of electrostatics, electrical potential, energy density and their applications.
- To impart knowledge on the concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications.
- To impart knowledge on the concepts of Faraday's law, induced emf and Maxwell's equations
- To impart knowledge on the concepts of Concepts of electromagnetic waves and Poynting vector.

Prerequisites: Mathematics, Physics

COURSE OUTCOMES: After the course, the student should be able to:

Course	Course Outcome	POs	PSOs
C203.1	Explain the different coordinate systems, and apply Gauss's law	**1,**	**1**
C203.2	Interpret the concepts of Electrostatic fields and apply boundary conditions on Electrostatic field	**2, 3,**	**1**
C203.3	Develop concepts of Magnetostatic fields and apply boundary conditions.	**4**	**1**
C203.4	Analyze the Maxwell's equations for electromagnetic fields		**1**
C203.5	Derive Electromagnetic wave equation and apply the Poynting expression.		**1**

S.No	Date	Period	Topics to be Covered	Book No [Page No]
UNIT I ELECTROSTATICS – I			**(Target Periods :9+3)**	
1.			Sources and effects of electromagnetic fields	T1[3-19]
2.			Co-ordinate systems	T1[29-46]
3.			Vector fields , Gradient, Divergence and Curl, Theorem's and applications	T1[65-90]
4.			Coulomb's Law, Electric field intensity	T1[106-111]
5.			Field due to discrete and continuous charges	T1[113-124]
6.			Gauss's law and application	T1[124-134]
7.			Tutorial	
				Total Planned Periods: 12
			Assignment –I-DOS: ***Test-I***	
UNIT II ELECTROSTATICS – II			**(Target Periods :9+3)**	
8.			Electrical potential	T1[135-144]
9.			Electric field and equipotential plots,	T1[688-690]
10.			Uniform and Non-Uniform field, Utilization factor, Electric field in free space, conductors	T1[170-175]
11.			Electric field in Dielectric – dielectric polarization, Dielectric strength - Electric field in multiple dielectrics	T1[179-182]
12.			Boundary conditions, Poisson's and Laplace's equations	T1[190-198] T1[209-210]
13.			Capacitance, Energy density	T1[148-152] T1[233- 246]
14.			*Seminar- I-* Applications of Electrostatics	
15.			Tutorial	
			Assignment –II-DOS: ***CIT-I-***	
				Total Planned Periods: 12
UNIT III - MAGNETOSTATICS			**(Target Periods :9+3)**	
16.			Magnetic field intensity (H)- Biot-savart's Law	T1[274- 276]
17.			H due to straight conductors and circular loop	T1[277- 282]
18.			Ampere's Circuit Law , H due to infinite sheet of current	T1[285- 288]
19.			Magnetic flux density (B),B in free space, conductor	T1[293- 294]
20.			Scalar and vector potential, Lorentz force	T1[296- 298] T1[319-322]
21.			Magnetic materials, Magnetization, Magnetic field in multiple media	T1[331- 344]

22.			Boundary conditions, Inductance	T1[344- 353]
23.			Energy density	T1[353- 361]
24.			Magnetic force, Torque,	T1[381- 382]
25.			Tutorial	
26.			*Seminar – II* - Applications of Magnetostatics	
Assignment –III-DOS: ***Test-3***				
Total Planned Periods: 12				
UNIT IV - ELECTRODYNAMIC FIELDS **(Target Periods:9+3)**				
27.			Magnetic circuits	T1[361- 368]
28.			Faraday's laws	T1[386- 387]
29.			Transformer and motional EMF	T1[388- 391]
30.			Displacement current	T1[397- 399]
31.			Maxwell's equations (differential and integral forms)	T1[400- 402]
32.			Relation between field theory and circuit theory, Applications	Material
33.			Tutorial	
Total Planned Periods: 12				
CIT-II :				
UNIT V - ELECTROMAGNETIC WAVES **(Target Periods :9+3)**				
34.			Electromagnetic wave Generation and equations	T1[430- 432]
35.			Wave parameters – velocity – intrinsic impedance – propagation constant	T1[436- 437]
36.			Waves in free space, Lossy and lossless dielectrics – conductors-skin depth,	T1[436- 445]
37.			Poynting vector	T1[454- 458]
38.			Plane wave reflection and refraction, standing wave, Applications	T1[459- 462]
39.			Tutorial	
40.			*Content Beyond Syllabus:* Electromagnetic Interference (EMI)	
41.			Quiz(I & II)	
Total Planned Periods: 12				
CIT-III :				
NPTEL Website: http://nptel.ac.in/courses/108106073/				

Text /Reference Book

S.No	Title of the Book	Author	Publisher	Year
T1	Elements of Electromagnetics	Mathew N.O .Sadiku	Oxford University	2009
T2	Electromagnetism- Theory and applications	Ashutosh Pramanik	Prentice Hall	2006
T3	Electromagnetic Field Theory	K.A. Gangadhar, P.M. Ramanthan	Khanna Publications	2007
R1	Schaum's Series Theory and Problems of Electromagnetics Second Edition,	Joseph A. Edminister	Tata McGraw-Hill	2006
R2	Engineering Electromagnetics	William H. Hayt	Tata McGraw Hill	2001
R3	Electromagnetics with Applications,	Kraus and Fleish	McGraw-Hill	1999
R4	Electromagnetic field theory Fundamentals	Bhag Singh Guru and Hüseyin R.	Cambridge University Press	2009

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C203.1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
C203.2	3	3	-	1	-	-	-	-	-	-	-	-	2	-	-
C203.3	3	3	1	1	-	-	-	-	-	-	-	-	2	-	-
C203.4	3	3	1	1	-	-	-	-	-	-	-	-	2	-	-
C203.5	3	3	1	-	-	-	-	-	-	-	-	-	2	-	-
C203	3	3	1	1	-	-	-	-	-	-	-	-	2	-	-

Content Beyond Syllabus Added(CBS)	POs	Unit
Electromagnetic Interference (EMI)	PO6 (**2**)	V

STAFF INCHARGE **HOD/EEE**

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM - 630 612

Format No.:11
Issue No.: 02
Revision No.: 01
Date: 23/06/12

Lecture Schedule

Degree/Program: **B.E / EEE** Course code: **GE6351**
Semester: III**.** Section : A Course Name: **Environmental Science and Engineering**
Duration: **July -Oct 2016** Staff : **Manoj A, Mahalakshmi M**
Regulation : **2013(AUC)**

Aim: To create awareness in every engineering graduate about the environment& its importance, the effect of technology on the environment and ecological balance.

Prerequisites: Technical English I&II, 4th to 9th grade Environmental Science and geography books

Objectives:

1. To the study of nature and the facts about environment.
2. To find and implement scientific, technological, economic and political solutions to environmental problems.
3. To study the interrelationship between living organism and environment.
4. To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
5. To study the dynamic processes and understand the features of the earth's interior and surface.
6. To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

COURSE OUTCOMES: After the course, the student should be able to:

Course	Course Outcome	POs	PSOs
C204.1	Define Environment, ecosystem and biodiversity, classify types of ecosystems and outline the impacts to biodiversity.	**6,9,12**	**2,3**
C204.2	Define pollution, classify its types, analyze the causes and suggest control measures for pollution.	**6,7,8,9,12**	**2,3**
C204.3	Outline various natural resources; explain causes and impacts of destruction of resources.	**6,9,12**	**2,3**
C204.4	List various social issues related to land, water and energy; summarize the concerning government acts and rules to overcome these problems.	**6,7,9,12**	**2,3**
C204.5	Interpret population explosion and variation among nations, show the impacts of over population and illustrate the methods to mitigate the same.	**6,7,8,9,12**	**2,3**

Target Periods - 45 Periods **Curriculum: 3L - 0T-0P**

Sl. No	Date	Period No.	Topics to be covered	Book Page No.
Unit - I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY			**Target Periods : 12**	
1			Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment	R5(1.2 -1.7)
2			Concept of an ecosystem- Structure and function of an ecosystem ,producers, consumers and decomposers	R5(2.1-2.8)
3			Oxygen cycle and Nitrogen cycle, Energy flow in the ecosystem – Ecological succession process	R5(2.9 -2.17)
4			Introduction, types, characteristic features, structure and function of the forest ecosystem and grassland ecosystem	R5(2.17-2.23)
5			Introduction, types, characteristic features, structure and function of the desert ecosystem and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	R5(2.24-2.37)
6			Introduction to biodiversity definition: genetic species and ecosystem diversity- Biogeographical classification of India	R5(3.1-3.5)
7			Value of biodiversity: consumptive use, productive use, Social, ethical, aesthetic and option values – Biodiversity at global, national and local levels	R5(3.6-3.17)
8			India as a mega-diversity nation – hot-spots of biodiversity	R5(3.17-3.22)
9			Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts	R5(3.23-3.28)

10			Endangered and endemic species of India, Conservation of biodiversity: In-situ and ex-situ, conservation of biodiversity	R5(3.28-3.40)
11			Field study of common plants, insects, birds.	Notes
12			Field study of simple ecosystems – pond, river, hill slopes, etc.	Notes
			Seminar/ Quiz /Self-study	
Class Test I : (22.07.16 – 28.07.16)				
Unit II ENVIRONMENTAL POLLUTION Target Periods :10				
13			Definition – causes, effects and control measures of air pollution(Atmospheric chemistry- Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN	R5(4.1-4.14)
14			Acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO2, NOX, CO and HC)	R5(4.14- 4.24)
15			Water pollution: Physical and chemical properties of terrestrial and marine water and their environmental significance;	R5(4.24-4.27) R5(4.36-4.44)
16			Water quality parameters – physical, chemical and biological;	R5(4.27-4.36)
17			absorption of heavy metals - Water treatment processes.	R5(4.44-4.54)
18			Soil pollution - soil waste management: causes	R5(4.54-4.64)
19			Effects and control measures of municipal solid wastes	R5(4.64-4.70)
20			Causes, effects and control measures of Noise pollution, and Marine pollution	R5(4.71-4.80)
21			Causes, effects and control measures of Thermal pollution and Nuclear hazards	R5(4.80-4.91)
22			Role of an individual in prevention of pollution	R5(4.91-4.93)
ASSIGNMENT NO.:1 DOA: 8.8.16 DOS: 22.8.16 ***CIT– I – Series (10.08.16 – 17.08.16)***				
Unit III NATURAL RESOURCES Target Periods : 10+1				
20			Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people	R5(5.1-5.15)
21			Water resources: Use and over-utilization of surface and ground water, dams-benefits and problems	R5(5.15-5.21)
22			Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies	R5(5.22-5.33)
23			Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies	R5(5.33-5.42)
24			Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies	R5(5.43-5.68)
25			Land as a resource, land degradation, man induced landslides, soil erosion and desertification	R5(5.68-5.76)
26			Role of an individual in conservation of natural resources Equitable use of resources for sustainable lifestyles	R5(5.76-5.80)
27			Introduction to Environmental Biochemistry: Proteins – Biochemical degradation of pollutants, Bioconversion of pollutants.	R5(5.80-5.86)
			Seminar/ Quiz /Self-study	
ASSIGNMENT NO.:2 DOA: 29.8.16 DOS: 12.9.16 ***Class Test II : (30.08.16 – 07.09.16)***				
Class Test II : (01.09.16 – 09.09.16)				
Unit IV SOCIAL ISSUES AND THE ENVIRONMENT Target Periods : 07				
29			From Unsustainable to sustainable development - Urban Problems Related to energy – Water conservation, Rain Water Harvesting	R5(6.1-6.10)
30			Watershed Management – Resettlement and Rehabilitation of People, Its Problems and Concerns, Case Studies, Environmental Ethics:- Issues and Possible Solutions	R5(6.11-6.22)
31			Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust, Case Studies	R5(6.22- 6.28)
32			Wasteland Reclamation – Consumerism and Waste Products	R5(6.28- 6.34)
33			Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act	R5(6.34-6.38)

34			Wildlife Protection Act – Forest Conservation Act	R5(6.38-6.46)
35			Issues Involved in enforcement of Environmental Legislation – Public Awareness	R5(6.46-6.61)
			Seminar/ Quiz /Self-study	
ASSIGNMENT NO.:3 DOA: 3.10.16 DOS: 17.10.16				***CIT- II : (20.09.16 – 26.09.16)***
Unit-V HUMAN POPULATION AND THE ENVIRONMENT Target Periods : 06				
36			Population Growth, Variation among Nations - Population Explosion	R5(7.1-7.11)
37			Family Welfare Programme- Environment and Human Health	R5(7.11-7.17)
38			Human Rights- Value Education- HIV /AIDS	R5(7.17-7.28)
39			Women and Child Welfare	R5(7.28-7.32)
40			Role of Information Technology in Environment and Human Health – Case Studies	R5(7.3-7.41)
41			Revision	
Class Test – III - (6.10.16 – 8.10.16)				

NPTEL LECTURES

S. No	UNIT	Date[Period]	TOPIC	Ref / Link
1	2	12.09.16 – 05.10.16 Tentative	Air quality standards-Types and forms of air polutants	http://nptel.ac.in/courses/105104099/4
2	4	12.09.16 – 05.10.16 Tentative	Watershed management	http://nptel.ac.in/courses/105101010/4

Text Books and References

S. No		Title of the Book	Author	Publisher	Year
1	**T1**	Introduction to Environmental Engineering and Science, 2nd edition	Gilbert M.Masters	Pearson Education	2004.
2	**T2**	Environmental Science and Engineering	Benny Joseph	Tata McGraw-Hill, New Delhi	2006
3	**R1**	Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards Vol. I and II	R.K. Trivedi	Enviro Media	2006
4	**R2**	Environmental Encyclopedia	Cunningham, W.P. Cooper, T.H. Gorhani	Jaico Publ., House, Mumbai, 2001.	2006
5	**R3**	Environmental law	. Dharmendra S. Sengar	Prentice hall of India PVT LTD, New Delhi	2007
6	**R4**	Environmental Studies-From Crisis to Cure		Oxford University Press	2005
7	**R5**	Environmental Science and Engineering	A.Ravikrishnan	Srikrishna Hitech Publishing company Pvt.Ltd	2014

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C204.1	-	-	-	-	-	3	-	-	1	-	-	2	-	1	1
C204.2	-	-	-	-	-	3	1	1	1	-	-	3	-	1	1
C204.3	-	-	-	-	-	3	-	-	1	-	-	3	-	1	1
C204.4	-	-	-	-	-	3	2	-	1	-	-	3	-	1	1
C204.5	-	-	-	-	-	3	2	1	1	-	-	3	-	1	1
C204	-	-	-	-	-	3	1	1	1	-	-	3	-	1	1

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Ethics and Moral values	PO8(2) Strengthened	C204.5/V
Team based activities	PO9(2) & PO10(2) Strengthened & Vacant filled	C204.2/II,C204.5/V

Faculty In-Charge **HOD/EEE**

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM - 630 612

Lecture Schedule

Degree/Programme : **B.E / EEE**

Course code & Name : **EC6202 & Electronic Devices and Circuits** Duration : **July-Oct 2016.**

Semester : **III** Section : **A, B** Staff : **M. Jeyamurugan** Regulation : **2013/AUC**

AIM:

- To explain the structure of the basic electronic devices.
- To design applications using the basic electronic devices.

OBJECTIVES: The student should be made to:

- Be explaining with the structure of basic electronic devices.
- Be design to the basic electronic devices applications.

Prerequisites: Circuit theory

COURSE OUTCOMES: After the course, the student should be able to

CO	Course Outcomes	POs	PSOs
C205.1	Draw the characteristics of various types of Diodes, design Half and Full wave Rectifier.	1,2,3,4	1
C205.2	Compare the different configurations of BJT, draw its characteristics.	1,2,3,4	1
C205.3	Calculate the FET parameters, draw its frequency response characteristics.	1,2,3,4,6	1
C205.4	Design amplifier circuits and draw frequency response characteristics	1,2,3,4,6	1
C205.5	Develop the parameters of feedback amplifier circuit, describe different types of oscillator circuits	1,2,3,4,6	1

S. No	Date	Period Number	Topics to be Covered	Book No [Page No]	
UNIT – I : PN JUNCTION DEVICES				**Target Periods : 9+3=12**	
1			PN junction diode –structure, operation and	T1[20]	R7(1.1)
2			V-I characteristics	T1[35]	R7(1.5)
3			Diffusion capacitance and Transient capacitance	T1[50]	R7(1.10,14)
4			Tutorial	-	-
5			Rectifiers – Half Wave Rectifier and	T1[71]	R7(1.16)
6			Full Wave Rectifier	T1[75]	R7(1.23,29)
7			Tutorial	-	-
8			Display devices- LED	T1[948]	R7(1.37)
9			Laser diodes	T1[981]	R7(1.40)
10			Zener diode characteristics- Zener Reverse characteristics	T1[56]	R7(1.43,45)
11			Zener as regulator, Revision	T1[108]	R7(1.48)
12			Tutorial	-	-
13			*NPTEL*	-	-
Total Periods:		**13**	***Assignment - I***	*Date of Submission :**21.7.16***	
27.7.16		***1***	***Test – I: Class Test-I** (22.7.16 – 28.7.16)*	***Portion :** Unit – 1*	
UNIT – II : TRANSISTORS				**Target Periods : 9+3=12**	
14			BJT- structure, operation, characteristics	T1[143]	R7(2.2)
15			BJT Biasing	T1[180]	R7(2.68)
16			Tutorial	-	-
17			JFET- structure, operation, characteristics	T1[345]	R7(2.27)
18			JFET Biasing	T1[380]	R7(2.125)
19			Tutorial	-	-
20			MOSFET- structure, operation, characteristics	T1[367]	R7(2.40)
21			MOSFET Biasing	T1[417]	R7(2.152)
22			Tutorial	-	-
23			UJT - Structure and characteristics	T1[927]	R7(2.174)
24			Thyristor - Structure and characteristics	T1[893]	R7(2.182)
25			IGBT - Structure and characteristics, Revision	-	R7(2.200)
26			Tutorial	-	-
27			*CBS: Diode, Transistor testing & Evaluation - Demonstration*	T1[56], T1[172]	*PO5,PO7*
28			*Seminar-I*	-	-

Total Periods:		**15**	***Assignment - II***	*Date of Submission :**9.8.16***	
16.8.16		***1,2***	***Test – II: CIT-I*** *(10.8.16 – 17.8.16)*	***Portion :*** *Unit – 1,II*	
UNIT – III : AMPLIFIERS				**Target Periods : 9+3=12**	
29			BJT small signal model	T1[238]	R7(3.1)
30			Analysis of CE amplifiers	T1[254]	R7(3.27)
31			Analysis of CB amplifiers	T1[268]	R7(3.40)
32			Analysis of CC amplifiers	T1[263]	R7(3.43)
33			Tutorial	-	-
34			Gain and frequency response - High frequency analysis	R4[523]	R7(3.52)
35			Tutorial	-	-
36			MOSFET small signal model	T1[435]	R7(3.70)
37			Analysis of CS	T1[439]	R7(3.78)
38			Analysis of Source follower	T1[448]	R7(3.82)
39			Tutorial	-	-
40			Gain and frequency response - High frequency analysis	T1[460]	R7(3.90)
41			Tutorial, Revision	-	-
42			*Quiz-I*	-	-
Total Periods:		**14**	***Assignment - III***	*Date of Submission :**8.9.16***	
6.9.16		***1***	***Test – III : Class Test-II*** *(30.8.16 –7.9.16)*	***Portion :*** *Unit – III*	
UNIT – IV : MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER				**Target Periods : 9+3=12**	
43			BIMOS cascade amplifier	T1[518]	R7(4.1)
44			Differential amplifier	T1[510]	R7(4.2)
45			Common mode and Difference mode analysis	T1[512]	R7(4.4,9)
46			FET input stages	R4[574]	R7(4.25)
47			Tutorial	-	-
48			Single tuned amplifiers	T1[524]	R7(4.31)
49			Gain and frequency response	R6[463]	R7(4.1)
50			Neutralization methods	R6[482]	R7(4.40)
51			Tutorial	-	-
52			Power amplifiers –Types	T1[807]	R7(4.42)
53			Power amplifiers types (Qualitative analysis), Revision	T1[833]	R7(4.48)
54			Tutorial	-	-
55			*Quiz-II*	-	-
Total Periods:		**13**	***Test – IV [24.9.16]: CIT-II*** *(20.9.16 – 26.9.16)*	***Portion :*** *Unit – III, IV*	
UNIT – V : FEEDBACK AMPLIFIERS AND OSCILLATORS				**Target Periods : 9+3=12**	
56			Advantages of negative feedback Amplifier	T1[581]	R7(5.10)
57			Voltage series feedback	R4[753]	R7(5.8,29)
58			Voltage shunt feedback	R4[754]	R7(5.9,37)
59			Current series feedback	R4[755]	R7(5.8,31)
60			Current shunt feedback	R6[500]	R7(5.9,34)
61			Tutorial	-	-
62			Positive feedback - Condition for oscillations	R6[508]	R7(5.43,45)
63			Phase shift oscillators, Wien bridge oscillators	T1[666]	R7(5.48,61)
64			Tutorial	-	-
65			Hartley, Colpitts oscillators.	T1[675]	R7(5.80,86)
66			Crystal oscillators, Revision	T1[701]	R7(5.97)
67			Tutorial	-	-
68			*Seminar-II*	-	-
Total Periods:		**13**	***Test – V [8.10.16]: Class Test-III*** *(6.10.16 – 8.10.16)*	***Portion :*** *Unit – V*	

Books: Text-(T) / Reference-(R)

S. No		Title of the Book	Author	Publisher	Year
1	**T1**	Electronic Devices and Circuits	David A. Bell	Oxford Higher Education, 5th Edition	2015
2	**T2**	Microelectronic Circuits	Sedra and smith	Oxford University Press	2004
3	**R1**	Micro Electronic Circuits	Rashid	Thomson publications	1999
4	**R2**	Electron Devices	Floyd	Pearson Asia 5th Edition	2001
5	**R3**	Electronic Circuit Analysis and Design	Donald A Neamen	Tata McGraw Hill, 3rd Edition	2003
6	**R4**	Electronic Devices and Circuit theory	Robert L.Boylestad	7th Edition, Prentice Hall	2002
7	**R5**	Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation	Robert B. Northrop	CRC Press	2004
8	***R6***	*Electronic Devices and Circuits*	*S.Shalivahanan N.Suresh Kumar*	*McGraw Hill Education (India) Pvt. Ltd, 3rd Edition*	*2014*
9	***R7***	*Electronic Devices and Circuits*	*T.Joel*	*Sruthi Publishers*	*2014*

NPTEL:

Unit	http://nptel.ac.in/courses/webcourse-contents/electronics/		Module No.	Lecture No.
I	PN Diode	IIT, Kharagpur	01	02
	LED	IIT, Bombay	01	31
II	BJT	IIT, Kharagpur	01	03
III	FET & MOSFET	IIT, Delhi	05	02
IV	Differential Amplifiers	IIT, Delhi	07	09
V	Feedback configurations & Multistage amplifier	IIT, Delhi	01	04
	Oscillators	IIT, Madras	02	10

Mapping of Course Outcomes (COs) , Course (C), Program Specific Outcomes (PSOs) with Program Outcomes. (POs) – Before CBS

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C205.1	2	1	1	2	-	-	-	-	-	-	-	-	2	-	-
C205.2	2	2	2	2	-	-	-	-	-	-	-	-	2	-	-
C205.3	2	2	2	2	-	-	-	-	-	-	-	-	2	-	-
C205.4	2	2	1	2	-	1	-	-	-	-	-	-	2	-	-
C205.5	2	3	1	2	-	1	-	-	-	-	-	-	2	-	-
C205	2	2	2	2	-	1	-	-	-	-	-	-	2	-	-

Content Beyond Syllabus Added (CBS)	POs strengthened / vacant filled	CO / Unit
Diode testing & Evaluation - Demonstration	PO5,PO7-(3) / vacant filled	C205.1 / I
Transistor testing & Evaluation - Demonstration	PO5,PO7-(3) / vacant filled	C205.2 / II

STAFF INCHARGE **HOD/EEE**

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM - 630 612

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Format No.:11
Issue No.: 02
Revision No.: 01
Date: 23/06/12

Lecture Schedule

Course/Branch	:	**B.E / EEE**	Subject	:	**Linear Integrated Circuits & Applications**
Duration	:	**July – Oct 2016**	Subject Code	:	**EE6303**
Semester	:	**III** Section : **A & B**	Staff Handling	:	**S. Rajalingam & R. Divya**
Regulation	:	**2013 [AUC]**			

AIM

To expose the students to the concepts of fabrication of ICs, characteristics & applications of OP-AMP, functions of special ICs & its applications.

PRE-REQUISITE : Circuit Theory

OBJECTIVES

The students should be made:

- To study the IC fabrication procedure.
- To study characteristics; realize circuits; design for signal analysis using OP-amp ICs.
- To study the applications of OP-amp.
- To study the internal functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits, ADCs.

COURSE OUTCOMES: After the course, the student should be able to:

Course	Course Outcome	POs	PSOs
C206.1	Explain the procedure for the fabrication of IC.	1,2,3,6,12	1
C206.2	Summarize the DC & AC characteristics of Operational amplifier.		
C206.3	Discuss the applications of Operational amplifier.		
C206.4	Describe the internal functional blocks of special ICs like Timer and PLL.		
C206.5	Classify types of voltage regulators and describe the special ICs.		

Target Periods - 45 Periods **Curriculum: 3L - 0T- 0P**

S.No.	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I			**IC FABRICATION**	**Target Periods : 10 + 1**
1.			Introduction	T2 (01-02)
2.			IC classification	T2 (01-02)
3.			Fundamental of monolithic IC technology	T2 (03-04)
4.			Epitaxial growth	T2 (06)
5.			Masking and Etching, Diffusion of impurities	T2 (07-09)
6.			Realization of monolithic ICs and packaging	T2 (12-13)
7.			Fabrication of Diodes	T2 (20-25)
8.			Fabrication of Resistance	T2 (20-25)
9.			Fabrication of Capacitance	T2 (25-27)
10			Fabrication of FETs	T2 (27-30)
11.			***Technical Quiz – I***	
Assignment I - Date of Submission : 01.08.16 *Class Test I : (22.07.16 – 28.07.16)*				
UNIT II			**CHARACTERISTICS OF OP-AMP**	**Target periods : 11 + 1**
12.			Ideal OP – AMP characteristics	T2 (41-52)
13.			DC characteristics: Offset voltage, current, bias current	T2 (104-111)
14.				

15.			AC characteristics: Gain Bandwidth, Slew rate	T2 (111-127)
16.			Differential Amplifier	T2 (50 - 52)
17.			Frequency response of OP-AMP	T2 (112-114)
18.			Basic applications of op-amp: Inverting Amplifier, Non-Inverting Amplifier	T3 (90) T3 (102)
19.			V/I and I/V converters	T2 (146 - 147)
20.			Summer circuit	T2 (135-137)
21.			Differentiator	T2 (164-168)
22.			Integrator	T2 (168 – 175)
23.			***Technical Seminar - I***	
Assignment II - Date of Submission : 22.08.16 *Centralized Internal Test I : (10.08.16 – 17.08.16)*				
UNIT-III			**APPLICATIONS OF OP-AMP**	**Target Periods : 12 + 1**
24.			Instrumentation amplifier	T2 (141-144)
25.			Log and Antilog Amplifiers	T2(155 - 159)
26.			First and second order active filters	T2 (262-282)
27.			Comparators	T2 (207-212)
28.			Multivibrators	T2 (216-220)
29.			Waveform generators	T2 (220-222)
30.			Clippers, Clampers & Peak detector	T2 (151-153)
31.			S/H circuit	T2 (153-154)
32.			D/A converter (R – 2R ladder and weighted resistor types)	T2 (349-357)
33.				
34.			A/D converter using op-amp	T2 (357-366)
35.				
36.			**Content Beyond Syllabus:** "Design and implementation of Linear ICs for Industrial applications".	
Assignment III - Date of Submission : 12.09.16 *Class Test II : (30.08.16 – 07.09.16)*				
UNIT IV			**SPECIAL ICs**	**Target Periods: 9 + 1**
37.			555 Timer circuit – Functional block	T2 (311-312)
38.			555 Timer- Characteristics and applications	T2 (312-324)
39.				
40.			IC 566 – Voltage controlled oscillator circuit	T2 (334-336)
41.				
42.			IC 565 – Phase lock loop circuit functioning	T2 (337-342)
43.				
44.			IC 565 – Applications	T2 (342-345)
45.			Analog multiplier ICs	T2 (159-160)
46.			***Technical Seminar - II***	
Centralized Internal Test II : (20.09.16 – 26.09.16)				
UNIT V			**APPLICATION ICs**	**Target Periods: 9 + 1**
47.			IC voltage regulators LM78XX / 79XX	T2 (241-248)
48.				
49.			LM317 – Fixed voltage regulators	T3 (457)
50.			IC 723 Variable voltage regulators	T2 (248-255)
51.			Switching regulator	T2 (255-258)
52.			SMPS	T3 (466)
53.			LM 380 power amplifier	T3 (447)
54.			ICL 8038 function generator IC	T3 (497)
55.				
56.			***Technical Quiz – II***	
Class Test – III - (06.10.16 – 08.10.16)				

Books: Text/Reference

S.No.		Title of the Book	Author	Publisher	Year
1.	T1	OP-AMP & Linear ICs	David A. Bell	Oxford	2013
2.	T2	Linear Integrated Circuits	D. Roy Choudhary, Sheil B.Jani	New Age (IV Edition)	2003
3.	T3	OP-AMPS and Linear Integrated Circuits	Ramakant A. Gayakward	Pearson Education/PHI (IV Edition)	2003
4.	R1	OP-AMPs & Linear Integrated Circuits Concepts & Applications	Fiore	Cengage	2010
5.	R2	Fundamentals of Analog Circuits	Floyd, Buchla	Pearson	2013
6.	R3	Integrated Electronics - Analog and Digital Circuits System	Jacob Millman, Christos C.Halkias	Tata McGraw Hill	2003
7.	R4	OP - AMP and Linear ICs	Robert F. Coughlin, Fredrick F. Driscoll	PHI Learning, (VI Edition)	2012

NPTEL LECTURES

S. No	UNIT	Date[Period]	TOPIC	Ref / Link
1	II		Ideal Operational Amplifier	http://www.youtube.com/watch?v=uHQmNWbtwHU
2	III		Applications of OP-AMP	http://www.youtube.com/watch?v=nqk714QpRos
3	IV		Voltage Controlled Oscillator	https://www.youtube.com/watch?feature=player_embedded&v=KeNUgpw8-yM

SELF-STUDY TOPICS

S. No	UNIT	TOPIC	Books to be referred
1	II	Adder - Subtractor	Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV Edition, Pearson Education, 2003 / PHI. 2000.
2	III	Triangular Wave Generator	D.Roy Choudhary, Sheil B.Jani, 'Linear Integrated Circuits', IV Edition, New Age, 2003.
3	V	Advantages & Disadvantages of SMPS	David A.Bell, 'Op-amp & Linear ICs', Oxford, 2013

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C206.1	2	1	1	-	-	1	-	-	-	-	-	**1**	1	-	-
C206.2	2	1	1	-	-	1	-	-	-	-	-	1	1	-	-
C206.3	2	1	1	-	-	1	-	-	-	-	-	1	1	-	-
C206.4	2	1	1	-	-	1	-	-	-	-	-	1	1	-	-
C206.5	2	1	1	-	-	1	-	-	-	-	-	1	1	-	-
C206	2	1	1	-	-	1	-	-	-	-	-	1	1	-	-

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Design & Implementation of Linear ICs for Industrial applications	PO3(2) (Strengthened) & PO9(1) (vacant filled)	C206.3 / III

STAFF INCHARGE **HOD/EEE**

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

DEPARTMENT OF MATHEMATICS

MA6351 - TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

ASSIGNMENT -1

DOA: **DOS:**

UNIT I - PARTIAL DIFFERENTIAL EQUATION

1. Solve the partial differential equation $(x-2z)p+(2z-y)q=y-x$

2. Solve $(D^2+3DD^1-4D^{1^2})z=\cos(2x+y)+xy$

3. Solve:$(D^2-DD^1+2D)z=e^{2x+y}+4$

4. Solve the partial differential equation $x(y-z)p+y(z-x)q=z(x-y)$

5. Solve $(D^3-2D^2D')Z=2e^{2x}+3x^2y$

6. Solve $\left(D^2-2DD'+D'^2-3D+3D'+2\right)z=e^{2x-y}$

7. Solve $(y^2+z^2)p-xyq+xz=0$

8. Form the PDE by eliminating the arbitrary function 'f ' and 'g' from
$z = x^2 f(y) + y^2 g(x)$.

9. Form the p d e by eliminating the arbitrary function φ from
$\varphi(x^2+y^2+z^2, ax+by+cz)=0$

10 Solve the partial differential equation $x^2(y-z)p+y^2(z-x)q=z^2(x-y)$

11. Solve $\left(\mathbf{D^2+2DD'+D'^2-2D-2D'}\right)\mathbf{z=\sin(x+2y)}$

UNIT II - FOURIER SERIES

DOA: **DOS:**

1. Find the Fourier Series of $f(x)=x^2$ in (0, 2π). Hence deduce that $\sum_{n=1}^{\infty}\frac{1}{n^2}=\frac{\pi^2}{6}$

2. Expand $f(x)=\begin{cases} sinx & in \quad 0\le x\le\pi \\ 0 & in \quad \pi\le x\le 2\pi \end{cases}$ as a Fourier series of periodicity 2π
and hence evaluate $\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\cdots\infty$

3. Find the Fourier Series of $f(x)=(l-x)^2$ in (0, $2l$). Hence deduce that $\sum_{n=1}^{\infty}\frac{1}{n^2}=\frac{\pi^2}{6}$

4. Find the Fourier Series for $f(x)=x$ in $-\pi<x<\pi$.

5. Find the Half Range Cosine Series for $f(x)=(x-1)^2$ in $0\le x\le 1$.
Hence S.T. $\frac{\pi^2}{6}=\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\cdots\infty$

6. Find the Half Range Cosine Series for $f(x)=\begin{cases} x & in \ 0\le x\le 1 \\ 2-x & in \ 1\le x\le 2 \end{cases}$

7. Find the Fourier Sine Series for $f(x)=x^2$ in $0<x<\pi$.

8. Find the complex form of the Fourier series of the function
$f(x)=e^x$ when $-\pi<x<\pi$ & f (x+2x) = f (x)

9. Find the Fourier cosine series up to third harmonic to represent the function given by the following data: (May/June 2016)

x	0	1	2	3	4	5

y	4	8	15	7	6	2

10.Find the complex form of the Fourier series of the function

$f(x)$= cosax when $-\pi < x < \pi$ where a is neither 0 nor an integer.

ASSIGNMENT-2

Unit –III - APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION

DOA: DOS:

1. A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is set vibrating by giving each of its points a velocity $v = \begin{cases} \frac{2kx}{l} & 0 < x < l/2 \\ \frac{2k(l-x)}{l} & l/2 < x < l \end{cases}$. Find the displacement of the string at any distance x from one end at any time t.

2. A string is stretched and fastened to two points l apart. Motion is started by displacing the string into the form $y = k(lx - x^2)$ and then released it from this position at time t=0. Find the displacement of the point of the string at a distance of x from one end at time t .

3. A rod of length $'l'$ has its ends A and B kept at $0^{\circ}C$ and $100^{\circ}C$ respectively until steady state conditions prevail. If the temperature at B is suddenly reduced to $0^{\circ}C$ and kept so while that of A is maintained. Find the temperature function $u(x,t)$at a distance x from A at time 't'.

4. A bar 10cm long with insulated sides has its ends A and B kept at $50^{\circ}C$ and $100^{\circ}C$ until steady state conditions prevail. The temperature at A is suddenly raised to $90^{\circ}C$ and the temperature at B is reduced to $60^{\circ}C$ and kept so. Find the subsequent temperature distribution in the rod.

5. An infinitely long rectangular plate with insulated surface is 10 cm wide. The two long edges and one short edge are kept at zero temperature given by $\mathbf{u} = \begin{cases} \mathbf{10y}, & \mathbf{for}\ \ \mathbf{0 \le y \le 5} \\ \mathbf{20(10-y)}, & \mathbf{for}\ \ \mathbf{5 \le y \le 10} \end{cases}$ Find the steady state temperature distribution in the plate.

Unit –IV - FOURIER TRANSFORMS

DOA: DOS:

1. Find the fourier sine integral representation of the function $f(x) = e^{-x}\sin x$.
2. Find the Fourier transform of $\mathbf{e^{-a|x|}}$ and hence deduce that $\mathbf{F\left[xe^{-a|x|}\right] = i\sqrt{\frac{2}{\pi}}\frac{2as}{(s^2+a^2)^2}}$
3. Find the Fourier transform of f(x) if $\mathbf{f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a > 0 \end{cases}}$.

   Hence deduce that $\mathbf{\int_0^{\infty}\left(\frac{\sin t}{t}\right)dt = \frac{\pi}{2}}$.
4. Find the fourier sine transform of $f(x) = \begin{cases} x, \text{in}\ \ 0 < x < 1 \\ 2 - x\ , \text{in}\ \ 1 < x < 2 \\ 0\ , \text{in}\ \ x > 2 \end{cases}$

5. Find the fourier sine and cosine transform for x^{n-1} and hence deduce that $\frac{1}{\sqrt{x}}$ is self reciprocal under both the transforms. Hence find $F\left(\frac{1}{\sqrt{|x|}}\right)$.

6. Use Parseval's identity for fourier Cosine and Sine transform for e^{-ax}

   (i) $\int_0^\infty \frac{dx}{(x^2+a^2)^2}$ (ii) $\int_0^\infty \frac{x^2 dx}{(x^2+a^2)^2}$

7. Find the fourier transform of f(x) = $\begin{cases} a^2 - x^2, & |x| < a \\ 0, & |x| > a \end{cases}$, $a > 0$

   Hence evaluate i) $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cos\frac{x}{2}\, dx$ ii) $\int_0^\infty \left(\frac{x\cos x - \sin x}{x^3}\right)^2 dx$

8. verify the convolution theorem for fourier transform if f(x) = g(x) = $\mathbf{e}^{-\mathbf{x}^2}$

Assignment-III

UNIT-V - Z-TRANSFORMS & DIFFERENCE EQUATIONS

DOA: DOS:

1. (i) Find $Z[\cos n\,\theta]$ and $Z[\sin n\,\theta]$.
(ii) Find $Z[r^n \cos n\,\theta]$ and $Z[r^n \sin] n\,\theta]$.

2. Find the Z-transform of $\cos\frac{n\pi}{2}$ and $\frac{1}{n(n+1)}$

3. State and prove convolution theorem on Z-transform.

4. Find $Z^{-1}\left[\frac{z(z^2-z+2)}{(z+1)(z-1)^2}\right]$

5. Find the inverse Z-transform of $\frac{z}{z^2-2z+2}$ by residue method.

6. Form the difference equation from $y_n = a + b3^n$

7. Solve the difference equation y(n+3) – 3 y(n+1) + 2 y(n) = 0 given that y(0) = 4, y(1) = 0 and y(2) = 8

8. Using Z-transform, Solve $u_{n+2} - 5u_{n+1} + 6u_n = 4^n$ given $u_0 = 0,\ u_1 = 1$

9. Solve $y_{n+2} + 4y_{n+1} + 3y_n = 3^n$ given $y_0 = 0,\ y_1 = 1$

10. Using Z-transform, Solve $y_{n+2} + 4y_{n+1} - 5y_n = 24n - 8$ given $y_0 = 3, y_1 = 5$

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

DEPARTMENT OF MATHEMATICS

MA6351 - TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATION

TUTORIAL PROBLEMS

UNIT I - PARTIAL DIFFEREINTIAL EQUATION

Tutorial 1

1. Form the partial differential equation by eliminating the arbitrary function 'f' and 'g' from $Z^2 = xf(y) + yg(x)$.

2. Find the singular integral of $z = px + qy + p^2 + pq + q^2$

3. Find the singular integral if $z = px + qy + \sqrt{1 + p^2 + q^2}$

Tutorial 2

4. Solve $x^2p^2 + y^2q^2 = z^2$.

5. Solve :$Z^2(p^2 + q^2) = x^2 + y^2$.

6.Solve the Lagrange's equation $(x + 2z)p + (2xz - y)q = x^2 + y$

7. Solve $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$

Tutorial 3

8. Solve $(D^2 + DD' - 6D'^2)Z = y\cos x$

9. Solve $(D^3 + D^2D' - 4DD'^2 - 4D'^3)Z = \cos(2x + y)$

10. Solve $(2D^2 - DD' - D'^2 + 6D + 3D')Z = xe^y$

UNIT II - FOURIER SERIES

Tutorial 1

1. Expand f(x) = x(2π -x) as fourier series in (0,2π) and hence deduce that the sum of $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + ...$

2. Find the Fourier series of $f(x) = (\pi - x)^2$ in (0, 2 π)of periodicity 2 π.

3. Obtain the fourier series of f(x) = x sinx in$(-\pi, \pi)$

4. Obtain the Fourier series for the function f(x) given by $\mathbf{f(x)} = \begin{cases} 1-\mathbf{x}, & -\pi < \mathbf{x} < 0 \\ 1+\mathbf{x}, & 0 < \mathbf{x} < \pi \end{cases}$

Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + ... = \frac{\pi^2}{8}$.

Tutorial 2

5 .Find the fourier series of periodicity 3 for f(x) = 2x-x^2 in $0 < x < 3$

6. Find the Fourier Series of $f(x) = x + x^2$in $(-l, l)$.

7. Find the Half Range Cosine Series for $f(x) = x(\pi - x)$ in $0 < x < \pi$.

Tutorial 3

8. **Obtain the sine seriesfor** $\mathbf{f(x)} = \begin{cases} \mathbf{x} & 0 \le \mathbf{x} \le \mathbf{l}/2 \\ \mathbf{(l-x)} & \mathbf{l}/2 \le \mathbf{x} \le \mathbf{l} \end{cases}$

9. Find the Half Range sine Series for $\mathbf{f(x) = x\cos \pi x}$ in 0< x < l and hence find $\sum_{n=1}^{\infty} \frac{1}{n^2}$.

10. Find the fourier series up to second harmonic for y = f(x) from the following values.

x	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	$\frac{3\pi}{3}$	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$	$\frac{6\pi}{3}$
y	1.0	1.4	1.9	1.7	1.5	1.2	1.0

UNIT –III - APPLICATION OF PARTIAL DIFFERENTIAL EQUATIONS

Tutorial 1

1. A string is stretched and fastened to two points l apart. Motion is started by displacing the string into the form $y = k(lx - x^2)$ and then released it from this position at time t=0.Find the displacement of the point of the string at a distance of x from one end at time t.

2 A string of length l is initially at rest in its equilibrium position and motion is started by giving each of its points is given a velo$city\ V = \begin{cases} cx & 0 < x \le \frac{l}{2} \\ c(l-x) & \frac{l}{2} < x \le l \end{cases}$ Find the displacement function y(x,t)

Tutorial 2

3. A metal bar 30cm long has its ends A and B kept at $20°C$ and 80 $°C$, until steady state conditions prevail.The temperature at each end is then suddenly reduced to $0°C$ and kept so.Find the resulting temperature distribution function u(x,t) taking x=0 at A.

4. The ends A and B of a rod $l$cm long have their temperatures are kept at $20°C$ and 40 $°C$,until steady state conditions prevail. The temperature of the end B is suddenly reduced to $10°C$ and that of A is increased to $50°C$ .Find the temperature distribution in the rod after time t.

Tutorial 3

5. A square plate is bounded by the lines $x = 0$ and $x = 20$ and $y = 20$ .Its faces areinsulated. The temperature along the upper horizontal edge is given by $u(x, 20) = x(20 - x), 0 < x < 20$ while the other two edges are kept at $0°C$. Find the steady state temperature distribution in the plate.

6. A rectangular plate with insulated surface is 10cm wide and so long compared to its width that it may be considered infinite in length without introducing appreciable error. The temperature at short edge y=0 is given by $u = \begin{cases} 20x & 0 \le x \le 5 \\ 20(10-x) & 5 \le x \le 10 \end{cases}$ and all the other three edges are kept at $0°C$ .Find the steady state temperature at any point in the plate.

UNIT –IV - FOURIER TRANSFORMS

Tutorial 1

1. Find the fourier integral representation of f(x) defined as $f(x) = \begin{cases} 0, x < 0 \\ \frac{1}{2}, x = 0 \\ e^{-x}, x > 0 \end{cases}$
2. Find the fourier transform of $f(x) = \begin{cases} a^2 - x^2, & |x| \le a \\ 0, & |x| > a \end{cases}$ and hence deduce that

   $(i) \int_0^\infty \frac{sinx - xcosx}{x^3} dx = \frac{\pi}{4}$ $(ii) \int_0^\infty \left(\frac{xcosx - sinx}{x^3}\right)^2 dx = \frac{\pi}{15}$
3. Show that $e^{\frac{-x^2}{2}}$ is a self reciprocal with respect to fourier transform.

Tutorial 2

4. Find the fourier cosine transform of $f(x) = e^{-a^2x^2}$ and hence find the cosine transform of $e^{\frac{-x^2}{2}}$ and fourier sine transform of $xe^{\frac{-x^2}{2}}$

5. Evaluate $\int_0^\infty \frac{dx}{(x^2+a^2)(x^2+b^2)}$; $a, b > 0$
6. Evaluate $\int_0^\infty \frac{x^2 dx}{(x^2+a^2)(x^2+b^2)}; a > 0; b > 0$

Tutorial 3

7. Find the fourier transform of f(x) = $\begin{cases} a - |x| & , |x| < a \\ 0 & , |x| > a \ , a > 0 \end{cases}$

   hence deduce that $\int_0^\infty \left(\frac{\sin t}{t}\right)^2 dt = \frac{\pi}{2}$
8. Find the fourier Cosine transform of $f(x) = \frac{e^{-ax} - e^{-bx}}{x}, x > 0$
9. Find the fourier sine transform of $f(x) = \begin{cases} x, in 0 < x < 1 \\ 2 - x \ , in 1 < x < 2 \\ 0, in x > 2 \end{cases}$

UNIT-V - Z-TRANSFORMS & DIFFERENCE EQUATIONS

Tutorial - I

1. Solve $y_{n+1} - 2y_n = 0 given y_0 = 3$
2. Prove that, $Z(n) = \frac{z}{(z-1)^2}, \ |z| > 1$
3. Prove that, $Z\left(\frac{1}{n+1}\right) = z \log\left(\frac{z}{z-1}\right)$

Tutorial – II

4. State and prove initial and final value theorem
5. Evaluate $Z^{-1}\left[\frac{z(z+1)}{(z-1)^3}\right]$
6. Evaluate $Z^{-1}\left[\frac{z^2}{(z-a)^2}\right]$ using convolution theorem.

Tutorial – III

7. Solve the difference equation y(k+2)-4y(k+1)+4yk=0 where y(0)=1, y(1)=0.
8. Solve $y_{n+2} + y_n = 2 \ given \ \ y_0 = y_1 = 0$ by using Z-transforms.
9. Derive the difference equation from $y_n = (A + Bn)2^n$

K.L.N. College of Engineering

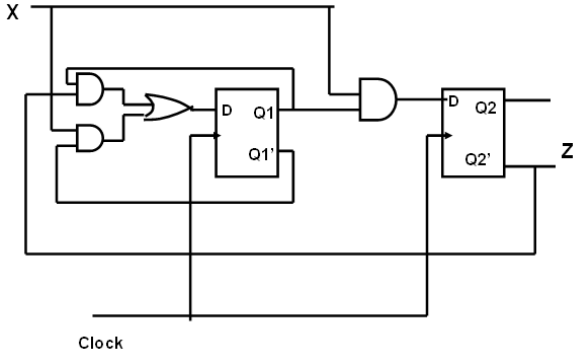
Department of Electrical and Electronics Engineering

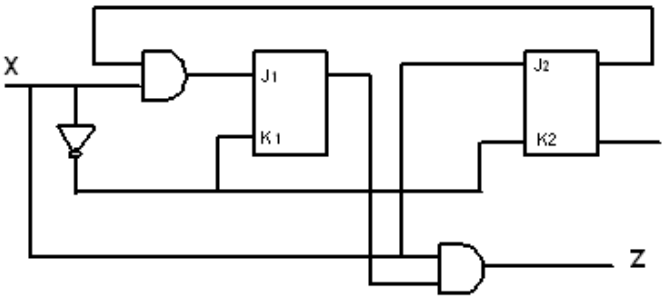
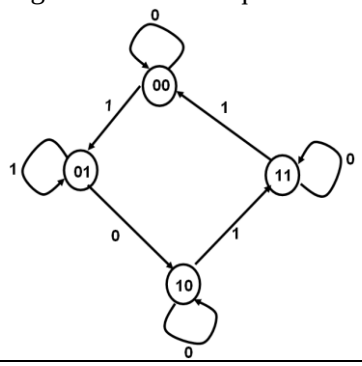
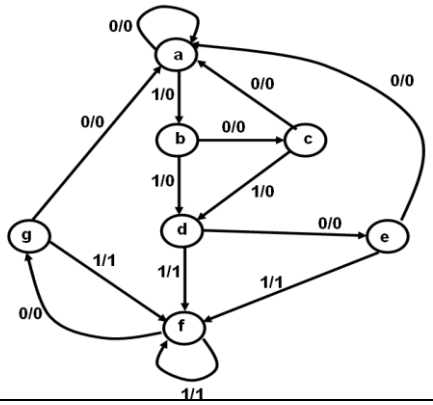
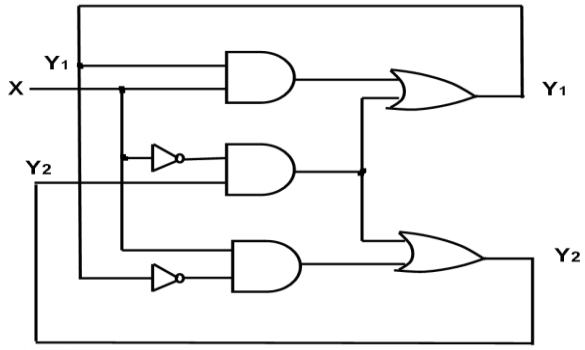
EE 6301 – DIGITAL LOGIC CIRCUITS[C202]

Important Questions/Assignments/ Self-study Topics/Seminar topics.

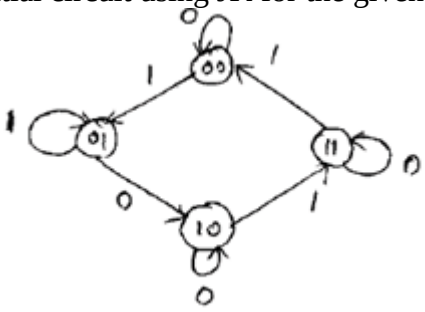
1. IMPORTANT QUESTIONS:

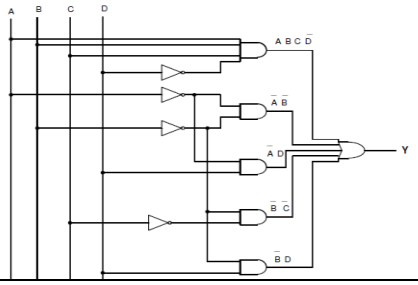
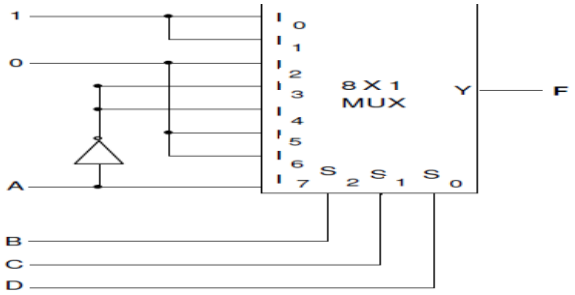
S.No.	4. Important Questions.	COs	POs
Q.1.1.	Perform the following: i) $(-105)_{10} + (-120)_{10}$ using ones and twos complement. Comment on the result	C202.1	1
Q.1.2.	Divide 100000110.1 by 101 and perform 100000 – 0.11 using ones complement,	C202.1	1
Q.1.3.	$(34)_{10} + (19)_{10}$ using excess – 3 code	C202.1	1
Q.1.4.	Determine whether single error has occurred and if so, corrects the error using Hamming code, for 1100010	C202.1	1
Q.1.5.	I.Compare ones complement and twos complement representation of signed binary numbers ii. Encode data bits 1001 into a seven bit even parity Hamming code.	C202.1	1
Q.1.6.	i) Perform the following arithmetic using two's complement (+27) + (-61), (-27) + (+61) and (-27) + (-61). ii) Generate the parity bits for 8421 BCD code in an odd parity system	C202.1	1,2
Q.1.7.	Draw the circuit diagram and explain the working of TTL inverter with tristate output	C202.1	1
Q.1.8.	Explain the concept and implementation of ECL logic family	C202.1	1
Q.1.9.	Explain the operation of TTL NAND gate with a neat circuit diagram.	C202.1	1
Q.1.10.	Draw the circuit of CMOS NOR gate and explain its operation. Mention any two points about the advantages of CMOS over the other digital logic families	C202.1	1
Q.1.11.	Write short notes on TTL, ECL and CMOS digital logic families.	C202.1	1
Q.1.12.	Explain the working of 3 input totem pole TTL NAND gate	C202.1	1
Q.1.13.	Draw and explain the circuit diagram of an ECL OR / NOR gate	C202.1	1
Q.1.14.	Name and explain the characteristics of TTL logic family.	C202.1	1
Q.1.15.	Explain the characteristics and implementation of the following digital logic families. i. CMOS, ii. ECL	C202.1	1
Q.2.1.	Using K-map simplify the expression Y (A, B, C, D) = $m_1+m_3+m_5+ m_7+m_8+m_9+ m_0+m_2+m_{10}+m_{12}+m_{13}$. Indicate the prime implicants, essential and non-essential prime implicants. Realize the logic circuit using AND-OR-INVERT gates and also by using NAND gates.	C202.2	1
Q.2.2.	Write short notes on i) alphanumeric codes and ii) Error detection and correction methods	C202.2	1
Q.2.3.	Simplify using five variable mapping F =(8,9,10,11,13,15,16,18,21,24,25,26,27,30,31)	C202.2	1
Q.2.4.	Simplify the following function using K – map and tabular methods. Compare the methods. F (A,B,C,D) = $\Sigma m(4,5,6,7,8) + \Sigma d (11,12,13,14,15)$.Implement the result using NAND gates.	C202.2	1
Q.2.5.	i.Design a 4 bit BCD to Excess- 3 code converter. ii.Design a two – bit magnitude Comparator	C202.2	1
Q.2.6.	Using 8 to 1 multiplexer, realize the following Boolean function T = f (w,x,y,z) = Σ (1,1,2,4,5,7,8,9,12,13)	C202.2	1
Q.2.7.	Design a logic circuit to simulate the function f (A, B, C) = A (B + C) by using only NAND gates	C202.2	1
Q.2.8.	Design an 8421 to gray code converter	C202.2	1
Q.2.9.	Design and implement a full adder circuit using logic gates and also by using half adders.	C202.2	1
Q.2.10.	Design a logic circuit to simulate the function f (A, B, C) = A (B + C) by using only NAND gates.	C202.2	1
Q.2.11.	Explain with truth table and gate level circuits diagram for a full adder	C202.2	1

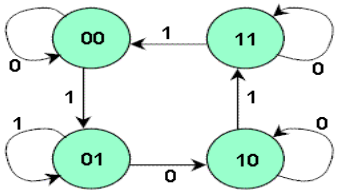
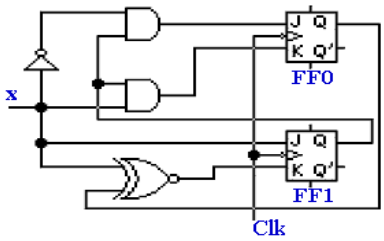
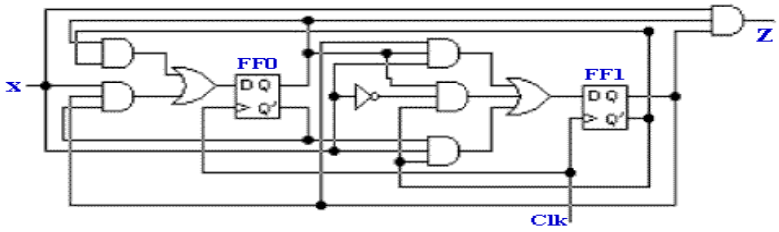
<table>
<tr><td>Q.2.12.</td><td>Implement the following function with a Multiplexer f (a, b, c, d) = Σ (0, 1, 3, 4, 8, 9, 15)</td><td>C202.2</td><td>1,2</td></tr>
<tr><td>Q.2.13.</td><td>What is a decoder? How is it different from encoder?</td><td>C202.2</td><td>1</td></tr>
<tr><td>Q.2.14.</td><td>Implement full adder circuit using, a) Decoder b) Multiplexer</td><td>C202.2</td><td>1</td></tr>
<tr><td>Q.2.15.</td><td>How can you convert a decoder into a de-multiplexer?</td><td>C202.2</td><td>1</td></tr>
<tr><td>Q.3.1.</td><td>Design a MOD –10synchronous counter using JK flip-flops. Write the excitation table and state table.</td><td>C202.3</td><td>1</td></tr>
<tr><td>Q.3.2.</td><td>Using SR flip-flops, design a synchronous counter which counts in the sequence 000, 111, 101, 110, 001, 010, 000,</td><td>C202.3</td><td>1</td></tr>
<tr><td>Q.3.3.</td><td>Design a synchronous counter using JK flip-flop to count the following sequence 7, 4, 3, 1, 5, 0, 7….</td><td>C202.3</td><td>1</td></tr>
<tr><td>Q.3.4.</td><td>Design a sequential circuit with four flip-flops ABCD. The next states of B, C, and D are equal to the present states of A, B, C respectively. The next state of A is equal to the EX-OR of present states of C and D</td><td>C202.3</td><td>1</td></tr>
<tr><td>Q.3.5.</td><td>i. Reduce the number of states in the following state table and tabulate the reduced state table.
<table>
<tr><td>Present state</td><td>Next State</td><td></td><td>Output</td><td></td></tr>
<tr><td></td><td>x = 0</td><td>x = 1</td><td>x = 0</td><td>x = 1</td></tr>
<tr><td>a</td><td>F</td><td>b</td><td>0</td><td>0</td></tr>
<tr><td>b</td><td>D</td><td>c</td><td>0</td><td>0</td></tr>
<tr><td>c</td><td>F</td><td>e</td><td>0</td><td>0</td></tr>
<tr><td>d</td><td>G</td><td>a</td><td>1</td><td>0</td></tr>
<tr><td>e</td><td>D</td><td>c</td><td>0</td><td>0</td></tr>
<tr><td>f</td><td>F</td><td>b</td><td>1</td><td>1</td></tr>
<tr><td>g</td><td>G</td><td>h</td><td>0</td><td>1</td></tr>
<tr><td>h</td><td>G</td><td>a</td><td>1</td><td>0</td></tr>
</table>
ii. Starting from state a, and the input sequence 01110010011, determine the output sequence for the given and reduced state stable.</td><td>C202.3</td><td>1</td></tr>
<tr><td>Q.3.6.</td><td>A sequential circuit has four flip-flops ABCD and an input x is describe the following
State equations. A (t + 1) = (CD’ + C’D) x + (CD + C’D’) x’
B (t + 1) = A
C (t + 1) = B
D (t + 1) = C
a. Obtain the sequence of states when x = 1 starting from ABCD = 0001
b. Obtain the sequence of states when x = 0 starting from ABCD = 0000</td><td>C202.3</td><td>1</td></tr>
<tr><td>Q.3.7.</td><td>A sequential circuit with 2 D flip-flops A and B and input X and output Y is specified by the following next state and output equations.
A (t + 1) = AX + BX
B (t + 1) = A’X
Y = (A + B) X’
i. Draw the logic diagram of the circuit
ii. Derive the state table
Iii.Derive the state diagram</td><td>C202.3</td><td>1</td></tr>
<tr><td>Q.3.8.</td><td>For the given Moore model sequential circuit, find the state table, state diagram, flips flop input and output equations.

</td><td>C202.3</td><td>1</td></tr>
</table>

Q.3.9.	Consider the following synchronous sequential circuit. Determine its state table. What does the circuit do? 	C202.3	1
Q.3.10.	Design the clocked sequential circuit using JK flip-flops whose state diagram is given below. 	C202.3	1
Q.3.11.	Design a synchronous decade counter using D flip flop	C202.3	1
Q.3.12.	Distinguish between synchronous and asynchronous sequential circuits	C202.3	1
Q.3.13.	What is the use of State reduction? Reduce the state diagram. 	C202.3	1
Q.4.1.	Design an asynchronous sequential circuit that has two inputs X_2 and X_1 and one output Z. The output is to remain a 0 as long as X_1 is a 0. The first change in X_2 that occurs while X_1 is a 1 will cause a Z to be a 1. Z is to remain a 1 until X_1 returns to 0. Construct a state diagram and flow table. Determine the output equations.	C202.4	1
Q.4.2.	Analyze the Boolean expression, K- Map, transition and state table and primitive flow table of the following asynchronous sequential circuits. 	C202.4	1
Q.4.3.	An asynchronous sequential circuit has two internal states and one output. The excitation and output functions describing the circuit are $Y_1=x_1+x_1y_2'+x_2y_1$	C202.4	1

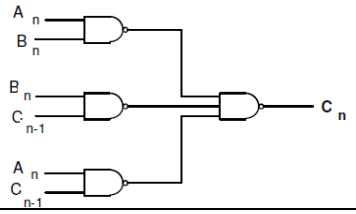
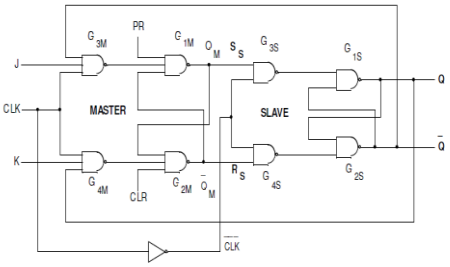
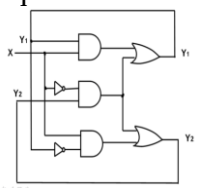
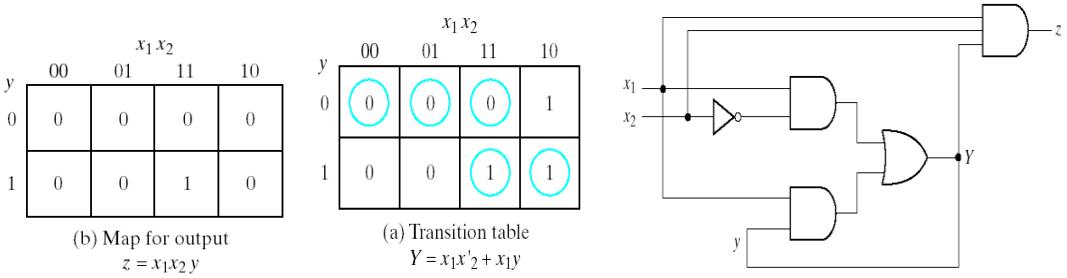
	$Y_2=x_2+x_1y_1'\ y_2+x_1y_1$ $Z=x_2+y_1$ (i) Draw the logic diagram of the circuit. (6) (ii) Derive the transition table and output map. (5) (ii) Obtain a flow table for the circuit. (5)		
Q.4.4.	An asynchronous sequential circuit is described by the excitation and output functions $Y = x_1x_2' +(x_1+x_2')\ y$ and $Z = y$ (i) Draw the logic diagram of the circuit with a NOR SR latch (ii) Derive the transition table and output map (iii) Obtain a two-state flow table	C202.4	1
Q.4.5.	Define the following: i) asynchronous sequential circuits, ii) Cycles, iii) critical and non-critical race	C202.4	1
Q.4.6.	Draw the state diagram and obtain the primitive flow table for a circuit with two inputs x_1 and x_2 and two outputs z_1 and z_2 that satisfies the following conditions. When $x_1\ x_2 = 00$ output $z_1\ z_2 = 00$, when $x_1 = 1$ and x_2 changes from 0 to 1 the output $z_1\ z_2 = 01$, when $x_2 = 1$ and x_1 changes from 0 to 1 the output $z_1\ z_2 = 10$ otherwise output does not change.	C202.4	1
Q.4.7.	Using ROM, design a combinational circuit which accepts 3 bit number and generates an output binary number equivalent to the square of input number.	C202.4	1
Q.4.8.	A combinational circuit is defined by the functions $F_1 (A, B, C) = \sum m (3, 5, 6, 7)$, $F_2 (A, B, C) = \sum m (0, 2, 4, 7)$. Implement the circuit using PLA.	C202.4	1
Q.4.9.	Discuss the working of the following programmable logic devices: i. PROM ii. PLA iii. PAL	C202.4	1
Q.4.10.	Illustrate the ROM and PLA design for the following functions $W(A,B,C,D) = \Sigma m(3,7,8,9,11,15)$ $X(A,B,C,D) = \Sigma m(3,4,5,7,10,14,15)$ $Y (A, B, C, D) = \Sigma m (1, 5, 7, 11, 15)$	C202.4	1
Q.4.11.	Generate the following Boolean functions with a PAL with 4 inputs and 4 outputs. $Y_3 = A'BC'D + A'BCD' + A'BCD + ABC'D$ $Y_2 = A'BCD' + A"BCD + ABCD$ $Y_1 = A'BC' + A'BC + AB'C + ABC'$ $Y_0 = ABCD$	C202.4	1
Q.4.12.	i. Draw a neat sketch showing the implementation of Z1 = ab'd'e + a'b'c'd'e' + bc + de Z2 = a'c'e Z3 = bc + de + c'd'e' + bd and Z4 = a'c'e + ce using a 5 x 8 x 4 PLA. ii. Draw a PLA circuit to implement the logic functions A'BC + AB'C + AC' and A'B'C' +	C202.4	1
Q.5.1.	Write a HDL code for state machine to BCD to ex–3 codes Converter.	C202.5	1
Q.5.2.	Write a behavioral VHDL description of the 4 bit counter	C202.5	1
Q.5.3.	Write VHDL code for a full sub tractor using logic Equation	C202.5	1
Q.5.4.	Write a HDL code for 8:1 MUX using behavioral model	C202.5	1
Q.5.5.	Write the HDL description of the circuit specified by the Following Boolean equations $S = xy\ '+ x'\ y$ $C = xy$	C202.5	1
Q.5.6.	Write an HDL data flow description of a 4 bit adder subtractor of Unsigned numbers use the conditional operator	C202.5	1
Q.5.7.	Write a HDL code for RTL Design	C202.5	1,2
Q.5.8.	Write a HDL code for BCD to 7-segment display decoder	C202.5	1
Q.5.9.	Write a HDL code for mod 6 counter.	C202.5	1
Q.5.10.	Write a HDL code for 4 bit counter	C202.5	1
Q.5.11.	Write the HDL gate level description of the priority encoder	C202.5	1
Q.5.12.	Write a VHDL description of an S-R latch using a process	C202.5	1
	5. Assignments / Seminar / Self-study topics.		
A.1.1.	Divide 100000110.1 by 101 and perform 100000 – 0.11 using ones complement	C202.1	1,2
A.1.2.	$(34)_{10} + (19)_{10}$ using excess – 3 code.	C202.1	1,2
A.1.3.	Determine whether single error has occurred and if so, corrects the error using Hamming code, for 1100010.	C202.1	1,2

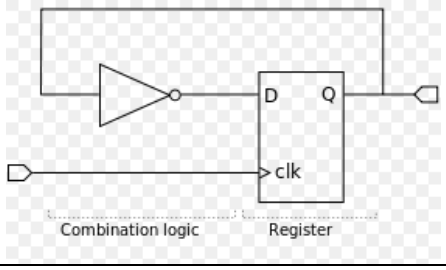
A.1.4.	i. Compare ones complement and twos complement representation of signed binary numbers. ii. Encode data bits 1001 into a seven bit even parity Hamming code.	C202.1	1,2
A.1.5.	Write short notes on TTL, ECL and CMOS digital logic families.	C202.1	1,2
A.2.1.	Simplify using five variable mapping F =(8,9,10,11,13,15,16,18,21,24,25,26,27,30,31)	C202.2	1,2
A.2.2.	i) Explain how you will construct an (n+1) bit Gray code from an n bit Gray code ii) Show that the Excess – 3 code is self –complementing	C202.2	1,2
A.2.3.	i) Prove that (x1+x2).(x1'. x3'+x3) (x2' + x1.x3) =x1'x2 ii) Simplify using K-map to obtain a minimum POS expression: (A'+B'+C+ (A+B'+C+D) (A+B+C+D') (A+B+C'+D') (A'+B+C'+D')(A+B+C'+D)	C202.2	1,2
A.2.4.	Reduce the following equation using K-map method of minimization F (A,B,C,D) = Σ m(0,1,3,4,5,7,10,13,14,15)	C202.2	1,2
A.2.5	(a) State and Prove idempotent laws of Boolean algebra. (b) Find the MSP from of F= Σ m (0,4,8,12,3,7,11,15) + Σ d(5) using a K-Map	C202.2	1,2
A.3.1	Design a synchronous sequential circuit using JK for the given state diagram. 	C202.3	1,2
A.3.2	Design a BCD counter using T flip flop	C202.3	1,2
A.3.3	Design BCD ripple counter using JK flip flop	C202.3	1,2
A.3.4	An asynchronous sequential circuit is described by the following excitation and output function.(1)Y=X1X2+(X1+X2) Y (2) Z=Y i) Draw the logic diagram of the circuit. ii) Drive the transition table and output map. iii) Describe the behavior of the circuit.	C202.3	1,2
A.3.5	List and explain the steps used for analyzing an asynchronous sequential circuit	C202.3	1,2
	5. TUTORIALS		
T.1.1	The decimal equivalent of hex number 1A53 is **(A)** 6793 **(B)** 6739**(C)** 6973 **(D)** 6379 **Ans[6739]**	C202.1	1,2
T.1.2.	The digital logic family which has the lowest propagation delay time is **(A)** ECL **(B)** TTL**(C)** CMOS **(D)** PMOS **Ans: A** The digital logic family which has the lowest propagation delay time is ECL (Lowest propagation delay time is possible in ECL because the transistors are used in difference amplifier configuration, in which they are never driven into saturation and thereby the storage time is eliminated).	C202.1	1,2
T.1.3.	Assume the code ward in 0011001 is transmitted and that 0010001 is received. The receiver does not "know" what was transmitted and must look for proper parities to determine if the code is correct. Designate any error that has occurred in transmission if even parity is used. **Ans [The error position code is 100 (binary four). This says the bit in position 4is in error. It is a 0and should be a 1.The corrected code is 0011001.which agrees with the transmitted code]**	C202.1	1,2
T.1.4	The code 101101010 is received. Correct any errors. There are four parity bits, and odd parity is used. **Ans [The error position code is 0111 (binary seven). This says the bit in position 7 is in error. The corrected code is 101101110.]**	C202.1	1,2
T.2.1	Simplify the Boolean expression F = C(B + C)(A + B + C). Ans: Simplify the Boolean Expression F = C (B +C) (A+B+C)	C202.2	1,2

	= C {(1+AB)=1}		
T.2.2	Simplify the following expression into sum of products using Karnaugh map F(A,B,C,D) =∑ 12,9,7,6,5,4,3,1(13,) Ans: Simplification of the following expression into sum of products using Karnaugh Map: F(A,B,C,D) = Σ (1,3,4,5,6,7,9,12,13) Karnaugh Map for the expression **F(A,B,C,D) = AB+C D+ A D+BC = A (B + D) +C (B + D)**	C202.2	1,2
T.2.3	Minimize the logic function**Y(**A,B,C,D**)= Σm(**0,1,2,3,5,7,8,9,11,14**)** . Use Karnaugh map.Draw logic circuit for the simplified function. Ans: Logic Circuit $Y(A,B,C,D) = ABC\overline{D} + \overline{A}\,\overline{B} + \overline{B}\,\overline{C} + \overline{B}D + \overline{A}D$  	C202.2	1,2
T.2.4	Design a 8 to 1 multiplexer by using the four variable function given by F**(**A,B,C,D**)** □□_m**(**0,1,3,4,8,9,15**).** **Ans:** Therefore, minterms m0 = A' B' C' m1 = A' B' C, m8 = A', B', C' and m9 = A' B' C produce a 1 output. When BCD = 010, 101 and 110, output F = 0, since I2, I5and I6 respectively are equal to 0.  **Logic circuit**	C202.2	1,2
T.2.5	Prove the following equations using the Boolean algebraic theorems: (i)A + *A'* .B + A. *B'* = A + B (ii) *A'*BC + A *B'* C + AB*C'* + ABC = AB + BC + AC **Ans:** **(i)** Given equation is A + *A'* .B + A. *B'* = A + B **L.H.S**. = A + *A'* .B + A. *B'* = (A + A. *B'*) + *A'* .B **=** A (1+ *B'*) + *A'* .B **=** A + *A'* .B (1+ *B'* =1) **=** (A + *A'*) (A + B) **=** (A + B) (A + *A'* = 1) = **R.H.S** **Hence Proved** **(ii)** Given equation is *A'*BC + A *B'* C + AB*C* + ABC = AB + BC + AC **L.H.S =** *A'*BC + A *B'* C + AB*C* + ABC = *A'*BC + A *B'* C + AB*C* + ABC **=** *A'*BC + A *B'* C + AB (C +*C'*) **=** *A'*BC + A *B'* C + AB (C +*C* = 1) **=** *A'*BC + A (B + *B'* C) = *A'*BC + A (B + C) (B + *B'* C = B + C) = *A'*BC + A B + AC = C (A + *A'*B) + A B + AC	C202.2	1,2

	= C (A + B) + A B + AC (A + *A*'B = A + B) = AC + BC + AB + AC = AB + BC + AC (AC + AC = AC) = **R.H.S** **Hence Proved**		
T.3.1	Design a Synchronous Sequential Circuits whose state diagram is shown in Fig. use JK FF Ans:   	C202.3	1,2
T.3.2	Design a Synchronous Sequential Circuits whose state table are specified in table, using D FF state table Ans:  	C202.3	1,2
T.3.3	What is a flip-flop? What is the difference between a latch and a flip-flop? List out the application of flip-flop. **Ans:** **Flip-Flop:** A flip-flop is a basic memory element used to store one bit of information. Both Flip-flops and latches are bistable logic circuits and can reside in any of the two stable states due to a feedback arrangement. The main difference between them is in the method used for changing the state. **Applications of Flop-Flops:** (1) Bounce elimination switch (2) Parallel Data Storage in Registers	C202.3	1,2

Present State Q0 Q1	Next State x= 0	Next State x= 1	Output x=0	Output x=1
0 0	0 0	0 1	0	0
0 1	0 0	1 0	0	0
1 0	1 1	1 0	0	0
1 1	0 0	0 1	0	1

	(3) Transfer of Data from one bit to another. (4) Counters (5) Frequency Division		
T.3.4	Discuss in detail, the working of Full Adder logic circuit. **Ans:** **Full-Adder:** A half-adder has only two inputs and there is no provision to add a carry from the lower order bits when multi bit addition is performed.  	C202.3	1,2
T.3.5	Draw the circuit diagram of a Master-slave J-K flip-flop using NAND gates. What is race around condition? How is it eliminated in a Master-slave J-K flip-flop. **(10)** **Ans:** **Logic Diagram of Master-Slave J-K Flip-Flop using NAND Gates:** Fig.7(a) shows the logic diagram of Master-Slave J-K Flip-Flop using NAND gates.  	C202.3	1,2
T.4.1	Analyze the Boolean expression, K- Map, transition and state table and primitive flow table of the following asynchronous sequential circuits.  Ans:  	C202.4	1,2
T.4.2	Define the following: i) asynchronous sequential circuits, ii) Cycles, iii) critical and non-critical race i) Asynchronous sequential circuits: The delay elements provide short-term memory for the sequential circuits. • Present state variables [y1..yk] are called secondary variables. ii) Cycles: iii) Race condition: Two or more binary state variables will change value when one input variable changes. Cannot predict state sequence if unequal delay is encountered. Non-critical race: The final stable state does not depend on the change order of state variables Critical race: The change order of state variables will result in different stable states Should be avoided	C202.4	1,2
T.4.3	Explain the following devices: ROM&PROM: ROM: Read-only memory (ROM) is similar in design to static or dynamic RAM circuits,	C202.4	1,2

	except that the "latching" mechanism is made for one-time (or limited) operation. The simplest type of ROM is that which uses tiny "fuses" which can be selectively blown or left alone to represent the two binary states. Obviously, once one of the little fuses is blown, it cannot be made whole again, so the writing of such ROM circuits is one-time only. Because it can be written (programmed) once, these circuits are sometimes referred to as PROMs (Programmable Read-Only Memory) PROM: A programmable read-only memory (PROM) or field programmable read-only memory (FPROM) or one-time programmable non-volatile memory (OTP NVM) is a form of digital memory where the setting of each bit is locked by a fuse or antifuse. They are a type of ROM (read-only memory) meaning the data in them is permanent and cannot be changed. PROMs are used in digital electronic devices to store permanent data, usually low level programs such as firmware (microcode).		
T.4.4	Explain the following devices: PLA –PAL. PLA – A programmable logic array (PLA) has a programmable AND gate array, which links to a programmable OR gate array, which can then be conditionally complemented to produce an output. PAL- Programmable Array Logic (PAL) is a family of programmable logic device semiconductors used to implement logic functions in digital circuits introduced by Monolithic Memories, obtained a registered trademark on the term PAL for use in "Programmable Semiconductor Logic Circuits".	C202.4	1,2
T.5.1	RTL Design: In digital circuit design, register-transfer level (RTL) is a design abstraction which models a synchronous digital circuit in terms of the flow of digital signals (data) betweenhardware registers, and the logical operations performed on those signals. Register-transfer-level abstraction is used in hardware description languages (HDLs) like Verilog and VHDL to create high-level representations of a circuit, from which lower-level representations and ultimately actual wiring can be derived. Design at the RTL level is typical practice in modern digital design 	C202.5	1,2
T.5.2	Write a behavioral VHDL description of the 4 bit counter.	C202.5	1,2
T.5.3	(I) Write VHDL code for a full sub tractor using logic Equation (II) Write a VHDL description of an S-R latch using a process	C202.5	1,2
T.5.4	Write a HDL code for 8:1 MUX using behavioral model	C202.5	1,2
T.5.5	Write a HDL code for mod 6 counter.	C202.5	
	5. Assignments / Seminar / Self-study topics.		
Sem.1.	Discuss the working of the following programmable logic devices: PROM	C202.4	1
Sem.2.	Discuss the working of the following programmable logic devices: i.PLA ii. PAL	C202.4	1
Sem.3.	Explain the Operation of Hazards & Errors in Digital Circuits.	C202.4	1
Sem.4.	Write a behavioral VHDL description of the 4 bit counter	C202.5	1,2
Sem.5.	Write a HDL code for 8:1 MUX using behavioral model	C202.5	1,3
	5. Assignments / Seminar / Self-study topics.		
Sel.1.1.	Discuss the detail about Digital Logic families.	C202.1	1,4
Sel.1.2.	Design the Code Converter.	C202.2	1,4
Sel.1.3.	Explain the operation of Sequential Circuits.	C202.3	1,4

K.L.N. College of Engineering
Department of Electrical and Electronics Engineering
EE6302- ELECTROMAGNETIC THEORY [C203]
Important Questions/Tutorials/Assignments/Self-study/Seminar topics.

S.No.	1. Questions.	COs	POs
Q.1.1	Given that $\bar{D} = \frac{10}{3}x^3\bar{a}_x$ c/m^2 , evaluate both sides of the divergence theorem for the volume of a cube, 2 m on the edge, centered at the origin and with edges parallel to the axis?	C203.1	1,2
Q.1.2	A vector field $\bar{D} = \frac{5}{4}r^2\bar{a}_r$ is given in spherical co-ordinates. Evaluate both sides of divergence theorem for the volume enclosed by r=4 m & θ = $\pi/4$.	C203.1	1,2
Q.1.3	A vector field $\bar{D} = \frac{5}{4}r^2\bar{a}_r$ is given in spherical co-ordinates. Evaluate both sides of divergence theorem for the volume enclosed between r = 1m & r = 2m.	C203.1	1,2
Q.1.4	Given $\bar{A} = 2r\cos\varphi\,\bar{a}_r + r\,\bar{a}_\phi$ in cylindrical co-ordinates. for the contour x=0 to 1,y=0 to1, verify stoke's theorem	C203.1	1,2
Q.1.5	Verify the divergence theorem for the following case $\bar{A} = xy^2\bar{a}_x + y^3\bar{a}_y + y^2z\,\bar{a}_z$ and the surface is a cuboids defined by 0 < x < 1, 0 < y < 1 and 0 < z < 1	C203.1	1,2
Q.1.6	Check validity of the divergence theorem considering the field $\bar{D} = 2xy\,\bar{a}_x + x^2\bar{a}_y$ c/m^2 and the rectangular parallelepiped formed by the planes x = 0, x = 1,y = 0,y = 2 & z = 0,z = 3.	C203.1	1,2
Q.1.7	Determine the divergence and curl of these vectors fields $\bar{P} = x^2yz\,\bar{a}_x + xz\,\bar{a}_z$ $\bar{Q} = \rho\sin\varphi\,\bar{a}_\rho + \rho^2z\,\bar{a}_\varphi + z\cos\varphi\,\bar{a}_z$, $\bar{T} = \frac{1}{r^2}\cos\theta\,\bar{a}_r + r\sin\theta\cos\varphi\,\bar{a}_\theta + \cos\varphi\,\bar{a}_\varphi$	C203.1	1,2
Q.1.8	If a Scalar potential is given by the expression **ϕ = xyz**, determine the potential gradient and also prove that the vector $\bar{F} = \mathbf{grad}\,\phi$ is irrotational. Find the gradient of the following scalar fields: (i) $V = e^{-z}\sin 2x\cosh y$ **(ii)** $U = \rho^2z\cos 2\varphi$ (iii) $W = 10\,r\,\sin^2\theta\cos\varphi$	C203.1	1,2
Q.1.9	Using gauss's law, calculate the **E** due to infinitely large uniformly charged plate? And two such plates- are placed parallel to each other. Compute **E** between and outside the plates when both the plates are -charged with the same charge density?	C203.1	1,2
Q.1.10	A Line charge of 20nC/m is located at x = 2m and y = - 4m. Calculate the field E at(-2, -1, 4) m.	C203.1	1,2
Q.1.11	A circular disc of radius 'a' m is charged uniformly with a charge density of σ c/ m^2.find the electric field at a point 'h' m from the disc along its axis	C203.1	1,2
Q.1.12	Derive an expression for electric field intensity **E** due to a uniformly charged long Straight line with constant charge density in C/m?	C203.1	1,2
Q.1.13	Three surface charge distributions are located in free space as follows: **10 μ C/m^2** at x **= 2,- 20 μC/m^2** at **y= - 3** and **30 μC/m^2** at **z = 5**. Determine **E** at **P (5,-1, 4)?**	C203.1	1,2
Q.1.14	Derive Electric field intensity and electric flux density for infinite line charge and infinite sheet of charge using gauss's law?	C203.1	1,2
Q.1.15	Given **E** = y $\mathbf{a}_x$ – x $\mathbf{a}_y$ + 2 $\mathbf{a}_z$,determine work expended in carrying 2C from B (1, 0, 1) to A(0.8, 0.6, 1) along shorter arc of circle and determine work required to carry 2C from B to A along straight line path from B to A?	C203.1	1,2
Q.2.1	Determine the capacitance of capacitor consisting of two parallel metal plates 30cm x 30cm, surface area, separated by 5 mm in air. What is the total energy stored by the capacitor if the capacitor is charged to P.D. of 500 V? What is the energy density?	C203.2	1,2
Q.2.2	A parallel plate capacitor with a separation of 1 cm has 29 kV applied, when air was the dielectric used. Assume that the dielectric strength of air as 30 kV/cm. A thin piece of glass with ε_r = 6.5 with a dielectric strength of 290 kV/cm with thickness 0.2 cm is inserted. Find whether glass or air will break?	C203.2	1,2
Q.2.3	Find the total current in a circular conductor of radius 4 mm, if the current density varies according to $J = \frac{10^4}{r}$ (A/m^2)	C203.2	1,2

Q.3.1	Plane y =0 carries a uniform current of $30\ \bar{a}_z\ mA/m$.Calculate the magnetic field intensity at(1, 10, -2) m in rectangular co –ordinate system.	C203.3	1,2
Q.3.2	Find the force for a wire is perpendicular to the page with current flowing inward has producing a Magnetic field B.	C203.3	1,2
Q.3.3	Find the magnetic flux density at a point on the axis of a loop of radius 'b' that carries a direct current I.	C203.3	1,2
Q.3.4	A thin cylindrical conductor of radius 'a' infinite in length carries a current I. Find H at all points?	C203.3	1,2
Q.3.5	Find $\bar{H}$at the centre of an equilateral triangle loop of side 4 m carrying current of 5A?	C203.3	1,2
Q.3.6	An iron ring with a cross sectional area of 3 cm^2 and a mean circumference of 15 cm is wound with 250 turns wire carrying a current of 0.3 A. The relative permeability of the ring is 1500. Calculate the flux established in the ring.	C203.3	1,2
Q.3.7	Determine the force between two long parallel wires of 200 m length separated by 5 cm in air and carrying currents of 40 A in same direction and in opposite direction.	C203.3	1,2
Q.3.8	Two coils when connected in series aiding have a total inductance of 860 mH and when connected in series opposing the total inductance is 140 mH. One coil has 4 times the inductance of the other. Calculate the inductance of each coil, the mutual inductance and co-efficient of coupling.	C203.3	1,2
Q.3.9	A magnetic material has $\mu_r = 10/\pi$ and is in a magnetic field of strength $\bar{H} = 5\rho^3\bar{a}_\varphi\ A/m$. Find the magnetization	C203.3	1,2
Q.3.10	A solenoid has 400 turns with a length of 2 m. It has a circular cross section of 0.1 m^2 . Find its inductance.	C203.3	1,2
Q.3.11	Consider a co-axial cable with inner conductor radius 'a' carrying current I, while – I is uniformly distributed in the outer conductor. The outer conductor is in the form of concentric cylinder whose inner radius is 'b' and outer radius is 'c'. Obtain the expression for magnetic field intensity $\bar{H}$ for the following regions, applying Amperes law (a) region r < a (b) region between 'a' and 'b' (i.e. a < r < b) (c) region between b and c and (d) region r > c.	C203.3	1,2
Q.4.1	Explain the different methods of emf induction with necessary governing equation with suitable examples?	C203.4	1,2
Q.4.2	Derive from first principles, Maxwell's equation for electric and magnetic field in both differential and integral form?	C203.4	1,2
Q.4.3	Derive the relationship between circuit theory and field theory using RLC circuit?	C203.4	1,2
Q.5.1	Determine the skin depth of copper at 60Hz with σ = 5.8 X 10^7 S/m. Given μ_r = 1;	C203.5	1,2
Q.5.2	A plane wave propagating through a medium with μ_r = 2,ε_r =8 has E = 0.5 sin (10^8 t- βz) $\bar{a}_x$ V/m. Determine the propagation parameters and H fields?	C203.5	1,2
Q.5.3	In free space E (z ,t) = 50 cos (ωt - βz) ax V/m. Find the average power crossing a circular area of radius 2.5 m in the constant Z- Plane.	C203.5	1,2
Q.5.4	Find the velocity of a plane wave in a loss-less medium having a relative permittivity of 5 and relative permeability of unity?	C203.5	1,2
Q.5.5	Derive the electromagnetic wave equation from the Maxwell's equation and their solution?	C203.5	1,2
Q.5.6	Give a mathematical representation of plane waves propagating in +*Z* direction in an infinite loss less dielectric medium. Explain how this medium is characterized by propagation constant and wave impedance?	C203.5	1,2
Q.5.7	Obtain the expression for Poynting vector from the Maxwell's equation for the general case?	C203.5	1,2
	2. Assignments		
A1.1	Prove that curl grad ϕ = 0;	C203.1	1,2
A1.2	Given the point **A (-2, 6, 3),** find the spherical coordinate of point A?	C203.1	1,2
A1.3	Given that $\bar{D} = \frac{10}{3}x^3\bar{a}_x$ c/m^2 , evaluate both sides of the divergence theorem for the volume of a cube, 2 m on the edge, centered at the origin and with edges parallel to the axis?	C203.1	1,2
A1.4	A vector field $\bar{D} = \frac{5}{4}r^2\bar{a}_r$is given in spherical co-ordinates. Evaluate both sides of divergence theorem for the volume enclosed between r = 1m & r = 2m.	C203.1	1,2
A1.5	A Magnetic field $\bar{H} = 3\cos x\,\bar{a}_x + z\cos x\,\bar{a}_y$A/m, for **z ≥ 0**	C203.1	1,2

	= 0 for **z < 0** is applied to a perfectly conducting surface in x y plane. Find the current density on the Conductor surface.		
A1.6	If $\mathbf{G(r) = 10e^{-2z}(\rho\,\bar{a}_\rho + \bar{a}_z)}$, determine the flux of G out of the surface of the cylinder ρ=1, 0 ≤ z ≤ 1.	C203.1	1,2
A1.7	Check validity of the divergence theorem considering the field $\bar{D} = 2xy\,\bar{a}_x + x^2\bar{a}_y$ c/m^2 and the rectangular parallelepiped formed by the planes x = 0, x = 1,y = 0,y = 2 & z = 0,z = 3.	C203.1	1,2
A1.8	If a Scalar potential is given by the expression **ϕ = xyz**, determine the potential gradient and also prove that the vector $\bar{F} = \mathbf{grad}\ \phi$ is irrotational.	C203.1	1,2
A1.9	Find the electric potential at a point **(4, 3) m** due to charge of 10^{-9}**C** located at the origin in free space.	C203.1	1,2
A1.10	Using gauss's law, calculate the **E** due to infinitely large uniformly charged plate? And two such plates- are placed parallel to each other. Compute **E** between and outside the plates when both the plates are -charged with the same charge density?	C203.1	1,2
A1.11	Derive the expressions for potential due to a point charge and a ring charge?	C203.1	1,2
A1.12	Derive the electric field and potential distribution and the capacitance per unit length of a coaxial cable	C203.1	1,2
B1.1	A Line charge of 20nC/m is located at x = 2m and y = - 4m. Calculate the field E at (-2, -1, 4) m.	C203.1	1,2
B1.2	Derive an expression for electric field intensity **E** due to a uniformly charged long Straight line with constant charge density in C/m?	C203.1	1,2
B1.3	Derive Electric field intensity and electric flux density for infinite line charge and infinite sheet of charge using gauss's law?	C203.1	1,2
B1.4	Derive the electrostatic boundary conditions at the interface of two dielectric media. If one of the medium is conductor, discuss the field pattern	C203.2	1,2
B1.5	Conducting spherical shells with radii a = 10 cm, b= 30 cm are maintained at a potential difference of 100V such that at V =0 at r= b and V = 100 V at r=a. Determine V and E region between the shells. If ε_r = 2.5 in the region, determine the total charge induced in the shells and the capacitance of the capacitor.	C203.2	1,2
B1.6	Calculate the total charge enclosed by a cube of 2m sides, centered at the origin and with the edges parallel to the axis when the electric flux density over the cube is **D**=10x^3/3 $\mathbf{a}_x$ (c/m^2)?	C203.2	1,2
B1.7	Given $\bar{J} = 10^4 \sin\theta\ \bar{a}_r\ A/m^2$ in spherical system. Find the current passing through spherical shell of r = 0.02 m.	C203.2	1,2
B1.8	Calculate inductance of ring shaped coil having a mean diameter of 20 cm wound on a wooden core of 2 cm diameter. The winding is uniformly distributed and contains 200 turns?	C203.3	1,2
B1.9	A conductor located at x = 0.5 m, y =0 and 0 < z < 2.0 m carries a current of 10 A in the $\bar{a}_z$ direction. Along the length of the conductor $\bar{B} = 2.5\ \bar{a}_z\ T$.find the torque about the x axis.	C203.3	1,2
B1.10	A solenoid 4 cm in length carries a current of 100 mA. If solenoid is to produce magnetic flux density of 5mWb/m^2, how many turn of wire are needed.	C203.3	1,2
B1.11	A long straight wire carries a current I = 1 A. At what distance is the magnetic field H= 1A/m.	C203.3	1,2
B1.12	Derive the Magnetostatic boundary conditions at the interface two different magnetic media?	C203.3	1,2
C1.1	Explain magnetization in magnetic materials and explain how the effect of magnetization is taken into account in the calculation of B/H?	C203.3	1,2
C1.2	Find the torque about the y axis for the two conductors of length l, carrying current in opposite directions, separated by fixed distance w, in the uniform magnetic field in x directions?	C203.3	1,2
C1.3	Derive an expression for magnetic scalar and vector potential.	C203.3	1,2
C1.4	Obtain the expression for Magnetic field strength at an 'r' m from conductor of finite length?	C203.3	1,2
C1.5	A circular loop located on x^2+y^2=9, z=0 carries a direct current of 10 A along $\bar{a}_\varphi$ direction in cylindrical coordinate system. Derive the expression for magnetic field intensity $d\bar{H}$ at point *P*(0,0,h) contributed by current element **I** $d\bar{l}$ using Biot-savart's law. Determine $\bar{H}$ at (0, 0, 4).	C203.3	1,2
C1.6	Calculate the inductance of 10 m length of a coaxial cable filled with a material for which ε_R = 18, σ =0 and μ_R = 8 and having dimensions of a = 1mm and b= 4mm.	C203.3	1,2
C1.7	Derive from first principles, Maxwell's equation for electric and magnetic field in both	C203.4	1,2

	differential and integral form?		
C1.8	Derive the relationship between circuit theory and field theory using RLC circuit?	C203.4	1,2
C1.9	Explain the different methods of emf induction with necessary governing equation with suitable examples?	C203.4	1,2
C1.10	Derive the electromagnetic wave equation from the Maxwell's equation and their solution?	C203.5	1,2
C1.11	Give a mathematical representation of plane waves propagating in +*Z* direction in an infinite loss less dielectric medium. Explain how this medium is characterized by propagation constant and wave impedance?	C203.5	1,2
C1.12	Obtain the expression for Poynting vector from the Maxwell's equation for the general case?	C203.5	1,2
	3. Tutorials		
T.1.1	Transform a vector $\bar{\mathbf{A}} = \mathbf{Y}\bar{\mathbf{a}}_x - \mathbf{X}\,\bar{\mathbf{a}}_y + \mathbf{Z}\,\bar{\mathbf{a}}_z$ in to cylindrical co-ordinates.	C203.1	1,2
T.1.2	Given that **P(-3,2,1)** and vector $\bar{\mathbf{A}} = \mathbf{y}\,\bar{\mathbf{a}}_x + (\mathbf{x}+\mathbf{z})\,\bar{\mathbf{a}}_y$, express P and A in cylindrical Co-ordinate system	C203.1	1,2
T.1.3	Find the gradient of a scalar function of position f, where **F(x,y,z) =$x^2y + e^z$** at point **P (1,5,-2).**	C203.1	1,2
T.1.4	A vector field $\bar{\mathbf{D}} = \frac{5}{4}\mathbf{r}^2\,\bar{\mathbf{a}}_r$ is given in spherical co-ordinates. Evaluate both sides of divergence theorem for the volume enclosed by r=4 m & θ = $\pi/4$.	C203.1	1,2
T.1.5	Given $\bar{\mathbf{A}} = 2\mathbf{r}\cos\boldsymbol{\varphi}\,\bar{\mathbf{a}}_r + \mathbf{r}\,\bar{\mathbf{a}}_\phi$ in cylindrical co-ordinates. for the contour x=0 to 1,y=0 to1, verify stoke's theorem	C203.1	1,2
T.1.6	Verify the divergence theorem for the following case $\bar{\mathbf{A}} = \mathbf{x}\mathbf{y}^2\bar{\mathbf{a}}_x + \mathbf{y}^3\bar{\mathbf{a}}_y + \mathbf{y}^2\mathbf{z}\,\bar{\mathbf{a}}_z$ and the surface is a cuboids defined by 0 < x < 1, 0 < y < 1 and 0 < z < 1	C203.1	1,2
T.1.7	Determine the divergence and curl of these vectors fields $(i)\bar{P} = x^2yz\,\bar{\mathbf{a}}_x + \mathbf{x}\mathbf{z}\,\bar{\mathbf{a}}_z$ $(ii)\bar{\mathbf{Q}} = \boldsymbol{\rho}\sin\boldsymbol{\varphi}\;\bar{\mathbf{a}}_\rho + \boldsymbol{\rho}^2\mathbf{z}\,\bar{\mathbf{a}}_{\varphi} + \mathbf{z}\cos\boldsymbol{\varphi}\;\bar{\mathbf{a}}_z$, $\overline{(ıı)T} = \frac{1}{r^2}\cos\theta\,\bar{\mathbf{a}}_r + \mathbf{r}\sin\theta\cos\varphi\,\bar{\mathbf{a}}_\theta + \cos\varphi\,\bar{\mathbf{a}}_\varphi$	C203.1	1,2
T.1.8	Find the gradient of the following scalar fields: **(i)** $V = e^{-z}\sin 2x\cosh y$ (ii) $U = \rho^2 z\cos 2\varphi$ (iii) $W = 10\,r\,\sin^2\theta\cos\varphi$	C203.1	1,2
T.1.9	The electric potential near the origin of a system of coordinates is **V=ax^2+by^2+cz^2.** Find the electric field at **(1, 2, 3)**	C203.1	1,2
T.1.10	Given **E** = y $\mathbf{a}_x$ – x $\mathbf{a}_y$ + 2 $\mathbf{a}_z$,determine work expended in carrying 2C from B (1, 0, 1) to A(0.8, 0.6, 1) along shorter arc of circle and determine work required to carry 2C from B to A along straight line path from B to A?	C203.1	1,2
T.2.1	A circular disc of radius 'a' m is charged uniformly with a charge density of σ c/ m^2.find the electric field at a point 'h' m from the disc along its axis	C203.1	1,2
T.2.2	Three surface charge distributions are located in free space as follows: **10 μ C/m^2** at x **= 2,- 20 μC/m^2** at **y= - 3** and **30 μC/m^2** at **z = 5**. Determine **E** at **P (5,-1, 4)?**	C203.1	1,2
T.2.3	A total charge of **10^{-8} C** is distributed uniformly along a ring of radius of **5m**. Calculate the Potential on the axis of the ring at apoint **5m** from the centre of the ring?	C203.1	1,2
T.2.4	Determine the capacitance of capacitor consisting of two parallel metal plates 30cm x 30cm, surface area, separated by 5 mm in air. What is the total energy stored by the capacitor if the capacitor is charged to P.D. of 500 V? What is the energy density?	C203.2	1,2
T.2.5	A parallel plate capacitor with a separation of 1 cm has 29 kV applied, when air was the dielectric used. Assume that the dielectric strength of air as 30 kV/cm. A thin piece of glass with ε_r = 6.5 with a dielectric strength of 290 kV/cm with thickness 0.2 cm is inserted. Find whether glass or air will break?	C203.2	1,2
T.3.1	Plane y =0 carries a uniform current of $30\;\bar{a}_z\;mA/m$.Calculate the magnetic field intensity at (1, 10, -2) m in rectangular co –ordinate system.	C203.3	1,2
T.3.2	Find the force for a wire is perpendicular to the page with current flowing inward has producing a Magnetic Field **B**.	C203.3	1,2
T.3.3	Find the magnetic flux density at a point on the axis of a loop of radius 'b' that carries a direct	C203.3	1,2

	current I.		
T.3.4	A thin cylindrical conductor of radius 'a' infinite in length carries a current I. Find H at all points?	C203.3	1,2
T.3.5	An iron ring with a cross sectional area of 3 cm^2 and a mean circumference of 15 cm is wound with 250 turns wire carrying a current of 0.3 A. The relative permeability of the ring is 1500. Calculate the flux established in the ring.	C203.3	1,2
T.3.6	Determine the force between two long parallel wires of 200 m length separated by 5 cm in air and carrying currents of 40 A in same direction and in opposite direction.	C203.3	1,2
T.3.7	Two coils when connected in series aiding have a total inductance of 860 mH and when connected in series opposing the total inductance is 140 mH. One coil has 4 times the inductance of the other. Calculate the inductance of each coil, the mutual inductance and co-efficient of coupling.	C203.3	1,2
T.3.8	A magnetic material has $\mu_r = 10/\pi$ and is in a magnetic field of strength $\bar{H} = 5\rho^3 \bar{a}_\varphi \ A/m$. Find the magnetization	C203.3	1,2
T.3.9	A solenoid has 400 turns with a length of 2 m. It has a circular cross section of 0.1 m^2 . Find its inductance.	C203.3	1,2
T.3.10	Consider a co-axial cable with inner conductor radius 'a' carrying current I, while – I is uniformly distributed in the outer conductor. The outer conductor is in the form of concentric cylinder whose inner radius is 'b' and outer radius is 'c'. Obtain the expression for magnetic field intensity $\bar{H}$ for the following regions, applying Amperes law (a) region r < a (b) region between 'a' and 'b' (i.e. a < r < b) (c) region between b and c and (d) region r > c.	C203.3	1,2
T.4.1	Calculate the induced emf at t = 10 sec when the flux through each turn of 200 turn coil is t (t - 1) mWb?	C203.4	1,2
T.4.2	A parallel-plate capacitor with plate area of 5 cm^2 and plate separation of 3 mm has a voltage 50 sin 10^3 t V applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\ \varepsilon_0$.	C203.4	1,2
T.4.3	If the electric field strength of a radio broadcast signal at a TV receiver is given by **E** = 5.0 cos (ωt - βy) $\mathbf{a}_z$, V/m, determine the displacement current density. If the same field exists in a medium whose conductivity	C203.4	1,2
T.5.1	Find the velocity of a plane wave in a loss-less medium having a relative permittivity of 5 and relative permeability of unity and determine the skin depth of copper at 60Hz with σ = 5.8 X 10^7 S/m. Given μ_r = 1;	C203.5	1,2
T.5.2	A plane wave propagating through a medium with μ_r = 2,ε_r =8 has E = 0.5 sin (10^8 t- βz) $\bar{\mathbf{a}}_x$ V/m. Determine the propagation parameters and H fields?	C203.5	1,2
T.5.3	In free space E (z ,t) = 50 cos (ωt - βz) ax V/m. Find the average power crossing a circular area of radius 2.5 m in the constant Z- Plane.	C203.5	1,2
	4. Seminar/Self study topics.		
S.1.1	Application of Electrostatic field	C203.2	1
S.1.2	Application of Magnetostatic field	C203.3	1

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

GE6351 – Environmental Science and Engineering [C204]

Important Questions/Tutorials/Assignments/Self study /Seminar topics.

S.No.	**4. Important Questions.**	COs	POs
Q.1.1.	Explain the various threats to biodiversity. What are the causes for loss of biodiversity?	C204.1	6
Q.1.2.	What is meant by value of biodiversity? Explain different values of biodiversity. Explain in-situ and ex-situ conservation of biodiversity.	C204.1	6
Q.1.3.	Briefly explain the structural and functional components of an ecosystem and energy flow through ecosystem.	C204.1	6
Q.1.4.	What are the cycles in ecosystems? Describe carbon cycle and biogeochemical cycle in the ecosystem.	C204.1	6
Q.1.5.	Discuss the characteristic features, structure and function of a) desert ecosystem b) forest ecosystem and c) aquatic ecosystem.	C204.1	6
Q.2.1.	Explain the methods of disposal of municipal solid waste and radioactive wastes.	C204.1	7
Q2.2.	Explain the causes, effects and control measures of a) marine pollution b) water pollution c) nuclear and radiation pollution.	C204.2	7
Q.2.3.	Describe the sources, effects, and control of noise pollution and soil pollutions (with impacts)	C204.2	7
Q2.4.	Discuss in detail about a) waste water treatment process b) acid rain formation and its effects	C204.2	7
Q.2.5.	Discuss in detail about the Bhopal gas tragedy and Chernobyl nuclear disaster.	C204.2	6,7
Q.3.1.	Discuss briefly the ill-effects of deforestation and effects of modern Agriculture.	C204.3	6
Q.3.2.	What are the causes of soil erosion and deforestation? Explain in detail.	C204.3	7
Q.3.3.	Explain the role of individual in environment protection and ecological benefits of forest.	C204.3	7
Q.3.4.	Explain a) benefits and problems of constructing dam b) effects of dams on forest and tribal people.	C204.3	7
Q.4.1.	Explain watershed management and agenda for sustainable development.	C204.4	6
Q.4.2.	Explain the rain water harvesting and need and strategy of water conservation.	C204.4	7
Q.4.3.	Explain resettlement and rehabilitation issues.	C204.4	7
Q.4.4.	What is consumerism? Mention the objectives and factors affecting consumerism.	C204.4	7
Q.4.5.	What is biomedical waste? Give the steps involve in management of biomedical wastes.	C204.4	7
Q.4.6.	What is an earthquake? Enumerate its effects. Mention the methods to mitigate the disaster.	C204.4	7
Q.5.1.	Explain briefly the population explosion and family welfare program, training and development.	C204.5	7
Q5.2.	Explain a) HIV/AIDS b) various policies and programs for women and child development.	C204.5	7
Q.5.3.	Write short notes on a) women and child welfare b) human rights c) value education. Ii) outline the various family welfare plans in the post independent India.	C204.5	6
Q.5.4.	Explain the role of NGOs in environmental protection and health.	C204.5	7
Q.5.5.	Discuss EIA? Give the objectives, benefits and process of EIA.	C204.5	7
	6.Assignments/Seminar/Self study topics.		
A.1.1.	**What are food chain and food web?**	C204.1	6
A.1.2.	Distinguish between primary succession and secondary succession.	C204.1	6
A.1.3.	**What are endangered and endemic species?**	C204.1	6
A.1.4.	Briefly explain the energy flow through ecosystem.	C204.1	6
A.1.5.	**Explain the structural and functional components of an ecosystem.**	C204.1	6
A.1.6	Explain the effects of nuclear and Radiation pollution.	C204.1	6
A.1.7	What is acid rain? How it is formed? Give its effects.	C204.1	6
A.2.1	Distinguish between water logging & Salinity.	C204.2	6
A.2.2	Give the steps involved in anaerobic digest in process.	C204.2	7
A.2.3	State a few drawbacks of pollution related acts.	C204.2	7
A.2.4	Name any four environmental protection acts.	C204.2	7
A.2.5	Compare nuclear power with coal power.	C204.2	7
A.2.6	What is a biomedical waste? Give the steps involved in management of biomedical waste.	C204.2	7
A.5.1.	Define the term population dynamics.	C204.5	7
A.5.2	What are the policies for women development?	C204.5	7
A.5.3	Define human rights.	C204.5	7
A.5.4	Explain briefly the population explosion.	C204.5	6
A.5.5	Explain the value of education.	C204.5	6
S.1.1	Pollution case study	C204.1	6

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

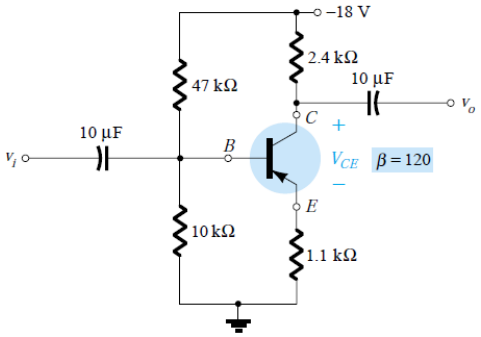
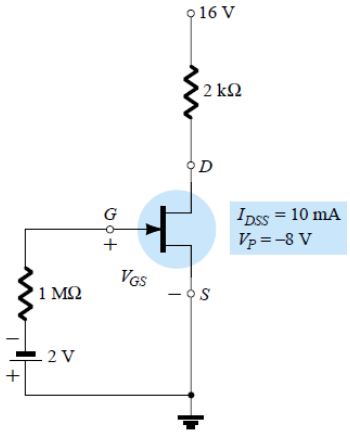
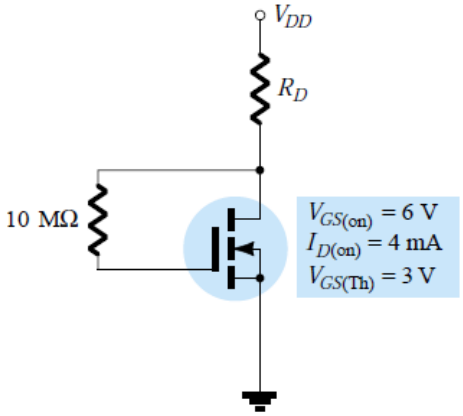
EC 6202 - ELECTRONIC DEVICES AND CIRCUITS [C205]

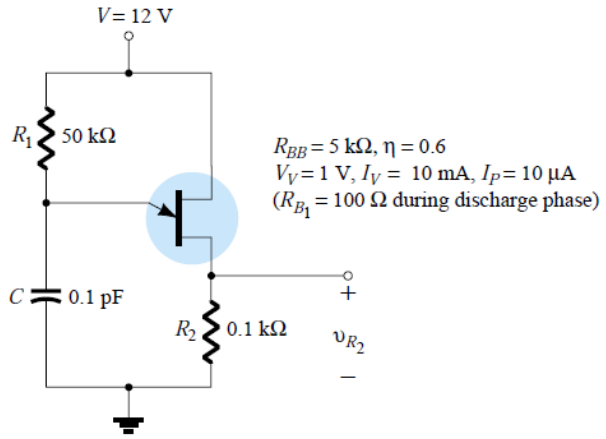
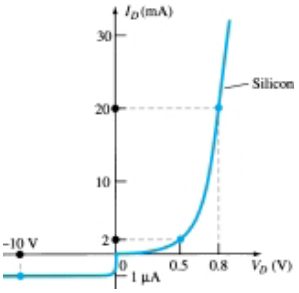
Important Questions/Assignments/ Self-study Topics/Seminar topics.

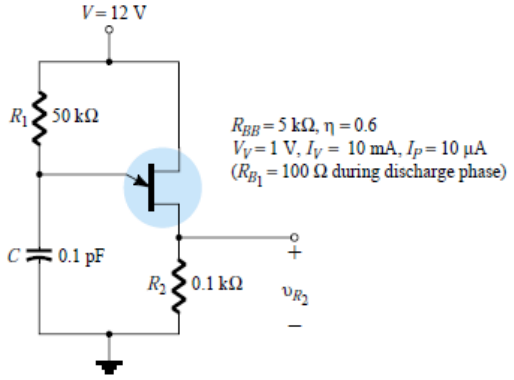
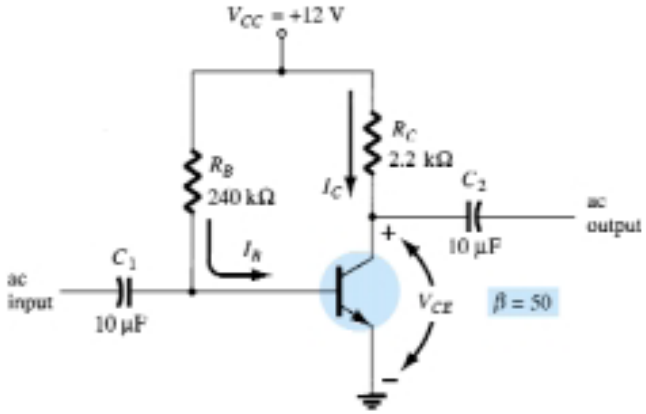
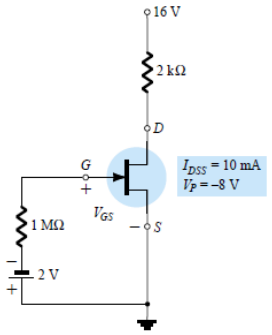
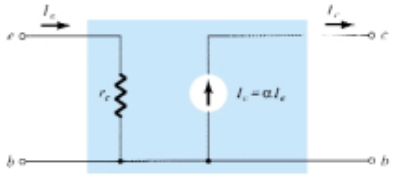
1. IMPORTANT QUESTIONS:

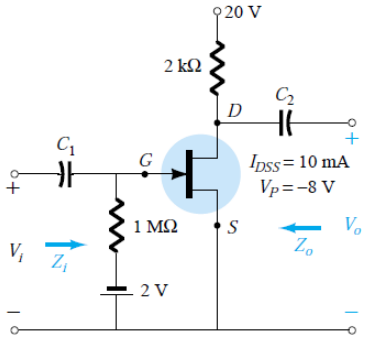
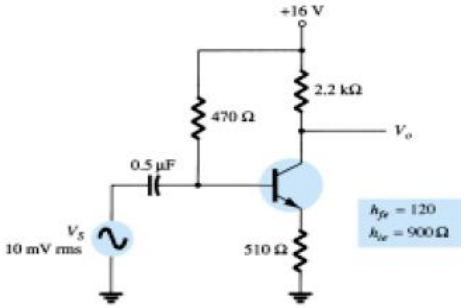
S.No.	4. Important Questions.	COs	POs
Q.1.1.	Draw the symbol and structure of PN and Zener Diode. List the applications of Diode.	C205.1	1
Q.1.2.	Define knee voltage of a diode.	C205.1	1
Q.1.3.	What is meant by depletion region?	C205.1	1
Q.1.4.	Draw the VI characteristics of PN junction diode &Zener diode.	C205.1	1
Q.1.5.	Define static and dynamic resistance of PN diode.	C205.1	1
Q.1.6.	Relate voltage and current of forward biased PN junction diode.	C205.1	1,2
Q.1.7.	What is transition and diffusion capacitance of PN junction diode?	C205.1	1
Q.1.8.	What is a rectifier? Name it's types.	C205.1	1
Q.1.9.	Define PIV & TUF.	C205.1	1
Q.1.10.	Derive the ripple factor of FWR.	C205.1	1
Q.1.11.	Mention the advantage of bridge rectifier over full wave rectifier.	C205.1	1
Q.1.12.	Compare full wave with half wave rectifier.	C205.1	1
Q.1.13.	What is LED and Laser Diode?	C205.1	1
Q.1.14.	What are the advantages and disadvantage of LED? Draw its symbol.	C205.1	1
Q.1.15.	Compare LED and PN diode.	C205.1	1
Q.1.16.	List the applications of LED and LASER diode. Draw the symbol and structure of it.	C205.1	1
Q.1.17.	Compare Zener and Avalanche breakdown mechanism.	C205.1	1
Q.1.18	Draw the series voltage regulator.	C205.1	1
Q.1.19.	Compare rectifier and regulator.	C205.1	1
Q.1.20.	Define voltage regulation	C205.1	1
Q.2.1.	Draw the symbol & structure of BJT, JFET, MOSFET, UJT, SCR& IGBT.	C205.2	1
Q.2.2.	What is transistor? What are the types and advantages of it.	C205.2	1
Q.2.3.	Draw the circuit of NPN and PNP transistor in CE, CB and CC configurations.	C205.2	1
Q.2.4.	State the relation between α, β and γ.	C205.2	1
Q.2.5.	What are the operating modes of BJT with reference to junction biasing?	C205.2	1
Q.2.6.	Why BJT is called as current controlled device?	C205.2	1
Q.2.7.	Among CE, CB and CC configurations, which one is most popular? Why?	C205.2	1
Q.2.8.	What is meant by biasing?	C205.2	1
Q.2.9.	Define pinch-off voltage of FET.	C205.2	1
Q.2.10.	Why FET is called as voltage controlled device?	C205.2	1
Q.2.11.	Draw the drain and transfer characteristics of FET and indicate the operating regions.	C205.2	1
Q.2.12.	Write the relation between JFET parameters.	C205.2	1,2
Q.2.13.	Why are N-channel MOSFET preferred over P-channel MOSFET?	C205.2	1
Q.2.14.	Compare BJT, FET and MOSFET.	C205.2	1
Q.2.15.	What is MOSFET? Name its types.	C205.2	1
Q.2.16.	What is a thyristor? Mention two of them.	C205.2	1
Q.2.17.	What is meant by latching and holding current in SCR?	C205.2	1
Q.2.18	Show how SCR can be triggered on by the application of pulse to the G terminal.	C205.2	1
Q.2.19.	List the merits, demerits and applications of UJT, SCR and IGBT.	C205.2	1
Q.2.20.	What is intrinsic stand-off ratio of a UJT?	C205.2	1
Q.3.1.	What are amplifiers? Write its uses.	C205.3	1

Q.3.2.	Define the four h-parameters.	C205.3	1
Q.3.3.	What is the need of coupling capacitors in amplifier design?	C205.3	1
Q.3.4.	Draw the hybrid model of BJT in CE, CB & CC Configuration.	C205.3	1
Q.3.5.	Draw the circuit diagram of CS and CD FET amplifier	C205.3	1
Q.3.6.	Draw the small signal equivalent circuit of a CS & CD FET.	C205.3	1
Q.3.7.	Draw the frequency response of an amplifier	C205.3	1
Q.3.8.	What are the effect of coupling and bypass capacitors?	C205.3	1
Q.3.9.	Discuss the significance of cut-off frequencies.	C205.3	1
Q.3.10.	State Miller's theorem.	C205.3	1
Q.3.11.	Compare the characteristics of CE, CB and CC amplifiers.	C205.3	1
Q.3.12.	Differentiate between power transistor and signal transistor.	C205.3	1
Q.3.13.	Draw the high frequency equivalent circuit of MOSFET.	C205.3	1
Q.4.1.	What are cascade amplifiers? Write down the need of cascading the amplifiers.	C205.4	1
Q.4.2.	Define CMRR. What is its ideal value?	C205.4	1
Q.4.3.	Write its significance & List the various methods of improving CMRR.	C205.4	1
Q.4.4.	Mention the classification of differential amplifier. State the advantage of it.	C205.4	1
Q.4.5.	Draw the ideal tuned circuit and write the expression for its resonant frequency.	C205.4	1
Q.4.6.	Draw the ideal and actual response of tuned circuit.	C205.4	1
Q.4.7.	Define Q factor & dissipation factor.	C205.4	1
Q.4.8.	What is neutralization? What is the need for neutralization? List the methods of it.	C205.4	1
Q.4.9.	List the advantages, dis advantages and applications of tuned amplifier.	C205.4	1
Q.4.10.	What is power amplifier? Classify it.	C205.4	1
Q.4.11.	State the feature of large signal amplifier.	C205.4	1
Q.4.12.	Compare the amplifier classes.	C205.4	1
Q.5.1.	Draw the block diagram of feedback amplifier. Name the types of feedback amplifier.	C205.5	1
Q.5.2.	Name the types of feedback topologies.	C205.5	1
Q.5.3.	Mention the advantages and disadvantages of negative feedback amplifier.	C205.5	1
Q.5.4.	Which is the most commonly used feedback arrangement in cascaded amplifier? why?	C205.5	1
Q.5.5.	What is meant by feedback?	C205.5	1
Q.5.6.	State the Barkhausen criterion for an oscillator.	C205.5	1
Q.5.7.	Write the expression for the frequency of oscillations of RC, LC & Crystal oscillator.	C205.5	1,2
Q.5.8.	List the advantage, disadvantage & application of oscillators.	C205.5	1
Q.5.9.	What is the advantage of colpitts oscillator compared to phase shift oscillator?	C205.5	1
Q.5.10.	Compare RC phase shift and wien bridge oscillator.	C205.5	1
Q.5.11.	Differentiate oscillator with amplifier.	C205.5	1
Q.5.12.	State Piezo electric effect.	C205.5	1
	5. Assignments / Seminar / Self-study topics.		
A.1.1.	Determine the the GE PN junction diode current for the forward bias voltage of 0.22V at room temperature 25°C with reverse saturation current is 1mA. Taken $\eta = 1$.	C205.1	1,2
A.1.2.	A Si diode has a bulk resistance of 2Ω and forward current of 12mA. What is the actual value of V_F for the device.	C205.1	1,2
A.1.3.	A FWR circuit is fed from a transformer having centre-tapped secondary winding. The rms voltage from either end of secondary to centre tap is 30v. if the diode R_F is 2Ω and that of the half secondary is 8Ω, for a load of 1KΩ. Calculate power delivered to the load, % regulation at full load, efficiency & TUF of secondary.	C205.1	1,2,3
A.1.4.	A 4.5v zener is rated at 1.5W. what is the maximum safe current of the zener?	C205.1	1,2
A.1.5.	A zener diode with $v_z = 4.3v$ has $Z_z = 22\Omega$ when $I_z = 20mA$. Calculate the upper and lower limits of V_z when I_z changes by ±5mA	C205.1	1,2
A.2.1.	Calculate I_c and I_E for a transistor that has $\alpha_{dc} = 0.99$ and $I_B = 150\mu A$. Determine the value of	C205.2	1,2

	β_{dc} for the transistor.		
A.2.2.	Determine V_{CE} for the voltage-divider bias configuration of Fig.. 	C205.2	1,2
A.2.3.	Determine the following for the network of Fig. (a) V_{GSQ}. (b) I_{DQ}. (c) V_{DS}. (d) V_D. (e) V_G. (f) V_S. 	C205.2	1,2
A.2.4.	The levels of V_{DS} and I_D are specified as $V_{DS} = 1/2V_{DD}$ and $I_D = I_{D(on)}$ for the network of Fig. Determine the level of V_{DD} and R_D. 	C205.2	1,2
A.2.5	Given the relaxation oscillator of Fig. (a) Determine R_{B1} and R_{B2} at I_E=0 A. (b) Calculate V_P, the voltage necessary to turn on the UJT. (c) Determine whether R_1 is within the permissible range of values as determined by Eq. (21.8) to ensure firing of the UJT. (d) Determine the frequency of oscillation if R_{B1} =100 ohm during the discharge phase. Sketch the waveform of v_C for a full cycle.	C205.2	1,2

			
A.3.1	For an amplifier, mid band gain = 100 and lower cutoff frequency is 1KHz. Find the gain of an amplifier at a frequency of 20Hz.	C205.3	1,2
A.3.2	A CC amplifier has V_{cc} = 15v, R_B = 75KΩ, R_E = 910Ω. The β of the Si transistor is 100 and the R_L = 600Ω. Find r_{in} and A_v.	C205.3	1,2
A.3.3	A CB transistor amplifier is driven by a V_s and R_s = 1200Ω. The R_L = 1KΩ. The h parameters are given below: h_{ib} = 220Ω, h_{fb}= -0.98, h_{rb} = 3 x 10^{-4}, h_{ob} = 0.5μA/V. compute A_i, R_i, A_v, R_o& A_p.	C205.3	1,2
A.3.4	For CS amplifier, the operating point is defined by V_{GSQ} = -2.5V, V_P = -6V &I_{dQ} = 2.5mA with I_{DSS} = 8mA. Also R_G = 1MΩ, R_S = 1KΩ, R_D = 2.2KΩ and V_{DD} = 15v. calculate g_m, r_d, Z_i, Z_o, & A_v.	C205.3	1,2
A.3.5	Determine the LF response of the amplifier. The parameters are V_{cc} = 10V, R_1 = 68KΩ, R_2 = 22KΩ, R_c = 2.2KΩ, R_E = 1KΩ, R_L = 10KΩ, R_s = 680Ω, C_1=C_2 = 0.1μF, C_E=10μF & β = 100.	C205.3	1,2
	5. TUTORIALS		
T.1.1	A Si diode has a bulk resistance of 2Ω and I_F = 20mA. What is the value of $V_{F?}$	C205.1	1,2
T.1.2.	A diode with V_F = 0.7v is connected as a HER. The R_L - 500Ω, and the rms ac input is 2v. determine the peak V_o, peak I_L, PIV.	C205.1	1,2
T.1.3.	A 4.5v zener is rated at 1.5W. what is the maximum safe current of the diode?	C205.1	1,2
T.1.4	Determine the dc resistance levels for the diode of Fig. at (a) I_D = 2 mA (b) I_D = 20 mA (c) V_D= -10 V 	C205.1	1,2
T.2.1	Calculate Ic and Ie for a transistor that has α_{dc} = 0.99 and Ib = 150μA. Determine the value of β_{dc}	C205.2	1,2
T.2.2	Determine the V_p for an N channel Si FET with a channel width of 5.6 x 10^{-4}cm andN_d = 10^{15}/cm^3. Given ε = 12.	C205.2	1,2
T.2.3	Given the relaxation oscillator of Fig. (a) Determine R_{B1} and R_{B2} at I_E=0 A. (b) Calculate V_P, the voltage necessary to turn on the UJT. (c) Determine whether R1 is within the permissible range of values to ensure firing of the UJT. (d) Determine the frequency of oscillation if R_{B1}=100Ω during the discharge phase.	C205.2	1,2

			
T.2.4	Determine the following for the fixed-bias configuration of Fig.(a) I_{BQ} and I_{CQ}. (b) V_{CEQ}. (c) V_B and V_C.(d) V_{BC}. 	C205.2	1,2
T.2.5	Determine the following for the network of Fig. using mathematical approach (a)V_{GSQ}. (b) I_{DQ}. (c) V_{DS}. (d) V_D. (e) V_G. (f) V_S. 	C205.2	1,2
T.3.1	Determine the mid band gain, upper cutoff frequency of CS amplifier fed with the signal having internal resistance Rsig = 100k ohm, Rg = 4.7M ohm, Rd = Rl = 15 k ohm, gm = 1 mA/v, ro = 150 k ohm, Cgs = 1pF anfCdg=0.4 pF.	C205.3	1,2
T.3.2	A BJT has gm = 38 mho, rbe = 5.9 k ohm, hie = 6k ohm, rbb' = 100 ohm, Cb'c=12pF, Cb'e=63pF fe = 224 at 1kHz. Calculate f_T.	C205.3	1,2
T.3.3	Given I_E=2.5 mA, h_{fe}=140, h_{oe}=20 μS, and h_{ob}=0.5μS, determine the common-emitter hybrid equivalent circuit.	C205.3	1,2
T.3.4	For a common-base configuration of Fig. withI_E=4 mA, α=0.98, and an ac signal of 2 mV applied between the base and emitter terminals:(a) Determine the input impedance.(b) Calculate the voltage gain if a load of 0.56 kΩis connected to the output terminals.(c) Find the output impedance and current gain. 	C205.3	1,2
T.3.5	The fixed-bias configuration had an operating point defined by V_{GSQ} =-2 V and I_{DQ}=5.625 mA,	C205.3	1,2

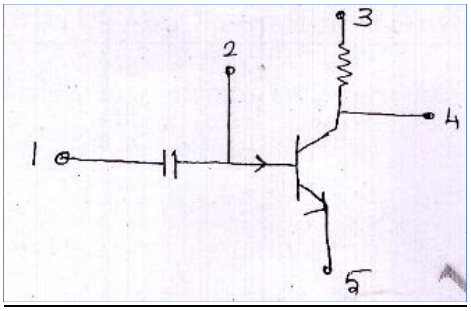
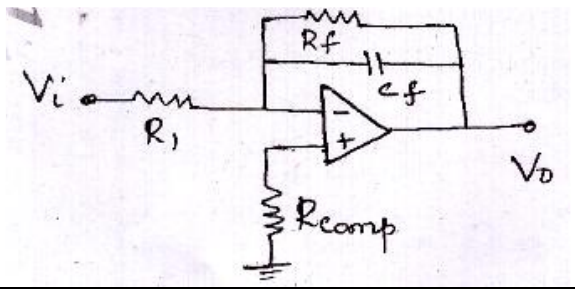
	with I_{DSS} =10 mA and V_P=-8 V. The network isredrawn as Fig. with an applied signal V_i. The value of $y_{os}$is provided as 40 µS.(a) Determine g_m.(b) Find r_d.(c) Determine Z_i.(d) Calculate Z_o. (e) Determine the voltage gain A_v. 		
T.4.1	A multi stage amplifier consists of 3 stages. The A_v are 60, 100& 160. Calculate overall gain.	C205.4	1,2
T.4.2	A single transistor is operating as an ideal class B amplifier with 1K ohm load. I = 10mA. How much signal power is delivered to the load?	C205.4	1,2
T.4.3	Calculate the resonant frequency of a tuned amplifier c=10pF & L=1mH.	C205.4	1,2
T.4.4	A differential amplifier has (i) CMRR = 1000 & (ii) CMRR = 10000. The first set of inputs is V_1 = +100µV & V_2 = -100µV. The second set of inputs is V_1 = 1100µV & V_2 = 900µV. calculate the percentage difference in output voltage obtained for the two sets of input voltages	C205.4	1,2
T.5.1	In an RC Phase shift oscillator, if R = 200KΩ & C = 100pF. Find the frequency of oscillation	C205.5	1,2
T.5.2	In a wien bridge oscillator, if R = 100KΩ & frequency of oscillation = 10KHz, find the value of C	C205.5	1,2
T.5.3	In a Hartley bridge oscillator, the value of C in the tuned circuit is 500pF and the two sections of coil have inductances 38µH & 12µH. Find the frequency of oscillation and the β.	C205.5	1,2
T.5.4	Determine the voltage gain, input, and output impedance with feedback for voltage series feedback having A= -100, Ri = 10 kΩ, Ro = 20 kΩ for feedback of (a)β = -0.1 &(b)β = -0.5. 	C205.5	1,2
	5. Assignments / <u>Seminar</u> / Self-study topics.		
Sem.1.	Semiconductors	C205.1	1
Sem.2.	Special purpose diodes	C205.1	1
Sem.3.	LCD	C205.	1
Sem.4.	Non sinusoidal oscillator	C205.	1,2,3,4
Sem.5.	Wave shaping circuits	C205.	1,3
	5. Assignments / Seminar / <u>Self-study topics</u>.		
Sel.1.1.	Opto electronic devices	C205.	1,3
Sel.1.2.	CRO	C205.	1,6
Sel.1.3.	Filters	C205.	1,3

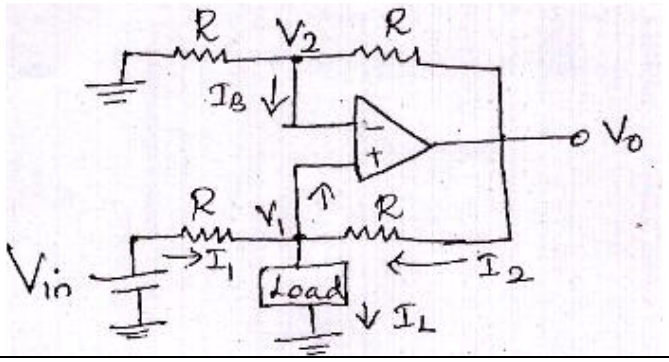
K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6303 –Linear Integrated Circuits & Applications [C206]

Important Questions /Assignments /Self study /Seminar topics

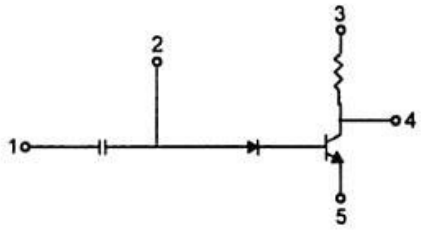
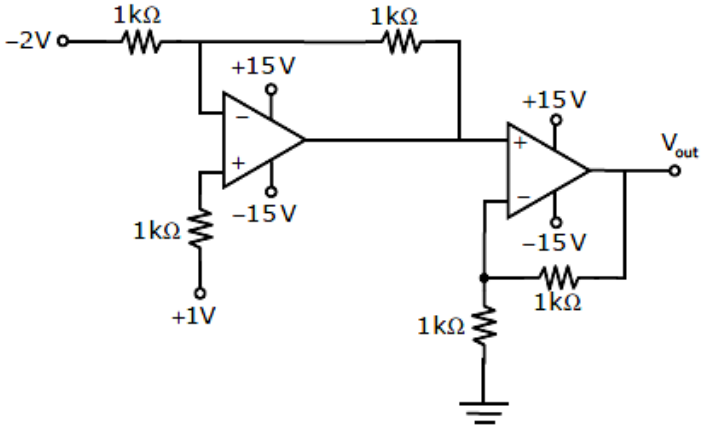
IMPORTANT QUESTIONS			
S. No.	**Questions**	**COs**	**POs**
UNIT – I IC FABRICATION			
Q.1.1	Explain the fabrication process involved in the following circuit diagram. 	C206.1	1,3,6,12
Q.1.2	Explain the process of masking and photo etching in IC fabrication.	C206.1	1
Q.1.3	Discuss the different ways to fabricate diodes.	C206.1	1,3
Q.1.4	Explain how a monolithic capacitor can be fabricated.	C206.1	1,3
Q.1.5	Describe the Epitaxial growth process.	C206.1	1
Q.1.6	Explain the different types of IC packages with examples.	C206.1	1
Q.1.7	Briefly explain the various processes involved in fabrication of monolithic IC which integrated diode, capacitance and FET.	C206.1	1,3
Q.1.8	Explain the process of Ion implantation and state its advantages.	C206.1	1
Q.1.9	List the merits of integrated circuits over discrete circuits.	C206.1	1
Q.1.10	Explain the process of Photolithography and diffusion.	C206.1	1
UNIT – II CHARACTERISTICS OF OP-AMP			
Q.2.1	Consider the lossy integrator as shown in following figure. For the component value R_1=10 kΩ, R_f=100 kΩ, C_f=1 nF, determine the lower frequency limit of integration and show the response for the inputs (1) Step input (2) Square input (3) Sine input 	C206.2	1,2,3

Q.2.2	Design an adder-subtractor circuit for $V_o = 2V_1 + 5V_2 – 10V_3$.	C206.2	1,2,3,6,12
Q.2.3	For a V-I converter shown in following figure, V_{in} = 5V, R = 10kΩ, V_1 = 1V, find the load current and output voltage V_0. Assume thatthe op-amp is initially nulled. 	C206.2	1,2,3
Q.2.4	For a maximum frequency of 100Hz, design a differentiator circuit and draw the frequency response for the same.	C206.2	1,2,3,6,12
Q.2.5	Design an op-amp circuit to give an output voltage $V_0 = 4V_1 – 3V_2 + 5V_3 – V_4$ where V_1, V_2, V_3 and V_4 are inputs.	C206.2	1,2,3,6,12
Q.2.6	Explain voltage to current converter using operational amplifier. Also explain the application of OP-AMP as integrator.	C206.2	1
Q.2.7	Explain in detail about the stability criteria and different methods of frequency compensation techniques used in operational amplifiers.	C206.2	1
Q.2.8	Define slew rate and explain how it can be improved.	C206.2	1,2,3
Q.2.9	Derive the expression forCMRR of differential amplifier with equivalent circuit and explain any one method to improve CMRR.	C206.2	1,2,3
	UNIT – III APPLICATIONS OF OP-AMP		
Q.3.1	A dual slope ADC uses a 16-bit counter and a 4 MHz clock rate. The maximum input voltage is +10 V. The maximum integrator output voltage should be -8 V when the counter has cycled through 2^n counts. The capacitor used in the integrator is 0.1 µF. Determine the value of the resistor R of the integrator.	C206.3	1,2,3
Q.3.2	Derive the expression for the log and antilog amplifiers with necessary diagrams.	C206.3	1,2,3
Q.3.3	In a triangular wave generator, given R_2 = 1.2kΩ, R_3 = 6.8 kΩ, R_1 = 120kΩ, C_1 = 0.01µF. Determine the peak to peak output amplitude& frequency of triangular wave.	C206.3	1,2,3
Q.3.4	Design a RC phase shift oscillator for a frequency of 1 KHz.	C206.3	1,2,3,6,12
Q.3.5	Discuss the second order high pass filter with its frequency response and design the circuit with the cut-off frequency of 5KHz.	C206.3	1,2,3,6,12
Q.3.6	With a neat circuit diagram, explain the working of Schmitt trigger using op-amp.	C206.3	1
Q.3.7	Explain the working of Instrumentation amplifier.	C206.3	1
Q.3.8	With a neat circuit diagram, explain the operation of R-2R typeD/A converter.	C206.3	1
Q.3.9	Illustrate the working principle of dual slope type A/D converter. Discuss its advantages and limitations.	C206.3	1
Q.3.10	Explain the operation of peak detector and S/H circuit. Also state the advantages and applications of sample and hold circuits.	C206.3	1

Q.3.11	Differentiate a clipper and a clamper with neat sketches.	C206.3	1
	UNIT – IV SPECIAL ICs		
Q.4.1	For the VCO circuit, assume R_2 = 2.2 KΩ, R_1 = R_3 = 15 KΩ and C_1 = 0.001µF. Assume V_∞ = 12V. Determine the output frequency, the change in output frequency if modulating input V_c is varied from 7V to 8V.	C206.4	1,2,3
Q.4.2	For a 555 astable circuit, determine the high state time interval, low state time interval, period, frequency and duty cycle.	C206.4	1,2,3
Q.4.3	With neat diagram, explain the operation of four quadrant variable transconductance multiplier circuit.	C206.4	1
Q.4.4	In the astable multivibrator using 555 timer, R_A = 2.2KΩ, R_B = 6.8KΩ and C = 0.01µF. Calculate t_{HIGH}, t_{LOW}, free running frequency and Duty cycle.	C206.4	1,2,3
Q.4.5	Explain the working of a voltage controlled oscillator.	C206.4	1
Q.4.6	Explain how frequency multiplication is done using PLL.	C206.4	1
Q.4.7	With the help of neat diagram, explain the working of IC 555 as an astable multivibrator.	C206.4	1
Q.4.8	With block diagram discuss the principle of operation of NE565 PLL circuit.	C206.4	1
Q.4.9	Explain how PLL is used as an AM detector and frequency translator.	C206.4	1
Q.4.10	(i) Draw the functional block diagram &explain the characteristics of IC 555. (ii) Write a short note on Analog multiplier.	C206.4	1
	UNIT – V APPLICATION ICs		
Q.5.1	State the advantages of IC voltage regulator and explain the features and internal structure of general purpose Linear IC 723 regulator.	C206.5	1
Q.5.2	With a neat functional diagram, explain the operation of LM 380 power amplifier.	C206.5	1
Q.5.3	Explain the operation of SMPS with neat diagrams and also discuss its advantages and disadvantages.	C206.5	1
Q.5.4	With a neat diagram, explain the working of step down switching regulator.	C206.5	1
Q.5.5	Explain the working of series voltage regulator.	C206.5	1
Q.5.6	Explain the working principle of IC 8038 function generator.	C206.5	1
Q.5.7	What are IC voltage regulators? Explain the principle of operation of IC LM317 as a voltage regulator.	C206.5	1
Q.5.8	Explain Isolation Amplifiers and discuss the limitations of linear voltage regulators.	C206.5	1
Q.5.9	Design a regulator using IC 723 to meet the following specifications: V_0 = 5V; I_o = 100mA; V_{in} = 15 ± 20%; I_{sc} = 150 mA; V_{sense} = 0.7V.	C206.5	1,2,3,6,12

ASSIGNMENT QUESTIONS

S. No.	Questions	COs	POs
	UNIT – I IC FABRICATION		

A.1.1	Draw the cross-sectional view of the following circuit when fabricated by silicon planar technology.  	C206.1	1,3,6,12
A.1.2	Design a 4 kΩ diffused resistor.	C206.1	1,2,3,6,12
A.1.3	Explain why inductors are difficult to fabricate in ICs.	C206.1	1,12
A.1.4	Discuss the various ways for reducing V_T of a MOSFET.	C206.1	1,12
A.1.5	List the merits of integrated circuits over discrete circuits.	C206.1	1,12
	UNIT – II CHARACTERISTICS OF OP-AMP		
A.2.1	Design an amplifier with a gain of +5 using one op-amp.	C206.2	1,2,3,6,12
A.2.2	A square wave of peak to peak amplitude of 500 mV has to be amplified to a peak-to-peak amplitude of 3 volts, with a rise time of 4 µs or less. Can a 741C op-amp be used?	C206.2	1,2,3,12
A2.3	Give the detailed procedure on how to measure the slew rate of the 741C op-amp.	C206.2	1,3
A.2.4	(a) Design an op-amp differentiator that will differentiate an input signal with f_{max}=100 Hz. (b) Draw the output waveform for a sine wave of 1V peak at 100 Hz applied to the differentiator. (c) Repeat part (b) for a square wave input.	C206.2	1,2,3,6,12
A.2.5	In the circuit shown below, the op-amps are ideal. Determine Vout. **[GATE 2013]**  **ANS: 8V**	C206.2	1,2,3
	UNIT – III APPLICATIONS OF OP-AMP		
A.3.1	A dual slope ADC uses a 16-bit counter and a 4 MHz clock rate. The maximum input voltage is +10 V. The maximum integrator output voltage should be -8 V when the counter has cycled through 2^n counts. The capacitor used in the integrator is 0.1 µF. Determine the value of the resistor R of the integrator.	C206.3	1,2,3

	ANS: R = 205 KΩ		
A.3.2	A Schmitt trigger with the upper threshold level V_{UT} = 0V and hysteresis width V_H = 0.2V converts a 1 kHz sine wave of amplitude $4V_{pp}$ into a square wave. Calculate the time duration of the negative and positive portion of the output waveform. **ANS: T_1 = 0.516 ms, T_2 = 0.484 ms**	C206.3	1,2,3
A.3.3	List the applications of Instrumentation amplifier & Comparator.	C206.3	1,6,12
A.3.4	Consider a four bit D to A converter. The analog value corresponding to digital signals of values 0000 and 0001 are 0V and 0.0625V respectively. Determine the analog value (in Volts) corresponding to the digital signal 1111. **[GATE 2015]** **ANS: 0.9225**	C206.3	1,2,3

SEMINAR TOPICS

UNIT – II CHARACTERISTICS OF OPAMP

1. Voltage to current converter with floating load
2. Voltage to current converter with Grounded load
3. Applications of V-I converter
4. Current to voltage converter
5. Applications of I-V converter
6. Inverting Summer
7. Non inverting summer
8. Subtractor/Difference amplifier

UNIT – IV SPECIAL ICs

1. Linear Ramp Generator using 555 Timer
2. Pulse Width modulation using 555 Timer
3. Missing Pulse Detector using 555 Timer
4. Square Wave generator using 555 timer
5. 555 Timer as Schmitt Trigger

Reg. No. | | | | | | | | | | | | |

Question Paper Code : 57502

B.E./B. Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Third Semester

Civil Engineering

MA 6351 – TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all branches except Environmental Engineering, Textile Chemistry, Textile Technology, Fashion Technology and Pharmaceutical Technology)

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Form the partial differential equation by eliminating the arbitrary functions from

   $f(x^2 + y^2, z - xy) = 0$.

2. Find the complete solution of the partial differential equation $p^3 - q^3 = 0$.

3. Find the value of the Fourier series of $f(x) = \begin{cases} 0 \text{ in } (-c, 0) \\ 1 \text{ in } (0, c) \end{cases}$ at the point of discontinuity $x = 0$.

4. Find the value of b_n in the Fourier series expansion of $f(x) = \begin{cases} x + \pi \text{ in } (-\pi, 0) \\ -x + \pi \text{ in } (0, \pi) \end{cases}$

5. Classify the partial differential equation $u_{xx} + u_{xy} = f(x, y)$.

6. Write down all the possible solutions of one dimensional heat equation.

7. State Fourier integral theorem.

8. Find the Fourier transform of a derivative of the function $f(x)$ if $f(x) \to 0$ as $x \to \pm \infty$.

9. Find $Z\left\{\frac{1}{n!}\right\}$

10. Find $Z\{(\cos\theta + i \sin\theta)^n\}$.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Solve the equation $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$. **(8)**

(ii) Find the singular integral of the equation $z = px + qy + \sqrt{1 + p^2 + q^2}$. **(8)**

OR

(b) (i) Solve : $(D^3 - 2D^2D')z = 2e^{2x} + 3x^2y$. **(8)**

(ii) Solve : $(D^2 + 2DD' + D'^2 - 2D - 2D')z = \sin(x + 2y)$ **(8)**

12. (a) (i) Find the Fourier series of $f(x) = x$ in $-\pi < x < \pi$. **(6)**

(ii) Find the Fourier series expansion of $f(x) = |\cos x|$ in $-\pi < x < \pi$. **(10)**

OR

(b) (i) Find the half range sine series of $f(x) = x \cos \pi x$ in $(0, 1)$. **(8)**

(ii) Find the Fourier cosine series up to third harmonic to represent the function given by the following data : **(8)**

x :	0	1	2	3	4	5
y :	4	8	15	7	6	2

13. (a) Find the displacement of a string stretched between two fixed points at a distance of $2l$ apart when the string is initially at rest in equilibrium position and points of the string are given initial velocities v where $v = \begin{cases} \frac{x}{l} & \text{in } (0, l) \\ \frac{2l - x}{l} & \text{in } (l, 2l) \end{cases}$, x being the distance measured from one end. **(16)**

OR

(b) A long rectangular plate with insulated surface is l cm wide. If the temperature along one short edge is $u(x, 0) = k(lx - x^2)$ for $0 < x < l$, while the other two long edges $x = 0$ and $x = 1$ as well as the other short edge are kept at 0 °C, find the steady state temperature function $u(x, y)$. **(16)**

14. (a) Find the Fourier cosine and sine transform of $f(x) = e^{-ax}$ for $x \geq 0$, $a > 0$. Hence deduce the integrals $\int_0^\infty \frac{\cos sx}{a^2 + s^2} ds$ and $\int_0^\infty \frac{s \sin sx}{a^2 + s^2} ds$. **(16)**

OR

(b) (i) Find the Fourier transform of $f(x) = e^{-\frac{x^2}{2}}$ in $(-\infty, \infty)$. **(8)**

(ii) Find the Fourier transform of $f(x) = 1 - |x|$ if $|x| < 1$ and hence find the value of $\int_0^\infty \frac{\sin^4 t}{t^4} dt$. **(8)**

15. (a) (i) Find the Z-transforms of $\cos\frac{n\pi}{2}$ and $\frac{1}{n(n+1)}$.

(ii) Using convolution theorem, evaluation $Z^{-1}\left\{\frac{z^2}{(z-a)^2}\right\}$. **(8)**

OR

(b) (i) Find the inverse Z-transform of $\frac{z}{z^2-2z+2}$ by residue method. **(8)**

(ii) Solve the difference equation $y_{n+2} + y_n = 2$, given that $y_0 = 0$ and $y_1 = 0$ by using Z-transforms. **(8)**

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 27327

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Civil Engineering

MA 6351 — TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all branches except Environmental Engineering, Textile Chemistry, Textile Technology, Fashion Technology and Pharmaceutical Technology)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Construct the partial differential equation of all spheres whose centres lie on the Z – axis, by the elimination of arbitrary constants.

2. Solve $(D+D'-1)(D-2D'+3)z=0$.

3. Find the root mean square value of $f(x)=x(l-x)$ in $0\le x\le l$.

4. Find the sine series of function $f(x)=1$, $0\le x\le \pi$.

5. Solve $3x\frac{\partial u}{\partial x}-2y\frac{\partial u}{\partial y}=0$; by method of separation of variables.

6. Write all possible solutions of two dimensional heat equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$.

7. If $F(s)$ is the Fourier Transform of $f(x)$, prove that $F\{f(ax)\}=\frac{1}{a}F\left(\frac{s}{a}\right), a\neq 0$.

8. Evaluate $\int_0^\infty \frac{s^2}{(s^2+a^2)(s^2+b^2)}ds$ using Fourier Transforms.

9. Find the Z – transform of $\frac{1}{n+1}$.

10. State the final value theorem. In Z transform.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find complete solution of $z^2(p^2+q^2)=(x^2+y^2)$. (8)

(ii) Find the general solution of $(D^2+2DD'+D'^2)z=2\cos y - x\sin y$. (8)

Or

(b) (i) Find the general solution of $(z^2-y^2-2yz)p+(xy+zx)q=(xy-zx)$. (8)

(ii) Find the general solution of $(D^2+D'^2)z=x^2y^2$. (8)

12. (a) (i) Find the Fourier series expansion the following periodic function of period 4 $f(x)=\begin{cases}2+x & -2\le x\le 0\\ 2-x & 0<x\le 2\end{cases}$. Hence deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots=\frac{\pi^2}{8}$. (8)

(ii) Find the complex form of Fourier series of $f(x)=e^{ax}$ in the interval $(-\pi,\pi)$ where a is a real constant. Hence, deduce that $\sum_{n=-\infty}^{\infty}\frac{(-1)^n}{a^2+n^2}=\frac{\pi}{a\sinh a\pi}$. (8)

Or

(b) (i) Find the half range cosine series of $f(x)=(\pi-x)^2, 0<x<\pi$. Hence find the sum of series $\frac{1}{1^4}+\frac{1}{2^4}+\frac{1}{3^4}+\ldots$ (8)

(ii) Determine the first two harmonics of Fourier series for the following data. (8)

x:	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	π	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$
$f(x)$:	1.98	1.30	1.05	1.30	–0.88	–0.25

13. (a) A tightly stretched string with fixed end points $x=0$ and $x=l$ is initially at rest in its equilibrium position. If it is vibrating by giving to each of its points a velocity $v=\begin{cases}\frac{2kx}{l} & in\ \ 0<x<\frac{l}{2}\\ \frac{2k(l-x)}{l} & in\ \ \frac{1}{2}<x<l\end{cases}$. Find the displacement of the string at any distance x from one end at any time t. (16)

Or

(b) A bar 10 cm long with insulated sides has its ends A and B maintained at temperature $50°C$ and $100°C$, respectively, until steady state conditions prevails. The temperature at A is suddenly raised to $90°C$ and at the same time lowered to $60°C$ at B. Find the temperature distributed in the bar at time t. (16)

14. (a) (i) Find the Fourier sine integral representation of the function $f(x)=e^{-x}\sin x$. (8)

(ii) Find the Fourier cosine transform of the function $f(x)=\dfrac{e^{-ax}-e^{-bx}}{x}, x>0$. (8)

Or

(b) (i) Find the Fourier transform of the function $f(x)=\begin{cases}1-|x|, & |x|\le 1\\ 0, & |x|>1\end{cases}$.

Hence deduce that $\int_0^{\infty}\left(\dfrac{\sin t}{t}\right)^4 dt=\dfrac{\pi}{3}$. (8)

(ii) Verify the convolution theorem for Fourier transform if $f(x)=g(x)=e^{-x^2}$. (8)

15. (a) (i) If $U(z)=\dfrac{z^3+z}{(z-1)^3}$, find the value of u_0, u_1 and u_2. (8)

(ii) Use convolution theorem to evaluate $z^{-1}\left\{\dfrac{z^2}{(z-3)(z-4)}\right\}$. (8)

Or

(b) (i) Using the inversion integral method (Residue Theorem), find the inverse Z- transform of $U(z)=\dfrac{z^2}{(z+2)(z^2+4)}$. (8)

(ii) Using the Z- transform solve the difference equation $u_{n+2}+4u_{n+1}+3u_n=3^n$ with $u_0=0, u_1=1$. (8)

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Reg. No. | | | | | | | | | | | | |

Question Paper Code : 57308

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Third Semester

Electrical and Electronics Engineering

EE 6301 – DIGITAL LOGIC CIRCUITS

(Common to Electronics and Instrumentation Engineering and Instrumentation and Control Engineering)

(Regulation 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Convert the following binary code into a Gray Code :

   1010111000_2

2. Define fan-in and fan-out.

3. Write the POS representation of the following SOP function :

   $f(x, y, z) = \sum m (0, 1, 3, 5, 7)$

4. Design a half subtractor.

5. Give the characteristic equation and characteristic table of SR flip-flop.

6. State any two differences between Moore and Mealy state machines.

7. What are the two types of asynchronous sequential circuits ?

8. State the difference between PROM, PLA and PAL.

9. What is data flow modelling in VHDL ? Give its basic mechanism.

10. Write the VHDL code to realize a 2 × 1 multiplexer.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Convert 1010111011101100_2 into its octal, decimal and hexadecimal equivalent. (6)

(ii) Deduce the odd parity hamming code for the data : 1010. Introduce an error in the LSB of the hamming code and deduce the steps to detect the error. (10)

OR

(b) (i) With circuit schematic explain the operation of a two input TTL NAND gate. (8)

(ii) With circuit schematic and explain the operation and characteristics of a ECL gate. (8)

12. (a) (i) Simplify the following function using Karnaugh Map.
$f(w, x, y, z) = \sum m(0, 1, 3, 9, 10, 12, 13, 14) + \sum d(2, 5, 6, 11)$ (8)

(ii) Implement the following function using only NAND gates :
$f(x, y, z) = \sum m(0, 2, 4, 6)$ (8)

OR

(b) (i) Design a BCD to Excess-3 code converter. (8)

(ii) Design a full adder and implement it using suitable multiplexer. (8)

13. (a) (i) Explain the operation of a JK master slave flip flop. (8)

(ii) Design a MOD-5 counter using T Flip Flops. (8)

OR

(b) (i) Design a serial adder using Mealy state model. (8)

(ii) Explain the state minimization using partitioning procedure with a suitable example. (8)

14. (a) (i) What are Static-0 and Static-1 hazards ? Explain the removal of hazards using hazard covers in K-map. (8)

(ii) Explain cycles and races in asynchronous sequential circuits. (8)

OR

(b) (i) What are transition table and flow table ? Give suitable examples. (6)

(ii) Implement the following function using PLA and PAL : (10)
$f(x, y, z) = \sum m (0, 1, 3, 5, 7)$

15. (a) (i) Explain the various operators supported by VHDL. (8)

(ii) Write the VHDL code to realize a decade counter with behavioural modelling. (8)

OR

(b) (i) Explain functions and subprograms with suitable examples. (6)

(ii) Write the VHDL code to realize a 4-bit parallel binary adder with structural modelling and write the test bench to verify its functionality. (10)

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Question Paper Code : 27206

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Electrical and Electronics Engineering

EE 6301 — DIGITAL LOGIC CIRCUITS

(Common to Electronics and Instrumentation Engineering and Instrumentation and Control Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is an unit distance code? Give an example.
2. Define Fan-out.
3. Convert the given expression in canonical SOP form $Y = AB + A'C + BC'$.
4. Draw the logical diagram of EX-OR gate using NAND gates.
5. Draw the truth table and state diagram of SR flip-flop.
6. What is edge triggered flip flops?
7. What is PROM?
8. Compare pulsed mode and fundamental mode asynchronous circuit
9. Write the behavioral model of D flip flop.
10. List out the operators present in VHDL.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw the CMOS logic circuit for NOR gate and explain its operation. (8)

(ii) Perform the following operation $(756)_8 - (437)_8 + (725)_{16}$. Express the answer in octal form. (8)

Or

(b) (i) A 12 bit Hamming code word containing 8 bits of data and 4 parity bits is read from memory. What was the original 8 bit data word that was written into memory if the 12 bit word read out is as (1) 101110010100 and (2) 111111110100. (12)

(ii) Briefly discuss weighted Binary code. (4)

12. (a) (i) Simplify the boolean function using K-map and implement using only NAND gates.

$F(A,B,C,D) = \sum m(0,8,11,12,15) + \sum d(1,2,4,7,10,14)$.

Mark the essential and non-essential prime implicants. (8)

(ii) Design a full subtractor and implement using logic gates. (8)

Or

(b) (i) Design a 4 bit BCD to excess 3 code converter and implement using logic gates. (8)

(ii) What is a multiplexer? Implement the following Boolean function with 8×1 MUX and external gates

$F(A,B,C,D) = \sum m(1,3,4,11,12,13,14,15)$. (8)

13. (a) (i) A sequential circuit with two D flip flops A and B, input X and output Y is specified by the following next state and output equations

$A(t+1) = AX + BX$,

$B(t+1) = A'X$

$Y = (A+B)X'$.

Draw the logic diagram, derive state table and state diagram. (12)

(ii) Realize T flip-flop using JK flip-flop. (4)

Or

(b) (i) Design a synchronous decade counter using T flip flop and construct the timing diagram (8)

(ii) Design a mealy model of sequence detector to detect the pattern 1001. (8)

14. (a) Design an asynchronous sequential circuit (with detailed steps involved) that has 2 inputs x_1 and x_2 and one output z. The circuit is required to give an output z = 1 when x_1 =1, x_2 = 1 and x_1 = 1 being first. (16)

Or

(b) Show how to program the fusible links to get a 4 bit Gray code from the binary inputs using PLA and PAL and compare the design requirements with PROM. (16)

15. (a) (i) Write a VHDL program for 1 to 4 Demux using dataflow modelling. (8)

(ii) Write a VHDL program for Full adder using structural modelling. (8)

Or

(b) Explain in detail the RTL design procedure. (16)

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Question Paper Code : 57309

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Third Semester

Electrical and Electronics Engineering

EE 6302 – ELECTROMAGNETIC THEORY

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What is Electric field intensity ?
2. State Gauss's Law.
3. What is a capacitor and capacitance ?
4. Write Poisson's equation in cylindrical co-ordinates.
5. State Ampere's Circuital Law.
6. Write magnetic boundary conditions.
7. State Faraday's law of Electromagnetic induction.
8. What is meant by displacement current ?
9. What is Skin depth ?
10. Write poynting vector.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Three point charges in free space are located as follows : 50 nC at (0,0) m; 40 nC at (3,0) m ; – 60 nC at (0, 4) m. Find the electric field intensity at (3, 4) m. **(8)**

(ii) A charge is distributed along a finite straight line with constant density ρ C/m along " X axis. Develop an expression for E at an arbitrary point P. **(8)**

OR

(b) (i) A charge Q1 = 100 nC is located in vacuum at P1 (– 0.03, 0.01, 0.04) m. Find the force on Q1 due to (i) Q2 = 120 μC at P2 (0.03, 0.08, –0.02) m (ii) Q3 = 120 μC at P3 (–0.09, –0.06, 0.10) m (iii) Q2 and Q3. **(8)**

(ii) Explain divergence and curl of a vector. **(8)**

12. (a) (i) Develop an expression for the capacitance of parallel plate capacitor having two different dielectric media. **(8)**

(ii) Explain the potential at a point in an electric field. Derive the electric field intensity at any point in a field due to a point charge. **(8)**

OR

(b) (i) Write Laplace's equation in cartesian co-ordinates. And obtain the solution when V is function of x only for the boundary condition $V = V_1$ at $x = x_1$ and $V = V_2$ at $x = x_2$. **(8)**

(ii) Calculate the potential at a point P(0, 0) m due to point charges Q_1 and Q_2. $Q_1 = 10^{-12}$ Coulomb is located at(0.5, 0) m and $Q_2 = -10^{-11}$ Coulomb is located at (– 0.5, 0) m. **(8)**

13. (a) (i) Develop an expression for the magnetic field intensity at any point on the line through the centre at a distance 'h' m from the centre and perpendicular to the plane of a circular loop (in XY plane) of radius 'a' m and carrying a current I Ampere in the anti-clockwise direction. **(8)**

(ii) Find the magnetic field intensity at Point P (1.5, 2, 3) caused by a current filament of 24 Ampere in the a_z direction on the z axis and extending from z = 0 to z = 6. **(8)**

OR

(b) (i) Deduce the point form of Ampere's circuital law. **(8)**

(ii) Determine the torque on a rectangular loop (a m × b m) carrying current I and placed in a uniform magnetic field. **(8)**

14. (a) Starting from the basic principle obtain Maxwell's equations in point and integral form.

OR

(b) Explain the relation between field theory and circuit theory.

15. (a) (i) Deduce the wave equations for conducting medium. (8)

(ii) Discuss group velocity, phase velocity and propagation constant of electromagnetic waves. (8)

OR

(b) (i) Deduce the expression for fields of a plane electromagnetic waves which are incident normally on the surface of a perfect dielectric medium. (10)

(ii) Write short note on standing waves. (6)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 27207

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Electrical and Electronics Engineering

EE 6302 — ELECTROMAGNETIC THEORY

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the practical applications of electromagnetic fields?

2. Give the differential displacement and volume in spherical co-ordinate system.

3. What is the electric field intensity at a distance of 20 cm from a charge of 2 μC in vacuum?

4. Calculate the capacitance per Km between a pair of parallel wires each of diameter 1cm at a spacing of 50cms.

5. What is the mutual inductance of the two inductively coupled coils with self inductance of 25 mH and 100 mH?

6. What is the practical significance of Lorentz's Force?

7. Find the characteristics impedance of the medium whose relative permittivity is 3 and relative permeability is 1.

8. A parallel-plate capacitor with plate area of 5 cm^2 and plate separation of 3 mm has a voltage 50 sin 10^3t V applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\varepsilon_0$.

9. What is practical significance of skin depth?

10. A plane wave travelling in air is normally incident on a block of paraffins with $\varepsilon_r = 2.3$. Find the reflection co-efficient.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Verify the divergence theorem for a vector field $D = 3x^2 a_x + (3y + z)a_y + (3z - x)a_z$ in the region bounded by the cylinder $x^2 + y^2 = 9$ and the planes $x = 0$, $y = 0$, $z = 0$ and $z = 2$. (12)

(ii) A novel printing technique is based upon electrostatic deflection principle. Justify. (4)

Or

(b) (i) State and prove Coulomb's Law. (6)

(ii) Obtain an expression for electric field intensity due to a uniformly charged line of length 'l'. (10)

12. (a) (i) Derive the expressions for energy and energy density in static electric fields. (10)

(ii) State and prove the electro-static boundary conditions. (6)

Or

(b) (i) Derive an expression for capacitance of concentric spheres. (8)

(ii) Derive an expression for polarization 'P'. (8)

13. (a) (i) Obtain an expression for magnetic flux density and magnetic field intensity at any point along the axis of a circular coil. (12)

(ii) Distinguish between scalar and vector magnetic potential. (4)

Or

(b) (i) An air co-axial transmission line has a solid inner conductor of radius 'a' and a very thin outer conductor of inner radius 'b'. Determine the inductance per unit length of the line. (12)

(ii) Compare the different magnetic materials. (4)

14. (a) (i) A circular loop of wire is placed in a uniform magnetic field of flux density 0.5 wb/m^2. The wire has 200 turns and frequency of rotation of 1000 revolutions/minute. If the radius of the coil is 0.2 m, determine (1) the induced emf, when the plane of the coil is 60° to the flux lines and (2) the induced emf, when the plane of the coil is perpendicular to the field. (8)

(ii) Explain in detail about the difference between conduction and displacement currents. (8)

Or

(b) Derive the set of Maxwell's equations with solutions in integral form from fundamental laws for a free space. (16)

15. (a) Obtain the electromagnetic wave equation for free space in terms of electric field and explain the wave propagation with necessary parameters. (16)

Or

(b) (i) Derive Poynting theorem from Maxwell's equation and explain. (8)

(ii) A uniform plane wave propagating in a medium has

$$E = 2e^{-\alpha z} \sin(10^8 t - \beta z) a_y V/m$$

If the medium is characterized by $\varepsilon_r = 1$, $\mu_r = 20$ and $\sigma = 3S/m$, find α, β and H. (8)

Reg. No. | | | | | | | | | | | | |

Question Paper Code : 57420

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Third Semester

CIVIL ENGINEERING

GE 6351 – ENVIRONMENTAL SCIENCE AND ENGINEERING

(Common to Third Semester Computer Science and Engineering, Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Environmental Engineering, Robotics and Automation Engineering, Information Technology, Polymer Technology, Textile Chemistry, Textile Technology, Fashion Technology, Biotechnology, Plastic Technology, Pharmaceutical Technology and Petrochemical Technology)

(Also Common to Fourth Semester Geoinformatics Engineering and Mechanical Engineering, Chemical Engineering and Medical Electronics)

(Also Common to Agriculture Engineering Fifth Semester Electronics and Communication Engineering, Mechatronics Engineering, Mechanical and Automation Engineering, Automobile Engineering, Aeronautical Engineering, Production Engineering, Petroleum Engineering, Petrochemical Engineering)

(Also common to Sixth Semester Materials Science and Engineering)

(Also common to Sixth Semester Biomedical Engineering)

(Regulation 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Give any two examples of physical hazard.

2. Mention two primary and secondary consumers in grassland ecosystem.

3. What is PAN ? Give its detrimental effect.

4. What are the causes of thermal pollution ?

5. Mention any two environmental effects of mining for mineral resources.

6. What are the reasons for land degradation ?

7. Explain the term sustainability briefly.

8. State any two biomedical waste handling rules.

9. Mention any two family welfare programs adopted in India.

10. What do you understand by population explosion ?

PART – B (5 × 16 = 80 Marks)

11. (a) (i) What is an ecosystem ? What are its components ? Explain the functions of each component with examples. **(8)**

(ii) Explain the factors that give threat to biodiversity. **(8)**

OR

(b) (i) How is biodiversity conserved in India ? **(4)**

(ii) Explain oxygen and nitrogen cycle briefly with diagrams. **(12)**

12. (a) (i) Write an elaborate notes on chemical and photochemical reactions in the atmosphere. **(10)**

(ii) What are the causes and effects of marine pollution ? **(6)**

OR

(b) (i) What are the methods adopted for the control of air pollutants ? Explain each briefly. **(8)**

(ii) How are water pollutants classified ? Give examples of each type. **(8)**

13. (a) (i) How is biogas produced ? What are its advantages ? **(8)**

(ii) What are the effects of modern agriculture ? **(8)**

OR

(b) (i) What are renewable and non-renewable energy resources ? Why are non-renewable energy resources preferred for energy utilization now-a-days ? What are advantages and disadvantages of harnessing non-renewable energy resources ? (10)

(ii) Explain bioconversion of pollutants with examples. (6)

14. (a) (i) Discuss the recent approaches to achieve sustainable development. (12)

(ii) What is green chemistry and what are its principles ? (4)

OR

(b) (i) Discuss the various applications of green chemistry for achieving sustainable development. (8)

(ii) Explain salient features of Water Act. (8)

15. (a) (i) What are sparsely populated areas ? Give examples and reasons for poor population in those areas. (8)

(ii) What is HIV ? How is it caused ? What are the preventive measures suggested ? (8)

OR

(b) (i) Explain a note on EIA. (8)

(ii) Discuss women and child welfare programs practiced in India. What are the hurdles encountered ? (8)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 27279

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Civil Engineering

GE 6351 — ENVIRONMENTAL SCIENCE AND ENGINEERING

(Common to Third Semester Computer Science and Engineering, Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Environmental Engineering, Robotics and Automation Engineering, Information Technology, Polymer Technology, Textile Chemistry, Textile Technology, Fashion Technology, Biotechnology, Plastic Technology, Pharmaceutical Technology and Petrochemical Technology)

(Also common to Fourth Semester Geoinformatics Engineering, Mechanical Engineering and Chemical Engineering)

(Also common to Electronics and Communication Engineering, Mechatronics Engineering, Geoinformatics Engineering, Automobile Engineering, Aeronautical Engineering, Production Engineering, Medical Electronics Engineering, Petrochemical Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define biodiversity.

2. What is food chain?

3. Define noise pollution.

4. What is the role of individual in pollution prevention?

5. What are renewable and non-renewable energy resources?

6. What do you mean by land degradation?

7. List out the advantages of rain water harvesting.

8. Define consumerism.

9. State the role of information technology in Environment.

10. Define population explosion.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Describe the types, characteristic features, structure and functions of

(1) Forest ecosystem

(2) Aquatic ecosystem. (8)

(ii) Explain the following :

(1) Ecological Succession

(2) Ecological Pyramids. (8)

Or

(b) (i) What are the major causes of man-wild conflicts? Discuss the remedial steps that can curb the conflict. (8)

(ii) Explain briefly the energy flow through ecosystem. (8)

12. (a) (i) Explain the causes, effects and control measure of water pollution. (8)

(ii) Explain the various methods of controlling air pollution. (8)

Or

(b) (i) Write a note on :

(1) Nuclear hazards

(2) Thermal pollution. (8)

(ii) What is marine pollution? Explain the ill effects of marine pollution with the help of a case study. (8)

13. (a) (i) Discuss the impact of mining on environment and human health. (8)

(ii) What are the effects of deforestation? Is deforestation justified? Comment. (8)

Or

(b) (i) Explain the merits and demerits of dam. (8)

(ii) Write informative notes on modern agriculture. (8)

14. (a) (i) Name the laws that have been framed for environmental protection and mention the objectives for each act. (8)

(ii) Discuss various measures for wasteland reclamation. (8)

Or

(b) (i) Write a note on :

(1) Earthquake

(2) Cyclone. (8)

(ii) Explain in detail, how biomedical wastes are managed and handled. (8)

15. (a) (i) What is AIDS? What are the sources and mode of transmission of HIV infection? (8)

(ii) Write a note on the following :

(1) Women and child welfare in India

(2) Human rights. (8)

Or

(b) (i) What are the objectives and elements of value education? How can the same be achieved? (8)

(ii) Population explosion affects the environment seriously. Discuss. (8)

———————

Reg. No. | | | | | | | | | | | | |

Question Paper Code : 57278

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Third Semester

Electrical and Electronics Engineering

EC 6202 – ELECTRONIC DEVICES AND CIRCUITS

(Common to Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Robotics and Automation Engineering & Second Semester BPO Medical Engineering)

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Define diode-resistance.
2. Mention the applications of diode.
3. Differentiate between JFET and MOSFET.
4. Draw the transfer and drain characteristic curves of JFET.
5. Draw the small signal model of BJT device.
6. Differentiate between power transistor and signal transistor.
7. Define CMRR. How to improve it ?
8. Compare the characteristics of CE, CB and CC amplifiers.
9. List-out the advantages of negative feedback.
10. Define Barkhausen's criteria.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Explain the VI characteristics of PN junction diode. **(8)**

(ii) Explain the VI characteristics of Zener diode. **(8)**

OR

(b) Briefly discuss the following terms :

(i) Transition and diffusion capacitance

(ii) Temperature effect of PN junction

(iii) Laser Diode **(6 + 5 + 5)**

12. (a) (i) For an n-channel silicon FET with a = 3×10^{-4} cm and Nd = 10^{15} electrons/cm^{-3}. Find (a) the pinch off voltage and (b) the channel half-width for $V_{GS} = 0.5\ V_P$. **(6)**

(ii) Elaborately discuss the drain current characteristics and transfer characteristics of MOSFET. **(10)**

OR

(b) (i) Elaborately discuss the structure and characteristics of the IGBT. **(8)**

(ii) Explain the operation of the UJT. **(8)**

13. (a) (i) Determine the voltage gain and input impedance of common-base amplifier. **(8)**

(ii) Determine the mid band gain, upper Cutoff frequency of a Common-Source amplifier fed with the signal having internal resistance Rsig = 100 kΩ (Figure 13(a) (ii)). The amplifier has R_G = 4.7 MΩ, R_D = R_L = 15 kΩ, gm = 1 mA/V, ro = 150 kΩ, Cgs = 1 pF and Cgd = 0.4 pF. **(8)**

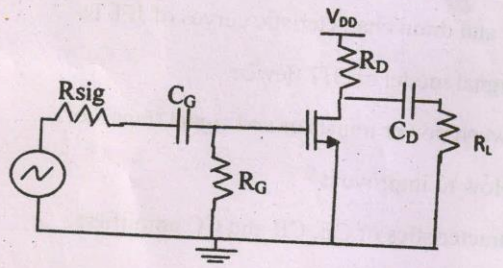


Figure 13(a) (ii)

OR

(b) Determine the mid-band gain and bandwidth of a CE amplifier (shown in Figure 13(b)) Assume lower cutoff frequency is 100 Hz. Let hfe = β = 100, cbe = 4pF, cbc = 0.2PF and $V_A = \infty$. **(16)**

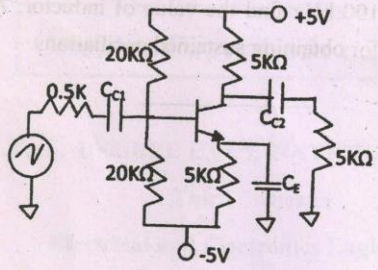


Figure 13(b)

14. (a) (i) Explain single tuned amplifier and derive for gain, resonant frequency and cutoff frequencies. **(12)**

(ii) Briefly explain Hazeltine neutralization used in tuned amplifier for stabilization. **(4)**

OR

(b) Explain the common mode and differential mode operation of the differential amplifier. **(16)**

15. (a) (i) Identify the nature of feedback in Figure 15(a) (i). Let R_{C1} = 3 kΩ, R_{C2} = 500 Ω, R_E = 50 Ω, R_S = R_F = 1.2 kΩ, hfe = 50, hie = 1.1 kΩ, hre = hoe = 0. Determine overall voltage gain (Avf), overall current gain (Aif), input impedance (Rif) and output impedance (Rof). **(16)**

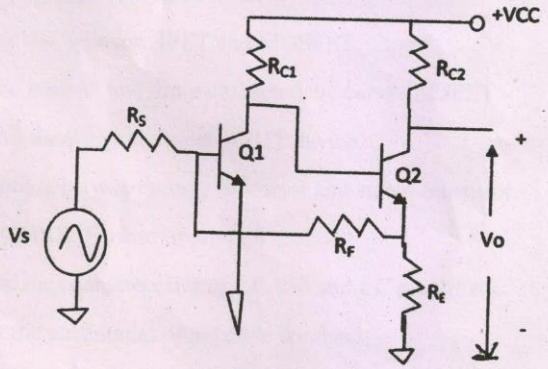


Figure 15(a) (i)

OR

(b) (i) Draw and explain the RC-phase Shift oscillator using BJT and also deriv the condition for Oscillation. **(12)**

(ii) In Colpitt's Oscillator C1 = 1nF and C2 = 100 nF. If the frequency of oscillation is 100 kHz find the value of inductor. Also find the minimum gain required for obtaining sustained oscillations. **(4)**

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 27186

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Electrical and Electronics Engineering

EC 6202 — ELECTRONIC DEVICES AND CIRCUITS

(Common to Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Robotics and Automation Engineering, Biomedical Engineering, and Medical Electronics)

(Also Common to Second Semester for Biomedical Engineering and Medical Electronics)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the symbol of the following devices.
   (a) PN diode
   (b) Zener diode
   (c) LED
   (d) UJT.
2. Calculate the diffusion Capacitance for a silicon diode with a 15 mA forward current, if the charge carrier transit time is 70nsec.
3. Calculate I_C and I_E for a transistor that has $\alpha_{dc} = 0.99$ and $I_B = 150\,\mu A$. Determine the value of β_{dc} for the transistor.
4. Show how an SCR can be triggered on by the application of a pulse to the gate terminal.
5. Draw the small signal equivalent circuit of a CS JFET.
6. What is the need of coupling capacitors in amplifier design?
7. Define CMRR. What is its ideal value?
8. What is the need for neutralization?

9. Mention the advantages of negative feedback circuits.

10. What is the advantage of a Colpitts oscillator compared to a phase shift oscillator?

PART B — (5 × 16 = 80 marks)

11. (a) (i) With necessary diagrams, explain the forward and reverse characteristics of PN junction diode. (8)

(ii) Draw the circuit diagram of a half wave rectifier for producing a positive output voltage. Explain the circuit operation and sketch the waveforms. (8)

Or

(b) With neat diagram, explain the operation of Zener diode and its forward and reverse characteristics. Also distinguish between Avalanche and Zener Break downs. (16)

12. (a) (i) Explain the selection of Q point for a transistor bias circuit and discuss the limitations on the output voltage swing. (8)

(ii) Draw the cross section diagram for an N type enhancement mode MOSFET. Briefly explain its operation. (8)

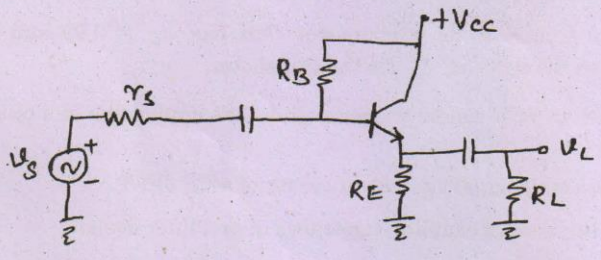
Or

(b) (i) Draw the basic construction and equivalent circuit of a Uni Junction Transistor. Briefly explain the device operation. (8)

(ii) Sketch the four layer construction of an SCR and the two transistor equivalent circuit Explain the device operation. (8)

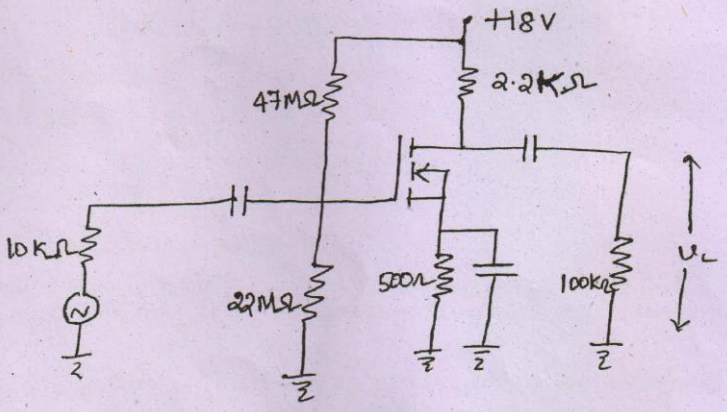
13. (a) (i) Discuss the factors involved in the selection of I_C, R_C and R_E for a single stage common emitter BJT amplifier circuit, using voltage divider bias. (8)

(ii) A CC amplifier shown in below figure has V_{CC} = 15 V, R_B = 75$k\Omega$ and R_E = 910Ω The β of the silicon transistor is 100 and the load resistor is 600Ω Find r_{in} and A_v. (8)



Or

(b) (i) The MOSFET shown in below figure has the following parameters. $V_T = 2$ V, $\beta = 0.5 \times 10^{-3}$, $r_D = 75k\Omega$ It is biased at $I_D = 1.93$mA Determine the input impedance and voltage gain. (8)



(ii) With neat circuit diagram, perform ac analysis for common source using equivalent circuit NMOSFET amplifier. (8)

14. (a) With neat sketch, explain the BJT differential amplifier with active load and derive for Ad, Ac and CMRR. How CMRR can be improved. (16)

Or

(b) (i) Explain with circuit diagram class B power amplifier and derive for its efficiency. (8)

(ii) With neat circuit, explain and derive the gain and Band width of a single tuned amplifier. (8)

15. (a) Sketch the circuit diagram of a two-stage capacitor coupled BJT amplifier that uses series voltage negative feedback. Briefly explain how the feed back operates.

Or

(b) Describe and explain the operation of the following oscillators.

(i) Wien bridge oscillator (5)

(ii) Design a Wien bridge oscillator circuit to oscillate at a frequency of 20 kHz. (5)

(iii) Crystel oscillator. (6)

Reg. No. | | | | | | | | | | | | |

Question Paper Code : 57310

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Third Semester

Electrical and Electronics Engineering

EE 6303 – LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

[Common to Electronics and Instrumentation Engineering and Instrumentation and Control Engineering]

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. State the limitations of 1C technology.
2. Distinguish between dry etching and wet etching.
3. Why 1C 741 is not used for high frequency applications.
4. Draw the circuit diagram of an integrator and give its output equation.
5. What is sample and hold circuit ? Where it is used ?
6. What is the advantage of using active clipper over passive clipper ?
7. Define capture range of PLL.
8. What is analog multiplier IC ? Where it is used ?
9. Why do switching regulators have better efficiency than the series regulators ?
10. Give some examples of monolithic IC voltage regulators.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Distinguish diffusion and ion Implantation process in IC fabrication. **(6)**

(ii) Describe the metallization process, assembly processing and packaging with neat diagram. **(10)**

OR

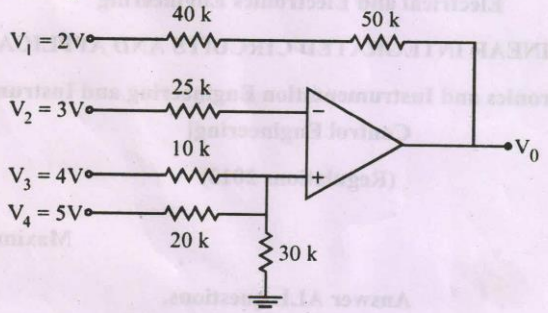
(b) Discuss briefly about the PN junction diode and JFET fabrication. **(16)**

12. (a) Discuss the frequency response characteristics and compensation of an operational amplifier. **(16)**

OR

(b) (i) Explain the application of Op-Amp as differentiator. **(8)**

(ii) Find V_0 for the given circuit. **(8)**



13. (a) (i) Design a Schmitt trigger using Op-Amp. **(8)**

(ii) Explain the working of successive approximation type A/D converter. **(8)**

OR

(b) (i) Draw the instrumentation amplifier using 3 Op-Amp and derive its output voltage equation. **(8)**

(ii) Explain the first order low pass butterworth filter with a neat diagram. Derive its frequency response and plot the same. **(8)**

14. (a) With the help of schematic diagram, explain the operation of IC-566 VCO. Also derive an expression for the output frequency. **(16)**

OR

(b) (i) Design and draw the waveform of a 1 kHz square wave generator using 555 timer for duty cycle of 50%. **(6)**

(ii) Explain the operation of astable operation of IC555 with necessary waveform. **(10)**

15. (a) Explain the operation of switching regulator. Give its advantages. **(16)**

OR

(b) Write short notes on :

(i) LM 380 power amplifier. **(8)**

(ii) ICL 8038 Function generator. **(8)**

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 27208

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Electrical and Electronics Engineering

EE 6303 — LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

(Common to Electronics and Instrumentation Engineering and Instrumentation and Control Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

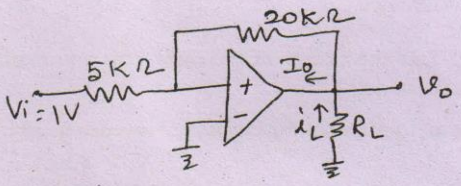
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Classify ICs on the basis of application, device used and chip complexity.

2. Mention different available IC package configurations.

3. What are the ideal characteristics of an OP — AMP?

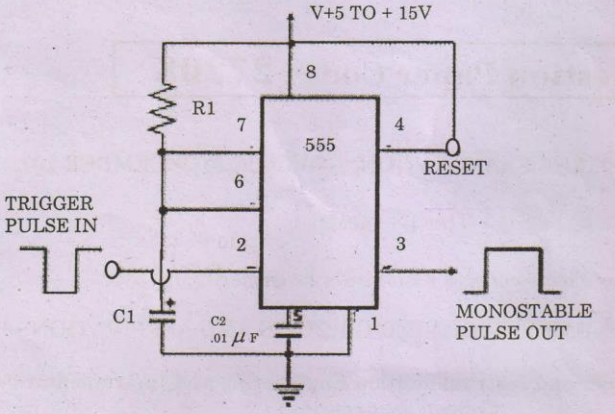
4. 

In circuit shown in above figure, calculate V_0, A_{CL}, load current i_L and output current i_0.

5. Draw the circuit of a log amplifier using two op-amps.

6. Calculate the value of the LSB, MSB and full scale output for an 8 – bit DAC for the 0 to 12V range.

7. In the Monostable multivibrator of below figure circuit R_1 = 100K Ω and the time delay T = 100mS. Calculate the value of C_1.



8. Define capture range and Lock-in range.

9. Define Line regulation and Load regulation.

10. What is the purpose of using an external pass transistor with an IC voltage regulator.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the various steps involved in fabrication of a typical transistor into monolithic ICs. (16)

Or

(b) What is thin and thick film technology? Explain various methods used for deposition of thin film technology. (16)

12. (a) (i) What is Slew rate? List the causes of the Slew rate and explain its significance in applications. (10)

(ii) Briefly explain the methods used for frequency compensation. (6)

Or

(b) (i) Draw and explain the operation of a current to voltage converter. (8)

(ii) What are the limitations of an ordinary op-amp differentiator? Draw the circuit of a practical differentiator that will eliminate these limitations. (8)

13. (a) (i) Design a second order Butterworth Low pass filter having upper cut-off frequency of 1 kHz. (12)

(ii) Explain how to measure the phase difference between two signals. (4)

Or

(b) (i) Draw a sample and hold circuit and explain its operation. (8)

(ii) Design a circuit of a clipper which will clip the input signal below a reference voltage. (8)

14. (a) (i) Draw and explain the functional diagram of 555 timer. (10)

(ii) Discuss the operation of a FSK generator using 555 Timer. (6)

Or

(b) Draw the block diagram of a VCO and explain its operation. (16)

15. (a) (i) Draw and explain the functional diagram of 723 IC regulator. (8)

(ii) Explain fold back characteristics of 723 IC regulator. (8)

Or

(b) (i) Draw the circuit diagram of a LM 380 power audio amplifier and explain its operation. (12)

(ii) What are the applications of LM 380 power amplifier? (4)

ANNA UNIVERTISY, CHENNAI -25.
OFFICE OF THE CONTROLLER OF EXAMINATIONS

RULES OF THE EXAMINATIONS

A candidate is permitted to use geometric tools, non-programmable calculators and approved tables and data books only during the theory and the practical examinations. No other material/gadget (including cell phone) should be brought inside the examination hall.

A candidate should neither possess/refer any forbidden material in any form nor should seek/obtain assistance in any form from any person/source towards answering the questions during the examinations. He/she should not assist other candidates in any form towards answering the questions during the examinations. The candidate should not reveal his/her identity in any form in the answer scripts. The candidate should not indulge in canvassing either directly or indirectly to award more than deserving marks in the exanimations. The candidate should maintain discipline and decorum during the examinations.

Violation of the above rules in any form during the examinations will attract punishment ranging from levying fine to permanently debarring the candidate from continuing his/her studies as given below.

Sl.No.	Nature of Malpractice	Maximum Punishment
1	Appeal by the candidate in the answer script to show mercy by way of awarding more than deserving marks.	Fine of Rs. 1000/- per subject.
2	The candidate writing his/her name in the answer script.	
3	The candidate writing his/her registration number/college name in places other than specified in the answer script	
	Any special marking in the answer script by the candidate.	
4 5	The candidate communicating with neighbouring candidate orally or non-verbally; the candidate causing suspicious movement of his/her body.	
6	Irrelevant writing by the candidate in the answer script.	
7	The candidate marking on the question paper or writing answer on his/her question paper or making use of his/her question paper for rough work	
8	The candidate possessing cell phones/programmable calculator(s)/any other electronic storage device(s) **gadgets**	Invalidating the examination of the particular subject written by the candidate
9	The Candidate facilitating the other candidate(s) to copy from his /her answer script	
10	The candidate possessing any incriminating material(s) (whether used or not). For example:-Written or printed materials, bits of papers containing written information, writings on scale, calculator, handkerchief, dress, part of the body, Hall Ticket, etc.	Invalidating the examinations of the subject concerned and all the theory and the practical subjects of the current semester registered by the candidate.
11	The candidate possessing cell phone(s)/programmable calculator(s)/any other electronic storage device(s) **gadgets**	

	and containing incriminating materials (whether used or not).	Further the candidate is not considered for revaluation of answer scripts of the arrears-subjects. If the candidate has registered for arrears – subjects only, invalidating the examinations of all the arrears – subjects registered by the candidate.
12	The Candidate possessing the question paper of another candidate with additional writing on it.	
13	The candidate passing his/her question paper to another candidate with additional writing on it	
14	The candidate passing incriminating materials brought into the examination hall in any medium (hard/soft) to other candidate(s).	
15	The candidate copying from neighbouring candidate.	
16	The candidate taking out of the examination hall answer booklet(s), used or unused	
17	Appeal by the candidate in the answer script coupled with a promise of any form of consideration.	
18	Candidate destroying evidence relating to an alleged irregularity.	Invalidating the examinations of the subject concerned and all the theory and the practical subjects of the current semester registered by the candidate. Further the candidate is not considered for revaluation of answer scripts of the arrears-subjects. If the candidate has registered for arrears – subjects only, invalidating the examinations of all the arrears – subjects registered by the candidate. **Additional Punishment:** 1. if the candidate has not completed the programme, he/she is debarred from continuing his/her studies for one year i.e., for two subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects up to the last semester during the debarred period. 2. if the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for two subsequent semesters.
19	Vulgar/offensive writings by the candidate in the answer script.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears –subjects registered by the candidate.
20	The candidate possessing the answering script of another candidate	
21	The candidate passing his /her answer script to another candidate	
22	Involved in any one or more of the malpractices of serial no. 8 to 21 for the second or subsequent times.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears –subjects registered by the candidate. **Additional Punishment:** (i) If the candidate has not completed the programme, he/she is debarred from continuing his/her studies for one year i.e., for two subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects up to the last semester during the debarred period. (ii) If the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for two subsequent semesters.
23	The candidate substituting an answer book let prepared outside the examination hall for the one already distributed to the candidate	
24	The candidate indulge in any disruptive conduct including, but not limited to, shouting, assault of invigilator, officials or students using abusive and /or threatening language, destruction of property.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears –subjects registered by the candidate. **Additional Punishment:** (i) if the candidate has not completed the programme, he/she is debarred from continuing his/her studies for **two years** i.e.,
25	The candidate harass or engage others to harass on his/her behalf an invigilator, official,	

	witnesses or any other person in relation to an irregularity by making telephone calls, visits, mails or by any other means.	for four subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects up to the last semester during the debarred period. (ii) if the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for four subsequent semesters.
26	Candidate possessing any firearm/weapon inside the examination hall.	
27	Cases of Impersonation	(i)Handing over the impersonator to the police with a complaint to take appropriate action against the person involved in the impersonation by the Chief Supt. (ii)If a student of this University is found to impersonate a 'bonafide student', the impersonating student is debarred from continuing his/her studies and writing the examinations **permanently.** He/she is not eligible for any further admission to any programme of the University. (iii)Debarring the 'bonafide student' for whom the impersonation was done from continuing his/her studies and writing the examinations **permanently.** He/she is not eligible for any further admission to any programme of the University.

CONTROLLER OF EXAMINATIONS

K.L.N. COLLEGE OF ENGINEERING, Pottapalayam 630612
(11 km from Madurai City)

STUDENTS LEAVE APPLICATION FORM

Department of Electrical and Electronics Engineering

Date:

Name of the Student :

Roll No.: : Sem / Yr. / Sec.

No. of days, leave, already availed :

%of Attendance as on : _____ is _____

Date & Day :

Reason for Leave :

Signature of the Student **Name, Mobile No. & Signature of Parent / Guardian**

Recommended / Not Recommended

Class Tutor **Class Coordinator** **HOD/EEE**

K.L.N.COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

ON DUTY REQUISITION FORM – STUDENTS –

TO ATTEND SKILL DEVELOPMENT PROGRAMMES (Workshop / Seminar / Symposium etc.)

Date: _____

To,

The Principal,
KLNCE.
Pottapalayam.

Respected Sir,

Sub.: Request for OD to attend _____

As, I am going to attend _____ conducted by _____ from_____ to_____. Please permit me to attend the programme and also grant me O.D. for these days.

S. No	Roll No.	Name & Degree, Semester / Section)	No. of Programmes already attended & Days OD availed	No. of Arrears in AU Exam	No. of subjects failed in Class Test	No. of Subjects failed in CIT's	ATT % As on	Sign

Discipline / misbehavior, reported if any :

Clash with Internal test if any :

Recommended by		
Class co-ordinator	HOD	
	OD Permitted	OD Approved

K.L.N.COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
On duty (OD) norms for students – Reminder

1. Students who apply for OD should submit the filled in OD form, forwarded by class co-ordinator, to the Department office. Such OD should be applied, **atleast a day before** availing it. Only after getting permission from the HOD, students are permitted to avail OD.

2. Students are permitted to **apply** for OD for attending co-curricular and extra curricular activities, inside / outside the college, only after getting prior permission from the class co-ordinator and HOD. Permission will be granted, considering students port folio, (performance in the University examination, Class test / CITs and attendance). Also the relevance of the seminar / workshop / technical events / certificate courses etc. will be reviewed with the class co-ordinators to sanction OD.

3. On duty will be approved only after the submission of relevant certificates (Copies to submitted to the staff in-charge, Mr. S. Rajalingam, and to the college office).

4. Final year Students having more than 6 arrears, third year students having more than 4 arrears and Second year students having more than 3 arrears (cumulative) will not be permitted to attend the Co-curricular / extra curricular activities. This is to ensure them to concentrate more on academic subjects. However, this will be relaxed, at the request of parents and students, considering the students contribution in the co –curricular / extra curricular activities.

5. Students who failed in 3 and above subjects in class tests / CITs will not be permitted to participate in any inside / outside the college co curricular activities. This is to ensure them to concentrate on academic subjects.

6. Students with less than 90% of attendance will not be permitted to apply for OD.

7. Students with the history of indiscipline activities reported in the past in the class room / laboratories / campus etc. will not be permitted to apply for OD.

8. Status of Students who have applied for OD for attending Co-curricular / extra curricular activities inside / outside the college will be monitored. Their presence in the concerned venue will be constantly monitored. Non availability of students, in the concerned venue, is reported, if any, disciplinary action will be taken.

9. First and Second year students of B.E-EEE are not encouraged to participate in the Co-curricular / extra curricular activities, as subject content of first and second year is heavy and basics are to be studied in deep for successful career.

10. Curricular / co-curricular events, are planned and periodically conducted by the department. Also certificate / certification courses are regularly conducted by the department during summer / winter holidays. Students are encouraged to attend such courses / events organized by the department, as it will not affect the regular academics.

11. Students are encouraged to attend curricular / co-curricular events, inside / outside the college, after college working hours or during holidays, as it will not affect the regular academics.

12. Students will be selectively permitted to attend curricular / co-curricular events inside / outside the college, if it is highly recommended by the faculty. A maximum of 10% of the students from each class will be permitted for attending such events. Preference will be given for those students having no history of arrears and passed all the class test / CITs.

13. Students attending curricular / co-curricular events inside / outside the college should maintain highest order of discipline. Indiscipline reports received, if any, students will not be permitted for attending any events thereafter and suitable disciplinary action will be taken.

14. It was reported that students who involved in indiscipline activities, while participating in the curricular / co-curricular activities, outside the college, were not permitted to appear for the University Examinations, as such issues reported to the University. Hence students should be very cautious while attending events inside / outside the college.

Co-operation of the all the staff are solicited for better academic performance and successful career.

HOD / EEE

A Brief History of The College

K.L.N. College of Engineering is the first self-financing Co-educational Engineering College in Madurai, started in 1994 by Munificence of Philanthropist and well wishers in Sourashtra Community which is a linguistic minority in Tamilnadu. This college is sponsored by the committee of eminent industrialists and academicians led by enthusiastic, educationalist and industrialist (Late) Thiru K.L.N. Krishnan. This college has the approval of All India Council for Technical Education, New Delhi and is affiliated to Anna University, Chennai.

Thiru. K.L.N. Krishnan, Founder President of this Engineering College has rendered Yeoman service to Sourashtra Arts & Science College and Sourashtra Girls Higher Secondary School, Madurai for the past several years. He also promited a Polytechnic under the name of K.L. Nagaswamy Memorial Polytechnic College in Viraganur, Madurai in 1983. This Engineering College, functioned in the premises of the above polytechnic during the academic years 1994-95 & 1995-96 was shifted to its own premises in the year 1996.

(Late) Thiru K.L.N. Krishnan is the Founder President, and the college is now under the management of Dr. K.N.K. Ganesh as Secretary & Correspondent and other executive committee members.

Campus :

This college is situated on the South Eastern outskirts of Madurai, 11th Km on Madurai – Nedungulam Road. It is built in an area of 53.8 acres. The Campus has multistoreyed buildings consisting of well provided class rooms, drawing halls, seminar halls, conference hall, library, Air-Conditioned Computer centres, staff rooms and student rest rooms. The infrastructure also consists of five double storeyed laboratory buildings and three single storeyed workshops and Machine shop, and an automobile workshop.

The Administrative block (2 storeyed) of 1,185 sq. metre with office in the ground floor, I.T. laboratory in the first floor & class rooms in the second floor has been constructed on the eastern side.

A two storeyed block of 1,185 sq. metre consisting class room has been constructed on the southern side of the administrative block.

A two storeyed block of 1,185 sq. metre with EIE laboratory in the ground floor, DSP laboratory in the first floor & class rooms in the second floor has been constructed on the western side of the administrative block.

A two storeyed block of 2,122 sq. metre with spacious library, video library & Electronic resource section in the ground floor, class rooms in the first floor & CSE laboratory in the second floor has been constructed near the administrative block.

A single storeyed block of 1,193 sq. metre with S.M. laboratory in the ground floor CAD, CAM laboratories in the first floor & class rooms in the second floor has been constructed on the north western side of the administrative block.

Three Mechanical sheds (occupied by three Mech. Engg. Laboratory) of 2460 sq. metre have been constructed on the northern side of the mechanical block. An automobile work shop of 2304 sq. metre has been constructed on the north western side of the administrative block.

An Indoor stadium cum Auditorium of 2,221 sq. metre has been constructed

on the northern side of the administrative block.

A separate double storeyed post-Graduate block of 4,020 square metre for M.B.A. and M.C.A. departments has been constructed on the South Western side of the administrative Block.

A single storeyed block of two canteens with 2,485 square metre in the ground floor and ladies rest room in the first floor has been contructed on the south western side of the Administrative Block.

A single storeyed block of 1,289 square metre for Electrical & Electronics Engg., Laboratories & class rooms in the ground floor and Electronics & Communication Laboratory and Class rooms in the first floor has been constructed on the western side of the Administrative Block.

A two-storeyed block with an area of 2,956 sq. metre has been constructed as an extension to Block III Opposite the U.G. library Block. This block comprised Physics lab, Chemistry lab and EIE Lab. D.S.P. Lab & Class rooms.

A two-storeyed block with an area of 2076 squre metre for the use of EEE Dept. in the ground floor & ECE Dept. in the first & 2nd floors is now under construction as an extension to the existing EEE & ECE block on the western side of the administrative block.

A two storeyed block with an area of 2,977 sq. metre for the use of Mechanical & Automobile depts. is now under construction, as an extension to the existing Mechanical block on the North-Western side of the administrative block.

A separate building with ground floor of area of 170 sq. metre for the installation of Generator on the South-estern side (Opposite to the Vinayagar temple) of the administrative block is under construction & (nearing completion)

In order to facilitate the easy accessibility for the students, in all, 950 numbers of computers have been installed so far. This sounds the management's conviction in providing essential infrastructure for the learning purpose in our college.

An overhead Tank of 20,000 Litre Capacity at a height of 40 feet has been constructed at a cost of Rs.4 lakhs, donated by Rotary international, Rotary District-1240, Rotary club of LEIGH-ON-SEA. Treated drinking water plant at a cost of Rs.2 lakhs has been installed near the overhead tank.

Well-furnished Men's Hostel, Mess block and canteen block are also inside the campus. The college is a quiet retreat, ideal for concentrated study, away from distractions and disturbances of a large city.

A single storeyed block of 1,330 square metre with a spacious dining hall in the ground floor and 13 rooms in the first floor for men students has been constructed on the northern side of the administrative block and is already in use. A two storeyed hostel block of 2,034 square metre adjacent to the existing hostel for men students has been constructed.

Total expenditure incurred so far towards the cost of equipments & buildings & other assets is about Rs.22.50 crores.

A VINAYAGAR Temple on the eastern side of the administrative Block has been constructed Eight class rooms for I year B.E. / B.Tech 2 class room for M.E. (P.S.) students, and two staff rooms have been constructed in the ECE/EEE block.

A Ladies Hostel of 1460 sq.m. which can accommodate about 150 students in under construction within the campus.

SALIENT FEATURES OF THE DEPARTMENT

1. GENERAL

- Started offering B.E. in Electrical and Electronics Engineering in the year 1994 with an intake of 40 (No.-732-50-8/RC/94, dated 11th August 1994, AICTE) with the latest intake of 120 in 2011 (F.No.Southern/1-400215781/2011/EOA, dated 01.09.2011, AICTE).
- Started offering M.E. in Power Systems Engineering in the year 2005 with an intake of 20 and increased intake to 24 in 2012 (F.No.Southern/1-687512981/2012/EOA, dated 10.05.2012, AICTE).
- Accredited in March 2004 (First time – F.No.NBA/ACCR-242/2003, dated 24/03/04) and Re-accredited (Second time – F.No.NBA/ACCR-242/2003, dated July 19, 2008) by National Board Accreditation, New Delhi.

  Re-accredited (Third time - For 2 years w.e.f. 28-08-2012) by National Board Accreditation, New Delhi.
- Recognized Research Centre No.4490408, Approved by Anna University, Chennai with effect from December 2012, offering guidance for M.S & Ph.D.(Full time/Part time).
- Both UG and PG programs are permanently affiliated to Anna University, Chennai with effect from December 2012.
- MODROB fund of Rs.5 lakhs was allotted for the year 2011-2012 for the Power Electronics laboratory (No.8024/RIFD/MOD-131(pvt)/Policy-III/2011-2012, dated 06.03.2012).

2. INFRASTRUCTURE

- Electrical machines laboratory, Control, Measurement and Instrumentation laboratory, Power Electronics laboratory, Electric circuits and Electronic devices laboratory, Research and Development laboratory and Power System Simulation Laboratory are equipped with machineries, components, signal generating, power supply measuring, recording instruments and computer systems costing Rs.2 crores. The total built up area of laboratories is 1208.21 sq.m.
- Latest softwares on Power system analysis, Power system stability, Power world simulator and Power electronics are available to study, solve, design and simulate research on Power system and Power Electronics problems to experience the real time results.
- All the class rooms are equipped with computer systems, LCD and OHP to promote the Teaching-Learning process more effectively.
- Separate library facility for EEE students with more than two thousand books on core subjects and hard copies of IEEE Journals and magazines from 1999 are available for reference. Staff and students can access the softcopy of Journals, proceedings published by IEEE, Elsevier, ASME, Springer, Mc Graw Hill.
- All laboratories are provided with sufficient computing facilities, printing facility with internet connection to simulate laboratory experiments.

3. STAFF

- Teams of well qualified, and experienced 32 faculties with cadre ratio as per AICTE, are guiding the students to attain the best educational objectives.
- Excellent research environment promotes the staff and students to participate, present and publish their research works in the National/International Journals and National/International conferences.
- Facility and experienced faculty available for guiding Ph.D. scholars.
- Staff development Programme / Faculty development programme / Workshop/ Seminar are organized regularly to share the knowledge of our experienced faculty with parent institution and other colleges staff and students and Industrial persons.

4. RESEARCH AND DEVELOPMENT

- The Research and Development section is doing research on Industrial Power Harmonics and mitigation and interact with industries in measuring, recording, analyzing and designing of filters for reducing harmonics with the help of Power Quality analyzer, as per IEEE standard.

5. STUDENTS

- Students secured 95 University Ranks in UG and 15 University Ranks in PG from 1998 to 2015 with **Gold medal** in 2000 (UG - EEE) and in 2011 (PG – Power Systems Engineering). Sweety Jain of 2009 batch student secured 2nd rank in Anna University Examination in 2009 among 8500 students who completed degree and out of 240 Engineering colleges all over Tamil Nadu.
- IEEE student's chapter which was started in the year 1999, continuously conducting number of student technical programme. Guest lecturers from industries have been arranged periodically to promote Industry-Institute Interaction and to bridge the gap between curriculum and latest trend in industry.
- To promote innovation, latest trends in industry and employability skills, student's professional activities are conducted every year in the name of symposium and conferences.
- Workshop/Seminar is regularly conducted for students to meet out the curriculum objectives.
- Inplant trainings are arranged for second and third year students to have hands on training with industry. Industrial visits are arranged every semester to know about the various process taking places in industry.
- Placement oriented training programme were conducted every semester right from the first year to develop soft skills, attitude, aptitude, self confidence, communication skills, interview skills etc, so as to face the campus placement programme organized by the college. Professional Trainers from software companies, Bangalore, Chennai are being invited for such training programme.

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM – 630 612

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FACULTY LIST

S.No.	Name of the Faculty	Designation	Mobile No.	Email id
1.	Dr.S.M.Kannan	Professor & Head	9442035859	smkeeeklnce@gmail.com
2.	Dr.S.Venkatesan	Professor	9790672188	vensenn@yahoo.com
3.	Dr.K.Gnanambal	Professor	-	gnans_balu@rediffmail.com
4.	Dr. S.Parthasarathy	Professor	9443402901	sarathy_sps@yahoo.co.in
5.	Dr. S.Venkatanarayanan	Professor	9677320576	venjey@yahoo.co.uk
6.	A.Marimuthu	Associate Professor	9865002712	marimuthu_a@yahoo.com
7.	P.Loganthurai	Associate Professor	9952112115	loganthurai@yahoo.co.in
8.	M.Jegadeesan	Associate Professor	9524499063	m_jegadeesan07@rocketmail.com
9.	A.S.S.Murugan	Associate Professor	9344661182	assm17174@yahoo.co.in
10.	S.Manoharan	AP(Sr.Gr.)	9715585524	sharpmano@yahoo.com
11.	C.Muthamil Selvi	AP(Sr.Gr.)	-	selvi.muthamil@yahoo.co.in
12.	M.Ganesh Kumari	AP(Sr.Gr.)	-	gnshkumari@gmail.com
13.	M.Jeyamurugan	AP(Sr.Gr.)	9600637578	jeyam3182@gmail.com
14.	K.R.Jeyavelumani	Assistant Professor	-	krjeya35@gmail.com
15.	M.Balamurugan	Assistant Professor	9677564275	murugan.bala10@gmail.com
16.	T.Gopu	Assistant Professor	9487059842	gopu70@gmail.com
17.	J.Merlin	Assistant Professor	-	merlinfabi@yahoo.com
18.	R.Jeyapandi Prathap	Assistant Professor	9788671119	jprathap03@gmail.com
19.	S.Rajalingam	Assistant Professor	9790248476	rajalingamrcet@gmail.com
20.	N.Vimal Radha Vignesh	Assistant Professor	9894965475	nvimalvignesh@gmail.com
21.	A.Manoj	Assistant Professor	9487526428	manojhails@gmail.com
22.	R.Jeyarohini	Assistant Professor	-	rjreee2008@gmail.com
23.	R.C.Hemesh	Assistant Professor	9443675916	kirthihemesh@gmail.com
24.	S.P.Rajaram	Assistant Professor	9786614484	ramraja798@gmail.com
25.	E.Jeyasri	Assistant Professor	-	jeyasrieswaran@gmail.com
26.	A.P.S.Ramalakshmi	Assistant Professor	-	ramalakshmi.aps@gmail.com
27.	V.Sindhu	Assistant Professor	-	savisindhu@yahoo.co.in
28.	R.Divya	Assistant Professor	-	divyaraajagopal@gmail.com
29.	R.Sridevi	Assistant Professor	-	sridevirs87@gmail.com
30.	M. Bharani lakshmi	Assistant Professor	-	bharanilakshmi.m@gmail.com
31.	J.Sangeetha	Assistant Professor	-	geetha_maniraj@yahoo.com
32.	M.Maha Lakshmi	Assistant Professor	-	mmahalakshmi36@gmail.com
33.	Dr. C.Vimala Rani	Assistant Professor	-	jaysanjayvim@gmail.com

Placement Activity – Reminder

1. In the month of October every first year students must fill forms online in TATA CONSULTANCY SERVICES (TCS) campus recruitment using **nextsteptcs.com** website and must submit the following documents in the department.
   a. SSLC and HSC mark sheet photo copy at least 5.
   b. Latest passport size Photo at least 5.
   c. Current address proof with parent contact cell numbers.
   d. Create your own two E-mail id using Gmail.
   e. Resume with Scanned copy of passport size Photo.
   f. CT number registered in the TCS website.
2. Every semester end update CGPA in your resume and TCS profile.
3. An Engineering student from Electrical and Electronics Engineering should complete the following courses in order to enhance their software skills. This will be most helpful during their successful completion in Curriculum during 4th Semester and in the software company campus recruitment.
   a. Should complete **C Programming** before joining **2nd Semester**.
   b. Should complete **C++ Programming** before joining **3rd Semester**.
   c. Should complete **JAVA Programming** before joining **4th Semester**. (for the successful completion of object oriented Programming theory paper and laboratory during 4th Semester)
4. An Engineering student from Electrical and Electronics Engineering should complete the **Micro Processor, Micro Controller and Embedded Systems** courses before joining **5th Semester** in order to enhance their Hardware skills. This will be most helpful during their successful completion in Curriculum from 5th to 6th Semester and in the Core company campus recruitment. (for the successful completion of Micro Processor and Micro Controller theory as well as laboratory during 5th Semester and Embedded Systems during 6th Semester)
5. From 6th Semester Summer vacation onwards all should prepare for GATE Examination because all Engineering students from Electrical and Electronics Engineering should appear GATE Examination in order to settle in their life by pursuing higher education in the reputed colleges like IIT, NIT and Anna University or else to join as a Graduate Engineer trainee in a public sector companies like IOC, BHEL, PGCI etc.,
6. Before joining 7th Semester all should get any international certification programme course like OCJP, CCNA, etc., and upload the certification details in TCS campus commune website. This will be most helpful during the TCS campus and other MNC company recruitment.

Activity	Semester							
	1	2	3	4	5	6	7	8
TCS Online form Filling in nextsteptcs.com	In the month of October							
Documents to be submitted in the EEE Department/ Placement Coordinator	a. SSLC and HSC mark sheet photo copy at least 5. b. Latest passport size Photo at least 5. c. Current address proof with parent contact cell numbers. d. Create your own two E-mail id using Gmail. e. Resume with Scanned copy of passport size Photo. f. CT number registered in the TCS website.							
Updating CGPA in resume and TCS online profile	✓	✓	✓	✓	✓	✓	✓	✓
C Programming	✓	✓						
C++ Programming		✓						
JAVA Programming			✓					
Micro Processor & Micro Controller				✓				
Embedded Systems					✓			
GATE / UPSC/ TNPSC Preparation			✓	✓	✓	✓	✓	
International Certification – OCJP / CCNA						✓	✓	

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

All India Installed Capacity (in MW) of Power Stations

This is a **list of states and territories of India by installed capacity of power utilities** with electricity generation mode break-up as on **31 March 2016** with figures in Megawatts.

REVISED

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN

SOUTHERN REGION

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

(As on 31.03.2016)

State	Ownership/ Sector	Modewise breakup							Grand Total
		Thermal				Nuclear	Hydro (Renewable)	RES (MNRE)	
		Coal	Gas	Diesel	Total				
Andhra Pradesh	State	3085.91	0.00	0.00	3085.91	0.00	1758.87	89.50	4934.28
	Private	2990.00	3182.65	16.97	6189.62	0.00	0.00	2586.80	8776.42
	Central	1473.30	0.00	0.00	1473.30	127.16	0.00	0.00	1600.46
	Sub-Total	**7549.21**	**3182.65**	**16.97**	**10748.83**	**127.16**	**1758.87**	**2676.30**	**15311.17**
Telangana	State	4806.59	0.00	0.00	4806.59	0.00	2135.66	0.00	6942.25
	Private	270.00	1697.75	19.83	1987.58	0.00	0.00	605.54	2593.12
	Central	1721.88	0.00	0.00	1721.88	148.62	0.00	0.00	1870.50
	Sub-Total	**6798.47**	**1697.75**	**19.83**	**8516.05**	**148.62**	**2135.66**	**605.54**	11405.87
Karnataka	State	4220.00	0.00	127.92	4347.92	0.00	3599.80	155.33	8103.05
	Private	2060.00	0.00	106.50	2166.50	0.00	0.00	4950.19	7116.69
	Central	1628.46	0.00	0.00	1628.46	475.86	0.00	0.00	2104.32
	Sub-Total	**7908.46**	**0.00**	**234.42**	**8142.88**	**475.86**	**3599.80**	**5105.52**	**17324.06**
Kerala	State	0.00	0.00	234.60	234.60	0.00	1881.50	138.92	2255.02
	Private	0.00	174.00	0.00	174.00	0.00	0.00	116.55	290.55
	Central	1038.69	359.58	0.00	1398.27	228.60	0.00	0.00	1626.87
	Sub-Total	**1038.69**	**533.58**	**234.60**	**1806.87**	**228.60**	**1881.50**	**255.47**	**4172.44**
Tamil Nadu	State	4770.00	524.08	0.00	5294.08	0.00	2182.20	122.70	7598.98
	Private	2350.00	503.10	411.66	3264.76	0.00	0.00	9388.56	12653.32
	Central	4155.10	0.00	0.00	4155.10	986.50	0.00	0.00	5141.60
	Sub-Total	**11275.10**	**1027.18**	**411.66**	**12713.94**	**986.50**	**2182.20**	**9511.26**	**25393.90**
NLC	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Central	100.17	0.00	0.00	100.17	0.00	0.00	0.00	100.17
	Sub-Total	**100.17**	**0.00**	**0.00**	**100.17**	**0.00**	**0.00**	**0.00**	**100.17**
Puducherry	State	0.00	32.50	0.00	32.50	0.00	0.00	0.00	32.50
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
	Central	249.32	0.00	0.00	249.32	52.78	0.00	0.00	302.10
	Sub-Total	**249.32**	**32.50**	**0.00**	**281.82**	**52.78**	**0.00**	**0.03**	**334.63**
Central - Unallocated		1523.08	0.00	0.00	1523.08	300.48	0.00	0.00	1823.56
Total (Southern Region)	State	16882.50	556.58	362.52	17801.60	0.00	11558.03	506.45	29866.08
	Private	7670.00	5557.50	554.96	13782.46	0.00	0.00	17647.67	31430.13
	Central	11890.00	359.58	0.00	12249.58	2320.00	0.00	0.00	14569.58
	Grand Tota	**36442.50**	**6473.66**	**917.48**	**43833.64**	**2320.00**	**11558.03**	**18154.12**	**75865.79**

'*'Renewable Energy Sources (RES) includes small hydro projects, wind, solar, tidal, biomass and urban & industrial waste power.

ADVANCED TRAINING INSTITUTE

Guindy, CHENNAI, Tamilnadu

Phone : 044-22501211/0252 Fax : 044-22501460, Email : atichn@vsnl.com, atichn@yahoo.com, Url : www.atichennai.org.in

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Annual Training calendar 2016 – 2017

(Short Term Skill Training Programme)

	Course Code	Course Title	Duration (Week)	Date	
				From	To
GROUP:1	**ELECTRICAL CONTROL MAINTENANCE**				
	01.01	Protective Relays , Circuit Breakers, & Switch Gear Protection	01	04-04-2016	06-04-2016
				09-05-2016	13-06-2016
				20-06-2016	24-06-2016
				06-06-2016	12-06-2016
				12-09-2016	16-09-2016
				24-10-2016	28-10-2016
				19-12-2016	23-12-2016
				06-02-2017	10-02-2017
				13-03-2017	17-03-2017
	01.02	Operation and Maint. Of Power Transformers	01	11-04-2016	15-04-2016
				16-05-2016	20-06-2016
				27-06-2016	01-07-2016
				01-06-2016	05-06-2016
				29-08-2016	02-09-2016
				31-10-2016	04-11-2016
				05-12-2016	09-12-2016
				26-12-2016	30-12-2016
				13-02-2017	17-02-2017
				20-03-2017	24-03-2017
	01.03	Trouble shooting & Maintenance of Electric Motors	01	25-04-2016	29-04-2016
				23-05-2016	27-06-2016
				11-07-2016	15-07-2016
				19-09-2016	23-09-2016
				17-10-2016	21-10-2016
				07-11-2016	11-11-2016
				02-01-2017	06-01-2017
				20-02-2017	24-02-2017
	01.04	Operation & Control of Industrial AC/DC Motors	01	2-05-2016	5-05-2016
				30-05-2016	3-06-2016
				13-06-2016	17-06-2016
				15-07-2016	22-07-2016
				25-09-2016	30-09-2016
				21-11-2016	25-11-2016
				09-01-2017	13-01-2017
				27-02-2017	03-03-2017
	01.05	Electrical Safety at Work Place and First Aid	01	2-05-2016	6-05-2016
				5-05-2016	10-06-2016
				25-07-2016	29-07-2016
				3-10-2016	7-10-2016
				25-11-2016	02-12-2016
				16-01-2017	20-01-2017
				06-03-2017	10-03-2017
GROUP:1	**ELECTRONIC CONTROL MAINTENANCE**				
	02.01	Maintenance and Servicing of SMPS Inverter & UPS	02	11-07-2016	22-07-2016
				2-1-2017	13-1-2017
	02.02	Power Electronics and its Industrial Applications	02	4-04-2016	15-04-2016
				26-9-2016	7-10-2016
				27-2-2017	10-3-2017
	02.03	Industrial Drives & Automation using Siemens PLC	02	16-05-2016	27-05-2016
				6-5-2016	19-5-2016
				23-1-2017	3-2-2017
	02.04	Siemens S 7 400 PLC Step 7 (Level 1)	01	25-04-2016	29-04-2016
				29-5-2016	2-9-2016
				6-2-2017	10-2-2017
	02.05	Siemens S 7 400 PLC Win CC SCADA (Level 2)	01	2-05-2016	5-05-2016
				5-09-2016	9-09-2016
				13-02-2017	17-02-2017
	02.06	Siemens S 7 400 PLC TIA portal (Level 1)	01	16-05-2016	20-05-2016
				27-05-2016	1-07-2016
				3-05-2016	12-08-2016
				23-1-2017	27-1-2017
				28-11-2016	2-12-2016

List of PSUs through GATE Exam

Name of PSU	Eligible Branches	Name of PSU	Eligible Branches	Name of PSU	Eligible Branches
ONGC Ltd.	XE, GG	MDL	ME, EE	NLC	ME, EE, EC, IN, MN, CE
NHPC Limited	EE	PSPCL Ltd	ME, EE, EC, IN, CE, CS	NALCO	ME, EE, EC, IN, MT, CE, MN, CS, CH
BPCL Limited	ME, EE, CH, IN, CE	OPGC Ltd	ME, EE, CE, C & I	RITES	CE, ME
CEL	EC, ME, EE, XE	IRCON International Ltd	EC, EE, IN	NPCCL	CE
Coal India Ltd.	ME, EE, MN, GG	BNPM	ME, EE, EC, CH	MECL	ME, CY, GG
POWERGRID	EE, CE, CS	AAI	EC, EE	NBCC Ltd.	CE
Indian Oil	CH, CE, CS, EE, EC, GG, IN, ME, MT, MN	BBNL	EC, EE, CS	PAPCL	EE, EC, ME, IN, CS
THDC India Ltd	ME, EE, CE	NFL	EE, CS, CH, IN, XE		
HPCL	ME, EE, CE, IN, CH, EC	GSECL	EE, ME, MT, C & I		
NTPC Limited	ME, EC, EE, IN	GAIL	ME, EE, IN, CH		

Lists of TOP 10 software companies to offer jobs in India

S. No.	Name of the Company	About the company	Head quarters	Revenue	No. of Employees	Website
1.	**Tata Consultancy Services**	TCS was established in 1968 and is spread across 47 countries.	Mumbai, India	US$ 13.44 billion	300,464	www.tcs.com
2.	**Cognizant Technology Solutions**	CTS was founded in year 1994 by Srilankan American Kumar Mahadeva.	Teaneck, New Jersey, United States	US$ 8.84 billion	178,000	www.cognizant.com
3.	**Infosys**	Infosys was founded in year 1981.	Bangalore, Karnataka	US$ 8.4 billion	160,405	www.infosys.com
4.	**Wipro**	Azim Premji is the Chairman & TK Kurien is the CEO of Wipro.	Mumbai, India	US$7.3 billion	146,053	www.wipro.com
5.	**Tech Mahindra**	Tech Mahindra was founded in year 1986	Mumbai	$4.09 billion	89,500	www.techmahindra.com
6.	**HCL Technologies**	HCL was founded by Shiv Nadar in year 1991.	Noida, Uttar Pradesh	US$335 million	90,190	www.hcltech.com
7.	**iGate**	iGate was earlier known as Patni Computer Systems and was founded by Narendra Patni and his wife.	Bridgewater, New Jersey, U.S	US$ 1.15 billion	31,000 +	www.igate.com
8.	**Mphasis**	MPhasis was founded by Jaithirth Rao in year 2000	Bangalore, India	US$1.0 billion	45,426 +	www.MphasiS.com
9.	**Larsen &Toubro Infotech**	L & T Infotech was founded in year 1997	Mumbai	US$ 650 million	16,000+	www.lntinfotech.com
10.	**Oracle Financial Services Software Limited**	Oracle Financial Services Software Limited was earlier know as i-Flex Solutions Limited. It is spread across 130 countries around the globe and provides the IT solutions to the financial companies.	Mumbai, India	US$610 million	9,682	www.oracle.com

Lists of TOP 10 core companies to offer Electrical jobs

1 | Bharat Heavy Electricals Ltd.
Corporate office – New Delhi, India | **Establishment** – 1964 |
Business – Electrical equipments | **Website** – *www.bhel.com* |

Bharat Heavy Electricals Ltd established in the year 1964 is a leading power plant equipment manufacturer and has expertise in engineering, manufacture, construction, testing, designing and servicing of various products of the core sectors such as defense, power, industries etc. BHEL is among the top electrical companies in India and which has total 16 manufacturing divisions and four regional offices. It is currently operating more than 150 project sites across India and abroad.

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2 | Alstom
Corporate office – Levallois-Perret, France | **Establishment** – 1928 |
Business – Power generation and transmission | **Website** – *www.alstom.com* |

Alstom a multinational corporation is one of the best electrical companies in India and world, operating in hydroelectric power transportation and generation and it is active in many core industry sector. Company has a workforce of 9000+ employees in India and over 85000+ worldwide.

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3 | ABB
Corporate office – Zürich, Switzerland | **Establishment** – 1988 |
Business – Electrical equipments | **Website** – *www.abb.com* |

ABB holds interests in robotics and mainly in the automation and power areas. ABB is active in the field of electricity grids manufacturing and other technologies in the field of automation and power. ABB is one of the few giant electrical player at global level and among the largest engineering company in the world.

4| Siemens
Corporate office – Erlangen, Germany | **Establishment** – 1847 |
Business – Renewable energy, Power generation & transmission| **Website** – *www.energy.siemens.com* |

Siemens a German conglomerate is rated one the finest electrical company in India. Company's product line includes generators, steam turbines, compressors, high-voltage switching products and many more. Siemens employees more than 86000 people worldwide and it is a leading supplier of energy related products worldwide.

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5 | Crompton Greaves
Corporate office – Mumbai, Maharashtra | **Establishment** – 1878 |
Business – Electrical | **Website** – *www.cgglobal.com* |

Crompton Greaves is a part of Avantha Group which is headquartered in Mumbai. CGL deals in manufacturing, marketing and designing of power transmission and generation related products. CGL has manufacturing units in Canada, France, Hungary, UK, US, Indonesia, Ireland, India and Belgium.

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6 |Bajaj Electricals Ltd.
Corporate office – Mumbai, Mharashtra | **Establishment** – 1938 |
Business – Electrical Appliances | **Website** – *www.bajajelectricals.com* |

Bajaj Electricals is a leader in the field of electrical equipment and headquartered in Mumbai. It is one of the top 5 electrical companies in India having 19 branch offices across India. Bajaj Electricals provides complete range of consumer durable such as fan, electrical appliances, lighting which includes tubes, lamps etc.

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7 | Eason Reyrolle
Corporate office – Bangalore, Karnataka | **Establishment** – 1986 |
Business – Electric Equipments & Industrial Consumables | **Website** – *www.easunreyrolle.com* |

Established in 1980 Easun Reyrolle is a Power Management Products, Transmission, Distribution & Industrial Application, Systems, Solutions and Services provider having significant presence in global market as reputed electrical products manufacturer.

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8 | Schneider Electrical
Corporate office – Rueil Malmaison, France | **Establishment** – 1981 |
Business – Electric Equipment | **Website** – *www.schneider-electric.co.in* |

Schneider Electric a French company established in the year 2000 is among the top electrical companies in India which is involved in energy management. Company has a workforce of more than 17000 employees and has 31 global manufacturing Plants.

9| Wipro Lighting
Corporate office – Pune, Maharashtra | **Establishment** – |
Business – Lamps, Luminaires and Accessories | **Website** – *www.wiprolighting.com* |

Wipro lightings a part of Wipro group and a leading electrical company in India producing Lamps, luminaries and accessories. Company's product portfolio comprises of high end lighting control and architectural dimming system, high intensity discharge lamp Luminaries, brightness management lighting products etc.

10| Kelvin Electrical
Corporate office – Al-Ain, U.A.E | **Establishment** – 2005 |
Business – | **Website** – *www.kelvin-electrical.com* |

Kelvin Electrical LLC founded in 2005 is based in United Arab Emirates (UAE). Kelvin Electrical deals in Cable Management Systems, Interior, Architectural, Exterior and Special lighting, Cable Support Systems, Raised Floor, Wiring Accessories etc.

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Lists of core companies to offer Electrical jobs in India

Types of Electrical Core Companies

1. **Electrical motors and Generators**
2. **Consultancy (Electrical Engineering)**
3. **Electrical appliances**
4. **Electrical components companies**
5. **Lighting & luminaries**
6. **Power Generation**
7. **Electric wires & Cables**
8. **Electrical exporters**
9. **Measurements & Instrumentation**
10. **Power Distribution**
11. **Transformers**
12. **Green Energy Companies in India**
13. **Internationally renowned MNC'S**
14. **Top 20 core companies in India to offer electrical jobs**
15. **Exclusive Government jobs for Electrical Engineers**

Electrical motors and Generators

1. Ajay Engineers http://www.ajayengineers.com
2. All India Electric Motor Manufacturers' Association http://www.aiemma.com/
3. Aqua Brand Submersible Sewage Pump http://www.aquapumps.com
4. Compact http://www.compactlighting.net
5. Crown Electric Company http://www.crown-gear.com
6. Lawkim http://lawkimindia.com/
7. MMC Electric Company http://www.dynafluxindia.com
8. MS Enterprises and Trimega Power Corporation http://www.msein.com
9. National Electrical Industries - Ahmedabad. http://www.elmomachines.com/
10. Numeric Power Systems http://www.numericups.com
11. Pranshu Electricals http://www.pranshuelec.com/
12. Reva Industries http://www.reva.com/
13. Rotomag Motors & Controls Pvt. Ltd. http://www.rotomag.com
14. Rudrashakti Electronics http://www.rudrashakti.com
15. Sanjay Diesels - Diesel Generating Sets. http://www.dgsets.com/
16. Venus Industrial Corporation http://www.venusind.com/
17. A-One Industries. http://www.aoneindustries.com/contactus.html

Consultancy (Electrical Engineering)

1. APJ Projects http://www.apjprojects.com
2. Consolidated Consultants and Engineers Pvt. Ltd http://www.consolidatedconsultants.com
3. DSON Enterprises http://www.dsonenterprises.com
4. Eltech Engineers http://www.eltechindia.com/
5. John Mech-El Technologies (P) Ltd http://www.johnmech-el.com/
6. Mandvi Electric Works http://www.bicserve.com/
7. Miraj Instrumentation Services http://www.mirajinstrumentation.com
8. PG Associates http://www.engineeringconsultant.in
9. Power Gem Engineers - Consultants in Power Generation. http://www.powergem.com/
10. Secon Engineers http://www.seconindia.com
11. Shanti Enterprises Electricals Limited http://www.shantielectricals.com
12. Shashi Electricals http://www.shashielectricals.com
13. SK Systems http://www.sksystem.com
14. Tata Consulting Engineers http://www.tce.co.in
15. Nutronics India http://www.nutronicsindia.com/

Electrical appliances

1. Ajay Industrial Corporation http://www.ajayindustrial.com/
2. Ankit Electricals http://www.ankitelectricals.com
3. A.P.C. System & Products Pvt. Ltd http://www.apcsp.com
4. Arka Trading & Services http://www.mfdplaza.in
5. Bajaj Electricals Ltd - Part of Bajaj Group. http://www.bajajelectricals.com/
6. Electroil http://www.electroil.com/
7. Eveready Industries India Ltd http://www.evereadyindustries.com/
8. Graftec india http://graftec.trade-india.com
9. Indexelectronics http://www.indexelectronics.com
10. Khaitan Group http://www.khaitan.com/
11. Lloyd Electric & Engineering Limited http://www.lloydengg.com/
12. Modern Electrical Stores http://www.modernelectricalsindia.com/
13. Needo electronics and electricals pvt. Ltd. http://www.needoindia.com
14. Picasso home products http://www.picassoappliances.com/
15. Polor Industries Ltd http://www.polarinc.com/
16. Rajshree India Ltd. http://www.rajshreefans.com
17. Shilpa Electricals http://www.shilpaelectricals.com/
18. Super Impex http://www.superimpex.com
19. Tri Star Engineering Industries http://www.tristarengg.com
20. Vijay Electricals http://www.vijayelectricalspune.com/
21. Vxl Technologies Ltd. http://www.vxldesign.com
22. XtremeWorx http://www.xtremeworx.net

Electrical components companies

1. Ace Bimetalliks India Pvt. Ltd. http:// www.aceelectricals.com
2. Aditron India Pvt. Ltd. (Engineering Division) http://www.aiplen.com
3. Admir Ovens http://www.admir.com
4. Arvind Anticor Ltd http://www.picklingplant.com
5. Asiatic Electronic Industries. http://www.asiatic-india.com/
6. Axis Electrical Components India Pvt. Ltd. http://www.axis-india.com
7. Balar Marketing Pvt. Ltd http://www.allelectricalproducts.com/
8. Bhartia Industries Limited http://www.bchindia.com
9. Brass Copper & Alloy (I) Ltd. http://www.hexworldwide.com
10. Brightech Valves and Controls Pvt. Ltd. http://www.brightechvalves.com
11. Caltech Engineering Services http://www.caltechindia.com
12. Color Design India http://www.colordesigntech.com/
13. Consult Techniques (I) Pvt. Ltd http://www.consulttechnique.com/
14. Deki Electronics Ltd. http://www.dekielectronics.com
15. Elpro International Limited http://www.elproindia.com/
16. Elymer http://www.elymer.com
17. E S Electronics (India) Pvt. Ltd http://www.energysaversindia.com/
18. Finetech Engineering Corporation http://www.finetechindia.com
19. Gayatri Control, Ahmedabad http://www.gayatricontrol.com/
20. Gemscab Industries Ltd http://www.gemscab.com/
21. Hallmark Electronics http://www.hallmarkelect.com/
22. India International House Ltd http://www.builderhardware.com/
23. Jaykrishna magnetics pvt.ltd http://www.jkmagnetics.com
24. Leotech Group http://www.leotechindia.com/
25. Maxx Mobile Phone Accessories Pvt. Ltd http://www.maxmobile.co.in
26. Mehta Engineering Enterprise http://www.mehtaswitch.com

27. Mehta Tubes Ltd http://www.mehta-group.com/
28. Mellcon Engineers http://www.mellcon.com
29. Micromot Controls http://www.micromotcontrols.com
30. Muskaan Engineers http://www.electricitysaver.com/
31. Neelam Import Pvt. Ltd. http://www.cellking.org
32. Onload Gears http://www.onloadgears.com/
33. Orton Engineering Pvt. Ltd, Thane http://www.ortonengineering.com/
34. Persang Alloy Industries http://www.webmasterindia.com/persangalloy
35. PMT Engineers http://www.pmtengineers.com
36. Powercap Systems (Madras) Pvt. Ltd http://www.transformersindia.com/
37. Powertek Equipment Company http://www.powertekindia.com/
38. Pragati Electrocom Pvt. Ltd http://www.pragatielectrocom.com/
39. Pran Electronics Pvt. Ltd. http://www.pranelectronics.com
40. Precicraft Components India Pvt. Ltd http://www.precicraft.com/
41. Prima Automation India Pvt. Ltd http://www.prima-automation.com/
42. Rittal India Pvt Ltd http://www.rittal-india.com
43. Sanghi Yantra Udyog http://www.skyuindia.com/
44. SKN - Bentex Group of Companies. http://www.sknbentex.com/
45. South India Industrial Suppliers http://siis-india.com/bus_bar_support.html
46. Square Automation Pvt. Ltd http://www.squareautomation.com/
47. Sudhir Switchgears http://www.sudhirswitchgears.com
48. Syntron Controls http://www.syntron-controls.com
49. Torque Master Tools Pvt. Ltd http://www.torquemasterindia.com/
50. United Core http://www.unitedcores.com/
51. Utiliti Controls http://www.utiliticontrols.com/
52. valrack modular systems pvt.ltd http://www.valrack.com
53. Wavetronics http://www.wavetronicsindia.com
54. Rane Holdings Limited http://www.rane.co.in

Lighting & luminaries

1. A.K. Electricals http://www.akelectricals.com/
2. APCO India http://www.indiabizclub.net/Electrical/APCO_INDIA.html
3. Aquascape engineers http://www.fountainsnozzles.com
4. Arihant Enterprises : http://www.arihantsecurityindia.com/
5. Atlas Electricals www.indiabizclub.net/Electrical/ATLAS_ELECTRICALS.html
6. Baliga Lighting http://www.baliga.com/
7. Crompton Greaves Limited. http://www.cglonline.com/
8. Decon Lighting http://deconlighting.com
9. GE Lighting India http://www.gelighting.com/india/index.html
10. Jain Industrial Lighting Corporation http://www.indiamart.com/jilco/
11. Jayanta Lamp Industries Pvt.Ltd : http://www.jayantagroup.com
12. Kuber Lighting Pvt Ltd http://www.kuber.biz
13. Litray Lighting : http://www.litraylighting.com/
14. Mindscreen Pvt. Ltd. http://www.mindscreenfilms.com/
15. Peralites http://www.indiabizclub.net/Electrical/PEARLITES.html
16. Sam International http://www.indiamart.com/
17. Shyam Electricals - http://www.shyamelectricals.com/
18. Hpl Electric & Power Pvt.Ltd http://www.hplindia.com

Power Generation

1. Advance Engineering Company - http://www.advanceengineering.com/
2. APGENCO http://www.apgenco.com/

3. Birla Power Solutions Limited http://www.birlapower.com
4. Dyna Hitech Power Systems Ltd http://www.dynahitech.com
5. Essar Group http://www.essar.com/Group/group.asp
6. Essar Power Ltd. http://www.essar.com/
7. Jindal Steel & Power Ltd. http://www.jindalsteelpower.com
8. Kaiga Atomic Power Station http://www.npcil.org/docs/kaigaps.htm
9. Kakrapar Atomic Power Station http://www.npcil.org/docs/kaps.htm
10. Kirloskar Electric Co http://www.kirloskar-electric.com/
11. Lanco Industries http://www.lancogroup.com/groups/kpower/kpower.html
12. Madras Atomic Power Station (MAPS) http://www.npcil.org/
13. Magnum Power Generation Ltd http://www.magnumgrouponline.com/power/
14. Narora Atomic Power Station http://www.npcil.org/docs/naps.htm
15. National Thermal Power Corporation (NTPC) http://www.ntpc.co.in
16. NEPC India Ltd http://www.nepcindia.com
17. PTC India http://www.ptcindia.com
18. Rajasthan Atomic Power Station (RAPS) http://www.npcilraps.com/
19. Rajasthan Renewable Energy Corporation Limited (RRECL) http://www.rrecl.com/
20. Reliance Energy http://www.rel.co.in
21. Tarapur Atomic Power Station http://www.npcil.org/docs/taps.htm
22. Tata Electric Companies http://www.tata.com
23. Tata Power http://www.tatapower.com/
24. Techno Instrument India Pvt.Ltd web site url: http://www.tiiindia.com/
25. Torrent Power web site url: http://www.torrentpower.com/
26. Uttar Pradesh Power Corporation Ltd http://www.uppcl.org/
27. ABB Ltd www.abb.co.in/
28. Adani Power Ltd www.adanipower.com/
29. Aplab Ltd www.aplab.com/
30. BF Utilities Ltd www.bfutilities.com/
31. CESC Ltd. www.cescltd.com/
32. CMI Ltd. www.cmilimited.com.au/
33. DLF Power Limited www.eipowertech.com/dlf_power_limited.htm
34. DPSC Ltd www.dpscl.com/
35. Energy Development Company Ltd www.energy.com.ph/
36. Entegra Ltd www.entegra.co.in/
37. GMR Infrastructure Ltd www.gmrgroup.in/
38. Gujarat Industries Power Company Ltd www.gipcl.com/
39. GVK Power & Infrastructure Ltd www.gvk.com/
40. HBL Power Systems Ltd www.hbl.in/
41. Indowind Energy Ltd www.indowind.com/
42. Indo power projects Ltd www.indopowerprojects.in/
43. Jaiprakash Power Ventures Ltd www.jppowerventures.com/
44. Kalpataru Power Transmission Ltd www.kalpatarupower.com/
45. KSK Energy Ventures Ltd www.ksk.co.in/
46. National Wind & Power Corpn. Ltd www.nationalwind.com/
47. Neyveli Lignite Corpn. Ltd www.nlcindia.com/
48. NHPC Ltd. www.nhpcindia.com/
49. NTPC Limited www.ntpc.co.in/
50. Power Grid Corpn. Of India Ltd www.powergridindia.com/
51. PTC India Ltd www.ptcindia.com/
52. Reliance Power Ltd www.reliancepower.co.in/

53. Savant Infocomm Ltd www.savant-infocomm.com/
54. Sun Source (India) Ltd www.sunsource.in/about_us.htm
55. Suryachakra Power Corpn. Ltd www.suryachakra.in/
56. Suzlon Energy Limited www.suzlon.com/

Electric wires & Cables

1. Aksh Optifibre Limited http://www.akshoptifibre.com/
2. Anant Distributors Private Ltd. http://www.proflexcable.com/
3. Brimson Cables Private Ltd http://www.brimsoncable.com/
4. Capital Cables India Limited - http://www.indiantrade.com/cci/
5. Colt Cables Private Limited http://www.coltcables.com/
6. Cords Cable Industries Ltd http://www.cordscable.com/
7. Delton Cables Limited - http://www.deltoncables.com/
8. Fort Gloster Industries Limited http://www.glostercables.com/
9. Kaydour Cables India http://www.kaydourcables.com
10. KEI Industries Limited http://www.kei-ind.com/
11. Lapp India http://www.lappindia.com/
12. National Cable Industries http://www.nationalcables.com/
13. Navinbhai Cables Private Ltd http://www.ncplindia.com/
14. Neolex Cables http://www.neolexcable.com/
15. North Eastern Cables Private Ltd //www.khetangroup.com/
16. Novoflex Marketing Private Limited. http://www.novoflexgroup.com/
17. Polycab Wires Private Limited http://www.polycab.com/
18. Q-Flex Cables Limited http://www.qflexcable.com/
19. Ravin Cables limited - Primecab brand of cables. http://www.primecab.com/
20. Relemac India http://www.relemacindia.com
21. RollRing Industries - Calicut, Kerala. http://www.rollring.com/
22. Samdaria Electricals http://www.samdariaelectricals.co.in/
23. Satish Enterprises http://www.satishenterprise.com/
24. Shree Nakoda Cables Private Limited. http://www.nakodacables.com/
25. Skytone Electricals (India) http://www.skytonecables.com/
26. Surbhi Cables Industries Private Limited. http://www.indiamart.com/surbhi/
27. Surbhi Telelink Pvt. Ltd http://www.surbhiindia.com/
28. Torrent Cables Ltd http://www.torrentcables.com/
29. Universal Cables http://www.universalcablesltd.com
30. Usha Martin http://www.ushamartin.com
31. Weather Crafts Ltd http://www.weathercraft.com/
32. Finolex Cables Limited http://www.finolex.com

Electrical exporters

1. Arbariya steels http://www.arbariya.com/
2. Bajaj International Pvt. Ltd. http://www.bajajinternational.com/
3. Biax http://www.biaxmetals.com/
4. Brightech Valves and Controls Pvt Ltd http://www.brightechvalves.com
5. Dynamic Scaffolding & Equipment Co http://www.dynamicscaffolding.com/
6. Excel Metal And Engg. Industries http://www.excelmetal.net
7. Impex Trading Company http://www.impextradingco.com
8. Miltop Trading Company http://www.miltop.com/
9. Om(India)Exports http://omindiaexpo.com
10. Oriental Export Corporation http://www.indialinks.com/oriental/
11. Sevana Electrical Group http://www.sevana.com/
12. Veejay Lakshmi Engineering Works Limited http://www.veejaylakshmi.com

13. Vishal Electromag Industries http://www.vishalmotor.com
14. Vaibhav Electricals http://www.vaibhavelectricals.com
15. Industrial Forging Industries http://www.ifi-india.net/
16. Imperial Brass Component http://electronics-electrical.exportersindia.com
17. M/s Horizon Exports http://www.horizonexport.net
18. Golden Crest Marketing Network Pvt. Ltd. http://www.aceenergy.co.in/
19. Shree Krishna Enterprises http://www.shreekrishnaenterprises.co.in/
20. Sahiba International Trading Company http://www.sahibainternational.com
21. Pushpak Metals web site url: http://www.pushpakmetals.com/
22. IEEMA http://www.ieema.org
23. ELSTER METERING (P) LTD http://www.elstermetering.com/
24. Shivam Electronics http://www.shivamelectronics.com
25. SUBRTO http://www.subrtoburnishing.com/
26. Unitek Engineers http://www.unitekengineers.com
27. Euro Technologies http://www.eurotapes.in/

Measurements & Instrumentation

1. Active Control Pvt Ltd http://www.indiamart.com/activecontrols/
2. Autometers Alliance Limited. http://www.autometers.com/
3. EIP Bulk Control Pvt Ltd http://www.eipbulkcontrols.com/
4. IMP Power Limited http://www.imp-power.com/
5. Instruments International http://www.indorecity.com/ii/index.html
6. Kanji Precision Works http://www.kanjimeters.com
7. Mittal Enterprises http://www.indiamart.com/mittalenterprises/
8. Modsonic http://www.modsonic.com/
9. Nippon Instruments http://www.nipponinstruments.com/
10. Poonawala Electro Weigh http://www.peweigh.com
11. Prok Devices http://www.prokdvs.com
12. Shanti Instruments http://www.shanti-instruments.com
13. Texlab Industries http://www.texlabindia.com
14. Vasavi Electronics http://www.vasavi.com
15. VPL Infotech http://vplinf.com

Power Distribution

1. Areva T&D India http://www.areva-td.co.in/
2. BSES Yamuna Power Ltd and BSES Rajdhani Power Ltd. http://www.bsesdelhi.com/
3. Central Power Distribution Company of Andhra Pradesh Limited http://www.apcentralpower.com/
4. CESC Limited http://www.cescltd.com
5. Eastern Power Distribution Company of Andhra Pradesh Limited http://www.apeasternpower.com/
6. Elpro International Limited http://www.elproindia.com/
7. Gujarat Electricity Board http://www.gseb.com
8. Haryana Power Utilities http://www.haryanaelectricity.com/
9. Hubli Electricity Supply Company Limited (HESCOM) http://www.hescom.org/
10. Maharashtra State Electricity Distribution Company Limited http://www.mahadiscom.in
11. Natinal Hydroelectric Power Corporation of India http://www.nhpcindia.com
12. Noida Power Company Ltd http://www.noidapower.com
13. North Delhi Power Limited http://www.ndplonline.com/
14. Power Grid Corporation Of India http://www.powergridindia.com
15. Southern Power Distribution of Andhra Pradesh http://www.apspdcl.in
16. Transmission Corporation of Andhra Pradesh (AP TRANSO) http://www.aptranscorp.com/

Transformers

1. Emco Limited http://www.emcoindia.com
2. Golecha Electro Stampings. http://www.golecha.com/

3. Intaf India http://www.intafindia.com/
4. Kappa Electricals Private Ltd http://www.kappaelectricals.com/
5. Kotsons Transformers http://www.kotsons.com/
6. Mahindra Electrical Works http://www.mewindia.com
7. Marson's Electricals http://www.marsonselectricals.com/
8. P.M. Electronics Limited. http://www.indiamart.com/pme/
9. Prismatic India http://www.wind-it.com/
10. Raksan Transformers Private Ltd http://www.raksantransformers.com/
11. Roland Electronics and devices Private Ltd. http://www.redpl.com/
12. Sai Electricals http://www.saielectricals.com/
13. Tesla Transformers Limited http://www.teslatransformers.com/
14. Transformers and Electricals Kerala Limited. http://www.telk.com/
15. Transformers and Rectifiers (India) Ltd. http://www.jmtril.com
16. T.S. International http://www.transformers-reactors.com

Green Energy Companies in India

1. **Suzlon Energy:** Suzlon is of course the first company that comes to mind. They are one of the leading wind energy companies in India are one of the better known alternative energy companies in India. Here are some details from their website.

Conceived in 1995 with just 20 people, Suzlon is now a leading wind power company with:

- Over 16,000 people in 25 countries
- Operations across the Americas, Asia, Australia and Europe
- Fully integrated supply chain with manufacturing facilities in three continents
- Sophisticated R&D capabilities in Belgium, Denmark, Germany, India and The Netherlands
- Market leader in Asia, Suzlon Market Share (Combined with REpower) rose to 9.8% thereby making Suzlon 3rd * largest wind turbine manufacturing company in the world.

2. **Orient Green Power Limited:** Primarily engaged in the Wind and Biomass energy space. Currently wind constitutes the majority of their energy portfolio, so this is another one of India's wind energy companies. As of March 31, 2010, their total portfolio of operating projects included 193.1 MW of aggregate installed capacity, which comprised 152.6 MW of wind energy projects and 40.5 MW of biomass projects. Their portfolio of committed and development projects included approximately 815.5 MW of prospective capacity, which comprised an estimated 622.0 MW of wind energy projects, 178.5 MW of biomass projects and a 15.0 MW small hydroelectric project

3. **Indowind Energy Limited:** Indowind Energy Limited is also a wind energy company that develops wind farms for sale, manages the wind assets, and generates green power for sale to utilities and corporates. Turnkey implementation of Wind Power Projects, from concept to commissioning. Wind Asset Management Solution for installed assets, including operations, billing, collection of revenue to project customers. Supply of Green Power to Customers. CERs (Carbon Credit) Sales and Trading.

4. **Suryachakra Power Corporation Limited:** SPCL is the flagship company of Suryachakra Group with interests in Power generation – renewable energy (biomass, Solar, hydro, Wind) and Clean Technology / Ultra Super Critical Thermal Power Plants (coal, Gas), Engineering Consultancy and Urban infrastructure development activities. Suryachakra Power Corporation Limited has established 3 wholly owned subsidiaries for setting up of renewable energy (biomass) power projects and also acquired stake in Sri Panchajanya Power Private limited, which was setting up a 10 MW Biomass Power Plant at Hingoli, Maharashtra.

5. **NEPC India:** This is a Public Limited Company promoted by the Khemka Group with the primary objective of promoting wind energy. This successful Group has a multi crore turnover from diversified activities in the field of Power Generation from Wind Energy and manufacture and marketing of Wind Turbine Generator (a renewable energy device).

6. **Azure Power:** Azure Power is the green energy space as it is one of the solar energy companies in India. It is a solar power company, and they are supplying power to 20,000 people in 32 villages in Punjab.

7. **AuroMira Energy:** Auro Mira is also a green technology energy company that is private, and present in the Biomass, Small Hydel and Wind Sectors. It plans to develop over 1000 MW capacity by 2012. AME is presently focusing in Biomass, Small Hydro and Wind Sectors. AME plans to invest $ 900 Million to develop, own and operate over 1000 MW in clean energy in addition to WTG manufacture and to develop over 15000 acres of energy plantation in the next five years. AME intends to foray into other clean energy technologies, solar, bio-diesel etc. in the future.

8. **Husk Power Systems:** This is truly an alternate energy company which owns and operates 35-100 kW "mini power-plants" that use discarded rice husks to deliver electricity to off-grid villages in the Indian "Rice Belt

9. **RRB Energy Limited:** This company is in the field of Wind Power Generation, and is an ISO 9001:2008 and ISO 14001:2004 certified Company. RRBEL is also an Independent Power Producer having established wind farms of aggregate megawatt capacity.

10. **Moser Baer Solar Limited:** This is a subsidiary of Moser Baer that is one of the solar energy companies as well. The Group's photovoltaic manufacturing business was established between 2005 and 2007 with the primary objective of providing reliable solar power as a competitive non-subsidized source of energy.

Internationally renowned MNC's to offer electrical jobs

Cisco, Hewlett Packard, Intel, AMD, IBM, Ford, General Electric, General Motors, Lockheed Martin, Lucent Technologies, Moog, Micron, Motorola, Nokia, Qualcomm, Rockwell, Sun Microsystems, Atto Technology, MTI and Texas Instruments.

Top core companies in India to offer electrical jobs

1. Bharat Sanchar Nigam Limited
2. Tata Consultancy Services
3. Bharti Airtel Limited
4. Wipro Ltd
5. Infosys Technologies Limited
6. Hewlett-Packard India
7. HCL Infosystems Limited
8. Reliance Communications Ltd
9. LG Electronics India Pvt Ltd
10. IBM India Pvt Ltd
11. Videocon Industries Ltd
12. HCL Technologies Limited
13. Satyam Computer Services Ltd
14. Siemens Ltd.
15. Samsung India Electronics Pvt. Ltd.
16. Mahanagar Telephone Nigam Ltd
17. Redington (India) Limited
18. Cognizant Technology Solutions
19. Idea Cellular Ltd
20. Videsh Sanchar Nigam Limited

Exclusive Government jobs for Electrical Engineers

1. ISRO
2. DRDO
3. BEL
4. BHEL
5. GAIL
6. SAIL
7. HAL
8. HPCL
9. NTPC
10. ONGC
11. IOCL
12. RRB
13. ECIL
14. APGENCO
15. APTRANSCO

Ref: http://www.regencyengg.com/eee_job_offer.html

K.L.N COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SAMPLE TCS QUESTION PAPER

1. Two bowls are taken, one contains water and another contains tea.one spoon of water is added to second bowl and mixed well, and a spoon of mixture is taken from second bowl and added to the second bowl. Which statement will hold good for the above?

(Ans: second liquid in first bowl is smaller than the first mixture in second bowl)

2. Which is the smallest no divides 2880 and gives a perfect square?
a.1 b.2 c.5 d.6
Ans: c
3. Form 8 digit numbers from by using 1, 2,3,4,5 with repetition is allowed and must be divisible by4?
a.31250 b.97656 c.78125 d.97657
Ans: c
4. One problem on (a3-b3)/(a2+ab+b2)

Ans: 'a-b'

5. Rearrange and categorize the word 'RAPETEKA'?

Ans: bird

6. In school there are some bicycles and 4wheeler wagons.one Tuesday there are 190 wheels in the campus. How many bicycles are there?

Ans: 15

7. Key words in question (Fibonacci series, infinite series, in the middle of the question one number series is there….I got the series 3 12 7 26b 15?

Ans:54

(Logic: 3*2+1=7 12*2+2=26

7*2+1=15 26*2+2=54)

8. A father has 7 penny's with him and 1 water melon is for 1p, 2chickoos for 1p, 3 grapes foe 1p.he has three sons. How can he share the fruits equally?
Ans: 1 watermelon,2chickoos,1grape

9. A lies on mon, tues, wed and speak truths on other days, B lies on thur, fri, sat

and speaks truths on other days.. one day a said I lied today and B said I too lied today. What is the day?

10. Man, Bear, North, South, walks.

Ans: White

11. (1/2) of a number is 3 times more than the (1/6) of the same number?

Ans: 9

12. There are two pipes A and B. If A filled 10 liters in hour B can fills 20 liters in same time. Likewise B can fill 10, 20, 40, 80,160….if B filled in (1/16) th of a tank in 3 hours, how much time will it take to fill completely?

Ans:7 hours

13. KEYWORDS:T.Nagar,Chennai,1-100,prime numbers b/n 140-180,How many 2's are there?

Ans: 20 (Not only 2's ,1's,3's,4's,5's,6's,7's,8's,9's,0's also 20)

14. One question has last part like difference between two terms is 9 and product of two numbers is 14, what is the squares of sum of numbers?

Ans:109

15. A man is standing before a painting of a man and he says I have no bro and sis and his father is my father's son?

Ans: His son

16. What is the value of [(3x+8Y)/(x-2Y)]; if x/2y=2?

Ans:10 {the numerical may change)

17. A pizza shop made pizzas
with to flavours.in home there are 'N' different flavors, in that 'M' flavors are taken to made pizza.in how many ways they can arrange?
(Logic: NcM)

18. One grandfather has three grandchildren, two of their age difference is 3, eldest child age is 3 times youngest child's age and eldest child's age is two times of sum of other two children. What is the age of eldest child?

Ans:15

19. In a market 4 man are standing .the average age of the four before 4years is 45,aftyer some days one man is added and his age is 49.what is the
average weight of all?

Ans: 49

20. KEYWORDS: one organization ,material labor and maintenance are in the ratio of 4:6:7,the material cost is:100,what is the total cost?

Ans: 425

21. KEYWORDS: density, reluctance, sensitivity, voltage ,current, what is the resistance Formula is "R=V/I"
22. KEYWORDS: Sports readers,10 tables,4chairs per table, each table has differentnumber of people then how many tables will left without at least one person?
Ans : 6
23. KEYWORDS: Die, card, coin, b/n 2 to 12
Ans: All are equal
24. In a school for a student out of a 100 he got 74 of average for 7 subjects and he got 79 marks in 8th subject. what is the average of all the subjects?
Ans: 74.625
25. In a question ,last part has ,the ages of two people has the ratio of 6:6 and by adding the numbers we get 44,after how many years the ratio would be 8:7?
Ans: 8

26. Two years before Paul's age is 2times the Alice age and the present age of Paul is 6times the Alice. what is the presents Paul's age???(3years) "u try to solve this question once"
27. One train travels 200m from A to B with 70 km/ph. and returns to A with 80kmph, what is the average of their speed?

This are the only question which i remember

All The Very Best to my dear friends !

25 Sample Questions of TCS

Q1) Given a collection of points P in the plane , a 1-set is a point in P that can be separated from the rest by a line, .i.e the point lies on one side of the line while the others lie on the other side. The number of 1-sets of P is denoted by n1(P). The minimum value of n1(P) over all configurations P of 5 points in the plane in general position (.i.e no three points in P lie on a line) is

a) 3
b) 5
c) 2

Q2) Paul the octopus who has been forecasting the outcome of FIFA world cup matches with tremendous accuracy has now been invited to predict ICC world cup matches in 2011. We will assume that the world cup contenders have been divided into 2 groups of 9 teams each. Each team in a group plays the other teams in the group. The top two teams from each group enter the semi finals (after which the winner is decided by knockout).

However, Paul has a soft spot for India and when India plays any team, Paul always backs India. Alas, his predictions on matches involving India are right only 2 out of 3 times. In order to qualify for the semi finals, it is sufficient for India to win 7 of its group matches. What is the probability that India will win the ICC world cup?

a) (2/3)^10
b) (2/3)^9 + 8/3 * (2/3)^9
c) 8/3 * (2/3)^9
d) (2/3)^10 + 8/3*(2/3)^9

Q3) A toy train produces at least 10 different tunes when it moves around a circular toy track of radius 5 meters at 10 meters per minute. However , the toy train is defective and it now produces only two different tunes at random. What are the odds that the toy train produces 4 consecutive music tunes of the same type?

a) 1 in 16
b) 1 in 4
c) 1 in 8

Q4) A number when divided by D leaves a remainder of 8 and when divided by 3D leaves a remainder of 21 . What is the remainder left, when twice the number is divided by 3D?

a) 13
b) cannot be determined
c) 3
d) 42 **(solution:c)**

Q5) Six friends decide to share a big cake. Since all of them like the cake, they begin quarreling who gets to first cut and have a piece of the cake. One friend suggests that they have a blindfold friend choose from well

shuffled set of cards numbered one to six. You check and find that this method works as it should simulating a fair throw of a die. You check by performing multiple simultaneous trials of picking the cards blindfold and throwing a die. You note that the number shown by the method of picking up a card and throwing a real world die, sums to a number between 2 and 12. Which total would be likely to appear more often – 8,9 or 10?

a) 8
b) All are equally likely
c) 9
d) 10

Q6) One day Alice meets pal and byte in fairyland. She knows that pal lies on Mondays, Tuesdays and Wednesdays and tells the truth on the other days of the week byte, on the other hand, lies on Thursdays, Fridays and Saturdays, but tells the truth on the other days of the week. Now they make the following statements to Alice – pal. Yesterday was one of those days when I lie byte. Yesterday was one of those days when I lie too. What day is it ?

a) Thursday
b) Tuesday
c) Monday
d) Sunday **(solution:a)**

Q7) A car manufacturer produces only red and blue models which come out of the final testing area completely at random. What are the odds that 5 consecutive cars of the same color will come through the test area at any one time?

a) 1 in 16
b) 1 in 125
c) 1 in 32
d) 1 in 25

Q8) Alok is attending a workshop "How to do more with less" and today's theme is *Working with fewer digits.* The speakers discuss how a lot of miraculous mathematics can be achieved if mankind(as well as womankind) had only worked with fewer digits.

The problem posed at the end of the workshop is

How many four digit numbers can be formed using the digits 1, 2,3,4 ,5 (but with repetition) that are divisible by 4?

Can you help Alok find the answer?

a) 100 b) 125 c) 75 d) 85

Q9) Rearrange the following letters to make a word and choose the category in which it Ms RAPETEKA

a) Bird
b) Vegetable
c) City

d) Fruit

Q10) On planet korba, a solar blast has melted the ice caps on its equator. 9 years after the ice melts, tiny planetoids called echina start growing on the rocks. Echina grows in the form of circle, and the relationship between the diameter of this circle and the age of echina is given by the formula

$d = 4*\sqrt{(t-9)}$ for $t \geq 9$

where d represents the diameter in mm and t the number of years since the solar blast.

Jagan recorded the radius of some echina at a particular spot as 7mm. How many years back did the solar blast occur?

a) 17
b) 21.25
c) 12.25
d) 12.06 **(solution:b)**

Q11) In the reading room of a library, there are23 reading spots. Each reading spot consists of a round table with 9 chairs placed around it. There are some readers such that in each occupied reading spot there are different numbers of readers. If in all there are 36 readers, how many reading spots do not have even a single reader?

a) 8
b) None
c) 16
d) 15 **(solution:d)**

Q12) Ferrari S.P.A is an Italian sports car manufacturer based in Maranello, Italy. Founded by Enzo Ferrari in 1928 as Scuderia Ferrari , the company sponsored drivers and manufactured race cars before moving into production of street-legal vehicles in 1947 as Feraari S.P.A. Throughout its history, the company has been noted for its continued participation in racing, especially in Formula One where it has employed great success .Rohit once bought a Ferrari . It could go 4 times as fast as Mohan's old Mercedes. If the speed of Mohan's Mercedes is 46 km/hr and the distance traveled by the Ferrari is 953 km, find the total time taken for Rohit to drive that distance.

a) 20.72
b) 5.18
c) 238.25
d) 6.18 **(solution:b)**

Q13) A sheet of paper has statements numbered from 1 to 70. For all values of n from 1 to 70. Statement n says ' At least n of the statements on this sheet are false. ' Which statements are true and which are false?

a) The even numbered statements are true and the odd numbered are false.

b) The odd numbered statements are true and the even numbered are false.

c) The first 35 statements are true and the last 35 are false.

d) The first 35 statements are false and the last 35 are false.

(solution:d)

Q14) Middle – earth is a fictional land inhabited by Hobbits, Elves, dwarves and men. The Hobbits and the Elves are peaceful creatures who prefer slow, silent lives and appreciate nature and art. The dwarves and the men engage in physical games. The game is as follows . A tournol is one where out of the two teams that play a match, the one that loses get eliminated. The matches are played in different rounds where in every round , half of the teams get eliminated from the tournament. If there are 8 rounds played in a knock-out tournol how many matches were played?

a) 257
b) 256
c) 72
d) 255 **(solution:d)**

Q15) A research lab in Chennai requires 100 mice and 75 sterilized cages for a certain set of laboratory experiments . To identify the mice, the lab has prepared labels with numbers 1 to 100 , by combining tags numbered 0 to 9. The SPCA requires that the tags be made of toxin-free material and that the temperature of the cages be maintained at 27 degree Celsius. Also , not more than 2 mice can be caged together and each cage must be at least 2 sq.ft in area. The 5 experiments to be conducted by lab are to be thoroughly documented and performed only after a round of approval by authorities. The approval procedure takes around 48 hours. How many times is the tag numbered '4' used by the lab in numbering these mice?

a) 9
b) 19
c) 20
d) 21 **(solution:b)**

Q16) There are two water tanks A and B, A is much smaller than B. While water fills at the rate of one litre every hour in A, it gets filled up like 10, 20, 40, 80, 160... in tank B.(At the end of first hour, B has 10 litres , second hour it has 20, and so on). If tank B is 1/32 filled after 21 hours, what is the total duration required to fill it completely?

a) 26 hrs
b) 25 hrs
c) 5 hrs
d) 27 hrs **(solution:a)**

Q17) Consider two tumblers, the first containing one litre of coffee. Suppose you take one spoon of water out of the first tumbler and pour it into the second tumbler. After moving you take one spoon of the mixture from the second tumbler and pour it back into the first tumbler . Which one of the following statement holds now?

a) There is less coffee in the first tumbler than water in the second tumbler.

b) There is more coffee in the firs tumbler than water in the second tumbler

c) There is as much coffee in the first tumbler as there is water in the second tumbler

d) None of the statements holds true.

Q18) Francois Pachet , a researcher at Sony Computer Science laboratories is also a jazz musician. He decided to build a robot able to improvise like a pro. Named Continuator, the robot can duet with a live musician in real- time. It listens to a musical phrase and then computes a complementary phrase with the same playing style. If the cost of making the robot is divided between and then computes a complementary phrase with the same playing style. If the cost of making the robot is divided between materials , labour and overheads in the ratio of 4:6:2.If the materials cost $108. the cost of the robot is

a) $270
b) $324
c) $216
d) $ 648 **(solution:b)**

Q19) A lady has fine gloves and hats in her closet- 18 blue- 32 red and 25 yellow. The lights are out and it is totally dark inspite of the darkness. She can make out the difference between a hat and a glove. She takes out an item out of the closet only if she is sure that if it is a glove. How many gloves must she take out to make sure she has a pair of each colour?

a) 50
b) 8
c) 60
d) 42

Q20) A man jogs at 6 mph over a certain journey and walks over the same route at 4 mph. What is his average speed for the journey?

a) 2.4 mph
b) 4 mph
c) 4.8 mph
d) 5 mph **(solution:d)**

Q21) Spores of a fungus, called late blight, grow and spread infection rapidly. These pathogens were responsible for the Irish potato famine of the mid-19th century. These seem to have attacked the tomato crops in England this year. The tomato crops have reduced and the price of the crop has risen up . The price has already

gone up to $45 a box from $27 a box a month ago. How much more would a vegetable vendor need to pay to buy 27 boxes this month over what he would have paid last month?

a) $27
b) $ 18
c) $45
d) $ 486

Q22) Given a collection of 36 points P in the plane and a point equidistant from all points in P, which of the following are necessarily true?

A. The points in P lie on a circle.

B. The distance between any pair of points in P is larger than the distance between X and a point in P

a) A and B
b) Neither A nor B
c) B only
d) A only

Q23) In the year 2002, Britain was reported to have had 4.3m closed – circuit television (CCTV) cameras – one for every 14 people in the country . This scrutiny is supposed to deter and detect crime. In one criminal case, the police interrogates two suspects . The ratio between the ages of the two suspects is 6:5 and the sum of their ages is 6:5 and the sum of their ages is 55 years. After how many years will the ratio be 8:7.?

a) 11
b) 6
c) 10
d) 5

Q24) Susan made a block with small cubes of 8 cubic cm volume to make a block 3 small cubes long, 9 small cubes wide and 5 small cubes deep. She realizes that she has used more small cubes than she really needed. She realized that she could have glued a fewer number of cubes together to lock like a block with same dimensions, if it were made hollow. What is the minimum number of cubes that she needs to make the block?

a) 114
b) 135
c) 21
d) 71

Q25) Alok and Bhanu play the following coins in a circle game. 99 coins are arranged in a circle with each coin touching two other coin. Two of the coins are special and the rest are ordinary. Alok starts and the players take turns removing an ordinary coin of their choice from the circle and bringing the other coins closer until they again form a (smaller) circle. The goal is to bring the special coins adjacent
to each other and the first player to do so wins the game. Initially the special coins are separated by two ordinary coins O1 and O2. Which of the following is true ?

a) In order to win, Alok should remove O1 on his first turn.

b) In order to win, Alok should remove one of the coins different from O1 and O2 on his first turn.

c) In order to win, Alok should remove O2 on his first turn.

d) Alok has no winning strategy.

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TCS MOCK EMAIL WRITING QUESTIONS

Directions:

1. Use all the phrases given
2. Minimum words should be 50 otherwise your email cannot be validated
3. Addressing and signing should be done as in the question given.
4. Common grammatical rules, punctuation should be according to standard English.
5. You can use your own phrases along with the phrases given.

Question : 1

As a member of your residential society, write an email to inspector of local Police station, Mr.Sharma, informing him about miscreants who ride their bikes rashly every evening outside your society. Sign the email as william.
residential area - ride - rashly - children - play - elderly - walk - grocery shop - across the road - dangerous - accidents - nuisance - action - immediately.

Sample Answer:

Dear Mr.Sharma,

We are the residents of Siddartha Nagar. We would like to bring to your notice that a few guys are riding their bikes very rashly in the evening hours in the main road of the colony. As you know that this is the time when children play on the road and elderly go for an evening walk. Also there is a grocery shop across the road and many housewifes used to cross the road to buy any groceries. In the recent times we observed that due this rash driving many accidents were happened and several injured. This is creating a constant nuisance for all. So we would like to request you to take necessary action to curb these activities.

Thanking you
Yours sincerely,
William.

Question 2:

As a recent buyer of their car, write an email to the Manager of Smart Automative company, Mr.Ahmed, regarding the poor quality of service facility available in the city. Sign the email as Chopra.
Outline:

very few - service centers - complaints - pending problems - maintenance - cost - time - delivery - increase - customer satisfaction

Dear Mr. Ahmed

I recently bought Fiat palio from "Sridhar Fiat show room" in Nagole. Recently I faced small problem with car AC and bought the car for maintenance. But to my utter surprise, the howroom staff told me that service is not available in their showroom and they asked me to take the car to near by service center. I found that there are very

few service centers available compared to sales showrooms, and there are many complaints regarding this. This in turn is causing many pending problems and increased maintenance cost, time and delivery time. I would like to suggest you that if more service centers are opened in the city, customer satisfaction also goes up which finally converts into more sales.

Thanks and Regards
Chopra

Question 3:

As a former student, write an email to your professor, Mr.Matt, thanking her for teaching and guidance that contributed to your overall development. Sign the email as peter.

Outline:

Successful - Placed - grateful - help - advice - grooming - values - shaping my future - sincere - professional

Dear Mr.Matt

I am very happy to tell you that I got successful in the recently conducted campus placement drive at my college. I am placed with TCS. I am extremely grateful for your help regarding my preparation. More over your advice regarding personality development helped for my personal grooming. In addition to that, your style of teaching inculcates not only those skills related to professional success but also for developing values which I believe helps for shaping my career. Once again I would like to thanks for your sincere and professional help.

with warm regards
Peter.

Question 4:

As an intern at ABC consulting Pvt.Ltd, write an email to your internship Project Manager, Mr.Ramesh, informing about the progress that you are making and some difficulties that your are encountering. Sign the email as Ben.

Outline:

Thank - challenging - progress - tight schedule - support - report - analytics - guidance - access - doubt - requirements - design.

Dear Mr.Ramesh
Thank you for allotting a challenging project for my internship. I am making steady progress and learning many new things. The project is due next month and we are on tight schedule. I need some additional support with regard to the reporting of Analytics. Your guidance helped me access the database with ease but I have several doubts regard to the requirements of the design. But I am facing little problem in reporting.
Thanks and regards
Ben

Tips for Effective Communication

Have courage to say what you think.

Be confident in knowing that you can make worthwhile contributions to conversation. Take time each day to be aware of your opinions and feelings so you can adequately convey them to others. Individuals who are hesitant to speak because they do not feel their input would be worthwhile need not fear. What is important or worthwhile to one person may not be to another and may be more so to someone else.

Practice.

Developing advanced communication skills begins with simple interactions. Communication skills can be practiced every day in settings that range from the social to the professional. New skills take time to refine, but each time you use your communication skills, you open yourself to opportunities and future partnerships.

Make eye contact.

Whether you are speaking or listening, looking into the eyes of the person with whom you are conversing can make the interaction more successful. Eye contact conveys interest and encourages your partner to be interested in you in return.

Use gestures.

These include gestures with your hands and face. Make your whole body talk. Use smaller gestures for individuals and small groups. The gestures should get larger as the group that one is addressing increases in size.

Manifest constructive attitudes and beliefs.

The attitudes you bring to communication will have a huge impact on the way you compose yourself and interact with others. Choose to be honest, patient, optimistic, sincere, respectful, and accepting of others. Be sensitive to other people's feelings, and believe in others' competence.

Develop effective listening skills:

Not only should one be able to speak effectively, one must listen to the other person's words and engage in communication on what the other person is speaking about. Avoid the impulse to listen only for the end of their sentence so that you can blurt out the ideas or memories your mind while the other person is speaking.

Enunciate your words.

Speak clearly and don't mumble. If people are always asking you to repeat yourself, try to do a better job of articulating yourself in a better manner.

Pronounce your words correctly.

People will judge your competency through your vocabulary. If you aren't sure of how to say a word, don't use it.

Use the right words.

If you're not sure of the meaning of a word, don't use it. Grab a dictionary and start a daily habit of learning one new word per day. Use it sometime in your conversations during the day.

Slow your speech down.

People will perceive you as nervous and unsure of yourself if you talk fast. However, be careful not to slow down to the point where people begin to finish your sentences just to help you finish.

Developing Leadership Skills

No one is a born leader; everyone can develop leadership skills and everyone can benefit from using them. First, take time to honestly analyze yourself. Learn to understand yourself.

It's the first step to understanding others. Consider these important questions:

1. What kind of leader am I? One who helps to solve problems? A leader who helps people get along? How do others see me as a leader?
2. What are my goals, purposes, and expectations in working with this particular group? Identify areas for improvement.

Ask yourself these questions:

1. Do I try to be aware of how others think and feel?
2. Do I try to help others perform to the best of their abilities?
3. Am I willing to accept responsibility?
4. Am I willing to try new ideas and new ways of doing things?
5. Am I able to communicate with others effectively?
6. Am I a good problem solver?
7. Do I accept and appreciate other perspectives and opinions?
8. Am I aware of current issues and concerns on campus or in my community?

Then after analyzing your strengths and weaknesses -- take action

Devise a strategy for upgrading your skills. Here are a few strategies to consider:

1) Communicate effectively:

Effective communication is dialogue. Barriers are created by speaking down to people, asking closed questions that elicit yes or no answers, using excessive authority, and promoting a culture that depends on unanimity. If your focus is winning the argument or if you react defensively to criticism, you'll create fear of openness and hinder the organization's growth.

Try these steps to effective communication:

• Listen actively - ask open questions. Be genuinely interested in what other's say.

• Thank people for their openness -- stress how much you value it -- even if you don't like specifically what is being said.

• Point to areas of agreement before jumping on areas of disagreement - this reduces defensiveness; members wont fear being "attacked."

• Set aside your authority to create an atmosphere of partnership to reduce fear in group members.

• Promote a culture of constructive dissent - though not to the point of paralysis.

• Portray disagreement as simply a difference of opinion. Get rid of the "I'm right, you're wrong" attitude.

2) Encourage enthusiasm and a sense of belonging. Show:

• Friendliness: others will be more willing to share ideas if you're interested in them as people too.

• Understanding: everyone makes mistakes. Try to be constructive, tolerant and tactful when offering criticism.

• Fairness: equal treatment and equal opportunity lead to an equally good effort from all group members.

• Integrity: members will take tasks more seriously if you show that you're more interested in group goals than your own personal gain.

3) Keep everyone working toward agreed upon goals:

• Remind everyone of the group's purposes from time to time. It's easy to become too narrowly focused and lose sight of the larger goals.

• Provide encouragement and motivation, by showing your appreciation for good ideas and extra effort.

• Harmonize differences and disagreements between group members by stressing compromise and cooperation.

• Involve everyone in discussions and decisions, even if asking for opinions and ideas means a longer discussion.

4) Get to know the people around you Everyone has different abilities, wants, needs, and purpose in life.

To get along with others and get results, you need to get to know them.

• Interact with group members as often as possible. The only way to get to know someone is through direct personal contact.

• Become familiar with every member of your group. Take note of each person's unique qualities and characteristics.

5) Treat others as individuals

Put your knowledge and understanding of each group member to work!

• Be aware of expectations. Everyone expects something different: recognition, a chance to learn, a chance to work with other people, etc.

• Be creative. A repetitious routine can cause boredom. A successful leader thinks of new and better approaches to old ways of doing things.

• Provide rewards. Recognition by the group is a source of personal satisfaction and positive reinforcement for a job well done.

• Delegate responsibilities. If everyone shares the work, everyone can share pride in the group's accomplishments. Let each member know what's expected of him/her, available resources, deadlines, etc.

6) Accept responsibility for getting things done

• Take the initiative. Why stand around and wait for someone else to get things started? Set an example.

• Offer help and information. Your unique knowledge and skills may be just what's needed.

• Seek help and information. Ask for advice if you need it. This will encourage group involvement and help accomplish group goals.

• Make things happen. By being decisive, energetic, and enthusiastic, you can and will help get things done!

• Know when and how to say "no."

If your time and resources are already committed, turn down extra tasks, but do it nicely.

7) Problem solve in a step - by-step way

Whether you are faced with a decision to make or a conflict to resolve, following a logical approach will help.

1. State the problem as simply and clearly as possible.
2. Gather all relevant information and available resources.
3. Brainstorm as many ideas or solutions as you can think of (with others if possible).
4. Evaluate each idea or solution and choose the best one.
5. Design a plan for using your idea or solution. Include a timetable, assigned roles, and resources to be used.
6. Follow up on your plan by asking if your idea worked and why or why not.

Q. 1 – Q. 5 carry one mark each.

Q.1 The man who is now Municipal Commissioner worked as _____.

(A) the security guard at a university

(B) a security guard at the university

(C) a security guard at university

(D) the security guard at the university

Q.2 Nobody knows how the Indian cricket team is going to cope with the difficult and seamer-friendly wickets in Australia.

Choose the option which is closest in meaning to the underlined phrase in the above sentence.

(A) put up with (B) put in with (C) put down to (D) put up against

Q.3 Find the odd one in the following group of words.

mock, deride, praise, jeer

(A) mock (B) deride (C) praise (D) jeer

Q.4 Pick the odd one from the following options.

(A) CADBE (B) JHKIL (C) XVYWZ (D) ONPMQ

Q.5 In a quadratic function, the value of the product of the roots (α, β) is 4. Find the value of

$$\frac{\alpha^n + \beta^n}{\alpha^{-n} + \beta^{-n}}$$

(A) n^4 (B) 4^n (C) 2^{2n-1} (D) 4^{n-1}

Q. 6 – Q. 10 carry two marks each.

Q.6 Among 150 faculty members in an institute, 55 are connected with each other through Facebook® and 85 are connected through WhatsApp®. 30 faculty members do not have Facebook® or WhatsApp® accounts. The number of faculty members connected only through Facebook® accounts is _____.

(A) 35 (B) 45 (C) 65 (D) 90

Q.7 Computers were invented for performing only high-end useful computations. However, it is no understatement that they have taken over our world today. The internet, for example, is ubiquitous. Many believe that the internet itself is an unintended consequence of the original invention. With the advent of mobile computing on our phones, a whole new dimension is now enabled. One is left wondering if all these developments are good or, more importantly, required.

Which of the statement(s) below is/are logically valid and can be inferred from the above paragraph?

(i) The author believes that computers are not good for us.
(ii) Mobile computers and the internet are both intended inventions

(A) (i) only (B) (ii) only (C) both (i) and (ii) (D) neither (i) nor (ii)

Q.8 All hill-stations have a lake. Ooty has two lakes.

Which of the statement(s) below is/are logically valid and can be inferred from the above sentences?

(i) Ooty is not a hill-station.
(ii) No hill-station can have more than one lake.

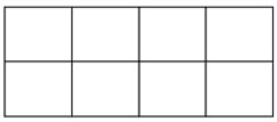
(A) (i) only

(B) (ii) only

(C) both (i) and (ii)

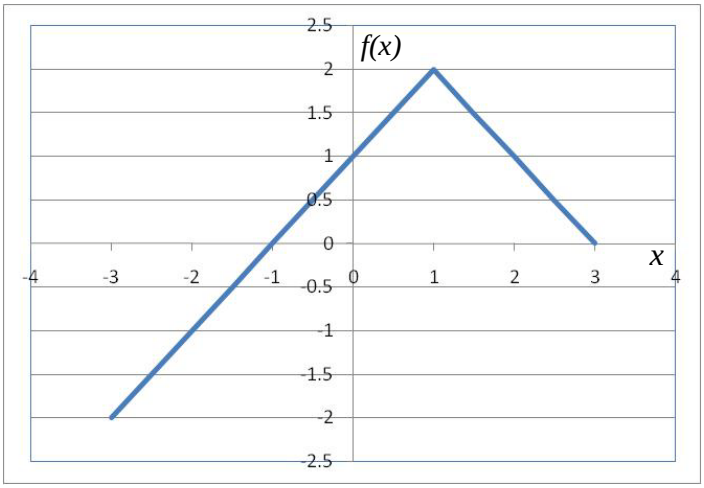
(D) neither (i) nor (ii)

Q.9 In a 2 × 4 rectangle grid shown below, each cell is a rectangle. How many rectangles can be observed in the grid?



(A) 21 (B) 27 (C) 30 (D) 36

Q.10



Choose the correct expression for *f(x)* given in the graph.

(A) $f(x) = 1 - |x - 1|$

(B) $f(x) = 1 + |x - 1|$

(C) $f(x) = 2 - |x - 1|$

(D) $f(x) = 2 + |x - 1|$

END OF THE QUESTION PAPER

Q. 1 – Q. 25 carry one mark each.

Q.1 The maximum value attained by the function $f(x) = x(x-1)(x-2)$ in the interval [1, 2] is _____.

Q.2 Consider a 3×3 matrix with every element being equal to 1. Its only non-zero eigenvalue is ____.

Q.3 The Laplace Transform of $f(t) = e^{2t}\sin(5t)\,u(t)$ is

(A) $\frac{5}{s^2-4s+29}$ (B) $\frac{5}{s^2+5}$ (C) $\frac{s-2}{s^2-4s+29}$ (D) $\frac{5}{s+5}$

Q.4 A function $y(t)$, such that $y(0) = 1$ and $y(1) = 3e^{-1}$, is a solution of the differential equation $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y = 0$. Then $y(2)$ is

(A) $5e^{-1}$ (B) $5e^{-2}$ (C) $7e^{-1}$ (D) $7e^{-2}$

Q.5 The value of the integral

$$\oint_C \frac{2z+5}{\left(z-\frac{1}{2}\right)(z^2-4z+5)}dz$$

over the contour $|z| = 1$, taken in the anti-clockwise direction, would be

(A) $\frac{24\pi i}{13}$ (B) $\frac{48\pi i}{13}$ (C) $\frac{24}{13}$ (D) $\frac{12}{13}$

Q.6 The transfer function of a system is $\frac{Y(s)}{R(s)} = \frac{s}{s+2}$. The steady state output $y(t)$ is $A\cos(2t+\varphi)$ for the input $\cos(2t)$. The values of A and φ, respectively are

(A) $\frac{1}{\sqrt{2}}, -45^\circ$ (B) $\frac{1}{\sqrt{2}}, +45^\circ$ (C) $\sqrt{2}, -45^\circ$ (D) $\sqrt{2}, +45^\circ$

Q.7 The phase cross-over frequency of the transfer function $G(s) = \frac{100}{(s+1)^3}$ in rad/s is

(A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) 3 (D) $3\sqrt{3}$

Q.8 Consider a continuous-time system with input $x(t)$ and output $y(t)$ given by

$$y(t) = x(t)\cos(t)$$

This system is

(A) linear and time-invariant
(B) non-linear and time-invariant
(C) linear and time-varying
(D) non-linear and time-varying

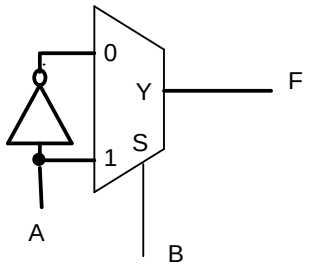
Q.9 The value of $\int_{-\infty}^{+\infty} e^{-t}\,\delta(2t-2)\,dt$, where $\delta(t)$ is the Dirac delta function, is

(A) $\frac{1}{2e}$ (B) $\frac{2}{e}$ (C) $\frac{1}{e^2}$ (D) $\frac{1}{2e^2}$

Q.10 A temperature in the range of -40° C to 55° C is to be measured with a resolution of 0.1° C. The minimum number of ADC bits required to get a matching dynamic range of the temperature sensor is

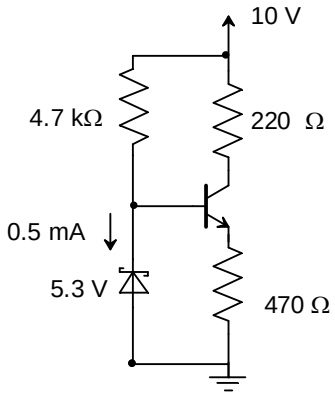
(A) 8 (B) 10 (C) 12 (D) 14

Q.11 Consider the following circuit which uses a 2-to-1 multiplexer as shown in the figure below. The Boolean expression for output F in terms of A and B is



(A) $A \oplus B$ (B) $\overline{A+B}$ (C) $A+B$ (D) $\overline{A \oplus B}$

Q.12 A transistor circuit is given below. The Zener diode breakdown voltage is 5.3 V as shown. Take base to emitter voltage drop to be 0.6 V. The value of the current gain β is _____.

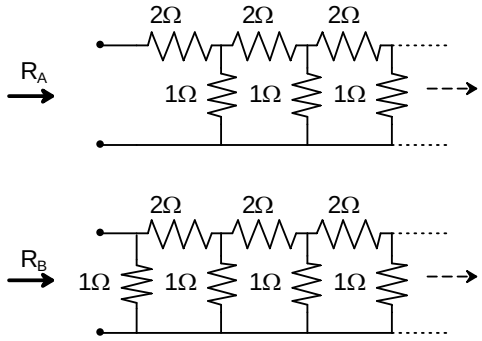


Q.13 In cylindrical coordinate system, the potential produced by a uniform ring charge is given by $\varphi = f(r, z)$, where f is a continuous function of r and z. Let $\vec{E}$ be the resulting electric field. Then the magnitude of $\nabla \times \vec{E}$

(A) increases with r. (B) is 0. (C) is 3. (D) decreases with z.

Q.14 A soft-iron toroid is concentric with a long straight conductor carrying a direct current I. If the relative permeability μ_r of soft-iron is 100, the ratio of the magnetic flux densities at two adjacent points located just inside and just outside the toroid, is _____.

Q.15 R_A and R_B are the input resistances of circuits as shown below. The circuits extend infinitely in the direction shown. Which one of the following statements is TRUE?

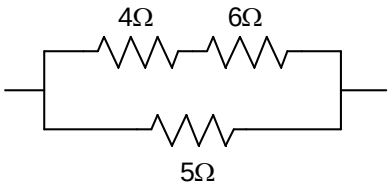


(A) $R_A=R_B$ (B) $R_A=R_B=0$ (C) $R_A< R_B$ (D) $R_B= R_A /(1+R_A)$

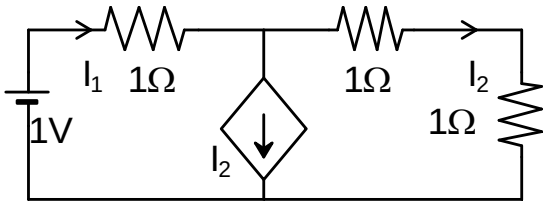
Q.16 In a constant V/f induction motor drive, the slip at the maximum torque

(A) is directly proportional to the synchronous speed.
(B) remains constant with respect to the synchronous speed.
(C) has an inverse relation with the synchronous speed.
(D) has no relation with the synchronous speed.

Q.17 In the portion of a circuit shown, if the heat generated in 5 Ω resistance is 10 calories per second, then heat generated by the 4 Ω resistance, in calories per second, is _____.



Q.18 In the given circuit, the current supplied by the battery, in ampere, is _____.



Q.19 In a 100 bus power system, there are 10 generators. In a particular iteration of Newton Raphson load flow technique (in polar coordinates), two of the PV buses are converted to PQ type. In this iteration,

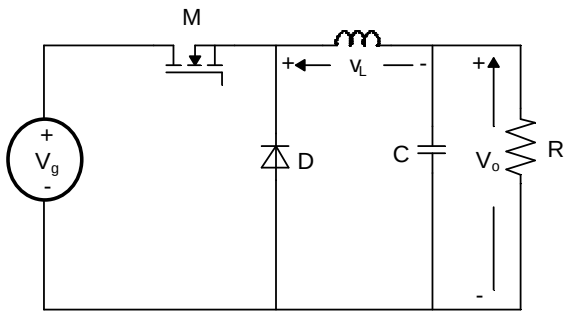
(A) the number of unknown voltage angles increases by two and the number of unknown voltage magnitudes increases by two.
(B) the number of unknown voltage angles remains unchanged and the number of unknown voltage magnitudes increases by two.
(C) the number of unknown voltage angles increases by two and the number of unknown voltage magnitudes decreases by two.
(D) the number of unknown voltage angles remains unchanged and the number of unknown voltage magnitudes decreases by two.

Q.20 The magnitude of three-phase fault currents at buses A and B of a power system are 10 pu and 8 pu, respectively. Neglect all resistances in the system and consider the pre-fault system to be unloaded. The pre-fault voltage at all buses in the system is 1.0 pu. The voltage magnitude at bus B during a three-phase fault at bus A is 0.8 pu. The voltage magnitude at bus A during a three-phase fault at bus B, in pu, is _____.

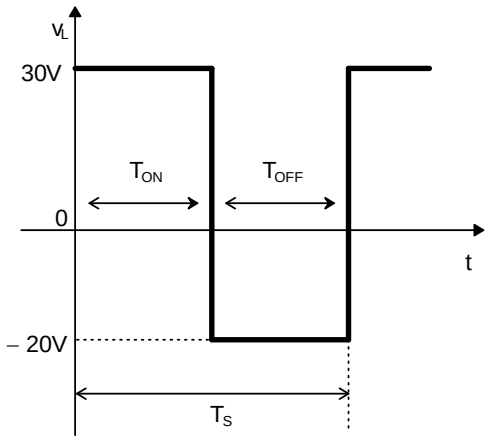
Q.21 Consider a system consisting of a synchronous generator working at a lagging power factor, a synchronous motor working at an overexcited condition and a directly grid-connected induction generator. Consider capacitive VAr to be a source and inductive VAr to be a sink of reactive power. Which one of the following statements is TRUE?

(A) Synchronous motor and synchronous generator are sources and induction generator is a sink of reactive power.
(B) Synchronous motor and induction generator are sources and synchronous generator is a sink of reactive power.
(C) Synchronous motor is a source and induction generator and synchronous generator are sinks of reactive power.
(D) All are sources of reactive power.

Q.22 A buck converter, as shown in Figure (a) below, is working in steady state. The output voltage and the inductor current can be assumed to be ripple free. Figure (b) shows the inductor voltage v_L during a complete switching interval. Assuming all devices are ideal, the duty cycle of the buck converter is _____.

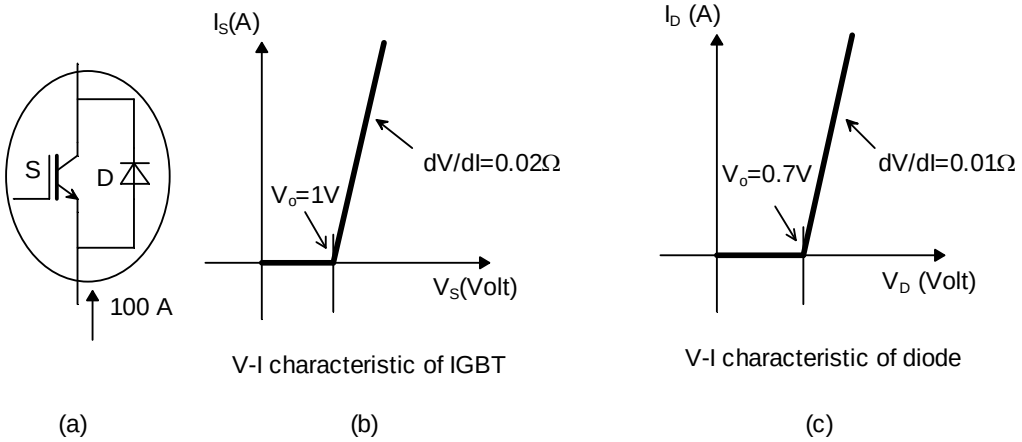


(a)



(b)

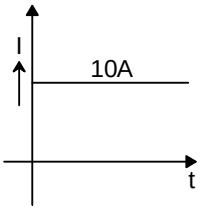
Q.23 A steady dc current of 100 A is flowing through a power module (S, D) as shown in Figure (a). The V-I characteristics of the IGBT (S) and the diode (D) are shown in Figures (b) and (c), respectively. The conduction power loss in the power module (S, D), in watts, is _____.



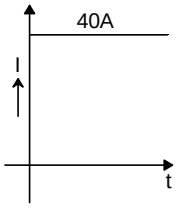
(a) (b) (c)

Q.24 A 4-pole, lap-connected, separately excited dc motor is drawing a steady current of 40 A while running at 600 rpm. A good approximation for the waveshape of the current in an armature conductor of the motor is given by

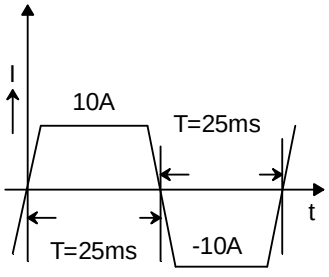
(A)



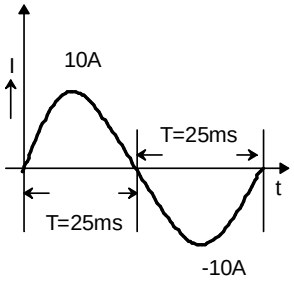
(B)



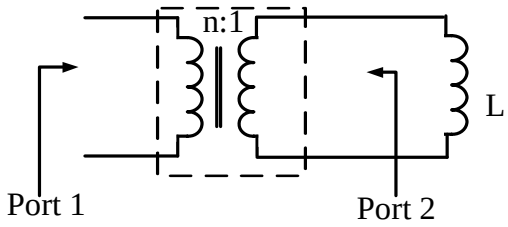
(C)



(D)



Q.25 If an ideal transformer has an inductive load element at port 2 as shown in the figure below, the equivalent inductance at port 1 is



(A) nL (B) n^2L (C) $\frac{n}{L}$ (D) $\frac{n^2}{L}$

Q. 26 – Q. 55 carry two marks each.

Q.26 Candidates were asked to come to an interview with 3 pens each. Black, blue, green and red were the permitted pen colours that the candidate could bring. The probability that a candidate comes with all 3 pens having the same colour is _____.

Q.27 Let $S = \sum_{n=0}^{\infty} n\alpha^n$ where $|\alpha| < 1$. The value of α in the range $0 < \alpha < 1$, such that $S = 2\alpha$ is _____.

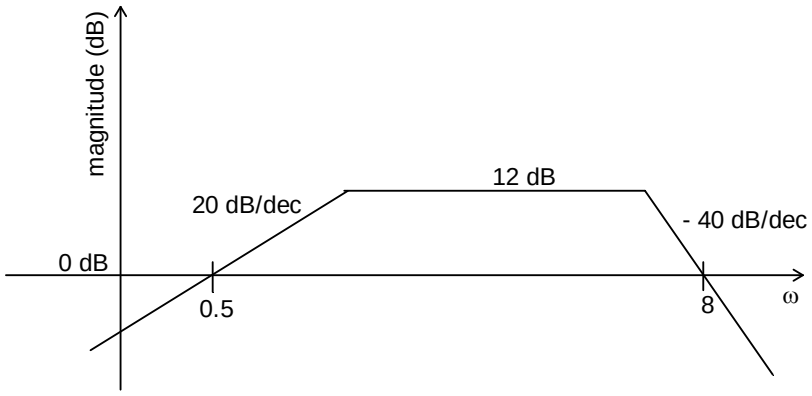
Q.28 Let the eigenvalues of a 2 x 2 matrix A be 1, -2 with eigenvectors x_1 and x_2 respectively. Then the eigenvalues and eigenvectors of the matrix $A^2 - 3A + 4I$ would, respectively, be

(A) 2, 14; x_1, x_2
(B) 2, 14; $x_1 + x_2, x_1 - x_2$
(C) 2, 0; x_1, x_2
(D) 2, 0; $x_1 + x_2, x_1 - x_2$

Q.29 Let A be a 4×3 real matrix with rank 2. Which one of the following statement is TRUE?

(A) Rank of A^TA is less than 2.
(B) Rank of A^TA is equal to 2.
(C) Rank of A^TA is greater than 2.
(D) Rank of A^TA can be any number between 1 and 3.

Q.30 Consider the following asymptotic Bode magnitude plot (ω is in rad/s).



Which one of the following transfer functions is best represented by the above Bode magnitude plot?

(A) $\frac{2s}{(1+0.5s)(1+0.25s)^2}$

(B) $\frac{4(1+0.5s)}{s(1+0.25s)}$

(C) $\frac{2s}{(1+2s)(1+4s)}$

(D) $\frac{4s}{(1+2s)(1+4s)^2}$

Q.31 Consider the following state-space representation of a linear time-invariant system.

$$\dot{\boldsymbol{x}}(t) = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix} \boldsymbol{x}(t),\ \ y(t) = \boldsymbol{c}^{\mathrm{T}}\boldsymbol{x}(t),\ \ \boldsymbol{c} = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \text{ and } \boldsymbol{x}(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

The value of $y(t)$ for $t = \log_e 2$ is _____.

Q.32 Loop transfer function of a feedback system is $G(s)H(s) = \frac{s+3}{s^2(s-3)}$. Take the Nyquist contour in the clockwise direction. Then, the Nyquist plot of $G(s)H(s)$ encircles $-1+j0$

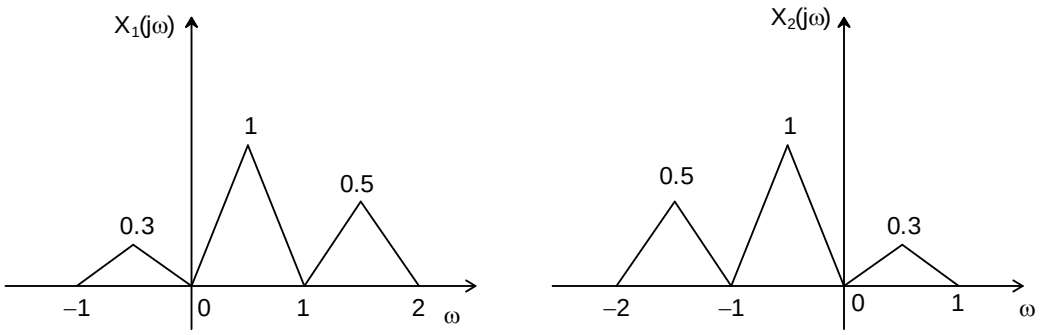
(A) once in clockwise direction
(B) twice in clockwise direction
(C) once in anticlockwise direction
(D) twice in anticlockwise direction

Q.33 Given the following polynomial equation

$$s^3 + 5.5\,s^2 + 8.5\,s + 3 = 0,$$

the number of roots of the polynomial, which have real parts strictly less than -1, is _____ .

Q.34 Suppose $x_1(t)$ and $x_2(t)$ have the Fourier transforms as shown below.



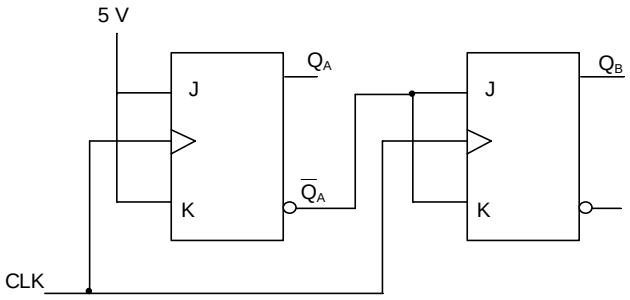
Which one of the following statements is TRUE?

(A) $x_1(t)$ and $x_2(t)$ are complex and $x_1(t)x_2(t)$ is also complex with nonzero imaginary part
(B) $x_1(t)$ and $x_2(t)$ are real and $x_1(t)x_2(t)$ is also real
(C) $x_1(t)$ and $x_2(t)$ are complex but $x_1(t)x_2(t)$ is real
(D) $x_1(t)$ and $x_2(t)$ are imaginary but $x_1(t)x_2(t)$ is real

Q.35 The output of a continuous-time, linear time-invariant system is denoted by $\boldsymbol{T}\{x(t)\}$ where $x(t)$ is the input signal. A signal $z(t)$ is called eigen-signal of the system $\boldsymbol{T}$, when $\boldsymbol{T}\{z(t)\} = \gamma\, z(t)$, where γ is a complex number, in general, and is called an eigenvalue of $\boldsymbol{T}$. Suppose the impulse response of the system $\boldsymbol{T}$ is real and even. Which of the following statements is TRUE?

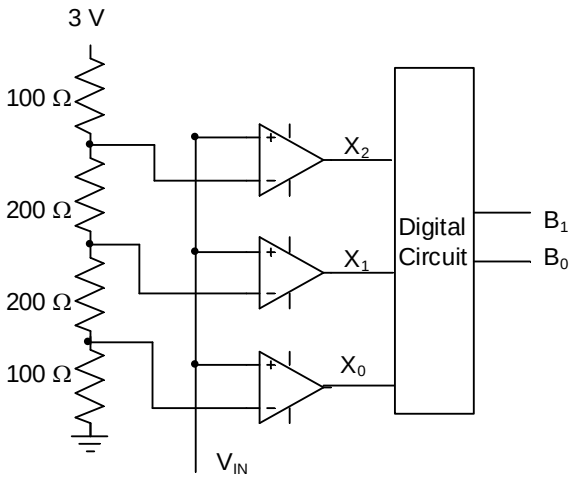
(A) $\cos(t)$ is an eigen-signal but $\sin(t)$ is not
(B) $\cos(t)$ and $\sin(t)$ are both eigen-signals but with different eigenvalues
(C) $\sin(t)$ is an eigen-signal but $\cos(t)$ is not
(D) $\cos(t)$ and $\sin(t)$ are both eigen-signals with identical eigenvalues

Q.36 The current state $Q_A\,Q_B$ of a two JK flip-flop system is 00. Assume that the clock rise-time is much smaller than the delay of the JK flip-flop. The next state of the system is



(A) 00 (B) 01 (C) 11 (D) 10

Q.37 A 2-bit flash Analog to Digital Converter (ADC) is given below. The input is $0 \leq V_{IN} \leq 3$ Volts. The expression for the LSB of the output B_0 as a Boolean function of X_2, X_1, and X_0 is

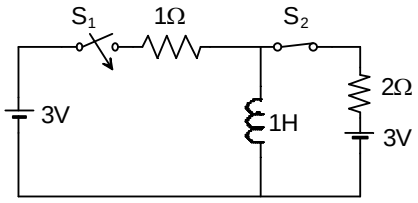


(A) $X_0[\overline{X_2 \oplus X_1}]$ (B) $\bar{X}_0[\overline{X_2 \oplus X_1}]$ (C) $X_0[X_2 \oplus X_1]$ (D) $\bar{X}_0[X_2 \oplus X_1]$

Q.38 Two electric charges q and $-2q$ are placed at (0,0) and (6,0) on the *x-y* plane. The equation of the zero equipotential curve in the *x-y* plane is

(A) $x = -2$ (B) $y = 2$ (C) $x^2 + y^2 = 2$ (D) $(x + 2)^2 + y^2 = 16$

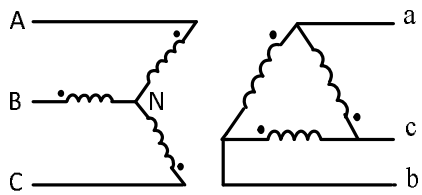
Q.39 In the circuit shown, switch S_2 has been closed for a long time. At time $t = 0$ switch S_1 is closed. At $t = 0^+$, the rate of change of current through the inductor, in amperes per second, is _____.



Q.40 A three-phase cable is supplying 800 kW and 600 kVAr to an inductive load. It is intended to supply an additional resistive load of 100 kW through the same cable without increasing the heat dissipation in the cable, by providing a three-phase bank of capacitors connected in star across the load. Given the line voltage is 3.3 kV, 50 Hz, the capacitance per phase of the bank, expressed in microfarads, is _____.

Q.41 A 30 MVA, 3-phase, 50 Hz, 13.8 kV, star-connected synchronous generator has positive, negative and zero sequence reactances, 15%, 15% and 5% respectively. A reactance (X_n) is connected between the neutral of the generator and ground. A double line to ground fault takes place involving phases 'b' and 'c', with a fault impedance of j0.1 p.u. The value of X_n (in p.u.) that will limit the positive sequence generator current to 4270 A is _____.

Q.42 If the star side of the star-delta transformer shown in the figure is excited by a negative sequence voltage, then

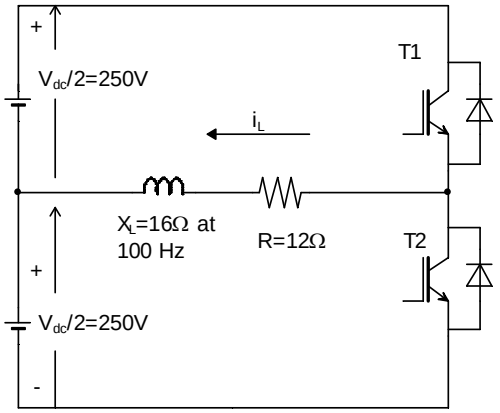


(A) V_{AB} leads V_{ab} by 60°
(B) V_{AB} lags V_{ab} by 60°
(C) V_{AB} leads V_{ab} by 30°
(D) V_{AB} lags V_{ab} by 30°

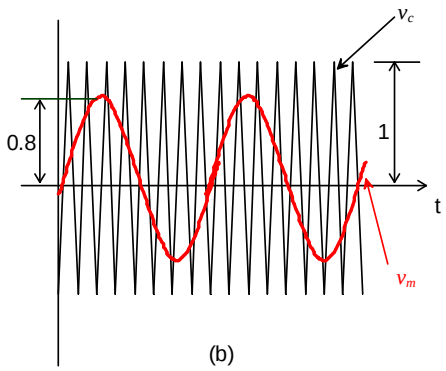
Q.43 A single-phase thyristor-bridge rectifier is fed from a 230 V, 50 Hz, single-phase AC mains. If it is delivering a constant DC current of 10 A, at firing angle of 30°, then value of the power factor at AC mains is

(A) 0.87 (B) 0.9 (C) 0.78 (D) 0.45

Q.44 The switches T1 and T2 in Figure (a) are switched in a complementary fashion with sinusoidal pulse width modulation technique. The modulating voltage $v_m(t) = 0.8 \sin(200\pi t)$ V and the triangular carrier voltage (v_c) are as shown in Figure (b). The carrier frequency is 5 kHz. The peak value of the 100 Hz component of the load current (i_L), in ampere, is _____ .

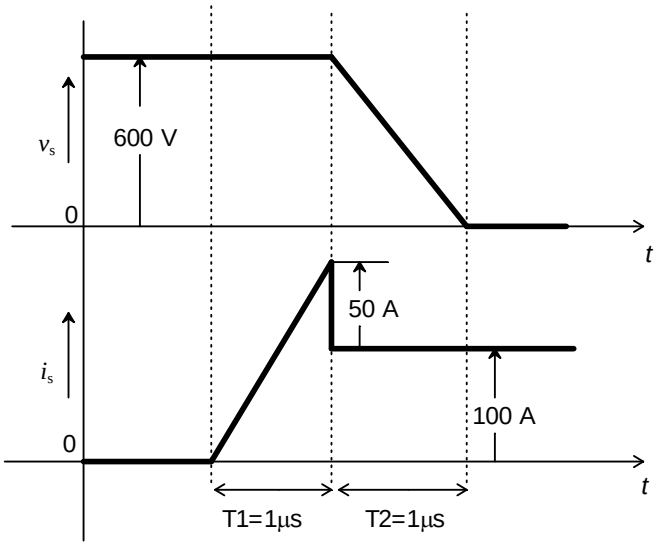


(a)



(b)

Q.45 The voltage (v_s) across and the current (i_s) through a semiconductor switch during a turn-ON transition are shown in figure. The energy dissipated during the turn-ON transition, in mJ, is _____.



Q.46 A single-phase 400 V, 50 Hz transformer has an iron loss of 5000 W at the rated condition. When operated at 200 V, 25 Hz, the iron loss is 2000 W. When operated at 416 V, 52 Hz, the value of the hysteresis loss divided by the eddy current loss is _____.

Q.47 A DC shunt generator delivers 45 A at a terminal voltage of 220 V. The armature and the shunt field resistances are 0.01 Ω and 44 Ω respectively. The stray losses are 375 W. The percentage efficiency of the DC generator is _____.

Q.48 A three-phase, 50 Hz salient-pole synchronous motor has a per-phase direct-axis reactance (X_d) of 0.8 pu and a per-phase quadrature-axis reactance (X_q) of 0.6 pu. Resistance of the machine is negligible. It is drawing full-load current at 0.8 pf (leading). When the terminal voltage is 1 pu, per-phase induced voltage, in pu, is _____.

Q.49 A single-phase, 22 kVA, 2200 V/ 220 V, 50 Hz, distribution transformer is to be connected as an auto-transformer to get an output voltage of 2420 V. Its maximum kVA rating as an auto-transformer is

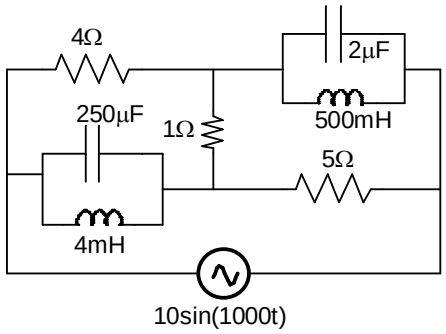
(A) 22 (B) 24.2 (C) 242 (D) 2420

Q.50 A single-phase full-bridge voltage source inverter (VSI) is fed from a 300 V battery. A pulse of 120^o duration is used to trigger the appropriate devices in each half-cycle. The rms value of the fundamental component of the output voltage, in volts, is

(A) 234 (B) 245 (C) 300 (D) 331

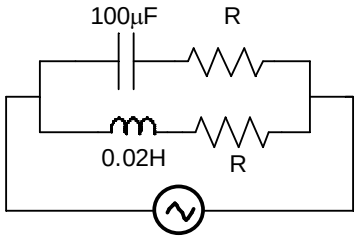
Q.51 A single-phase transmission line has two conductors each of 10 mm radius. These are fixed at a center-to-center distance of 1 m in a horizontal plane. This is now converted to a three-phase transmission line by introducing a third conductor of the same radius. This conductor is fixed at an equal distance D from the two single-phase conductors. The three-phase line is fully transposed. The positive sequence inductance per phase of the three-phase system is to be 5% more than that of the inductance per conductor of the single-phase system. The distance D, in meters, is _____.

Q.52 In the circuit shown below, the supply voltage is $10\sin(1000t)$ volts. The peak value of the steady state current through the 1 Ω resistor, in amperes, is _____.

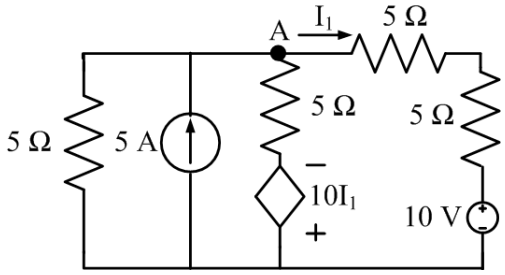


Q.53 A dc voltage with ripple is given by $v(t) = [100 + 10\sin(\omega t) - 5\sin(3\omega t)]$ volts. Measurements of this voltage $v(t)$, made by moving-coil and moving-iron voltmeters, show readings of V_1 and V_2 respectively. The value of $V_2 - V_1$, in volts, is _____.

Q.54 The circuit below is excited by a sinusoidal source. The value of R, in Ω, for which the admittance of the circuit becomes a pure conductance at all frequencies is _____.



Q.55 In the circuit shown below, the node voltage V_A is _____ V.



END OF THE QUESTION PAPER

GATE QUESTION – 2016 ANSWER

Q. No	Type	Section	Key	Marks
1	MCQ	GA	B	1
2	MCQ	GA	A	1
3	MCQ	GA	C	1
4	MCQ	GA	D	1
5	MCQ	GA	B	1
6	MCQ	GA	A	2
7	MCQ	GA	D	2
8	MCQ	GA	D	2
9	MCQ	GA	C	2
10	MCQ	GA	C	2
1	NAT	EE-1	0.0 : 0.0	1
2	NAT	EE-1	3.0 : 3.0	1
3	MCQ	EE-1	A	1
4	MCQ	EE-1	B	1
5	MCQ	EE-1	B	1
6	MCQ	EE-1	B	1
7	MCQ	EE-1	A	1
8	MCQ	EE-1	C	1
9	MCQ	EE-1	A	1
10	MCQ	EE-1	B	1
11	MCQ	EE-1	D	1
12	NAT	EE-1	18.0 : 20.0	1
13	MCQ	EE-1	B	1
14	NAT	EE-1	99.0 : 101.0	1
15	MCQ	EE-1	D	1
16	MCQ	EE-1	C	1
17	NAT	EE-1	1.9 : 2.1	1
18	NAT	EE-1	0.5 : 0.5	1
19	MCQ	EE-1	B	1
20	NAT	EE-1	0.83 : 0.85	1
21	MCQ	EE-1	A	1
22	NAT	EE-1	0.39 : 0.41	1
23	NAT	EE-1	169.0 : 171.0	1
24	MCQ	EE-1	C	1
25	MCQ	EE-1	B	1
26	NAT	EE-1	0.2 : 0.2	2
27	NAT	EE-1	0.28 : 0.31	2
28	MCQ	EE-1	A	2
29	MCQ	EE-1	B	2
30	MCQ	EE-1	A	2
31	NAT	EE-1	5.9 : 6.1	2
32	MCQ	EE-1	A	2
33	NAT	EE-1	2.0 : 2.0	2
34	MCQ	EE-1	C	2
35	MCQ	EE-1	D	2
36	MCQ	EE-1	C	2
37	MCQ	EE-1	A	2
38	MCQ	EE-1	D	2
39	NAT	EE-1	1.9 : 2.1	2
40	NAT	EE-1	47.0 :	2
41	NAT	EE-1	1.05 :	2
42	MCQ	EE-1	D	2
43	MCQ	EE-1	C	2
44	NAT	EE-1	9.9 :	2
45	NAT	EE-1	74.0 :	2
46	NAT	EE-1	1.4 :	2
47	NAT	EE-1	86.0 :	2
48	NAT	EE-1	1.58 :	2
49	MCQ	EE-1	C	2
50	MCQ	EE-1	A	2
51	NAT	EE-1	1.41 :	2
52	NAT	EE-1	1.0 :	2
53	NAT	EE-1	0.30 :	2
54	NAT	EE-1	14.0 :	2
55	NAT	EE-1	11.25	2

K.L.N. College of Engineering.

How to prepare for Anna University Examinations.

1. Don't study just for passing the tests/exams. Ensure that you understood the concepts and you can explain/ demonstrate/justify/analyze/ answer/ argue/ design /implement/draw/develop any mathematical model, based on what you have learnt. If you are confident enough, you can successfully solve any question papers/technical interviews/competitive examinations at any time without fear/confusion/ delay. Remember that, you will be working in an environment, after graduation, where all the process/operation of machineries/equipments are based on the basic scientific and engineering concepts what you have studied from first year to final year of your Engineering programme, where you are the only person to solve any problems aroused. You can't get away/escape from these. Hence, it is a lifelong learning, a wonderful experience.

2. Syllabus, books (at least 2-one Text books as prescribed in the syllabus, -one local author book) previous year question papers(atleast10), class notes, are your God/religion/food/ destiny/light. Ensure that you have studied all the contents of the syllabus, prepared correct answers for all questions in the AU question paper. **Remember that ignoring any one word in the syllabus** means you are losing 5 to 10 marks in each unit in the AU exams. Similarly, ignoring any one questions in the previous year question paper means you are losing 10 marks in each unit of AU exams. Don't expect that your Professor would cover 100% of the syllabus. Even if he/she has covered 100% of the syllabus don't think that he/she has covered 100% of each line in the syllabus. It is your responsibility to prepare 10% in excess of each lines in each units of the syllabus in addition to the contents taught by your Professors. This is possible by referring the books and the questions asked in the competitive exam books like GATE/TANCET/IES.

3. Plan your studies –right from the second week of the commencement of the classes till the semester examination is over. In a year, you will be attending the college only for 200 days(including theory/practical exams-8hours /day). You have 165 days(24 hours /day) away from the college. Prepare a time table from Monday-Friday. Take a rest on Saturday and Sunday. Allocate 3-4 hours in the evening for study.1-2 hours for completing assignments/observation/record note work. Remaining 2-3 hours for studying subjects A,B.(Mon),C,D(Tue)E,F(Wed), A,B(Thu),C,D(Fri),E,F(Sat or Sun).Each day, in addition to studying subjects for the current syllabus, you should refer competitive exam books (GATE/TANCET/IES/ Objective type questions –technical) corresponding to the current syllabus. This parallel preparation will ensure that you have prepared for state level and National level examinations there by you will be meeting the expectations of the Engineering Educational Objectives. Your preparation for AU examination should be vigorous (minimum), 15 days from the commencement of the exam and it should be maximum 2 days before the exam. You need to allocate for 8 hours per day during minimum days(early morning-6AM-10AM with a break for an hour,10AM-12 Noon-sleep/rest,12 noon-2PM-study,2PM-5PM-sleep/rest,6PM-10PM –study).Repetition/memorizing is required to retain certain contents to improve confidence on the subject. During rest time you can have group discussion with your friends or you can teach slow learners, thereby you will gain more knowledge and also help others.

4. Presentation – AU exam-General complaints by students that the valuation is not fair or poor valuation. Remarks of examiners that there is nothing in the answer paper. Parents may say that either "college is not good" or "it is a fate". Public may say "poor quality" and the experts may comment that " only 20% are employable". These statements will go on for centuries. Many students believes that they have written right answers mostly(but many of them actually wrong) and few examiners assumed certain answers by students are wrong(but many of them are actually correct). It is 70% true that students are not presenting

the answers well and it is 30% true that the valuation is not fair. But it is 95% true that the deserved students are getting expected results in most of the papers. This is because of good presentation. Good presentation involves many factors such as legible writing, good handwriting. answering correctly(100% correct),all answers with mathematical modeling/pictorial representation/drawing/layout/sketches with different colours, writing 7 pages for 16 mark questions with valid points and sketches, 4 pages for 8 marks with valid points and sketches/drawings/equations, characterizes,. Such students will solve problems correctly without any overwriting/ strikeouts. Simply, they do not cheat. These are the in-born qualities or developed over the years due to good habits, friendship, good character, obedience, hard work, well brought up by parents and blessing by God. Everyone can become like them if their attitude is good. Fear of God is the beginning of Wisdom. The examiners will know about your quality, just by referring the way you have answered Part-A- questions. A well prepared student would get a maximum of 18 out of 20 .This impresses the examiner so that they will award a maximum of 14-16 for each part-B-questions. Most of the students would answer wrongly in the Part-A-questions. This is due to their poor preparation during Class tests/internal tests, frequently taking leave, lot of diversion, skipping the classes for attending Co-Curricular/ /extra-curricular activities etc inside or outside the college.. Attending the classes is more important than attending college. Students are expected to attend 98%classes to maintain the continuity of the subjects learnt. One day absence means it will take a week to study on his/her own. If he/she fails to study on his/her own to review the classes not attended means a loss of 10 marks in the exams.

5. Know well about Why one should apply for revaluation without /with Photocopy, schedule and fees to be paid. Some times a well deserved students get low CGPA than he/she expected or even may fail. This may be due to error in valuation/data entry. Hence such students should not hesitate to apply for revaluation with/without photocopy. The parents should also be informed, all about these unfortunates (the misunderstanding between parents /sons/daughter/faculty may lead to unnecessary things).90% of those deserved students who applied for revaluation with photo copy benefitted after revaluation. Ignorance/communication failure of these formalities, by deserved students, may damage their life. Some students failed in revaluation secured “S”grade in the REVIEW, shows some hope in the examination system and the better prospect of the students.

6. Need to maintain high CGPA in every semester. :This is possible only when one gets “S” grade in all practical’s (from first to eighth semester).Those who are regular in attending the lab classes, submitting the observation and record note in time, disciplined behavior with staff and students in the class room/laboratory/campus etc will impress the faculty in-charge of practical’s, so that he/she will help such students during regular lab classes. This will improve the students to do the lab experiments with confidence and fetch them toget more marks. This will reflect in internal assessment marks also. Classification of degree-First class with distinction-More than 8.5CGPA(passed all subjects in first attempt),First class-More than 6.5CGPA at the end of eighth semester, less than this would be second class.

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6. M.E. – Computer Science & Engineering
7. M.E. – Computer Science & Engineering (with Specialization in Networks)