K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

(Approved by AICTE, New Delhi, Recognized Research center, and permanently affiliated to Anna University, Chennai)

(Three times Accredited by NBA, New Delhi)

B.E. – EEE – II – Semester - Students Hand book – EVEN Semester of 2015 – 2016

This Hand 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, Blooms Taxonomy.
3. Engineering Ethics.
4. Academic Calendar – 2015 – 2016 (Even semester).
5. Class Time Table.
6. B.E. – EEE – Syllabus – II Semester.
7. Lecture Schedule, Tutorial, Assignment questions, Seminar, Self-study topics (CT).
8. Anna University question papers (Previous years).
9. Reminders on Placement and Career Guidance.
10. General Reminders
11. All India Installed capacity (in MW) of power stations.
12. Skill Development and Entrepreneurship Programmes-Schedule- Advanced Training Institute – Guindy Industrial Estate-Chennai.

- Continued in the Back Cover Page

13. List of PSUs through GATE Exams.

14. Selected software companies and their profiles

15. Selected Core companies and their profiles

16. Aptitude Mock test papers & answers.

17. Mock E-mail writing questions

18. GATE 2015 - Questions & Answers.

19. General tips for effective communication and Leadership skills.

20. Malpractices & Punishments in Anna University Examination

21. Bonafide Certificate, Leave Letter Format.

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 and Electronics Engineering and allied applications.

MISSION

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

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The Educational Objectives of the Electrical and Electronics Engineering (EEE) Program 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.

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

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.

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM POST - 630 612
ACADEMIC CALENDER - Even Semester of 2015-2016.
II, VI & VIII SEMESTER UG & II, IV&VI SEMESTERPG DEGREE COURSES

S.No.	Date (Day)	Programme / Events	*Day*
		JANUARY '2016'	
1.	**01.01.16 (Friday)**	NEW YEAR – HOLIDAY- FOUNDERS DAY	-
2.	**15.01.16 (Friday)**	PONGAL - HOLIDAY	-
3.	**16.01.16 (Saturday)**	THIRUVALLUVAR THINAM- HOLIDAY	-
4.	**17.01.16(Sunday)**	ULAVAR THIRUNAAL - HOLIDAY	-
5.	**26.01.16(Tuesday)**	REPUBLIC DAY - HOLIDAY	-
6.	**28.01.16(Thursday)**	Commencement of classes- II,IV,VI &VIII -B.E./B. Tech (except EEE,ECE & /AUE- VIII semester)	**01**
7.	**30.01.16(Saturday)**	Commencement of classes- VIII semester (EEE, ECE & AUE) Monday order	**03**
		FEBRUARY '2016'	
8.	**01.02.16(Monday)**	Commencement of classes-II ,IV & VI sem –M.E /M.B.A / M.C.A Class committee meeting –I (1-5 Feb 2016) Students counselor meeting –I (1-5 Feb 2016)	**04**
9.	**15.02.16(Mon day)**	Class Test –I (15th Feb -20th Feb 2016)	**15**
10.	**29.02.16(Monday)**	CIT -1 – 29th Feb – 7th March 2016	**27**
		MARCH '2016'	
11.	**12.03.16 (Saturday)**	Friday order 18th Graduation Day- Tentative	**37**
12.	**18.03.16(Friday)**	Class Test –II -18th – 24th March 2016	**42**
13.	**24.03.16(Thursday)**	Sports Day - Tentative	**47**
14.	**25.03.16(Friday)**	GOOD FRIDAY – HOLIDAY	**-**
15.	**26.03.16(Saturday)**	Friday order Parents – Teachers Meeting	**48**
		APRIL '2016'	
16.	**06.04.16(Wednesday)**	International Conference on "Innovations in Engineering and Technology" – 6th & 7th April 2016 CIT-2 – 6th -13th April 2016	**56**
17.	**08.04.16(Friday)**	TELUGU NEW YEAR – HOLIDAY	**-**
18.	**14.04.16(Thursday)**	*TAMIL PUTTHANDU &* Dr.AMBEDKAR'S BIRTHDAY–HOLIDAY	**-**
19.	**15.04.16(Friday)**	Model Practical Examinations (15th – 20th April)	**62**
20.	**16.04.16(Saturday)**	Tuesday order 22nd College Annual Day	**63**
21.	**19.04.16(Tuesday)**	MAHAVEER'S JEYANTHI – HOLIDAY	**-**
22.	**20.04.16(Wednesday)**	Students Feedback on faculty& College facility Course Outcome Survey- 20th -23rd April	**65**
23.	**21.04.16(Thursday)**	Class Test -3 – 21st – 23rd April 2016	**66**
24.	**25.04.16(Monday)**	Anna University Practical Examinations (25th – 30th April 2016) – Tentative	**69**
25.	**30.04.16(Saturday)**	Last working Day- VIII- Semester – B.E / B.Tech.,	**74**
		MAY '2016'	
26.	**01.05.16(Sunday)**	MAY DAY – HOLIDAY	-
27.	**02.05.16(Monday)**	Commencement of Anna University – Theory Examinations- VIII semester –B.E / B.Tech.,	**75**
28.	**07.05.16(Saturday)**	Last working Day- II,IV& VI sem- all UG & PG courses	**80**
29.	**09.05.16(Monday)**	Commencement of Anna University –Theory Examinations- II,IV& VI sem -all UG & PG courses	-
30.	**10.05.16(Tuesday)**	Graduate Exit Survey -2016 passed out- survey to be completed on or before 31st May 2016	-
31.	**11.05.16(Wednesday)**	Collection of Alumni, Employer Survey – survey to be completed on or before 10th June 2016.	-

Commencement of classes : III, V, VII Semester – B.E./B.Tech., MCA, M.E, MBA : 04th July 2016.

Date: 08.01.2016

ANNA UNIVERSITY: : CHENNAI – 600 025

ACADEMIC SCHEDULE

for the

February 2016 – May 2016 (EVEN SEMESTER) SESSION OF THE

ACADEMIC YEAR 2015 – 2016

UG & PG Degree Programmes offered in **Affiliated Engineering Colleges**

Sl. No.	Programme	Semester	Commencement of Classes	Last working day	Commencement of End Semester Examinations
1.	**B.E. / B.Tech.(Full-Time)**	**VIII**	**30.01.2016**	**30.04.2016**	**02.05.2016**
2.	B.E. / B.Tech.(Full-Time)	II,IV,VI	01.02.2016	07.05.2016	09.05.2016
3.	B.E. (Part-Time)	III,V,VII			
4.	B.Arch. (Full-Time)	II,IV,VI,VIII,X			
5.	M.E. / M.Tech./ M.Arch.(FT/PT)	II,IV,VI			
6.	M.C.A. (Full-Time)	II,IV,VI			
7.	M.B.A. (FT/PT)	II,IV,VI			
8.	M.Sc (5 Yrs-Integrated)	II,IV,VI,VIII,X			
9.	M.Sc.(2 Yrs)	II,IV			

RE - OPENING DAY FOR THE NEXT SEMESTER: 04.07.2016 (Monday)

NOTE:

1. The Theory and Practical Examination schedules will be published in the due course (Practical Examinations will be conducted before the theory examinations).
2. All Saturdays are working days.

DIRECTOR
ACADEMIC COURSES

CLASS WISE TIME TABLE -2015-2016 (EVEN)

Year/Sem/Sec : I / II / A — *Faculty In-charge : R. Divya*

TIME / DAY	09.00 – 09.50	09.50 – 10.40	BREAK	10.55–11.45	11.45–12.35	LUNCH	01.15–02.05	02.05–02.55	02.55–03.45
MON	PHY	ENG		BCME	MATHS		PHY LAB / CHE LAB		
TUE	MATHS	CT		PHY	CHE		CT	BCME	ENG
WED	CHE	BCME		CHE	MATHS		CT	ENG	PHY
THU	CT	PHY		MATHS	ENG		CP LAB / EC LAB		
FRI	ENG	CP LAB		/ EC LAB			MATHS	CHE	BCME

Year/Sem/Sec : I / II / B — *Faculty In-charge : S. Rajalingam*

TIME / DAY	09.00 – 09.50	09.50 – 10.40	BREAK	10.55–11.45	11.45–12.35	LUNCH	01.15–02.05	02.05–02.55	02.55–03.45
MON	CT	ENG		PHY	MATHS		PHY LAB / CHE LAB		
TUE	CHE	ENG		CT	PHY		MATHS	CT	BCME
WED	MATHS	BCME		CHE	ENG		CT	BCME	PHY
THU	ENG	CP LAB		/ EC LAB			CHE	BCME	MATHS
FRI	PHY	ENG		MATHS	CHE		CP LAB / EC LAB		

SUB CODE	SUBJECT NAME	ABBREVIATION	STAFF NAME	
			A – Sec	B – sec
HS6251	Technical English – II	ENG	S.S. Karthick kumar	A. Daniel Paul
MA6251	Mathematics – II	MATHS	T.Kokila	M.Ramya
PH6251	Engineering Physics - II	PHY	Dr. R. Geetha	V.Revathy
CY6251	Engineering Chemistry - II	CHE	`G.J.Deeparani	O.D. Sakila
GE6251	Basic Civil and Mechanical Engineering	BCME	D. Satheesh Pandian	D. Muthukrishnan
EE6201	Circuit Theory	CT	R. Divya	S. Rajalingam
GE6262	Physics and Chemistry Laboratory - II	PHY LAB CHE LAB	Dr. R. Geetha G.J. Deeparani	V.Revathy O.D. Sakila
GE6263	Computer Programming Laboratory	CP LAB	R. Divya	S. Manoharan
EE6211	Electric Circuits Laboratory	EC LAB	R. Sridevi	S. Rajalingam

FACULTY INCHARGE

HOD/EEE 23/1/2016

5

ANNA UNIVERSITY, CHENNAI

AFFILIATED INSTITUTIONS

R - 2013

B. E. ELECTRICAL AND ELECTRONICS ENGINEERING

I TO VIII SEMESTERS CURRICULUM AND SYLLABUS

SEMESTER I

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	HS6151	Technical English - I	3	1	0	4
2.	MA6151	Mathematics - I	3	1	0	4
3.	PH6151	Engineering Physics - I	3	0	0	3
4.	CY6151	Engineering Chemistry - I	3	0	0	3
5.	GE6151	Computer Programming	3	0	0	3
6.	GE6152	Engineering Graphics	2	0	3	4
PRACTICAL						
7.	GE6161	Computer Practices Laboratory	0	0	3	2
8.	GE6162	Engineering Practices Laboratory	0	0	3	2
9.	GE6163	Physics and Chemistry Laboratory - I	0	0	2	1
			17	**2**	**11**	**26**

SEMESTER II

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	HS6251	Technical English - II	3	1	0	4
2.	MA6251	Mathematics - II	3	1	0	4
3.	PH6251	Engineering Physics - II	3	0	0	3
4.	CY6251	Engineering Chemistry - II	3	0	0	3
5.	GE6251	Basic Civil and Mechanical Engineering	4	0	0	4
6.	EE6201	Circuit Theory	3	1	0	4
PRACTICAL						
7.	GE6262	Physics and Chemistry Laboratory - II	0	0	2	1
8.	GE6263	Computer Programming Laboratory	0	1	2	2
9.	EE6211	Electric Circuits Laboratory	0	0	3	2
		TOTAL	**19**	**4**	**7**	**27**

1. Iodine flask - 30 Nos
2. pH meter - 5 Nos
3. Conductivity meter - 5 Nos
4. Spectrophotometer - 5 Nos
5. Ostwald Viscometer - 10 Nos

Common Apparatus : Pipette, Burette, conical flask, percelain tile, dropper (each 30 Nos.)

HS6251 TECHNICAL ENGLISH II L T P C
3 1 0 4

OBJECTIVES:

- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
- To equip them with writing skills needed for academic as well as workplace contexts.
- To make them acquire language skills at their own pace by using e-materials and language lab components.

UNIT I 9+3

Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on topics like weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using 'emoticons' as symbols in email messages; Grammar - Regular and irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. 'can') - Homophones (e.g. 'some', 'sum'); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II 9+3

Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his / her success, thanking one's friends / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercises on Grammar and vocabulary, Extensive reading activity (reading stories / novels), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students' dialogues.

UNIT III 9+3

Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret, etc.); Reading - Speed reading – reading passages with time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading articles from journals - Format for journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. 'rock', 'train', 'ring'); E-materials - Interactive exercise on Grammar and vocabulary -

Speed Reading practice exercises; Language Lab - Intonation practice using EFLU and RIE materials – Attending a meeting and writing minutes.

UNIT IV **9+3**

Listening - Listening to a telephone conversation, Viewing model interviews (face-to-face, telephonic and video conferencing); Speaking - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on Grammar and Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language Lab - Telephonic interview – recording the responses - e-résumé writing.

UNIT V **9+3**

Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent/agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from books, or any form of written materials - Intensive reading; Writing – Checklist - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; E-materials - Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises; Language Lab - Different models of group discussion.

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

OUTCOMES:

Learners should be able to

- speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.

TEXTBOOKS:

1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011

REFERENCES:

1. Anderson, Paul V. Technical Communication: A Reader-Centered Approach. Cengage. New Delhi. 2008.
2. Muralikrishna, & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011.
3. Riordan, Daniel. G. Technical Communication. Cengage Learning, New Delhi. 2005
4. Sharma, Sangeetha & Binod Mishra. Communication Skills for Engineers and Scientists. PHI Learning, New Delhi. 2009.

5. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA. 2007.

EXTENSIVE Reading (Not for Examination)

1. Khera, Shiv. You can Win. Macmillan, Delhi. 1998.

Websites

1. http://www.englishclub.com
2. http://owl.english.purdue.edu

TEACHING METHODS:

- Lectures
- Activities conducted individually, in pairs and in groups like individual writing and presentations, group discussions, interviews, reporting, etc
- Long presentations using visual aids
- Listening and viewing activities with follow up activities like discussions, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc
- Projects like group reports, mock interviews etc using a combination of two or more of the language skills

EVALUATION PATTERN:

Internal assessment: 20%

3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like

- Project
- Assignment
- Report
- Creative writing, etc.

All the four skills are to be tested with equal weightage given to each.

- ✓ Speaking assessment: Individual presentations, Group discussions
- ✓ Reading assessment: Reading passages with comprehension questions graded following Bloom's taxonomy
- ✓ Writing assessment: Writing essays, CVs, reports etc. Writing should include grammar and vocabulary.
- ✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content graded following Bloom's taxonomy.

End Semester Examination: 80%

MA6251 **MATHEMATICS – II** **L T P C**
3 1 0 4

OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I VECTOR CALCULUS 9+3

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS 9+3

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT III LAPLACE TRANSFORM 9+3

Laplace transform – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform -Statement of Convolution theorem – Initial and final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

UNIT IV ANALYTIC FUNCTIONS 9+3

Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: $w = z+k$, kz, $1/z$, z^2, e^z and bilinear transformation.

UNIT V COMPLEX INTEGRATION 9+3

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor's and Laurent's series expansions – Singular points – Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

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

OUTCOMES:

- The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:

1. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd.,2011.
2. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi, 2011.

REFERENCES:

1. Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private Ltd., 2011
2. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2012.
3. Peter V. O'Neil," Advanced Engineering Mathematics", 7th Edition, Cengage learning, 2012.
4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2008.
5. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics" Volume II, Second Edition, PEARSON Publishing, 2011.

PH6251 ENGINEERING PHYSICS – II L T P C
3 0 0 3

OBJECTIVES:

- To enrich the understanding of various types of materials and their applications in engineering and technology.

UNIT I CONDUCTING MATERIALS 9

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors -direct and indirect band gap- derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration –– Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications

Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High T_c superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius –

Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V ADVANCED ENGINEERING MATERIALS 9

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, Nanomaterials– Preparation -pulsed laser deposition – chemical vapour deposition – Applications – NLO materials –Birefringence- optical Kerr effect – Classification of Biomaterials and its applications

TOTAL: 45 PERIODS

OUTCOMES:

- The students will have the knowledge on physics of materials and that knowledge will be used by them in different engineering and technology applications.

TEXT BOOKS:

1. Arumugam M., Materials Science. Anuradha publishers, 2010
2. Pillai S.O., Solid State Physics. New Age International(P) Ltd., publishers, 2009

REFERENCES:

1. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011.
2. Senthilkumar G. Engineering Physics II. VRB Publishers, 2011.
3. Mani P. Engineering Physics II. Dhanam Publications, 2011.
4. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009.

CY6251 ENGINEERING CHEMISTRY - II L T P C
3 0 0 3

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I WATER TECHNOLOGY 9

Introduction to boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention of scale formation -softening of hard water -external treatment zeolite and demineralization - internal treatment- boiler compounds (phosphate, calgon, carbonate, colloidal) - caustic embrittlement -boiler corrosion-priming and foaming- desalination of brackish water –reverse osmosis.

UNIT II ELECTROCHEMISTRY AND CORROSION 9

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential- oxidation potential- reduction potential, measurement and applications - electrochemical series and its significance - Nernst equation (derivation and problems). Corrosion- causes- factors- types- chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Paints- constituents and function. Electroplating of Copper

and electroless plating of nickel.

UNIT III ENERGY SOURCES 9

Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion- differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor- solar energy conversion- solar cells- wind energy. Batteries and fuel cells:Types of batteries- alkaline battery- lead storage battery- nickel-cadmium battery- lithium battery- fuel cell H_2 -O_2 fuel cell- applications.

UNIT IV ENGINEERING MATERIALS 9

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina, magnesite and silicon carbide, Portland cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement–properties and uses. Glass - manufacture, types, properties and uses.

UNIT V FUELS AND COMBUSTION 9

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal- analysis of coal (proximate and ultimate)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) - petroleum- manufacture of synthetic petrol (Bergius process)- knocking- octane number - diesel oil- cetane number - natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG)- producer gas- water gas. Power alcohol and bio diesel. Combustion of fuels: introduction- theoretical calculation of calorific value- calculation of stoichiometry of fuel and air ratio- ignition temperature- explosive range - flue gas analysis (ORSAT Method).

TOTAL: 45 PERIODS

OUTCOMES:

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

1. Vairam S, Kalyani P and SubaRamesh.,“Engineering Chemistry”., Wiley India PvtLtd.,New Delhi., 2011.
2. DaraS.S,UmareS.S.“Engineering Chemistry”, S. Chand & Company Ltd., New Delhi , 2010.

REFERENCES:

1 Kannan P. and Ravikrishnan A., “Engineering Chemistry”, Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2009.

2. AshimaSrivastava and Janhavi N N., “Concepts of Engineering Chemistry”, ACME Learning Private Limited., New Delhi., 2010.
3. RenuBapna and Renu Gupta., “Engineering Chemistry”, Macmillan India Publisher Ltd., 2010.

4 Pahari A and Chauhan B., “Engineering Chemistry”., Firewall Media., New Delhi., 2010.

GE6251 BASIC CIVIL AND MECHANICAL ENGINEERING L T P C
4 0 0 4

OBJECTIVES

- To impart basic knowledge on Civil and Mechanical Engineering.
- To explain the materials used for the construction of civilized structures.
- To make the understand the fundamentals of construction of structure.
- To explain the component of power plant units and detailed explanation to IC engines their working principles.
- To explain the R & AC system.

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES 15

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

TOTAL: 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV IC ENGINES 10

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

TOTAL: 30 PERIODS

OUTCOMES:

- Ability to explain the usage of construction material and proper selection of construction materials.
- Ability to design building structures.
- Ability to identify the components use in power plant cycle.
- Ability to demonstrate working principles of petrol and diesel engine.
- Ability to explain the components of refrigeration and Air conditioning cycle.

TEXT BOOKS:

1. Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi, 1996.

REFERENCES:

1. Ramamrutham S., “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P) Ltd. 1999.
2. Seetharaman S., “Basic Civil Engineering”, Anuradha Agencies, 2005.
3. Venugopal K. and Prahu Raja V., “Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam, 2000.
4. Shantha Kumar S R J., “Basic Mechanical Engineering”, Hi-tech Publications, Mayiladuthurai, 2000.

EE6201 CIRCUIT THEORY L T P C
3 1 0 4

OBJECTIVES:

- To introduce electric circuits and its analysis
- To impart knowledge on solving circuits using network theorems
- To introduce the phenomenon of resonance in coupled circuits.
- To educate on obtaining the transient response of circuits.
- To Phasor diagrams and analysis of three phase circuits

UNIT I BASIC CIRCUITS ANALYSIS 12

Ohm’s Law – Kirchoffs laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits – Phasor Diagram – Power, Power Factor and Energy.

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 12

Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 12

Series and paralled resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 12

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input – Characterization of two port networks in terms of Z,Y and h parameters.

UNIT V THREE PHASE CIRCUITS 12

Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL : 60 PERIODS

OUTCOMES:

- Ability analyse electrical circuits
- Ability to apply circuit theorems
- Ability to analyse AC and DC Circuits

TEXT BOOKS:

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", Tata McGraw Hill publishers, 6th edition, New Delhi, 2003.
2. Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi, 2001.

REFERENCES:

1. Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd., New Delhi, 1996.
2. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, 2007.
3. Chakrabati A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi, 1999.
4. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2003.

GE6262 PHYSICS AND CHEMISTRY LABORATORY – II L T P C
0 0 2 1

PHYSICS LABORATORY – II

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS
(Any FIVE Experiments)

1. Determination of Young's modulus by uniform bending method
2. Determination of band gap of a semiconductor
3. Determination of Coefficient of viscosity of a liquid –Poiseuille's method
4. Determination of Dispersive power of a prism - Spectrometer
5. Determination of thickness of a thin wire – Air wedge method
6. Determination of Rigidity modulus – Torsion pendulum

OUTCOMES:

- The students will have the ability to test materials by using their knowledge of applied physics principles in optics and properties of matter.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Traveling microscope, meter scale, Knife edge, weights
2. Band gap experimental set up
3. Burette, Capillary tube, rubber tube, stop clock, beaker and weighing balance
4. spectrometer, prism, sodium vapour lamp.
5. Air-wedge experimental set up.
6. Torsion pendulum set up.

(vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

CHEMISTRY LABORATORY - II

OBJECTIVES:

- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

LIST OF EXPERIMENTS
(Any FIVE Experiments)

1 Determination of alkalinity in water sample
2 Determination of total, temporary & permanent hardness of water by EDTA method
3 Estimation of copper content of the given solution by EDTA method
4 Estimation of iron content of the given solution using potentiometer
5 Estimation of sodium present in water using flame photometer
6 Corrosion experiment – weight loss method
7 Conductometric precipitation titration using $BaCl_2$ and Na_2SO_4
8 Determination of CaO in Cement.

TOTAL: 30 PERIODS

OUTCOMES:

- The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

REFERENCES:

1. Daniel R. Palleros, “Experimental organic chemistry” John Wiley & Sons, Inc., New York, 2001.
2. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., “Vogel’s Textbook of practical organic chemistry, LBS Singapore ,1994.
3. Jeffery G.H, Bassett J., Mendham J. and Denny R.C., “Vogel’s Text book of quantitative analysis chemical analysis”, ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
4. Kolthoff I.M. and Sandell E.B. et al. Quantitative chemical analysis, McMillan, Madras 1980

- **Laboratory classes on alternate weeks for Physics and Chemistry.**

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1.	Potentiometer	-	5 Nos
2.	Flame photo meter	-	5 Nos
3.	Weighing Balance	-	5 Nos
4.	Conductivity meter	-	5 Nos

Common Apparatus : Pipette, Burette, conical flask, percelain tile, dropper (30 Nos each)

GE6263 COMPUTER PROGRAMMING LABORATORY

L	T	P	C
0	1	2	2

OBJECTIVES:

The Students should be made to

- Be exposed to Unix shell commands
- Be familiar with an editor on Unix
- Learn to program in Shell script
- Learn to write C programme for Unix platform

LIST OF EXPERIMENTS

1. UNIX COMMANDS **15**

Study of Unix OS - Basic Shell Commands - Unix Editor

2. SHELL PROGRAMMING **15**

Simple Shell program - Conditional Statements - Testing and Loops

3. C PROGRAMMING ON UNIX **15**

Dynamic Storage Allocation-Pointers-Functions-File Handling

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students should be able to:

- Use Shell commands
- Design of Implement Unix shell scripts
- Write and execute C programs on Unix

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware

- UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

Software

- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

EE6211 ELECTRIC CIRCUITS LABORATORY L T P C
0 0 3 2

OBJECTIVES :

- To provide practical experience with simulation of electrical circuits and verifying circuit theorems.

LIST OF EXPERIMENTS

1. Experimental verification of Kirchhoff's voltage and current laws
2. Experimental verification of network theorems (Thevenin, Norton, Superposition and maximum power transfer Theorem).
3. Study of CRO and measurement of sinusoidal voltage, frequency and power factor.
4. Experiental determination of time constant of series R-C electric circuits.
5. Experimental determination of frequency response of RLC circuits.
6. Design and Simulation of series resonance circuit.
7. Design and Simulation of parallel resonant circuits.
8. Simulation of low pass and high pass passive filters.
9. Simulation of three phase balanced and unbalanced star, delta networks circuits.
10. Experimental determination of power in three phase circuits by two-watt meter method .
11. Calibration of single phase energy meter.
12. Determination of two port network parameters.

TOTAL: 45 PERIODS

OUTCOMES :

- Ability to understand and apply circuit theorems and concepts in engineering applications.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1 Regulated Power Supply: 0 – 15 V D.C - 10 Nos / Distributed Power Source.
2 Function Generator (1 MHz) - 10 Nos.
3 Single Phase Energy Meter - 1 No.
4 Oscilloscope (20 MHz) - 10 Nos.
5 Digital Storage Oscilloscope (20 MHz) – 1 No.
6 Circuit Simulation Software (5 Users) (Pspice / Matlab /other Equivalent software Package) with PC(5 Nos.) and Printer (1 No.)
7 AC/DC - Voltmeters (10 Nos.), Ammeters (10 Nos.) and Multi-meters (10 Nos.)
8 Single Phase Wattmeter – 3 Nos.
9 Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box Each - 6 Nos.
10 Circuit Connection Boards - 10 Nos.

Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt)

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

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

LECTURE SCHEDULE

Course/Branch : **B.E / EEE** Subject: **CIRCUIT THEORY** Duration: **Jan-Apr 2016**

Subject Code : **EE6201** Semester: **II** Section: **A & B** Regulation: **2013(AUC)**

Staff Handling: **S. RAJALINGAM & R. DIVYA**

AIM

To develop the fundamental tools of linear circuit analysis which will be useful to all Engineers and to learn the "alphabet" of circuits, including wires, resistors, capacitors, inductors, voltage and current sources.

OBJECTIVES

- To introduce electric circuits and its analysis
- To impart knowledge on solving circuits using network theorems
- To introduce the phenomenon of resonance in coupled circuits
- To educate on obtaining the transient response of circuits
- To draw phasor diagrams and analysis of three phase circuits

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

Course	Course Outcome	POs	PSOs
C115.1	Apply Kirchhoff's current & voltage law to simple circuits and solve Complex circuits using Mesh & Nodal Methods.	1, 2, 3, 4, 5	1
C115.2	Apply Network theorems to solve simple and complex linear circuits.	1, 2, 3, 4, 5	1
C115.3	Solve the Series and Parallel resonant circuit, analyze the performance of single & double tuned circuits.	1, 2, 3, 4, 5	1
C115.4	Develop the Transient response of RLC circuits using Laplace Transform, explain the characteristics of two port networks.	1, 2, 3, 4, 5	1
C115.5	Explain three phase balanced and unbalanced star, delta network.	1, 2, 3, 4, 5	1

Target Periods-60

S. No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I - BASIC CIRCUITS ANALYSIS				**Target Periods : 12**
1.			Ohm's law	R4 (30-31)
2.			Kirchoff's laws	T1 (30-36)
3.			Tutorial 1	-
4.			DC Circuits	R4(2-23)
5.			AC Circuits	R4(370-402)
6.			Resistors in series & parallel circuits	T1 (43-49)
7.			Tutorial 2	-
8.			Mesh current method- DC & AC Circuit	R4(93-104)
9.			Node voltage method – AC & DC Circuit	R4(417-421)
10.			Phasor diagram	R4(52-72)
11.			Power, Power factor & Energy	R4(16-30)
12.			Tutorial 3	-
Assignment - 1				
UNIT II – NETWORK REDUCTION & NETWORK THEOREMS FOR DC & AC CIRCUITS				**Target Periods : 12**
13.			Network reduction technique- Introduction	T1(49)
14.			Voltage & Current division rule	T1 (49-52)
15.			Source transformation	T1 (110-116)
16.			Star –delta conversion	T1 (127-129)

17.			Tutorial 1	-
18.			Thevenin's theorem	T1 (116-123)
19.			Norton's theorem	T1 (116-123)
20.			Tutorial 2	-
21.			Superposition theorem	R4(130-135)
22.			Maximum power transfer theorem	T1 (125-127)
23.			Reciprocity theorem	R2(112-113)
24.			Tutorial 3	-
25.			Content Beyond Syllabus: Application of Maximum power transfer theorem in Ultrasonics	
Assignment – 2				
Centralized Internal Test - I				
UNIT III - RESONANCE AND COUPLED CIRCUITS				**Target Periods : 12**
26.			Series and Parallel resonance	R2(277)(290)
27.			Frequency response of series resonance	R4(629-634)
28.			Frequency response of parallel resonance	R4(634-637)
29.			Quality factor and Bandwidth	R2(288)(293)
30.			Tutorial 1	-
31.			Self inductance	R5(6.1)
32.			Mutual inductance	T2(402-404)
33.			Coefficient of coupling	R2(407-409)
34.			Tutorial 2	-
35.			Tuned circuits-Introduction	R2(420)
36.			Single tuned circuit-analysis	R2(420-423)
37.			Tutorial 3	-
Assignment – 3				
UNIT IV - TRANSIENT RESPONSE FOR DC CIRCUITS				**Target Periods : 12+2**
38.			Transient response –Introduction	R2(473)
39.			Transient response of RL circuit for DC input	R2(474-477)
40.			Transient response of RC circuit for DC input	R2(478-480)
41.			Tutorial 1	-
42.			Transient response of RLC circuit for DC input	R2(480-483)
43.			Tutorial 2	R2(480-483)
44.			Transient response of RL circuit for AC input	-
45.			Transient response of RC circuit for AC input	R2(483-486)
46.			Transient response of RLC circuit for AC input	R2(486-489)
47.			Two port networks	R2(693-762)
48.			Analysis of Z,Y and h parameters	R2(693-762)
49.			Tutorial 3	-
50.			**Quiz I**	
51.			**Seminar I**	
Centralized Internal Test - II				
UNIT V - THREE PHASE CIRCUITS				**Target Periods : 12+2**
52.			Three phase balanced voltage sources	R4(505-508)
53.			Three phase unbalanced voltage sources	R4(525-528)
54.			Three phase three wire circuit with star load	R5(9.11)
55.			Three phase three wire circuit with delta load	R5(9.12)
56.			Three phase four wire circuit with star load	R2(352-353)
57.			Three phase four wire circuit with delta load	R2(352-353)
58.			Balanced phasor diagram of voltage & current	R2(344-349)
59.			Unbalanced phasor diagram of voltage & current	R2(349-354)
60.			Power and power factor measurements in three phase circuits	R5(9.46-9.61)
61.			Tutorial 1	-
62.			Tutorial 2	-
63.			Tutorial 3	-
64.			**Quiz II**	-
65.			**Seminar II**	-
Centralized Internal Test - III				

Books: Text/Reference

S. No		Title of the Book	Author	Publisher	Year
1.	**T1**	Engineering Circuits Analysis	William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin	Tata McGraw Hill publishers, 6th edition, New Delhi.	2003
2.	**T2**	Electric circuits	Joseph A. Edminister, Mahmood Nahri	Schaum's series, Tata McGraw-Hill, New Delhi.	2001
3.	**R1**	Electric Circuits Analysis	Paranjothi SR	New Age International Ltd., New Delhi.	1996
4.	**R2**	Circuits and Networks Analysis and Synthesis	Sudhakar A and Shyam Mohan SP	Tata McGraw Hill	2007
5.	**R3**	Circuits Theory (Analysis and synthesis)	Chakrabati A	Dhanpath Rai & Sons, New Delhi.	1999
6.	**R4**	Fundamentals of Electric Circuits	Charles K. Alexander, Mathew N.O. Sadik	Second Edition, McGraw Hill	2003
7.	**R5**	Engineering circuit analysis	Gnanavadivel. J, Senthilkumar. C, Maruthupandi. P	Anuratha publications, Chennai.	2012

NPTEL LECTURES

S. No	UNIT	Date[Period]	TOPIC	Ref / Link
1.	III		Resonance	https://www.youtube.com/watch?v=6mC0xkXsFdw
2.	IV		Two port Networks	https://www.youtube.com/watch?v=GasWAlIvvD8

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C115.1	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115.2	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115.3	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115.4	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115.5	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-

Content Beyond Syllabus Added (CBS)	POs strengthened/vacant filled	CO/Unit
Application of Maximum power transfer theorem in Ultrasonics	PO2, PO3, PO4 (Strengthened)	C115.2 / II

STAFF INCHARGE **HOD/EEE**

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

EE6201 – CIRCUIT THEORY [C115]

Important Questions/Tutorials/Assignments

1. Course Outcomes

Course	Course Outcome	POs	PSOs
C115.1	Apply Kirchhoff's current &voltage law to simple circuits and solve Complex circuits using Mesh & Nodal Methods.	1,2,3,4,5	1
C115.2	Apply Network theorems to solve simple and complex linear circuits.	1,2,3,4,5	1
C115.3	Solve the Series and Parallel resonant circuit, analyze the performance of single & double tuned circuits.	1,2,3,4,5	1
C115.4	Develop the Transient response of RLC circuits using Laplace Transform, explain the characteristics of two port networks.	1,2,3,4,5	1
C115.5	Explain three phase balanced and unbalanced star, delta network.	1,2,3,4,5	1

2. Mapping of Course Outcomes (COs), Course (C), Program Specific Outcomes (PSOs) with Program Outcomes (POs) – before CBS [Levels of correlation: 3(High), 2(Medium), 1(low)]

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C115.1	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115.2	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115.3	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115.4	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115.5	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-
C115	3	2	1	1	1	-	-	-	-	-	-	-	2	-	-

3. PROGRAM OUTCOMES (POs)

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

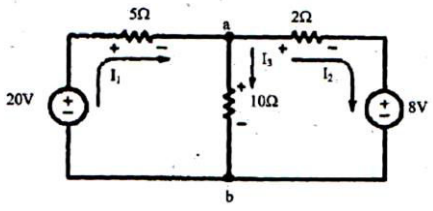
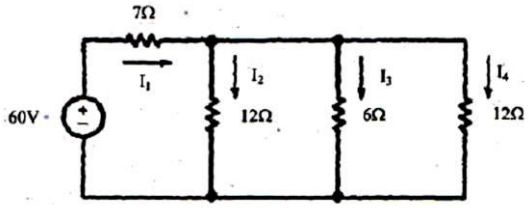
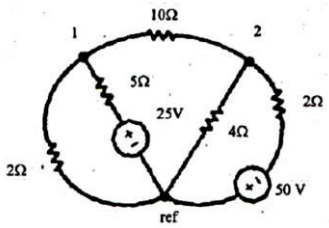
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

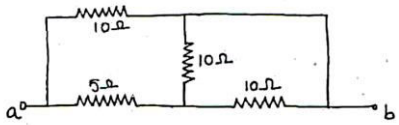
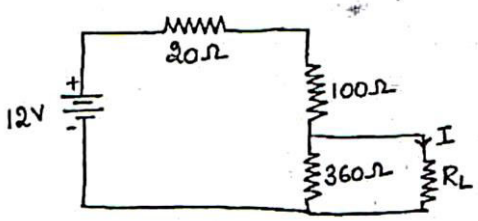
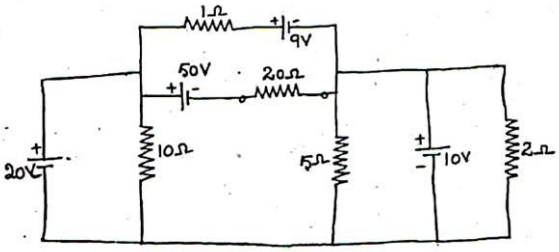
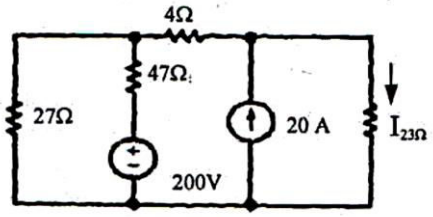
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

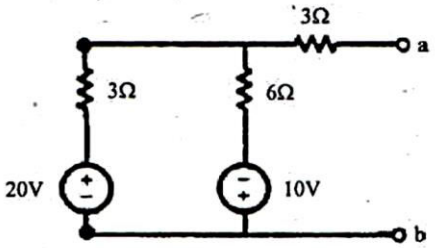
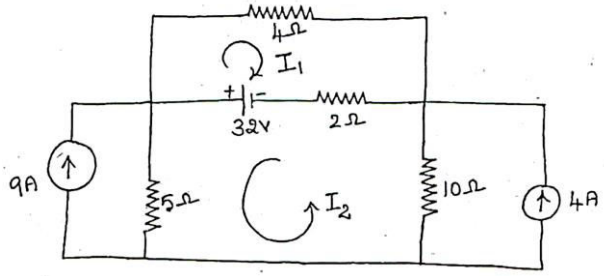
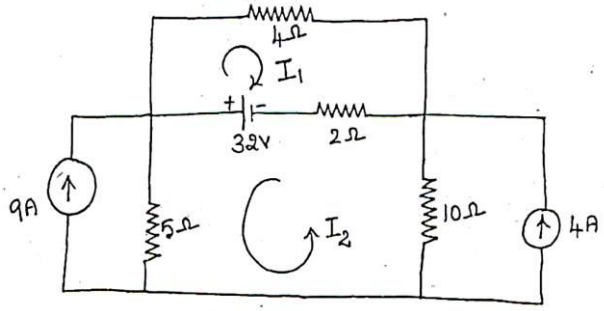
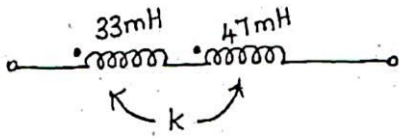
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

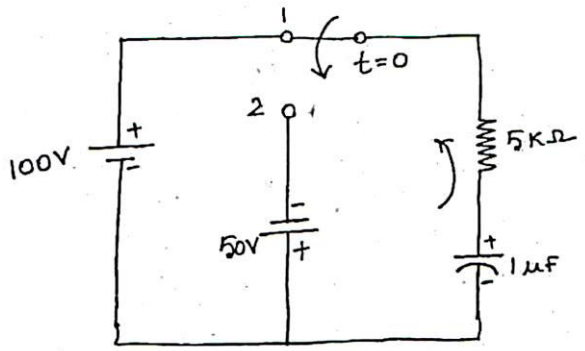
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

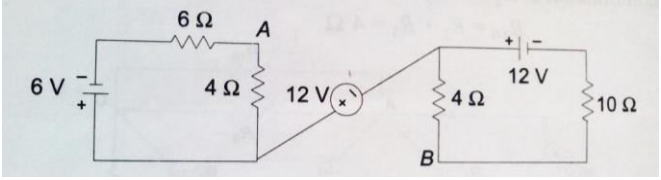
4. IMPORTANT QUESTIONS

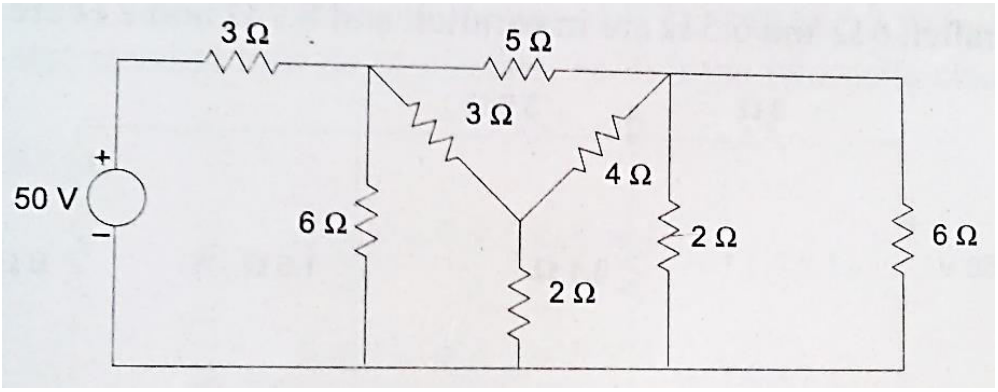
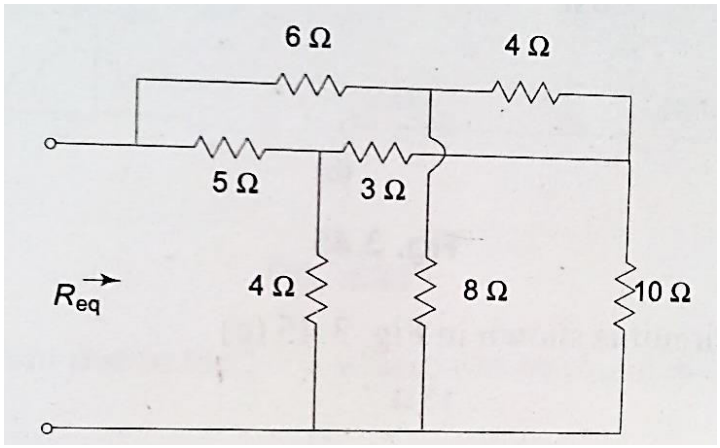
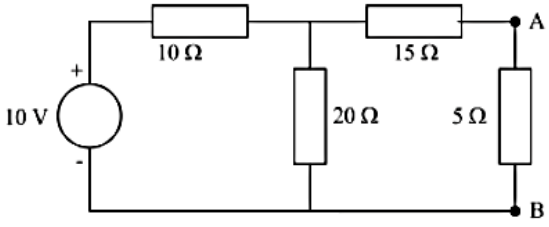
S. No.	Questions	COs	POs
1.1	Obtain the current in each branch of the network shown below using Kirchhoff's Current Law. 	C115.1	1,2
1.2	Use branch currents in the network shown below to find the current supplied by the 60-V Source. Solve the circuit by the mesh current method. (16) 	C115.1	1,2
1.3	Solve the network given below by the node voltage method. 	C115.1	1,2

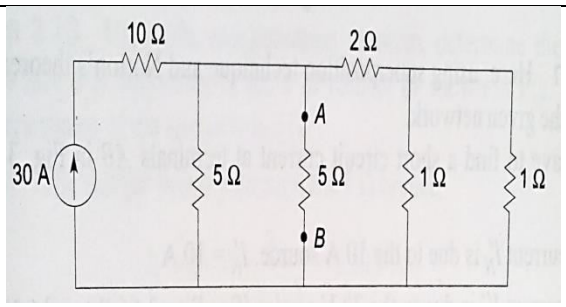
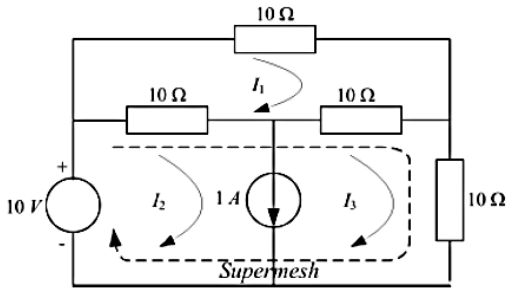
1.4	Calculate the equivalent resistance between the terminals "*a*" and "*b*", in Fig. 1.  Fig. 1	C115.1	1,2
1.5	Calculate the value of I_N for the circuit shown in Fig. 2.  Fig. 2	C115.1	1,2
2.1	Find the current *I*, through the 20 Ω resistor shown in Fig. 7 using Thevenin's theorem. (16)  Fig. 7	C115.2	1,2
2.2	Compute the current in the 23Ω resistor of the following figure shown below by applying the superposition principle. (8)  	C115.2	1,2

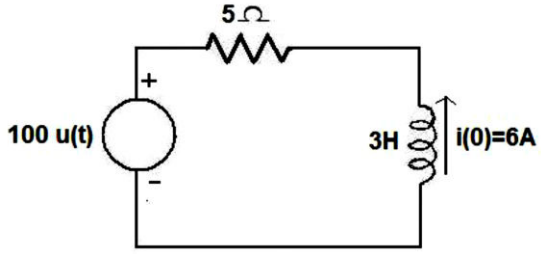
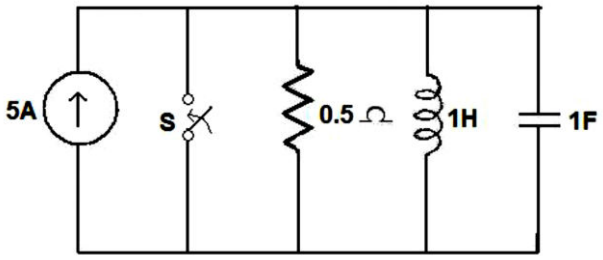
2.3	Obtain the Thevenin and Norton equivalent circuits for the active network shown below. **(16)** 	C115.2	1,2
2.4	**Find the current through 5 ohm resistor using superposition theorem** 	C115.2	1,2
2.5	**Find the current through 5 ohm resistor using Thevenins theorem and replace 5 ohm by 10 ohm and then find the current through 10 ohm resistor.** 	C115.2	1,2
3.1	Calculate the total inductance of the circuit, if the coefficient of coupling (k) between the two coils is 0.6, as shown in Fig. 3.  Fig. 3	C115.3	1,2

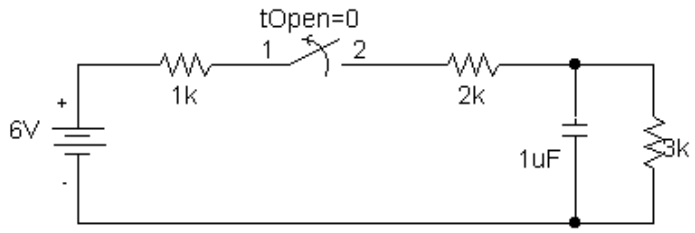
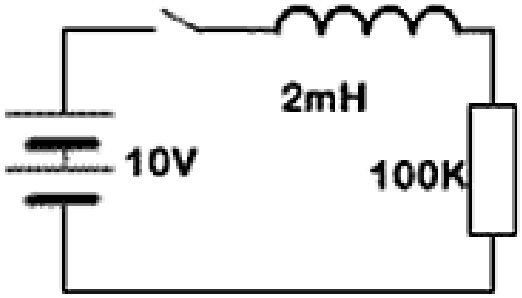
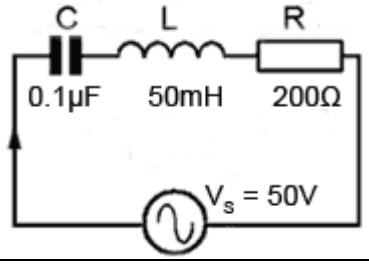
3.2	Impedance Z_1 and Z_2 are parallel and this combination is in series with an impedance Z_3, connected to a 100 V, 50 Hz ac supply. $Z_1 = (5 - jX_c)\Omega$, $Z_2 = (5 + j0)\Omega$, $Z_3 = (6.25 + j1.25)\Omega$. Determine the value of capacitance such that the total current of the circuit will be in phase with the total voltage. Find the circuit current and power. (16)	C115.3	1,2
3.3	Derive the expression for mutual inductance & coefficient of coupling of the transformer.	C115.3	1,2
3.4	Derive the expression for resonant frequency, Band width, and quality factor of series resonant circuit.	C115.3	1,2
3.5	Derive the expression for resonant frequency, Band width, and quality factor of parallel resonant circuit.	C115.3	1,2
4.1	The switch in the circuit shown in Fig. 9 is moved from position 1 to 2 at $t = 0$. Find the expression for voltage across resistance and capacitor, energy in the capacitor for $t > 0$. (16)  Fig. 9	C115.4	1,2
4.2	Derive the expression for time constant in DC response of RL series circuit and analyze.	C115.4	1,2
4.3	Derive the expression for time constant in AC response of RL series circuit and analyze.	C115.4	1,2
4.4	Derive the expression for time constant in DCresponse of RLC series circuit and analyze.	C115.4	1,2
4.5	Characterize the two port networks in terms of Z,Y and h parameters.	C115.4	1,2
5.1	Show that three phase power can be measured by two wattmeters. Draw the phasor diagrams. Derive an expression for power factor interms of wattmeter readings. (16)	C115.5	1,2

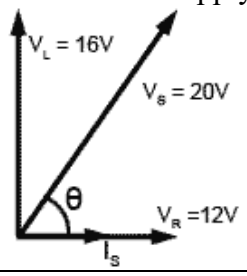
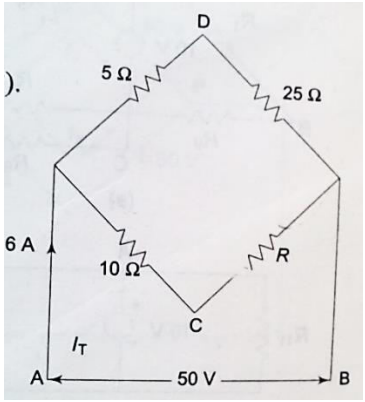
5.2	A 400 V (line to line) is applied to three star connected identical impedances each consisting of a 4 Ω resistance in series with 3 Ω inductive reactance. Find (1) line current and (2) total power supplied. (8)	C115.5	1,2
5.3	Analyze the three phase three wire circuits with star connected balanced loads	C115.5	1,2
5.4	Draw and analyze the phasor diagram of voltages and currents of a three phase balanced circuits	C115.5	1,2
5.5	Three star-connected impedances $Z_1 = (20 + j37.7)\ \Omega$ per phase are in parallel with three delta-connected impedance $Z_2 = (30 - j159.3)\ \Omega$ per phase. The line voltage is 398 volts. Find the line current, power factor, power and reactive volt-ampere taken by the combination. (8)	C115.5	1,2
4. TUTORIAL QUESTIONS			
UNIT I - BASIC CIRCUITS ANALYSIS			
T.1.1	A Resistor with a current of 3A through it converts 500J of electrical energy to heat energy in 12s. Determinethe voltage across the resistor. **ANS: 13.88V**	C115.1	1,2,3
T.1.2	Determine the power rating of a 5 ohm resistor which has a voltage rating of 100V. **ANS: 2KW**	C115.1	1,2,3
T.1.3	Determine the inductance of the coil through which flows a current of 0.2A with energy of 0.15J. **ANS:7.5H**	C115.1	1,2,3
T.1.4	Determine the inductance of a coil in which a current increases linearly from 0 to 0.2A in 0.3s, producing a voltage of 15V. **ANS: 22.73H**	C115.1	1,2,3
T.1.5	How will you calculate the value of resistance in 3, 4 and 5 band resistors? Illustrate with examples.	C115.1	1,4
T.1.6	An AC voltage of 220V is applied to a pure inductance at 50Hz. If the current is 5A, determine the instantaneous voltage. **ANS: V=311sin314t V**	C115.1	1,2,3
T.1.7	In an AC circuit, containing pure inductance, the voltage applied is 110V, 50Hz while the current is 10A. Determine the value of inductance. **ANS: L=35mH**	C115.1	1,2,3
T.1.8	An inductor of 20mH offers a reactance of 100 ohm. Determine the supply frequency. **ANS: f=796Hz**	C115.1	1,2,3
T.1.9	Determine the voltage across A and B in the given circuit.  **ANS: Voltage=13.04V**	C115.1	1,2,3

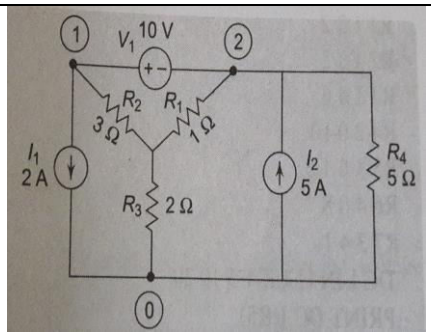
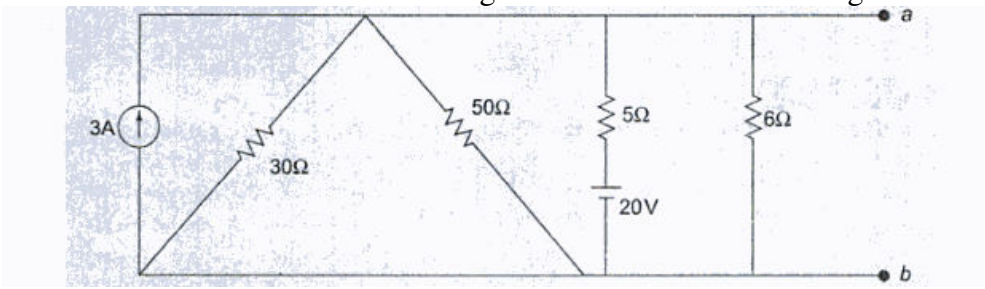
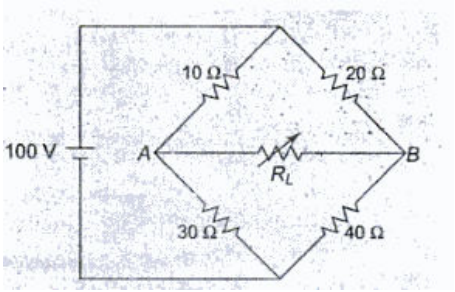
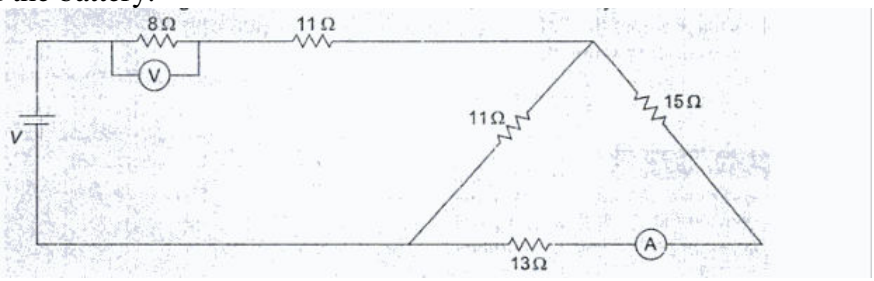
T.1.10	When a dc voltage is applied to a capacitor, the voltage across its terminals is found to build up in accordance with V_C =50(1-e^{-100t}). After a lapse of 0.01s, the current flow is equal to 2mA. Determine the value of capacitance in microfarads. **ANS: 1.089 microfarad**	C115.1	1,2,3
	UNIT II - NETWORK REDUCTION AND NETWORK THEOREMS FOR DCAND AC CIRCUITS		
T.2.1	Determine the current drawn by the given circuit.  **ANS: Current=10.2A**	C115.2	1,2,3
T.2.2	Determine the equivalent resistance by using star delta transformation.  **ANS: R_{eq}=4.93 ohm**	C115.2	1,2,3
T.2.3	Use Thevenin's theorem to determine the current through 5 ohm resistor.  **ANS: 0.25A**	C115.2	1,2,3
T.2.4	Determine the current through 5 ohm resistor by applying Norton's theorem.	C115.2	1,2,3

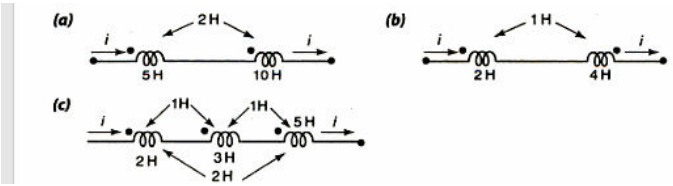
	 **ANS: 7.51A**		
T.2.5	Determine the current supplied by the 10V voltage source.  **ANS: I_2=1A**	C115.2	1,2,3
T.2.6	Explain the steps involved in Reciprocity theorem with an example.	C115.2	1
	UNIT III - RESONANCE AND COUPLED CIRCUITS		
T.3.1	A series RLC circuit has R=20 ohm, L=0.005 H and C=0.2 µF. It is fed from a 100 V variable frequency source. Calculate (a) frequency at which current is maximum (b) impedance at this frequency and (c) voltage across inductor at this frequency. **ANS: (a)f_r=5033Hz, (b) Z=R=20Ω, (c) V_L=230.55V**	C115.3	1,2,3
T.3.2	A series RLC circuit with R=10 ohms, L=10 mH and C=1µF has an applied voltage of 200 V at resonant frequency. Calculate the resonant frequency, the current in the circuit and voltages across the elements at resonance. Find also the quality factor and bandwidth. **ANS: f_r=1591.5494Hz, V_R=200V, V_L=2000V, V_C=2000V, Q=10, BW=159.15Hz**	C115.3	1,2,3
T.3.3	A series RLC circuit with R=5 ohm L=40 mH and C=1µF. Calculate (a) the Q of the circuit, (b) the separation between the half power frequencies, (c) the resonant frequency and (d) the half power frequencies f_1 and f_2. **ANS: (a) Q=40,** **(b) BW=19.89Hz, (c) f_r=795.77Hz, (d) f_1=785.83Hz & f_2=805.72Hz**	C115.3	1,2,3
T.3.4	A series circuit with R=10 ohm, L=0.1 H and C=50 µF has an applied voltage V=50 V with a variable frequency. Find the resonant frequency, the value of frequency at which maximum voltage occurs across the inductor and the value of frequency at which maximum voltage occurs across the capacitor. Explain what do you infer from the results. **ANS: f_L=72.08Hz, f_C=71.08Hz and f_r=71.18Hz**	C115.3	1,2,3,4
T.3.5	A series RLC circuit with R=10 ohm, L=0.2 mH and a variable capacitor has to resonate at 200KHz. Determine the value of C at resonance. **ANS: C=0.0031 µF**	C115.3	1,2,3
T.3.6	Draw the equivalent circuit of linear transformer.	C115.3	1,2
T.3.7	Two inductively coupled coils have self-inductances L1=50mH and L2=200mH. If the coefficient of coupling is 0.5, (i) Calculate the mutual inductance between the	C115.3	1,2,3

	coils, and (ii) what is the maximum possible mutual inductance? **ANS: (i) M=50mH (ii) M=100mH**		
T.3.8	Show that in series RLC circuit $F_1F_2=Fr^2$	C115.3	1,4
T.3.9	An amplifier with an output impedance of 1936 ohm is to feed a loudspeaker with an impedance of 4 ohm. (a) Calculate the desired turns ratio for an ideal transformer to connect the two systems, (b) An rms current of 20mA at 500Hz is flowing in the primary. Calculate the rms value of current in the secondary at 500Hz, (c) What is the power delivered to the load? **ANS: (a) $N_2/N_1=1/22$, (b) $I_{RMS}=0.44A$, (c) P=0.774W**	C115.3	1,2,3
UNIT IV - TRANSIENT RESPONSE FOR DC CIRCUITS			
T.4.1	A DC voltage of 100 volts is applied to a series RL circuit with R=25 ohm. Determine the current in the circuit at twice the time constant. **ANS: i(t) = 3.45A**	C115.4	1,2,3
T.4.2	In the circuit of the figure shown below, determine the expression for the transient current and the initial rate of growth of the transient current.  **ANS: $i(t) = 20 - 26e^{-\left(\frac{5}{3}\right)t}$, $\frac{di}{dt}|_{t=0} = 43.333$ A/sec**	C115.4	1,2,3
T.4.3	For the circuit shown in figure, determine the voltage across the resistor 0.5 ohm, when the switch, S is opened at t=0. Assume that there is no charge on the capacitor and no current in the inductor before switching. 	C115.4	1,2,3
T.4.4	A Series RLC circuit comprising R=10 ohm, L= 0.5H, and C = 1 microfarad is excited by a constant voltage source of 100V. Obtain the expression for the transient current assuming initially relaxed conditions. **ANS:$i(t) = e^{-10t}(0.1414 \sin 1414.2t)$ A**	C115.4	1,2,3
T.4.5	For a source free RLC series circuit, the initial voltage across C is 10V and the initial current through L is zero. If L = 20mH, C=0.5 microfarad and R=100 ohm, evaluatei(t).	C115.4	1,2,3
T.4.6	Calculate the voltage over the capacitor for the time t>0.	C115.4	1,2,3

			
T.4.7	Calculate the approximate voltage across the inductor 100ns after the switch is closed? 	C115.4	1,2,3
T.4.8	Determine the resonant frequency of the circuit. 	C115.4	1,2,3
T.4.9	If a simple RL circuit consisting of a 20Ω resistor in series with a 100mH inductor is connected to a 10V supply, from which it draws a current of 500mA after it has reached its steady state. Determine how long after switch on, will the current take to reach 316mA?	C115.4	1,2,3
	UNIT V - THREE PHASE CIRCUITS		
T.5.1	A balanced star connected load of (4+j3) ohm per phase is connected to a balanced 3 phase 400V supply. The phase current is 12A. Determine (a) Total active power **ANS: P=6651W** (b) Reactive power **ANS: Q=4988.36 VAR** (c) Total apparent power **ANS: S=8313.84VA**	C115.5	1,2,3
T.5.2	The voltage across the terminals R and Y is 400. Calculate the values of three line voltages. Assume RYB phase sequence. **ANS: V_{RY}=400∟0^0** **V_{BY}=400∟-120^0 V_{BR}=400∟ -240^0**	C115.5	1,2,3
T.5.3	The input power to a three phase load is 10kW at 0.8pf. Two wattmeters are connected to measure the power, calculate the individual readings of the wattmeters. **ANS: W_1=7.165 kW and W_2=2.835 kW**	C115.5	1,2,3
T.5.4	A two-phase generator is connected to two 90Ω load resistors. Each coil generates 120 V AC. A common neutral line exists. Determine how much current flow through the common neutral line.	C115.5	1,2,3

T.5.5	Compare the total copper cross sections in terms of current-carrying capacity for a single-phase and a three-phase 120 V system with effective load resistance of 15Ω.	C115.5	1,2,4
T.5.6	If in a Y-connected ac generator, each phase voltage has a magnitude of 90 V_{RMS}, calculate the magnitude of each line voltage.	C115.5	1,2,3
T.5.7	Calculate the phase difference θ between the supply voltage and the supply current. 	C115.5	1,2,3
T.5.8	Determine total average power and total reactive power for the circuit having line voltage 208V and the wattmeter readings of the balanced system is P_1=-560W and P_2=800W.	C115.4	1,2,3
T.5.9	Determine power factor for the circuit having line voltage 208V and the wattmeter readings of the balanced system as P1=-560W and P2=800W.	C115.4	1,2,3
	6. ASSIGNMENT QUESTIONS		
	UNIT I - BASIC CIRCUITS ANALYSIS		
A.1.1	An electric circuit has three terminals A,B,C. Between A and B is connected to a 2Ω resistor, between B and C are connected a 7Ω resistor and a 5Ω resistor in parallel and between A and C is connected a 1Ω resistor. A battery of 10V is then connected between terminals A and C. Calculate (a) total current drawn from the battery, (b) voltage across the 2Ω resistor and (c) current passing through the 5Ω resistor. **ANS: (a) I_T =12A, (b) $V_{2\Omega}$ =4volts, (c) $I_{5\Omega}$ =1.17A**	C115.1	1,2,3
A.1.2	Determine the value of resistance R and current in each branch when the total current taken by the circuit is 6A.  **ANS: R=1.52 ohm**	C115.1	1,2,3
A.1.3	Determine the power delivered by the 5A current source in the circuit shown below using PSpice. [Refer Pg. No. 101 , 'Circuits and Networks Analysis and Synthesis' by A. Sudhakar and Shyammohan S Palli]	C115.1	1,4,5

			
UNIT II - NETWORK REDUCTION AND NETWORK THEOREMS FOR DCAND AC CIRCUITS			
A.2.1	Apply Source Transformation technique and replace the circuit shown in figure between terminals 'ab' with the voltage source in series with a single resistor.  **ANS: V_{ab}=16.67V; R_{th} =2.38Ω**	C115.2	1,2,3
A.2.2	Determine the load resistance to receive maximum power from the source; also find the maximum power delivered to the load in the given circuit using PSpice. [Refer Pg. No. 155 , 'Circuits and Networks Analysis and Synthesis' by A. Sudhakar and Shyammohan S Palli] 	C115.2	1,4,5
A.2.3	A battery of unknown emf is connected across resistance as shown in the figure. The voltage drop across the 8Ω resistor is 20V. Determine the current through ammeter and emf of the battery.  **ANS: Ammeter reading=0.71A; Emf of the battery =67.38V**	C115.2	1,2,3

UNIT III - RESONANCE AND COUPLED CIRCUITS			
A.3.1	Determine the quality factor of a coil for the series circuit consisting of R=10Ω, L=0.1H and C=10μF.**ANS: Q=10**	C115.3	1,2,3
A.3.2	A voltage v(t) = 10sinωt is applied to a series RLC circuit. At the resonant frequency of the circuit, the maximum voltage across the capacitor is found to be 500V. Moreover, the bandwidth is known to be 400 rad/sec and the impedance at resonance is 100Ω. Determine the resonant frequency and also find the values of L and C of the circuit.**ANS: f_r= 4499Hz, L=0.25H, C=5nF**	C115.3	1,2,3
A.3.3	Categorize the following connections by examining the effective value of inductance.  **ANS: a) Series aiding &L_{eq}=19H; (b) Series opposing &L_{eq}=4H; (c) Series aiding &L_{eq}=18H**	C115.3	1,2,3,4
A.3.4	A series RLC circuit consists of a 10Ω resistance, 0.1H inductance and 50μF capacitor with an applied voltage of 100V. Determine the resonant frequency, the voltage across the inductor and Q factor of the circuit using PSpice. [Refer Pg. No.336, 'Circuits and Networks Analysis and Synthesis' by A. Sudhakar and Shyammohan S Palli]	C115.3	1,2,3

SELF STUDY TOPICS

- Basic Circuit Elements
- Kirchoff's laws in the frequency domain
- Ideal Transformers

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

Question Paper Code : 77178

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Civil Engineering

HS 6251 — TECHNICAL ENGLISH – II

(Common to all Branches except Marine Engineering)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Rewrite the following as numerical expressions : $(4 \times \frac{1}{2} = 2)$

   (a) A workshop for 5 days

   (b) A project worth 25 lakhs

   (c) A pole that is 15 metres high

   (d) A programme running for three days.

2. Complete the 'If clauses' using correct tense of the verbs : $(4 \times \frac{1}{2} = 2)$

   (a) If the child goes out in the rain, it ———— (catch) cold.

   (b) If I were an astronaut, I ———— (visit) the space station.

   (c) If the boys do not practice, they ———— (lose) in the finals.

   (d) If there had been good rains, the crops ———— (grow) well.

3. Fill in the blanks with the correct homophone from the words given :$(4 \times \frac{1}{2} = 2)$

(a) The _____ (leak/leek) in the tank is repaired.

(b) The farmer grows _____ (maze/maize) in his fields.

(c) The furniture has _____ (duel/dual) purpose as a sofa and bed.

(d) The _____ (scene/seen) at the country side is very beautiful.

4. Rewrite the following sentences in the passive form : $(2 \times 1 = 2)$

The hockey team won a gold medal in the national event. The chief minister appreciated their efforts.

5. Fill in the blanks with the most appropriate Modal verb from the list given. Change the form according to the meaning : (*Could, must, shall, would, should, might, need*) $(4 \times \frac{1}{2} = 2)$

(a) The manager _____ visit the company tomorrow.

(b) I _____ to tell him about the problems here.

(c) He _____ come forward to offer solutions.

(d) The company _____ show progress after that.

6. Frame sentences using any TWO of the phrasal verbs : $(2 \times 1 = 2)$

(a) get over

(b) back off

(c) breakdown

(d) look up

7. Combine the two sentences by using an appropriate clause : $(2 \times 1 = 2)$

(a) The IT company is started in Bangalore. It will offer jobs to the young professionals.

(b) The man drove the car very fast on the highway. He met with an accident

8. Use the following idioms by choosing the correct one for the blanks given. Make necessary changes in tenses : $(4 \times \frac{1}{2} = 2)$

(a) *make up one's mind*

(b) *at the eleventh hour*

(c) *catch up*

(d) *move to tears*

(i) Seeing the crying child the mother was ————

(ii) Ravi always prepares for the exams only ————

(iii) Hearing the news that Kiran was not selected in the National team, he ———— to work harder.

(iv) The workers have to ———— since the company was closed down for some days.

9. Complete the collocation in the sentence by choosing the correct words : $(4 \times \frac{1}{2} = 2)$

(a) The officer ———— (pay/had) sympathy on the manager and offered financial aid.

(b) The dog in our house ———— (went/get) missing when we moved to a new place.

(c) The champion ———— (broke/made) his own record in the Olympics.

(d) The company ———— (made/launched) a new product in the market last month.

10. Frame sentences by using any TWO of the following words both as a noun and a verb : $(4 \times \frac{1}{2} = 2)$

(a) fight

(b) long

(c) produce

(d) fly

PART B — $(5 \times 16 = 80$ marks)

11. Attempt both (i) and (ii) :

(i) Read the following passage and answer the questions given below :

For skydivers, the sky isn't the limit. It's just the beginning. Thousands of people each year try the sport of skydiving. Some only jump once, while others go on to experience lifelong adventures, maneuvering and flipping through the air. "Skydiving is not for everyone. But, if you enjoy the challenge of learning to perform in a completely new environment, are willing to make the effort to do it safely, and can overcome your fears to make the first few jumps – the rewards can be tremendous," says skydiver Bill von Novak. He has jumped around 5,500 times, is a fill-time instructor at Perris Valley Skydiving in California, and sometimes teaches a free fall course to Navy SEALS at Tac-Air.

There are three options for your first jump. However, before you can make any attempts at skydiving, a ground course on safety and equipment is required. The length and complexity of the course depends on the jump you choose. The most popular first-jump technique is tandem. Tandem has the shortest ground course, and is the easiest to complete. You and the instructor are strapped together in a double harness (the instructor behind, with you in front). Your instructor wears

the tandem rig, which contains a main and a reserve parachute. You jump out of the plane together, and the instructor takes care of opening the parachute at the appropriate altitude. The second technique is accelerated free fall or AFF. Accelerated refers to the learning process. You jump out of the plane while being held by two instructors, one on either side. They hold onto you until you open your parachute. The third technique is called Static line. The static line is connected to the rip cord on your parachute and to the plane. After jumping out, you will experience free fall for a second or two. Then the weight of your body will pull the line tight, opening the canopy. For each of these three methods, an instructor is there to coach you in the air with hand signals or with a radio.

When someone says parachute, huge round circles might come to mind. It's more common today to use a rectangle canopy called a Ram-air. When they are opened, the forward speed fills cells in the parachute with air, keeping it stable. Skydivers also wear jump suits, helmets, and gloves to help protect other areas of their bodies. Face shields or goggles are also commonly worn. This helps with visibility, an important consideration, since you are falling toward the Earth at the rate of 120-200 mph.

If you decide to try skydiving, just remember that there are very real risks involved. For some, the risk is the draw. When I asked Bill von Novak what his favorite thing about skydiving is, he said, "The freedom. For a few minutes there is absolutely nothing holding you to a spot on the planet, or in an airplane. You're completely free to fly around the sky and to choose your own orientation, speed, and trajectory."

Since skydiving is a risky sport, you must be eighteen years old to jump out of a plane at skydiving schools or areas called drop zones. But, there is an alternative if you are not yet of age — vertical wind tunnels. Vertical wind tunnels simulate the feeling of free fall. They are used by professional skydivers and competitors to practice their routines or tricks. Bill von Novak says, "The wind tunnel is a great way for younger aspiring jumpers to see what free fall is like."

If you decide after your first jump or a visit to a vertical wind tunnel that skydiving is a sport you would enjoy, you might want to look into the various types of sky sports and competitions. Each sport and competition has its own set of rules, and challenges. There is also a long list of people who have set or broken records. Bill von Novak is one of these people. His first world record was as part of a 300-person formation in Arizona in 2002. He was also one of the people that set the world records in Thailand for formations. In 2004, they made a formation of 357 people, then went back in 2006 to break that record with a formation of 400.

On August 16, 1960, a man named Joseph Kittinger did something that no one would ever dream was possible. He went up in a polyethylene plastic helium filled balloon called, Excelsior III. He reached an altitude of 102,800 feet. From there, he leapt out of the balloon's gondola, to free fall for 80,000 feet. He fell for four minutes and thirty-six seconds, reaching a speed of around 614 mph, before opening his parachute. Kittinger set records that still stand today. These records include: the highest balloon ascent; the highest parachute jump; the longest free fall; and the fastest speed by a man through the atmosphere of 614 mph.

With new innovations of equipment and knowledge, there are endless possibilities to where the future of skydiving will lead. If you are eager to try something challenging and would love to feel the freedom of flying, skydiving might be an adventure for you. Who knows? With risk and excitement mixed together, skydiving might just change your life.

(a) Choose the correct answers for the questions : (4 × 1 = 4)

(1) What is not true of Bill von Novak?

(i) He set a world record in Thailand

(ii) A full time instructor in a skydiving institute

(iii) First world record was a formation with 300 divers

(iv) He holds a record for the highest parachute jump.

(2) Who was Joseph Kittinger?

(i) the first person to parachute from an airplane

(ii) the person who organized the record 300-person skydiving formation in Arizona

(iii) the person who holds the record for parachuting from the lowest altitude

(iv) the person who made the highest ascent in a balloon

(3) When would a skydiver pull the rip cord?

(i) when he or she wants the parachute to open

(ii) when the main parachute fails to open

(iii) when he or she reaches the ground

(iv) when he or she first puts on a parachute

(4) What is a vertical wind tunnel?

(i) a wind storm that skydivers jump into

(ii) a machine that produces wind to make people feel like they are skydiving

(iii) an area below the airplane that skydivers should avoid

(iv) a place where skydivers store their gear

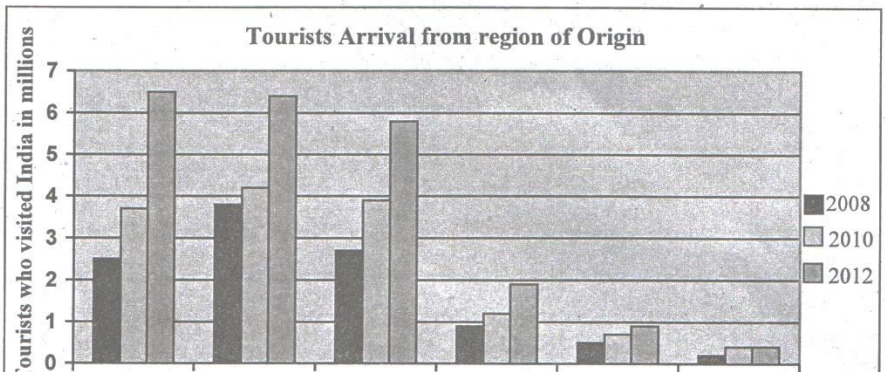
(b) Give short answers : (2 × 2 = 4)

(1) Describe a tandem parachute jump.

(2) How is an Accelerated Free Fall different from Static line?

(c) Prepare a check list of FOUR pieces of equipment that a diver should take for sky diving. (4)

(ii) The following chart represents the arrival of tourists from different regions. Analyze the given data and write a paragraph of 150 words : (4)



2008	2.5	3.8	2.7	0.9	0.5	0.2
2010	3.7	4.2	3.9	1.2	0.7	0.4
2012	6.5	6.4	5.8	1.9	0.9	0.4

12. (a) Read the following passage and answer the questions below :

The principal application of radium is the use for therapeutic purposes of the biological action of the rays. The biological action is a selective destruction of certain cells and can have very dangerous consequences, but can also be directed against some tissue, as for instance in the case of cancer. For medical use radium is put into tubes of glass or in platinum needles, sometimes also on flat surfaces recovered by a varnish, for the irradiation of the skin. Another form of use is to keep radium in solution and to extract from time to time the accumulated radon which, introduced into small tubes, has the same efficiency as radium till its

activity has disappeared. The use of radium for pharmaceutical preparations has been frequently tried. The scientific basis, however, in this case is far from being well established. Experimentation on the improvement of the soil by small quantities of radium has been till now very limited and some favourable results in this direction have been claimed.

By incorporating radium with phosphorescent zinc sulphide it is possible to obtain luminous paints giving a weak light visible in darkness. The most important use of this paint is for watches. The quantity necessary is of the order of one-tenth of a milligram per gram of zinc sulphide. After several years, the phosphorescent product is altered by the action of the rays and becomes less luminous, though the quantity of radium has not changed appreciably.

Radium in Nature–Radium exists in minute proportion in every kind of soil and water; the extraordinary sensitiveness of the methods of analysis has made it possible to ascertain this fact. If some inactive element is present in the same proportions, we are not able to detect it. The quantity of radium contained in the ordinary soil is of the order of 10-12 or 10-11 gr. of radium per gram while a good radioactive ore contains about 10-7 gr. of radium per gram of mineral.

Radium existing in the depths of the earth is sometimes dissolved by water and affects springs. Other springs dissolve principally the radon liberated by the radium and their activity dies out with the radon. This would explain why certain mineral waters are reputed to be efficient for curative effect only when used directly at the source. Some radio-active waters contain amounts of radium up to 10-10 gr. per litre; the amount of radon can attain 10-7 curies per litre.

The radium in the soil is the origin of the small quantity of radon present in the air and is partly responsible for the natural ionization of the air which is known to be an important factor in the meteorological conditions of the atmosphere. Radium and radioactive elements in general have played an important part in the evolution of terrestrial heat. It is not improbable that the radium present at the surface of the earth in a very dilute state has some connection with the evolution of life on our planet.

(1) Complete the following sentences by filling in with THREE to FIVE correct words : $(4 \times 1 = 4)$

(i) The biological action of the rays of radium is the _____.

(ii) Mixing radium with phosphorescent zinc sulphide will give _____.

(iii) Presence of small quantity of radium in the soil will result in _____.

(iv) The water springs get affected when _____.

(2) Answer the following questions in two sentences : $(3 \times 2 = 6)$

(i) How is radium used for medical purposes?

(ii) What happens to the phosphorescent product after some years?

(iii) How is the presence of a small quantity of radium in soil found out?

(3) Write a summary of the passage in about 100 words : (6)

Or

(b) Read the following passage and answer the questions given below :

By "biofuels" I mean fuels for vehicles, such as "biodiesel" and "bioethanol' - although you can also use the term "biofuel" to cover any kind of fuel made from living materials or their waste. Biofuels are made from two main sources :

(i) Growing crops such as corn, sugar cane, soya or rapeseed; or from palm oil

(ii) Growing algae for powering vehicles, the product is usually bioethanol or biodiesel. Bioethanol is mixed with petrol, whilst biodiesel can be used on its own. Biofuels are potentially carbon-neutral, because although carbon dioxide is released when we burn them, carbon dioxide is taken in by the plants as they grow. However, energy is needed to grow the crops, harvest them, and to process the results into usable products - and most of this energy will be from fossil fuels for farm machinery and power stations.

Biofuels from crops : Crops such as rapeseed contain oils that can be processed into biodiesel. Crops such as sugar cane contain sugars that can be fermented into bioethanol. Producing biofuels from crops means using large amounts of land to grow those crops - that means less land for food production. We must be careful to strike a balance between crops for fuel and crops for food.

Biofuels from algae: Algae - that's pond scum - are microscopic water plants. They reproduce and photosynthesise fast, and the algae are then filtered out of the water and the lipids (oils) are used to make biodiesel. They can grow in transparent plastic tubes, arranged vertically so we can maximise the area available for photosynthesis without taking up too much land.

It is claimed that biofuels will help us to reduce our reliance on fossil-fuel oil, and that this is a good thing. On the other hand, it is also claimed that it takes a huge amount of land to grow enough crops to make the amount of biofuels we'd need, so much so that it makes a big dent in the amount of land available for growing food.

Who is right? Should we be using more biofuels and less fossil fuels? Think about the carbon dioxide - there are similar CO_2 emissions from biofuel-powered vehicles as from petrol-powered ones. It is claimed that growing plants to make biofuels will take in that carbon dioxide again. But biologists tell us that forests are not 'the lungs of the planet' after all - they give out as much CO_2 as they absorb as the plants respire. It seems that it's plant plankton in the oceans that takes in most CO_2 and gives out most oxygen. Biofuels are renewable, we can plant more of the crops or grow more of the algae.

(1) Complete the sentences by filling the blanks with correct words : (4)

(i) The two products used to power vehicles are ———— and ————.

(ii) Sugar from sugarcane has to be ———— in order to make bioethanol.

(iii) Biofuels shall help to reduce relying on ————.

(iv) Majority of the CO_2 is absorbed by ————.

(2) Answer the following questions : (3 × 2 = 6)

(i) Why are bio fuels called 'carbon neutral'?

(ii) Why should the algae be grown in transparent plastic tubes?

(iii) What does it mean 'trees are not the lung of the planet'?

(3) Write THREE advantages and disadvantages of biofuels as you read from the passage. (6)

13. (a) You have come across the following advertisement in the newspaper on 12th June 2014. Write a letter of application and a detailed CV to one of the posts selected :

A leading private sector company in India needs the following engineers for the various projects in India.

1) **CIVIL / MECHANICAL ENGINEERS**
2) **ELECTRICAL / MANUFACTURING ENGINEERS**
3) **CHEMICAL ENGINEERS**
4) **COMPUTER SCIENCE ENGINEERS**

- 1 to 3 years of experience
- Should be able to work in a team
- Good communication skills

Apply to

The Managing Director,
L and T Ltd.
Bangalore - 5
Email id: landt14@gmail.com

Or

(b) You come across the following advertisement in a website www.careers.ma

Company Name	Role
Ammwaiy Staffing	• Technical Support Engineer • Civil Engineer
Locations	• Electrical Engineer
Thane, Pune	• Mechanical Engineer
Nationality	Industry
India	Engineering, Procurement, Construction
Experience	Salary
3 – 3 years	6.50 – 8.50 lacs
Education	Posted On
B.E/B.Tech	30th Aug 2014

- IT
- Manufacturing/ Engineering/ R and D

Prepare a detailed CV to be uploaded in the website.

14. (a) You are working in a textile company and your company is planning to install a waste water recycling plant. How would you conduct the study? Prepare a **Feasibility Report**. This report should contain among other things the background, method or methodology, feasibility of the project, conclusion and recommendation.

Or

(b) You along with two of your friends underwent a short training during your summer vacation in a company and you were involved in a mini Project. Prepare a **Project Report** to be submitted to your HOD. This report should contain

(i) managing the project

(ii) objectives/ purpose

(iii) outcome

(iv) solution and action

(v) key findings

(vi) recommendations etc.

15. (a) Aravind had been shortlisted for an interview by a multi-national company in Chennai. What are the questions likely to be asked by the Placement officer and how would he respond to them. Make a minimum of **eight** exchanges.(16 sentences) The first one is done for you.

P.O. : Hello Aravind, Can you tell us why you had applied to this company?

Aravind: It had been my dream to work in a multi -national company like yours.

Or

(b) You want to buy a new mobile phone and you visit the showroom. What kind of dialogue would take place between you and the marketing personal? You finally decide to go for a particular brand. Make at least **eight** exchanges, highlighting the marketing strategies used by the executive.

Marketing Executive: Hello sir, May I help you?

You: I'm on the lookout for a mobile phone.

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

Question Paper Code : 27298

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

Second Semester

Civil Engineering

HS 6251 — TECHNICAL ENGLISH – II

(Common to all Branches except Marine Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Rewrite the following as numerical expressions: $(4 \times \frac{1}{2} = 2)$

   (a) warranty for three years (b) a strike for two days

   (c) a book with 250 pages (d) a course which lasts for six weeks

2. Use the following homonyms and frame two sentences to show the difference in the meanings : $(2 \times 1 = 2)$

   (a) row

   (b) bark

3. Complete the following conditionals with correct forms of the verbs : $(4 \times \frac{1}{2} = 2)$

   (a) They ———————(help) you if they could.

   (b) If I ——————— (go) away, I would have met you at the party.

   (c) If you arrive early, you ——————— (have) to wait as I need to finish my packing.

   (d) She would have come if you ——————— (invite) her.

4. Rewrite the following in their passive form : (2)

A college student found a suspicious suitcase near a bus station. He handed it over to the police officer.

5. Fill in the blanks with suitable modal verbs: $(4 \times \frac{1}{2} = 2)$

(need, can, ought, have to be, may, should)

A: Hi, Mr. Kumar. I hope you don't mind me calling but I'd like to ask a few questions about the job.

B: Okay, fire away.

A: Right, the advert asks for computer skills. Do I _____ an expert?

B: Well, you don't have to be a programmer, but you _____ know the basics.

A: Oh, that's great. Now the advert also says that you _____ someone with good language skills. I speak English of course, my Tamil is good and I _____ speak some Hindi. Is that adequate?

B: That is very useful. Please do apply for the job at the earliest.

6. Make sentences using any TWO of the following phrasal verbs : $(2 \times 1 = 2)$

(a) look into

(b) get together

(c) turn up

(d) put off

7. Combine the given two sentences into one sentence using appropriate words. $(2 \times 1 = 2)$

(a) He was sitting in the auditorium. It was very crowded.

(b) The doctor treated the patient. She was very serious.

8. Choose the right option to complete the given idiomatic sentences. $(4 \times \frac{1}{2} = 2)$

(a) I've been in Aakash's good books ever since I

(i) crashed his car (ii) fixed his computer

(iii) lost his mobile phone (iv) misplaced his lab record notebook

(b) Suraj thinks he got a raw deal from his company, so he's writing a letter.

(i) to thank them (ii) to complain to them

(iii) to congratulate them (iv) to apologise to them

(c) Our school's basketball team is going great guns in the tournament. They have

(i) lost every game

(ii) won two out of four games

(iii) won every game

(iv) won the first game in this tournament

(d) You can see that Nisha has got a soft spot for dogs. Whenever she sees one, she

(i) kicks it (ii) pats it on the head

(iii) keeps away from it (iv) is scared

9. Fill in the blanks with right options to complete the collocations. $(4 \times \frac{1}{2} = 2)$

(a) He tried to ———— her some advice but she wouldn't listen.

(i) give (ii) suggest

(iii) recommend (iv) take

(b) She's slowly getting ———— after the accident.

(i) better (ii) ok

(iii) well (iv) healthy

(c) Castles are a ———— sight in Spain.

(i) frequent (ii) common

(iii) usual (iv) typical

(d) Cutting out sugar from his diet is ———— on his list.

(i) top (ii) big

(iii) up (iv) high

10. Choose any ONE word from the following and write two sentences using the same word, one in the noun form and the other in verb form. (2)

(a) coach (b) light

(c) show

PART B — (5 × 16 = 80 marks)

11. Answer both (a) and (b) for Question No. 11 :

(a) Read the following passage and answer the questions given below:

Reading is becoming more and more important in the new knowledge economy and remains the most effective human activity for transforming information into knowledge.

If top readers read at speeds of above 1000 words per minute (wpm) with near 85% comprehension, they only represent 1% of readers. Average readers are the majority and only reach around 200 wpm with a typical comprehension of 60%. This seems surprising since most readers, actively reading work documents, newspapers, magazines, books or the contents of a computer display are practicing daily for at least one hour. With such an intense training everyone should be close to top performances.

Unfortunately, this is far from the real situation. The average reader is five times slower than the good reader. Things are even worse if we consider reading efficiency as well as speed. Reading efficiency is reading speed weighted by comprehension rate and it amounts to 200 × 60% or 120 efficient words per minute (wpm) for the average reader and to 1000 × 85% or 850 ewpm for top readers. Thus, an efficiency ratio of seven divides these two categories.

Compare the results of the average reader to other areas. We may imagine a sprinter practicing every day for several years on the running track and then just calmly walking for a race. We can also picture a racing driver never exceeding 30 mph or a pianist playing every day of the week for 20 years and only able to play music like a beginner. Unfortunately, since the age of 12, most readers do not substantially improve their efficiency and never reach their full capacity.

Every computer-user who is also a slow typist is aware of the benefits he could obtain with a typing course, but nearly no one suspects the much higher profits he could reach by improving his reading comprehension and speed. The rapid improvement of voice recognition may gradually make typing virtuosity obsolete since a good typist performs well under the speed of speech. On the other hand, human or computer speaking, with an average speed of 150 wpm, will always remain many times slower than a good reader, without any consideration of the skimming and skipping possibilities.

There are three possible ways to improve reading. The fastest is probably a speed reading seminar based upon good materials and animated by a dynamic instructor. It is quite usual for a slow reader to double and even triple his reading efficiency during a two-day class offering a positive atmosphere, carefully selected texts and comprehension tests. However, as this rapid and encouraging improvement is not sufficiently anchored, it often fades with time.

A book about speed reading is the second possibility. Such a book usually provides speed and comprehension tests as well as techniques to improve reading. It often includes more general information about concentration, interest stimulation, skimming techniques and ways to approach a text. Some methods may include audio or videocassettes. A book-based method requires a good deal of time as well as a strong commitment from the reader.

27298

Finally, a speed reading computer program is probably the most efficient way to achieve top reading levels. Computers offer unique exercises to boost reading efficiency through interactivity, text animation and pacing. Higher reading skills obtained with a computer screen are totally transferable to reading from paper. Unfortunately the inverse way does not work so well. Speed reading software delivers enjoyable and fast paced training, thus giving the consistent practice necessary to break lifelong slow reading habits. This is the task that seminars and speed reading books usually leave up to the reader.

Answer the following questions: $(6 \times 1 = 6)$

(i) Compared to average reader, the accomplished reader reads with

(1) Higher speed and worse reading comprehension

(2) Higher speed and better reading comprehension

(3) Higher speed and same reading comprehension

(4) Higher speed and low reading comprehension

(ii) Readers reading above 1000 wpm

(1) are average readers

(2) are the majority of readers

(3) are the 1% minority

(4) are slow readers

(iii) The average speaking speed of a race driver is around

(1) 120 mph (2) 150 wpm

(3) 100 wpm (4) 200 wpm

(iv) What will lessen the importance of fast typing?

(1) More ergonomic keyboards

(2) Good keyboards

(3) Progress in voice recognition

(4) Spelling-checkers

(v) A speed reading seminar or book lacks

(1) Rapid results (2) Consistent practice

(3) Deep explanations (4) Expert advice

(vi) What is probably the best way to reach top level reading efficiency?

(1) a speed reading software

(2) a speed reading book

(3) a speed reading workshop

(4) a speed reading seminar

(vii) Prepare a checklist of 4 items to test whether a person is able to read efficiently and with adequate speed. (4)

(b) Look at the following table about the profits of Oil Companies. Analyse the given data and give a short review of the performance of these companies in a short paragraph of not more than 120 words. (6)

OIL COMPANY PROFITS

The following table shows the net income of Oil Companies from the year 2008 to 2012. This income is total revenue minus all costs of operation, interest on debt, and taxes. Net income is the amount available to management to use for providing a return to shareholders. Net incomes of five major oil companies generally follow the behaviour of oil prices. There were losses due to oil spill or war in these years.

Table: Net Income of the Five Major Oil Companies

	2008	2009	2010	2011	2012
ExonMobil	40,610	45,220	19,280	30,460	41,060
Chevron	18,688	23,931	10,483	19,024	26,895
BP Oil	17,287	25,593	16,578	–3,719	25,700
Royal Dutch Shell	27,564	26,277	12,518	20,127	28,625
ConoPhilips	11,891	–16,998	4,858	11,358	12,436
Total	1,16,040	1,04,023	63,717	77,250	1,32,916

Source: Oil Daily, Oil Business Magazine, Oil Gazette

12. (a) Read the following passage and answer the questions given below :

Hybrid Vehicles

A hybrid vehicle is a vehicle which uses two or more kinds of propulsion. Most hybrid vehicles use a conventional gasoline engine as well as an electric motor to provide power to the vehicle. These are usually called hybrid-electric-vehicles, or HEVs. Hybrids use two types of propulsion in order to use gasoline more efficiently than conventional vehicles do. Most hybrid vehicles use the gasoline engine as a generator which sends power to the electric motor. The electric motor then powers the car. In conventional vehicles, the gasoline engine powers the vehicle directly.

Since the main purpose of using a hybrid system is to efficiently use resources, most hybrid vehicles also use other efficient systems. Most hybrid vehicles have regenerative braking systems. In conventional vehicles, the gasoline engine powers the brakes, and the energy used in braking is lost. In regenerative braking systems, the energy lost in braking is sent back into the electrical battery for use in powering the vehicle. Some hybrid vehicles use periodic engine shut-off as a gas-saving feature. When the vehicle is in idle, the engine temporarily turns off. When the vehicle is put back in gear, the engine comes back on. Some hybrids use tires made of a stiff material which rolls easily and prevents dragon the vehicle.

Hybrid vehicles save up to 30% of the fuel used in conventional vehicles. Since hybrid vehicles use less gasoline, the cost of operating them is less than the cost of operating conventional vehicles. Therefore, hybrid vehicles are gaining in popularity. According to a recent study, over the five years it typically takes for a person to pay for a car, a typical hybrid car driver would save over $6,000 in gasoline costs. Almost all the world's major automakers are planning and producing safe and comfortable hybrid vehicles to meet the demand for these increasingly popular vehicles.

Although hybrid vehicles do represent a marked improvement in environmentally conscious engineering, there still remains one significant potential drawback: battery disposal. Batteries are difficult to dispose of in an environmentally safe manner. To properly dispose of the battery in a hybrid car requires substantial effort. If the battery is not disposed of properly, the environmental impact of a hybrid car can be equal, if not greater than, that of a regular gas only car.

Since hybrid vehicles use less gasoline than conventional vehicles, they put fewer emissions into the atmosphere than conventional vehicles do. As hybrids become more popular, conventional vehicles are being used less, and the level of emissions being put into the air is decreasing. Hybrid vehicles are an example of an energy-efficient technology that is good for both consumers and the environment.

(i) Write a short summary of the above given passage in not more than 80 words. (6)

(ii) Complete the following sentences with NO MORE THAN THREE WORDS (4)

(1) HEVs use two type of propulsion mainly in order to _____.

(2) Hybrid vehicles are more socially responsible vehicles to operate because _____.

(3) In regenerative braking system, the energy lost _____.

(4) One of the drawbacks of hybrid vehicles is _____.

(iii) Answer the following questions in two sentences : (3 × 2 = 6)

(1) How is a hybrid vehicle different from conventional vehicle?

(2) Why are hybrid vehicles gaining popularity nowadays?

(3) What are the major benefits in using hybrid vehicles?

Or

(b) Read the following passage and answer the questions given below :

Canary Islands Earthquake Could Trigger Monster Tsunami

The eruption of a volcano in the Canary Islands could trigger a "mega-tsunami' that would devastate Atlantic coastlines with waves as high as 330 feet, scientists said on Wednesday. They said an eruption of the Cumbre Vieja volcano on La Palma, part of the Spanish island chain off West Africa, was likely to cause a massive chunk of rock to break off, crashing into the sea and kicking up huge walls of water higher than any other in recorded history.

The tsunami would be capable of traveling huge distances at up to 500 miles an hour, the scientists said in a research paper to be published in September's Geophysical Research Letters. Simon Day, of the Benfield Greig Hazard Research Centre at the University College of London, said that as the volcano was not erupting at present, the short-term and medium-term risks were "negligible". But Cumbre Vieja should be monitored closely for any signs of activity so that emergency services could plan an effective response, he said.

"Eruptions of Cumbre Vieja occur at intervals of decades to a century or so and there may be a number of eruptions before its collapse", said Day, who collaborated on the research with Steven Ward of the University of California. "Although the year-to-year probability of a collapse is therefore low, the resulting tsunami would be a major disaster with indirect effects around the world".

WEST SAHARA TO BEAR BRUNT

The effects would spread north, west and south of the Canaries, with the west Sahara bearing the worst of the wave's energy. The energy released by the collapse would be equal to the electricity consumption of the entire United States in half a year. Immediately after the landslide, a dome of water 93,000 feet high and tens of miles wide would form, only to collapse and rebound.

As the landslide rubble moved deeper under water, a tsunami would develop. Within 10 minutes, the tsunami would have moved a distance of almost 155 miles. On the west Saharan shore, waves would probably reach heights of 330 feet.

Florida and the Caribbean, the final north Atlantic destinations to be affected by the tsunami, would have to brace themselves for 165 foot waves some eight to nine hours after the landslide.

Wave heights toward Europe would be smaller, but substantial waves would hit the coasts of Britain, Spain, Portugal and France. The research paper estimated water would penetrate several miles inland and that the devastation would cause trillions of dollars in damage.

(i) Write a short summary of the above given passage in not more than 80 words. (6)

(ii) Complete the following sentences with NO MORE THAN THREE WORDS (4)

(1) When Cumbre Vieja volcano erupts _____.

(2) The energy released during the eruption would be _____.

(3) _____ would bear the worst if the Cumbre Vieja volcano erupts.

(4) The time taken for the tsunami to move nearly 150 miles are _____.

(iii) Answer the following questions in 2 sentences : (3 × 2 = 6)

(1) How would a volcano in Canary islands create a tsunami?

(2) What does the research conclude about the impact of Cumbre Vieja volcano eruption?

(3) Describe the tsunami caused by the Cumbre Vieja volcano eruption.

13. (a) You have been called for an interview for a post of Management Trainee in one of the multinational companies which had come to your college for placement. Write the dialogue that would happen in the interview between you and the HR Executive. Assume that you have already cleared the written test and you are ready to work in any city. The first two dialogues are given for your reference. (16)

HR Executive: Why are you taking up a job instead of doing your higher studies?

You: I would like to work for a few years and get some industry experience before going for higher studies.

You should have minimum of eight interactions (16 sentences) between you and HR Executive.

Or

(b) You have recently become the Secretary of Robotics club in your college. You find the club using outdated documentation procedure. As a new Secretary of the Club, try to convince your Staff Co-ordinator to use advanced technology. This can make the job easier and faster in all Club activities. The first interaction is given for your reference. (16)

Staff: When our traditional way of documentation has been effective so long, why should we go in for new methods?

You: Sir, our traditional methods were effective when we had a few students. But today we have hundreds of students joining our club.

You should have minimum of eight interactions (16 sentences) between you and the Staff Co-ordinator.

14. (a) Respond to the following advertisement with a job application letter and a resume. (16)

ENGINEERS REQUIRED

A well reputed Construction Company based at Mumbai requires the following personnel to be posted all over India.

Project Manager	1	B.E. CSE/IT 3-5 years experience in Programming
Production Manager	1	B.E. Mechanical 3 years experience in Production
Materials Manager	1	B.E. Mechanical/Material Science Freshers can apply
Quantity Surveyor	3	B.E. Civil 2 years experience in construction

Candidates should also possess a strong drive for achievement, meet goals on time, able to work in teams and focus on long term.

If you think you have all that what we are looking for, mail your CVs to Mr. Rishab Patel, HR Manager, IBMsoft, Pritvi Avenue, Gandhi Marg, Mumbai 400 009 within 7 days after the publication of this advertisement. Only shortlisted candidates will be called for interview.

The Hindu
April 15, 2014

Or

(b) You have been working as a Software Engineer in a company called 'MacText Services' in Chennai for last three years. You come to know there is going to be a vacancy for Programming Head post in Bangalore branch. Write a letter of application to your Managing Director based in Mumbai evincing your interest for the post. List your achievements in your resume and outline what would you do if you were given the post. In your letter persuade your MD to consider you for the post. (16)

15. (a) You are working as Project Head in a company called PKR Communications. Your company is planning to start a sale and service outlet for mobile phones in your hometown. You have been asked to study the area, potential customers and give your opinion on the possibility of this venture in the form of a feasibility report. Your report should include suitability of the area, customer needs, competitors in this area and your suggestions. (16)

Or

(b) As part of Community Welfare Scheme, your college has started a Computer Awareness Programme among youth in nearby villages. As a member of this project you have been asked to give a detailed report on the status of your project to your college Dean. Your report should include the aim of the project, initiatives taken, goals achieved, and future plans and any other relevant issues. (16)

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

Question Paper Code : 77188

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Civil Engineering

MA 6251 – MATHEMATICS – II

(Common to all branches except Marine Engineering)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. In what direction from (3, 1, –2) is the directional derivative of $\phi = x^2y^2z^4$ maximum? Find also the magnitude of this maximum.

2. Find α such that $\vec{F} = (3x-2y+z)\vec{i} + (4x+\alpha y-z)\vec{j} + (x-y+2z)\vec{k}$ is solenoidal.

3. Solve : $(D^3 + D^2 + 4D + 4)y = 0$.

4. Transform the equation $(2x+3)^2 y'' - 2(2x+3)y' + 2y = 6x$ in to a linear differential equation with constant coefficients.

5. State the sufficiency condition for the existence of Laplace transform.

6. Evaluate $\int_0^\infty te^{-2t} \sin t \; dt$ using Laplace transform.

7. Show that $|z|^2$ is not analytic at any point.

8. Find the invariant points of the transformation $w = \frac{z-1}{z+1}$.

9. State Cauchy's integral theorem.

10. Identify the type of singularity of function $\sin\left(\frac{1}{1-z}\right)$.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Show that $\nabla^2(r^n) = n(n+1)r^{n-2}$ where $r^2 = x^2 + y^2 + z^2$. Hence find the value of $\nabla^2\left(\frac{1}{r}\right)$. (8)

(ii) Using Green's theorem, evaluate $\int_C (y - \sin x)dx + \cos x dy$ where C is the triangle formed by $y = 0$, $x = \frac{\pi}{2}$, $y = \frac{2x}{\pi}$. (8)

Or

(b) Verify Gauss divergence theorem for $\vec{F} = (4xz)\vec{i} - (y^2)\vec{j} + (yz)\vec{k}$ taken over the cube bounded by the planes $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$, $z = 1$. (16)

12. (a) (i) Solve : $(D^2 - 3D + 2)y = xe^{3x} + \sin 2x$. (8)

(ii) Solve the simultaneous differential equations :

$\frac{dx}{dt} + \frac{dy}{dt} + 3x = \sin t$, $\frac{dx}{dt} + y - x = \cos t$. (8)

Or

(b) (i) Solve : $(x^2D^2 - xD + 1)y = \log x + \pi$. (8)

(ii) Solve, by the method of variation of parameters, $y'' - 2y' + y = e^x \log x$. (8)

13. (a) (i) Find the Laplace transform of the triangular wave function $f(t)$ defined by

$f(t) = \begin{cases} t & \text{in } 0 < t \le c \\ 2c - t & \text{in } c < t < 2c \end{cases}$ and $f(t + 2c) = f(t)$ for all t. (8)

(ii) Find $L^{-1}\left\{\frac{s}{(s^2+1)(s^2+4)}\right\}$. (8)

Or

(b) (i) Solve the differential equation $y'' - 3y' + 2y = 4t + e^{3t}$, where $y(0) = 1$ and $y'(0) = -1$ using Laplace transforms. (10)

(ii) Find $L\left\{\frac{\cos at - \cos bt}{t}\right\}$. (6)

14. (a) (i) Determine the analytic function $w = u + iv$ if $u = e^{2x}(x\cos 2y - y\sin 2y)$. (8)

(ii) Show that a harmonic function 'u' satisfies the formal differential equation $\frac{\partial^2 u}{\partial z \partial \bar{z}} = 0$ and hence prove that $\log|f'(z)|$ is harmonic, where $f(z)$ is a regular function. (8)

Or

(b) (i) Find the image in the w-plane of the infinite strip $\frac{1}{4} \le y \le \frac{1}{2}$ under the transformation $w = \frac{1}{z}$. (8)

(ii) Find the bilinear transformation that maps the points $z = 0, -1, i$ into the points $w = i, 0, \infty$ respectively. (8)

15. (a) (i) Evaluate $\int_C \frac{z^2}{(z-1)^2(z+2)} dz$ where C is $|z| = 3$. (8)

(ii) Find the Laurent's series expansion of $f(z) = \frac{z^2 - 1}{(z+2)(z+3)}$ valid in the region $|z| < 2$ and $2 < |z| < 3$. (8)

Or

(b) Evaluate $\int_0^\infty \frac{dx}{(x^2 + a^2)^2}$, $(a > 0)$ using contour integration. (16)

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

Question Paper Code : 27324

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

Second Semester

Civil Engineering

MA 6251 — MATHEMATICS — II

(Common to all branches except Marine Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Prove that $3x^2y\vec{i} + \left(yz - 3xy^2\right)\vec{j} - \frac{z^2}{2}\vec{k}$ is a solenoidal vector.

2. State Green's theorem.

3. Find the particular integral of $\left(D^2 - 4D\right)y = e^x x$.

4. Transform $x^2y''' - 3xy'' = \frac{\sin(\log x)}{x}$ into a differential equation with constant coefficients.

5. State final value theorem on Laplace transform.

6. Find $L^{-1}\left(\frac{s+2}{s^2+4s+8}\right)$.

7. Prove that $w = \sin 2z$ is an analytic function.

8. Define conformal mapping.

9. State Cauchy's integral theorem.

10. Find the residue of $ze^{-\frac{2}{z}}$ at $z = 0$.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find the directional derivative of $4x^2z + xy^2z$ at $(1,-1,2)$ in the direction of $2\vec{i} - \vec{j} + 3\vec{k}$. (6)

(ii) Using Stoke's theorem evaluate $\iint_S curl\,\vec{f}.\vec{n}\,ds$ given $\vec{f} = y^2\vec{i} + y\vec{j} - xz\vec{k}$ and S is the upper half of the sphere $x^2 + y^2 + z^2 = a^2$. (10)

Or

(b) (i) Find ∇r^n and hence prove that $\nabla^2 r^n = n(n+1)r^{n-2}$. (6)

(ii) Verify Gauss Divergence theorem for $\vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ taken over the cube bounded by the planes $x = 0$, $x = 1$, $y = 0$, $y = 1$ $z = 0$ and $z = 1$. (10)

12. (a) (i) Solve : $(D^3 - 2D^2 + 4D - 8)y = e^{2x} + \sin x \cos x$. (8)

(ii) Solve : $\frac{dx}{dt} + y = \sin t$; $\frac{dy}{dt} + x = \cos t$ given that $x = 2$, $y = 0$ when $t = 0$. (8)

Or

(b) (i) Solve : $x^2y'' - 4xy' + 6y = x^2 + \log x$. (8)

(ii) Solve : $y'' + 4y = \cot 2x$, using the method of variation of parameters. (8)

13. (a) (i) Find Laplace transform of $t^2e^{-3t}\cos t$ and $\int_0^t \frac{\sin t}{t}dt$. (8)

(ii) Using convolution theorem evaluate $\int_0^t \sin u \cos(t-u)du$. (8)

Or

(b) (i) Find the Laplace transform of

$$f(t) = \begin{cases} \frac{4E}{T}t - E; & 0 \le t \le \frac{T}{2} \\ 3E - \frac{4E}{T}t, & \frac{T}{2} \le t \le T \end{cases}$$ and $f(t+T) = f(t)$ and E is a constant. (8)

(ii) Solve using Laplace transform, $x'' - 2x' + x = e^t$ when $x(0) = 2$, $x'(0) = -1$. (8)

14. (a) (i) If $f(z)$ is an analytic function, prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^p = p^2 |f'(z)|^2 |f(z)|^{p-2}$. (8)

(ii) Show that the transformation $w=\frac{1}{z}$ transforms all circles and straight lines in the w-plane into circles or straight lines in the z-plane. Which circles in the z-plane become straight lines in the w-plane and which straight lines transform into other straight lines? (8)

Or

(b) (i) Determine the analytic function $f(z)=u+iv$, given $u-v=\frac{\cos x+\sin x-e^{-y}}{2(\cos x-\cosh y)}$ and $f\left(\frac{\pi}{2}\right)=0$. (8)

(ii) Find the bilinear transformation which maps the points $-i,0,i$ into the points $-1,i,1$ respectively. Into what curve the y-axis is transformed under this transformation? (8)

15. (a) (i) Evaluate $\int_C \frac{\tan\frac{z}{2}}{(z-a)^2}dz$, where $-2<a<2$ and C is the boundary of the square whose sides lie along $x=\pm 2$ and $y=\pm 2$. (8)

(ii) Evaluate $\int_{-\infty}^{\infty} \frac{\cos x\,dx}{(x^2+a^2)(x^2+b^2)}$ using contour integration given $a>b>0$. (8)

Or

(b) (i) Expand Laurent's series $f(z)=\frac{z}{(z-1)(z-2)}$ valid in $1<|z|<2$ and $|z-1|<1$. (8)

(ii) Evaluate $\int_0^{2\pi} \frac{\cos 3\theta\,d\theta}{5-4\cos\theta}$. (8)

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

Question Paper Code : 77276

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Civil Engineering

PH 6251 — ENGINEERING PHYSICS – II

(Common to all branches except Biotechnology and Pharmaceutical Technology)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define mobility of electrons. Write its unit.

2. Fermi temperature of a metal is 24600 K. Calculate the Fermi velocity of electrons.

   Given : $k = 1.38 \times 10^{-23}$ J K^{-1}, $m = 9.1 \times 10^{-31}$ kg.

3. What are elemental semiconductors and compound semiconductors?

4. With increase of temperature, the conductivity of a semiconductor increases. Why?

5. What are the applications of ferrites?

6. What is the principle of SQUID?

7. What are the uses of dielectric material?

8. Define dielectric loss.

9. What do you understand by the term quenching?

10. What are nanomaterials?

PART B — (5 × 16 = 80 marks)

11. (a) (i) On the basis of free electron theory, derive an expression for electrical conductivity of metals. (12)

(ii) What are the drawbacks of classical free electron theory of metals? (4)

Or

(b) (i) Explain the concept of density of energy states. Derive an expression of density of energy states. (12)

(ii) Find the expression for carrier concentration in metals. (4)

12. (a) Obtain an expression for density of holes in the valence band of p-type semiconductor. (16)

Or

(b) What is Hall effect? Derive an expression of hall co-efficient. Describe an experimental setup for the measurement of hall co-efficient. (2+8+6)

13. (a) (i) Briefly explain different types of magnetic materials and their properties. (12)

(ii) Distinguish between soft and hard magnetic materials. (4)

Or

(b) (i) Explain Meissner effect, type I and type II superconductors. (4+4+4)

(ii) Calculate the critical current for a wire of lead having a diameter of 1 mm at 4.2 K. Critical temperature of lead is 7.18 K and H_c at 0K is 6.5×10^4 A/m. (4)

14. (a) Derive the expression for electronic and ionic polarisabilities. (8+8)

Or

(b) Discuss in detail the various dielectric breakdown mechanisms. (16)

15. (a) What are metallic glasses? Explain how they are prepared by melt spinning method. Also mention their application. (2+7+7)

Or

(b) Explain with necessary diagrams the synthesis of nanomaterials using the following methods.

(i) Chemical vapour deposition (8)

(ii) Pulsed laser deposition. (8)

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

Question Paper Code : 27472

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

Second Semester

Civil Engineering

PH 6251 — ENGINEERING PHYSICS – II

(Common to all branches except Biotechnology and Pharmaceutical Technology)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw qualitatively Fermi-Dirac distribution function at $T = 0$ K and at a temperature $T > 0$ K.
2. Calculate the drift velocity of conduction electrons in a copper wire of cross-sectional area 5 mm^2 carrying a current of 5 A. Conduction electron density in copper is 8.5×10^{28} / m^3.
3. Calculate the electrical conductivity of silicon at room temperature doped with 5×10^{16} phosphorous atoms /cm^3. Assume that all the impurities are ionized at room temperature. (Mobility of electrons and holes in silicon are 1350 cm^3/Vs and 450 cm^3/ Vs respectively).
4. The Hall effect experiment is performed to determine the mobility of holes in a p-type silicon. The resistivity and thickness of the sample are 2.0×10^5 Ω cm and 2 mm respectively. For an applied magnetic field of 0.1 T and current of 5 μA, the measured Hall voltage is 30 mV. Find the mobility of holes.
5. What are magnetic domains? Are they present in all the materials?
6. What causes conduction electrons to pair together in conventional superconductor?
7. The relative permittivity of diamond and germanium are 5.8 and 16 respectively. Give reasons why relative permittivity of germanium is greater than diamond.
8. Why dielectrics are used in capacitors?
9. Why metallic glasses are used as transformer core materials?
10. What is Kerr effect?

PART B — (5 × 16 = 80 marks)

11. (a) Derive the expression for electrical and thermal conductivities of metals following the assumptions of classical free electron theory. Hence deduce Wiedemann-Franz law. (16)

Or

(b) (i) Derive an expression for density of energy states. (8)

(ii) Derive an expression for conduction electron density in metals. (8)

12. (a) Derive the expressions for intrinsic carrier concentration and electrical conductivity of an intrinsic semiconductor. Explain the variation of electrical conductivity with temperature and band gap of the semiconductor. (16)

Or

(b) Explain p- type semiconductor and derive an expression for the position of Fermi level. Explain the behaviour of this semiconductor at high temperature. (16)

13. (a) (i) Explain the classification of materials based on magnetic behaviour with examples. (12)

(ii) What type of magnetic materials are used in magnetic tapes and electromagnets for data storage? (4)

Or

(b) (i) Explain the terms critical temperature, critical magnetic field and critical current density and their significance for superconductors. (8)

(ii) Explain the interaction of type-I and type-II superconductors with external magnetic field. (8)

14. (a) (i) Explain the different mechanism by which a dielectric material loses its insulating property. (8)

(ii) Explain the behaviour of a dielectric material in an alternating electric field of different frequency range. (8)

Or

(b) (i) Define the term polarizability in dielectrics. Derive an expression for electronic polarizability. (8)

(ii) Explain ferroelectric materials. Give its applications. (8)

15. (a) (i) What are the properties exhibited by nanomaterials? Explain any one method of preparing nanomaterials. (8)

(ii) What are biomaterials? Give the applications of biomaterials in ophthalmology and dentistry. (8)

Or

(b) (i) What are shape memory alloys? Give their characteristic properties and applications. (8)

(ii) Explain different kinds of shape memory effect with schematic diagram. (8)

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

Question Paper Code : 77106

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Civil Engineering

CY 6251 — ENGINEERING CHEMISTRY –II

(Common to all Branches except Marine Engineering)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write any two disadvantages of hardwater in boilers.
2. What are boiler compounds?
3. Write the nernst equation for the cell,

   $Z_n(s)/Z_{n(ag)}^{2+}//Mg_{(ag)}^{2+}/Mg_{(s)}$.
4. What is dry corrosion?
5. What are the limitations of $H_2 - O_2$ fuel cell?
6. Write a nuclear fission reaction.
7. Define refractoriness.
8. What is the composition of Boro silicate glass?
9. What is the drawback of sulphur in coal?
10. What is CNG? Mention its calorific value.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is reverse osmosis? How is it useful for desalination of brackish water? Explain with a diagram. (2 + 2 + 4)

    (ii) What are sludge and scale in boilers? How are they formed? Suggest any two methods to prevent their formation. (2 + 2 + 4)

Or

(b) (i) What are zeolites? How are they used in softening of water? Use a diagram for your explanation? (2 + 2 + 4)

(ii) Explain the internal conditioning of water? Take two examples for your explanation. (6 + 2)

12. (a) (i) Explain the terms, cell potential and single electrode potential and describe the method of determination of electrode potential. (4 + 4)

(ii) Discuss the importance of design and material selection in controlling corrosion. (8)

Or

(b) (i) What is electrochemical series? Write any two of its practical applications. (2 + 6)

(ii) What is electroless plating? Explain the plating of Nickel by this process. (2 + 6)

13. (a) (i) What is a photovoltaic cell? Explain the construction and working of a photovoltaic cell with a diagram. (2 + 6)

(ii) How is wind energy harnessed? What are its advantages and limitations? (2 + 3 + 3)

Or

(b) (i) Explain the construction, working and uses of a nuclear reactor with a neat diagram. (8)

(ii) What are the compounds of Ni-cd battery? Explain its construction and advantages. (3 + 5)

14. (a) (i) What are abrasives? How are they classified? Explain the properties of any two in each category. (2 + 2 + 4)

(ii) How is Portland cement manufactured? Give a neat diagram of the process. (4 + 4)

Or

(b) (i) Describe any four important properties of refractories. (4 × 2)

(ii) How is glass manufactured? Explain the process giving chemical reactions involved. Give a neat diagram also. (2 + 4 + 2)

15. (a) (i) Define gross and net calorific values. Calculate gross and net calorific values of a coal sample containing 84% carbon, 1.5% sulphur, 6% nitrogen, 5.5% hydrogen and 8.4% oxygen. (3 + 5)

(ii) What is meant by proximate analysis of coal? What are the quantities estimated in this analysis and their significance? (2 + 6)

Or

(b) (i) What is metallurgical coke? How is it superior than coal? Describe any one method of manufacturing metallurgical coke. (2 + 2 + 4)

(ii) What is meant by knocking in petrol engines? How is knocking prevented? (4 + 4)

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

Question Paper Code : 27472

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

Second Semester

Civil Engineering

PH 6251 — ENGINEERING PHYSICS – II

(Common to all branches except Biotechnology and Pharmaceutical Technology)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw qualitatively Fermi-Dirac distribution function at $T = 0$ K and at a temperature $T > 0$ K.
2. Calculate the drift velocity of conduction electrons in a copper wire of cross-sectional area 5 mm^2 carrying a current of 5 A. Conduction electron density in copper is 8.5×10^{28} / m^3.
3. Calculate the electrical conductivity of silicon at room temperature doped with 5×10^{16} phosphorous atoms /cm^3. Assume that all the impurities are ionized at room temperature. (Mobility of electrons and holes in silicon are 1350 cm^3/Vs and 450 cm^3/ Vs respectively).
4. The Hall effect experiment is performed to determine the mobility of holes in a p-type silicon. The resistivity and thickness of the sample are 2.0×10^5 Ω cm and 2 mm respectively. For an applied magnetic field of 0.1 T and current of 5 μA, the measured Hall voltage is 30 mV. Find the mobility of holes.
5. What are magnetic domains? Are they present in all the materials?
6. What causes conduction electrons to pair together in conventional superconductor?
7. The relative permittivity of diamond and germanium are 5.8 and 16 respectively. Give reasons why relative permittivity of germanium is greater than diamond.
8. Why dielectrics are used in capacitors?
9. Why metallic glasses are used as transformer core materials?
10. What is Kerr effect?

PART B — (5 × 16 = 80 marks)

11. (a) Derive the expression for electrical and thermal conductivities of metals following the assumptions of classical free electron theory. Hence deduce Wiedemann-Franz law. (16)

Or

(b) (i) Derive an expression for density of energy states. (8)

(ii) Derive an expression for conduction electron density in metals. (8)

12. (a) Derive the expressions for intrinsic carrier concentration and electrical conductivity of an intrinsic semiconductor. Explain the variation of electrical conductivity with temperature and band gap of the semiconductor. (16)

Or

(b) Explain p- type semiconductor and derive an expression for the position of Fermi level. Explain the behaviour of this semiconductor at high temperature. (16)

13. (a) (i) Explain the classification of materials based on magnetic behaviour with examples. (12)

(ii) What type of magnetic materials are used in magnetic tapes and electromagnets for data storage? (4)

Or

(b) (i) Explain the terms critical temperature, critical magnetic field and critical current density and their significance for superconductors. (8)

(ii) Explain the interaction of type-I and type-II superconductors with external magnetic field. (8)

14. (a) (i) Explain the different mechanism by which a dielectric material loses its insulating property. (8)

(ii) Explain the behaviour of a dielectric material in an alternating electric field of different frequency range. (8)

Or

(b) (i) Define the term polarizability in dielectrics. Derive an expression for electronic polarizability. (8)

(ii) Explain ferroelectric materials. Give its applications. (8)

15. (a) (i) What are the properties exhibited by nanomaterials? Explain any one method of preparing nanomaterials. (8)

(ii) What are biomaterials? Give the applications of biomaterials in ophthalmology and dentistry. (8)

Or

(b) (i) What are shape memory alloys? Give their characteristic properties and applications. (8)

(ii) Explain different kinds of shape memory effect with schematic diagram. (8)

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

Question Paper Code : 77160

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Electrical and Electronics Engineering

GE 6251 — BASIC CIVIL AND MECHANICAL ENGINEERING

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

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the types of surveying?
2. Write any four types of cement.
3. What is Safe Bearing Capacity (SBC) of soil?
4. Write the relation between stress and strain and show the notations used.
5. Classify the power plants.
6. Write the working principle of centrifugal pumps.
7. What are the types of heat engines and define about any one type?
8. Write down any two prime requirements of a boiler.
9. What is capacity of refrigerator?
10. Define air conditioning.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the principles of surveying? (6)

(ii) Explain with a sketch the 'rise and fall method' of leveling. (10)

Or

(b) (i) What are the qualities of stones? (6)

(ii) What is cement concrete and what are the tests carried out in cement concrete? (10)

12. (a) What are the types of foundation? Write down the requirements of good foundation.

Or

(b) (i) Compare the brick masonry with stone masonry. (10)

(ii) Define stress and strain. (6)

13. (a) Write in detail the working principle of thermal power plants and also give their advantages.

Or

(b) What are the advantages of nuclear power plants? Write down the applications of diesel power plants.

14. (a) Classify the I.C. Engines. With a neat sketch show the parts of I.C. engines.

Or

(b) Explain with a sketch the various stages involved in the four stroke cycle diesel engine.

15. (a) State the principle of refrigeration. Write down the properties of an ideal refrigerant.

Or

(b) Classify the air-conditioning systems and explain them briefly.

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

Question Paper Code : 27272

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

Second Semester

Electrical and Electronics Engineering

GE 6251 – BASIC CIVIL AND MECHANICAL ENGINEERING

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

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the principle of surveying.
2. Classify the cement concrete according to IS: 456-2000.
3. Define bearing capacity of soil.
4. What is bond in masonry?
5. Distinguish between external forces and internal forces.
6. What are the main components of Nuclear power plant?
7. Classify the internal combustion (I.C) engine.
8. Write down any two differences between 2-stroke and 4-stroke cycle engines.
9. What is capacity of refrigerator?
10. Write any two advantages of split type room air conditioner.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Classify the surveying based upon the objective of survey. (4)

(ii) The following are the observed fore bearing of the traverse sides: AB, 70° 30'; BC, 140° 15'; CD, 260° 15'; and DE, 335° 30'. Find their back bearings. (4 × 3 =12)

Or

(b) (i) Write any four qualities of bricks. (4)

(ii) What is cement concrete? And what are their uses and properties. (12)

12. (a) (i) What are the requirements of good foundation? (4)

(ii) Compare the brick masonry with stone masonry. (12)

Or

(b) (i) What are the components of a bridge? (4)

(ii) State the various points to be considered for the selection of a site for a dam. (12)

13. (a) Explain with a sketch the working of thermal power plant. (16)

Or

(b) Explain with a sketch the working of Diesel power plant. (16)

14. (a) Explain with a sketch the working principle of four-stroke cycle diesel engine. (16)

Or

(b) Explain with a sketch (draw only the first stage) the operation of two-stroke petrol engine. (16)

15. (a) Draw the layout of a vapour absorption refrigeration system and briefly explain the working principle. (16)

Or

(b) With a neat diagram explain the working of window air conditioner. (16)

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

Question Paper Code : 77122

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Electronics and Communication Engineering

EE 6201 — CIRCUIT THEORY

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

(Regulation 2013)

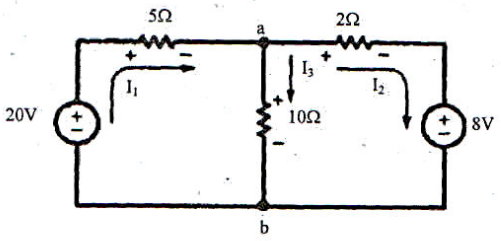
Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write briefly about Resistance in a Circuit.

2. Obtain the current in each branch of the network shown below using Kirchhoff's Current Law.



3. State Maximum Power transfer theorem.

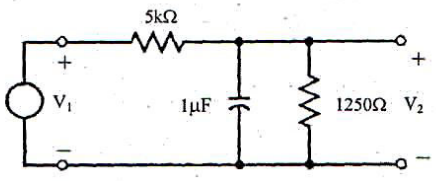
4. Write briefly about Network reduction technique.

5. Define Mutual Inductance.

6. Write the dot rule.

7. Define the frequency response of series RLC circuit.

8. Find the frequency response V_2 / V_1 for the two-port circuit shown below.

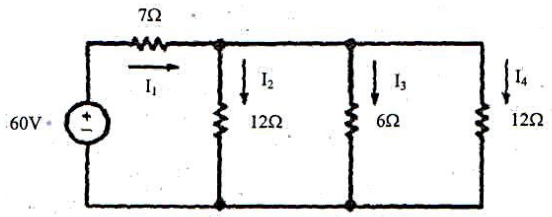


9. Write the distortion power factor equation of the three phase circuits.

10. Distinguish between unbalanced source and unbalanced load.

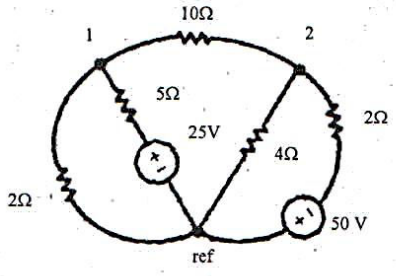
PART B — (5 × 16 = 80 marks)

11. (a) Use branch currents in the network shown below to find the current supplied by the 60-V Source. Solve the circuit by the mesh current method. (16)

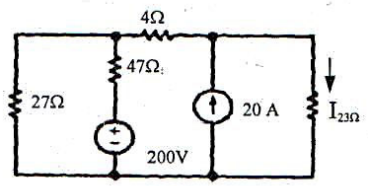


Or

(b) Solve the network given below by the node voltage method. (16)



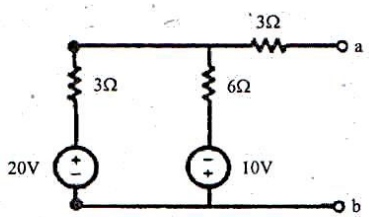
12. (a) (i) Compute the current in the 23 Ω resistor of the following figure shown below by applying the superposition principle. (8)



(ii) Derive the equation for transient response of RC and RL circuit for DC input. (8)

Or

(b) Obtain the Thevenin and Norton equivalent circuits for the active network shown below. (16)



13. (a) With neat illustration and necessary derivations, explain the Linear Transformer. (16)

Or

(b) Derive the Mutual inductance and the coupling coefficient of the transformer with necessary illustration. (16)

14. (a) Explain in detail with neat illustrations the High pass and Low pass networks and derive the necessary network parameters. (16)

Or

(b) Explain the characterization of two port networks in terms of *Z*, *Y* and *h* parameters. (16)

15. (a) Discuss in detail the three phase 3-wire circuits with star connected balanced loads. (16)

Or

(b) Explain in detail the phasor diagram of the voltages and currents of a three phase unbalanced circuits. (16)

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

Question Paper Code : 27205

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

Second Semester

Electronics and Communication Engineering

EE 6201 — CIRCUIT THEORY

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

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Kirchoff's current law.

2. Find the equivalent resistance of the circuit shown in Fig. 1.

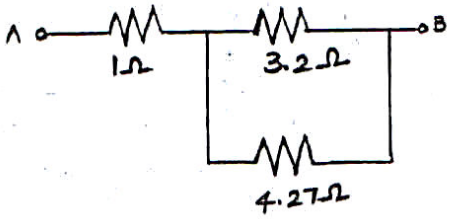


Fig.1

3. List the applications of Thevenin's theorem.

4. Two resistors of 4Ω and 6Ω are connected in parallel. If the total current is 30 A. Find the current through each resistor shown in Fig.2.

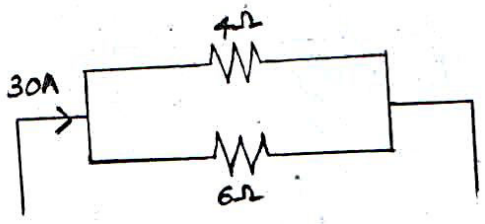


Fig. 2

5. Define selectivity.

6. What is co-efficient of coupling?

7. Distinguish steady state and transient state.

8. What is the time constant for RL and RC circuit?

9. What are the advantages of three phase system?

10. When a 3-phase supply system is called balanced supply system?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the magnitude and direction of the current in the 2 V battery in the circuit shown in Fig. 3. (8)

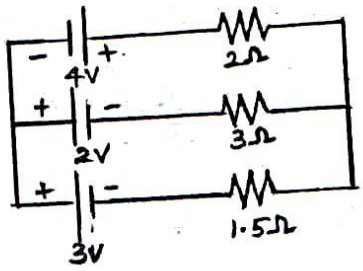


Fig. 3

(ii) Determine the power dissipation in the 4Ω resistor of the given circuit shown in Fig. 4. (8)

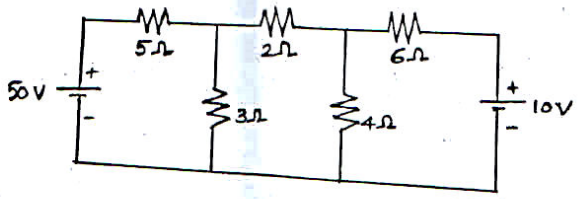


Fig. 4

Or

(b) Using node analysis, find the voltage V_x for the circuit shown in Fig. 5. (16)

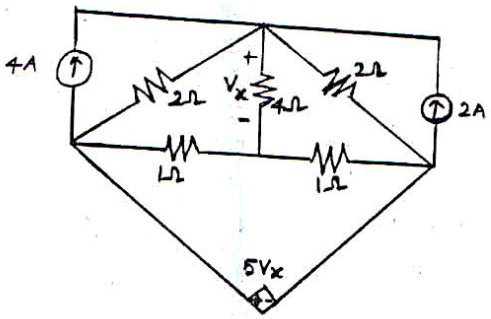


Fig. 5

12. (a) Find the Thevenin's equivalent of the network shown in Fig. 6. (16)

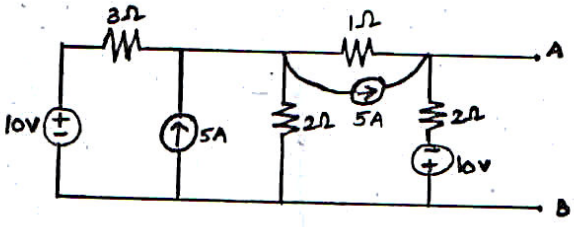


Fig. 6

Or

(b) Determine the value of resistance that may be connected across A and B so that maximum power is transferred from the circuit to the resistance. Also, estimate the maximum power transferred to the resistance shown in Fig. 7. (16)

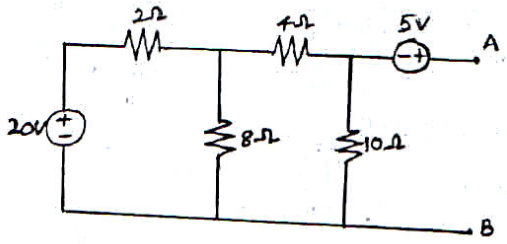


Fig. 7

13. (a) For the circuit shown in Fig. 8, determine the frequency at which the circuit resonates. Also find the quality factor, voltage across inductance and voltage across capacitance at resonance. (16)

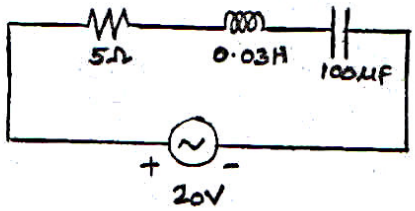


Fig. 8

Or

(b) Find the mutual reactance X_m in the coupled coils shown in Fig. 9. (16)

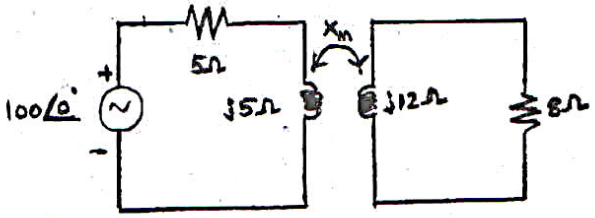


Fig. 9

14. (a) In the RL circuit shown in Fig. 10, the switch is closed to position-1 at $t = 0$. After t = 100 ms, the switch is changed to position-2. Find $i(t)$ and sketch the transient. (16)

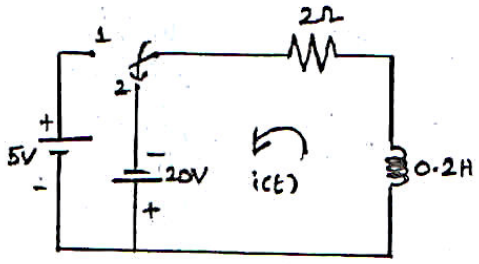


Fig. 10

Or

(b) (i) Determine the driving point impedance of the network shown in Fig. 11. (8)

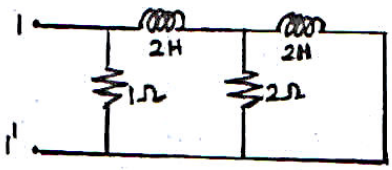


Fig. 11

(ii) Determine the h-parameters of the two port network shown in Fig. 12. (8)

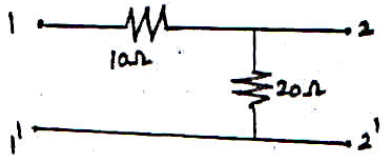


Fig. 12

15. (a) Show that three phase power can be measured by two wattmeters. Draw the phasor diagrams. Derive an expression for power factor interms of wattmeter readings. (16)

Or

(b) (i) Three equal impedances, each of $8 + j10\ \Omega$ are connected in star. This is further connected to a 440 V, 50 Hz, three phase supply. Calculate the active and reactive power and line and phase currents. (8)

(ii) Two wattmeter connected to measure the input to a balanced, three phase circuit indicate 2000 W and 500 W respectively. Find the power factor of the circuit.

(1) When both readings are positive and

(2) When the later is obtained after reversing the connections to the current coil of one instrument. (8)

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						✓	✓	

GENERAL REMINDERS.

I. General

1. Keep at least 5 photocopies of birth certificate, ration card, Voters ID card, College ID card,Aadhar card, 10^{th} ,+2 mark sheets, 10^{th} /+2 Transfer Certificates,[* all proofs to be kept in your bag, in your house and in your mail, all kept in a water proof file-remember Chennai flood]. This will be required at anytime, anywhere.
2. Apply for Savings Bank account in any of the nationalized banks in first year. Apply for LIC schemes, saving schemes right from the first year. [*Refer]
3. Get Driving license during third year of your Degree course[*Refer]
4. Get Passport before the completion of 6^{th} semester. [*Refer]
5. Always keep ID card issued by competent authority while moving from one city to another/ one state to another. It is better to wear ID card always.(except during bathing).
6. Never share your username and password of mail accounts to anyone even in your home/ to teachers/ friends. Never reply to un trusted mail/fake messages. Never transfer/ deposit money to any unknown mail. Beware of fraud/cheating by any one.
7. Share only legal, ethical, non-political, educational , and value based information/ photos/videos with your friends or any others through social media. Posting of illegal/political/unethical/ information/comments will spoil your career. Remember that all such communications in social media/mails are continuously monitored and recorded by intelligent agencies in the country and abroad, due to security threats.
8. Don't involve teasing of students of your class, juniors or seniors in the classrooms, laboratories or in hostels. Don't loan the cell phone to anyone. Also don't keep your cell phone easily accessible by anyone.
9. Don't send obscene messages or pictures through cell phones/ internet to anyone. Defaulters will be easily tracked by Cyber Crime Agencies. Don't purchase/loan someone's laptop/mobile phone, due to theft complaints.
10. Avoid two wheeler riding for long travelling, and night travelling. Wear helmet. Follow traffic rules. Lot of accidental deaths reported due to negligence of traffic rules. About 1.5lakhs of people lost their life in accidents in our country every year.
11. For any transaction of money, use cheques or bank accounts(for more than Rs. 10,000/-) because finding fake notes is difficult.

12. Always keep 10 passport and stamp size photographs, 10 no.s of revenue stamps, all ID proofs whenever going for banks/pass port office.
13. Keep at least email ids and good friendship of 25 students of your branch who have been placed in different companies. Collect background information on core/IT companies(minimum 25)
14. Develop good reading habit/read News papers daily/watch news channel daily/Watch films nominated for Oscar award.Watch channels like Discovery/Nat Geo/History/ any other news channels.(not more than an hour)
15. Speak in English only. Develop good writing skills by reading books.
16. Have a Desk top/Laptop, Printer before entering 5th semester.
17. Have internet facility in home for educational purpose.Keep all NPTEL material.
18. Keep all kind of stationary in your table for use at any time[pencil, sharpener, eraser, ball point pen of different colours, sketches, bell clip, stapler, single punch, tag, gum, knilfe,scissors,A4 paper, cello tap, emergency lamp, scale, protractor, compass, pen drive, CD, whitener, calculator, diary, stapler pin box]

II. Education:

20 Download Anna University examination results immediately after the publication of result from AU website. Mark sheet attestation will not be given without the above copy

21 Always keep 5 copies of AU mark sheets , of each semester. Post it on your mail.

22. Discrepancy in mark sheets such as Name, Date of Birth, CGPA awarded, register number should be corrected immediately.
23. Always keep Rs 5,000/- in a semester for the payment of Book fee/AU exam fee/Training fee/purchase of competitive exam books/Educational tour/seminar/additional course/ certification course etc. Educate your parents for the above. This may be required in a particular month or in several months spread in a semester.
24. Enroll in IEEE membership during first/second year. Attend at least one programme at Chennai.
25. Collect 5 sets of AU question papers, subject wise, in a semester(within 10 days)
26. Prepare good quality Resume. Consult TPO, placed final year students. Resume preparation is an art that ensures your quality and getting jobs in reputed concern. Update

your resume, monthly (by attending value added courses, online courses, co-curricular and extracurricular activities, publishing articles in conferences, symposium, technical events, journals,News papers, inplant training, internship, new languages learnt, project developed, industrial visits, social services participated etc.)

27. Attend any courses after consulting with HOD/senior staff to avoid courses not suited to your branch.
28. Purchase text/reference books every semester.
29. Purchase competitive exam books , like Objective type QB,GATE/TANCET/IES/IAS and prepare for the exams from second year onwards.
30. Collect aptitude/reasoning/analytical/numerical/verbal/test questions from the placed students or download from the website. For successful placement, preparation from the first year in the above topics is required.
31. Collect information like Product, clients, branches, head office, annual turnover, GM,CEO, etc of 25 core companies, and 25 software companies.
32. Attend atleast one seminar/workshop/ paper presentation contest per semester, applicable to your branch of study.
33. Plan your study for current subject/assignment work/observation work/record work/aptitude training for technical /non-technical daily/weekly/monthly.
34. Decide & justify clearly, your objective before 6^{th} semester and plan accordingly. Options are placement(ON/OFF) in core/IT companies, higher studies/ civil services , parents business , start your own business. Confused mind never take a decision.
35. Attend inplant training(Min:one week,Max:One month) during semester holidays. Avoid industrial visit (Energy waste) and educational tour (Money waste).
36. Do mini project in second, third year of your study .Update these in final year.Project should be based on the need of the society/industry.

III. Health

37. Health is wealth. Read Dalailama statement on life of a man. We work hard , earn and save money sacrificing our health. Later we spent lot of money for medical treatment due to poor healthcare.
38. Have regular exercise either in the forenoon/evening. (an hour walk is must everyday).

39. Your food habits decides what you are and how long you will live with peace. Avoid junk foods/road side eatery. Use hot water for drinking.
40. Consult doctors in case of health problems. Periodical medical checkup, once in 6 months, is necessary for health and dental care. This may require Rs.2,000/- per year. Otherwise you need to pay a lot. It is advisable to stay in a house, within 500 metre (walk able distance) from a multispecialty hospital, otherwise 250 meters from any hospital. This is required to tackle emergency situations and also to avoid paying more for transport.
41. Avoid roaming/walking during summer/rainy season.
42. Attend yoga classes/ do meditation.
43. Apply group insurance medical policy at the age of 20.
44. Follow ethics and be Nationalistic.

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 of **15 March 2015** with figures in Megawatts.

Rank	State/Union Territory	Total Installed Capacity (MW**)	Thermal				Nuclear (MW)	Hydro (MW)	Renewable energy* (MW)
			Coal (MW)	Gas (MW)	Diesel (MW)	Total (MW)			
—	**India**	**261,006.46**	**158,495.89**	**22,971.25**	**1,199.75**	**182,666.89**	**5,780.00**	**40,867.43**	**31,692.14**
1	Maharashtra	36,097.37	22,969.27	3,475.93	0.00	26,445.20	690.14	3,331.84	5,630.19
2	Gujarat	28,423.36	15,738.27	6,906.09	17.48	22,661.84	559.32	772.00	4,430.20
3	**Tamil Nadu**	**22,370.14**	**9,688.10**	**1,026.30**	**411.66**	**11,126.06**	**986.50**	**2,182.20**	**8,075.38**
4	Andhra Pradesh & Telangana	17,285.48	8,573.48	3,370.40	36.80	11,980.68	275.78	3,734.53	1,294.49
5	Rajasthan	15,416.59	8,734.72	825.03	0.00	9,559.75	573.00	1,643.69	3,640.15
6	Uttar Pradesh	14,842.37	11,095.45	549.97	0.00	11,645.42	335.72	2,033.55	827.68
7	Karnataka	13,940.66	6,158.39	0.00	234.42	6,392.81	254.86	3,599.80	3,693.19
8	Madhya Pradesh	12,902.35	8,503.89	257.18	0.00	8,761.07	273.24	3,223.66	644.38
9	West Bengal	8,708.82	7,216.87	100.00	12.20	7,329.07	0.00	1,248.30	131.45
10	Haryana	8,251.81	6,082.03	560.29	3.92	6,646.24	109.16	1,373.21	123.20
11	Punjab	7,614.95	3,790.88	288.92	0.00	4,079.80	208.04	3,029.53	297.58
12	Delhi Territory	7,500.79	4,556.37	2,116.01	0.00	6,672.38	122.08	690.33	16.00
13	Odisha	7,381.79	5,115.06	0.00	0.00	5,115.06	0.00	2,166.93	99.80
14	Chhattisgarh	6,864.91	6,388.49	0.00	0.00	6,388.49	47.52	120.00	308.90
16	Kerala	3,875.20	914.56	533.58	256.44	1,704.58	95.60	1,881.50	193.52
17	Himachal Pradesh	3,824.96	152.02	61.88	0.13	214.03	34.08	2,950.94	625.91
18	Uttarakhand	2,588.01	300.50	69.35	0.00	369.85	22.28	2,006.01	189.87
19	Jharkhand	2,579.86	2,358.88	0.00	0.00	2,358.88	0.00	200.93	20.05
20	Jammu and Kashmir	2,524.96	329.32	304.14	8.94	642.40	77.00	1,658.03	147.53

Rank	State/Union Territory	Total Installed Capacity (MW**)	Thermal				Nuclear (MW)	Hydro (MW)	Renewable energy* (MW)
			Coal (MW)	Gas (MW)	Diesel (MW)	Total (MW)			
21	Bihar	2,198.13	1,954.70	0.00	0.00	1,954.70	0.00	129.43	114.00
22	Assam	1,140.04	60.00	598.52	20.69	679.21	0.00	429.72	31.11
23	Meghalaya	455.27	0.00	65.61	2.05	67.66	0.00	356.58	31.03
24	Tripura	433.07	0.00	349.84	4.85	354.69	0.00	62.37	16.01
25	Goa	400.02	326.17	48.00	0.00	374.17	25.80	0.00	0.05
26	Sikkim	313.99	82.61	0.00	5.00	87.61	0.00	174.27	52.11
27	Puducherry Territory	281.87	230.09	32.50	0.00	262.59	19.28	0.00	0.00
28	Arunachal Pradesh	249.41	0.00	32.05	15.88	47.93	0.00	97.57	103.9
29	Manipur	178.80	0.00	46.96	45.41	92.37	0.00	80.98	5.45
30	Mizoram	149.92	0.00	27.28	51.86	79.14	0.00	34.31	36.47
31	Nagaland	116.83	0.00	32.84	2.00	34.84	0.00	53.32	28.67
32	Chandigarh Territory	109.58	32.54	15.32	0.00	47.86	8.84	52.88	0.00
34	Dadra and Nagar Haveli Territory	79.93	44.37	27.10	0.00	71.47	8.46	0.00	0.00
35	Daman and Diu Territory	48.29	36.71	4.20	0.00	40.91	7.38	0.00	0.00
36	Andaman and Nicobar Islands Territory	70.40	0.00	0.00	60.05	60.05	0.00	0.00	10.35
37	Lakshadweep Territory	9.97	0.00	0.00	9.97	9.97	0.00	0.00	0.00

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

Advanced Training Institute

Skill Development and Entrepreneurship Programmes
Ref: Advanced Training Institute,
CTI Campus, Guindy Industrial Estate, Chennai – 600 032.
Phone No.: 044- 2250 0252/1211, E mail : atichn@vsnl.com, www.ati.chennai.org.in

GROUP – I
ELECTRICAL CONTROL & MAINTENANCE

Course Coordinator

1. **Shri. M.S. Ekambaram, Dy.Director**
2. **Shri. C.C.Jose, Training Officer.**

Course Code	Course Title	Duration weeks	Date	
			From	To
01.01	Protective Relays, Circuit Breakers, & Switch Gear Protection	01	13.04.2015	17.04.2015
			18.05.2015	22.05.2015
			22.06.2015	26.06.2015
			27.07.2015	31.07.2015
			24.08.2015	28.08.2015
			21.09.2015	25.09.2015
			12.10.2015	16.10.2015
			07.12.2015	11.12.2015
			15.02.2016	19.02.2016
			21.03.2016	24.03.2016
01.02	Operation & Maintenance of Power Transformers	01	06.04.2015	10.04.2015
			11.05.2015	15.05.2015
			15.06.2015	19.06.2015
			20.07.2015	24.07.2015
			14.09.2015	18.09.2015
			30.11.2015	04.12.2015
			08.02.2016	12.02.2016
			07.03.2016	11.03.2016
			21.03.2016	24.03.2016

01.03	Trouble Shooting & Maintenance of Electric Motors	01	20.04.2015	24.04.2015
			08.06.2015	12.06.2015
			29.06.2015	03.07.2015
			03.08.2015	07.08.2015
			07.09.2015	11.09.2015
			23.11.2015	27.11.2015
			01.02.2016	05.02.2016
			29.02.2016	04.03.2016
01.04	Operation and Control of Industrial AC / DC Motors	01	25.05.2015	29.05.2015
			13.07.2015	17.07.2015
			17.08.2015	21.08.2015
			26.10.2015	30.10.2015
			18.01.2016	22.01.2016
			14.03.2016	18.03.2016
01.05	Electrical Safety at work place and first aid Practices	01	27.04.2015	01.05.2015
			01.06.2015	05.06.2015
			06.07.2015	10.07.2015
			10.08.2018	14.08.2015
			28.09.2015	01.10.2015
			14.12.2015	18.12.2015
			04.01.2016	08.01.2016
			22.02.2016	26.02.2016

GROUP – I
ELECTRONIC CONTROL & MAINTENANCE

Course Coordinator

1. **Dr.M.Jayaprakasan, Dy.Director**
2. **K.Arulselvi, Training Officer.**

Course Code	Course Title	Duration weeks	Date	
			From	To
02.01	Siemens S7 400 PLC & win CC SCADA / HMI – Programming (TIA portal)	02	13.04.2015	24.04.2015
			06.07.2015	17.07.2015
			14.09.2015	25.09.2015
			16.11.2015	27.11.2015
			01.02.2016	12.02.2016
02.00.2	PLC Siemens S7 400 Programming with step 7	01	15.06.2015	19.06.2015
			26.10.2015	30.10.2015
			04.01.2016	08.01.2016
			07.03.2016	11.03.2016
02.03	Maintenance & Servicing of SMPS and UPS	02	27.04.2015	08.05.2015
			20.07.2015	31.07.2015
			30.11.2015	11.12.2015
			15.02.2016	26.02.2016
02.04	Industrial Drives & Automation using Siemens PLC	02	15.06.2015	26.06.2015
			31.08.2015	11.09.2015
			18.01.2016	29.01.2016
02.05	Installation, Commissioning & Trouble Shooting of AC / DC Drives	01	18.05.2015	22.05.2015
			03.08.2015	07.08.2015
			18.01.2016	22.01.2016
02.06	PLC Siemens S7 400 Maintenance and Trouble Shooting	01	25.05.2015	29.05.2015
			10.08.2015	14.08.2015
			02.11.2015	06.11.2015
			21.03.2016	24.03.2016

02.07	Embedded System Programming & Applications (PIC 16F 877)	01	01.06.2015	05.06.2015
			24.08.2015	28.08.2015
			05.10.2015	09.10.2015
			14.12.2015	18.12.2015
02.08	Embedded Systems Programming & Applications (ARM 7 PLC 2378)	01	08.06.2015	12.06.2015
			28.12.2015	01.01.2016
02.09	Power Electronics and its Industrial Applications	02	20.07.2015	31.07.2015
			30.11.2015	11.12.2015

GROUP – I

PROCESS CONTROL INSTRUMENTATION

Course Coordinator

1. **Dr.M.Jayaprakasan, Dy.Director**
2. **M.Gunaseklharan, Training Officer.**

Course Code	Course Title	Duration weeks	Date	
			From	To
03.01	Agilent Veepro Graphical Programming for Industrial Instrumentation	01	13.04.2015	17.04.2015
			07.09.2015	11.09.2015
			23.11.2015	27.11.2015
03.02	Embedded System and its Application using P89C551rd2	01	20.04.2015	24.04.2015
			29.06.2015	03.07.2015
			05.10.2015	09.10.2015
			07.12.2015	11.12.2015
03.03	Industrial Automation using GE-GANUC PLC	01	18.05.2015	22.05.2015
			10.08.2015	14.08.2015
			28.12.2015	01.01.2016
			29.02.2016	04.03.2016
03.04	PLC Allen Bradley SLC 500 Programming & Applications	01	27.04.2015	01.05.2015
			13.07.2015	17.07.2015

			24.08.2015	28.08.2015
			26.10.2015	30.10.2015
			04.01.2016	08.01.2016
			15.02.2016	19.02.2016
03.05	Mixed Signal VLSI Design using PSOC	01	11.05.2015	15.05.2015
			07.09.2015	11.09.2015
			16.11.2015	20.11.2015
03.06	Configuration Networking & Troubleshooting of PLC	01	25.05.2015	29.05.2015
			17.08.2015	21.08.2015
			28.09.2015	01.10.2015
			18.01.2016	22.01.2016
			07.03.2016	11.03.2016
03.07	Testing and Calibration of Industrial Instruments (Pressure and Temperature)	01	01.06.2015	05.06.2015
			06.07.2015	10.07.2015
			07.09.2015	11.09.2015
			12.10.2015	16.10.2015
			30.11.2015	04.12.2015
			25.01.2016	29.01.2016
03.08	PLC & SCADA Based Industrial Automation using AB PLC	02	08.06.2015	19.06.2015
			14.09.2015	25.09.2015
			14.12.2015	24.12.2015
			01.02.2016	12.02.2016
03.09	Basic Industrial Instrumentation & Automation	02	06.04.2015	17.04.2015
			20.07.2015	31.07.2015
			02.11.2015	13.11.2015
			14.03.2016	24.03.2016

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 TPO 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.

List 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

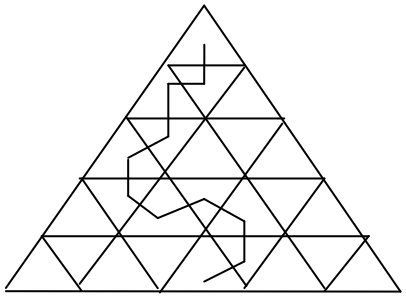
6. Hewlett-Packard India
7. HCL Infosystems Limited
8. Reliance Communications Ltd
9. LG Electronics India Pvt Ltd
10. IBM India Pvt Ltd
11. Videocon Industries Ltd
12. HCL Technologies Limited
13. Satyam Computer Services Ltd
14. Siemens Ltd.
15. Samsung India Electronics Pvt. Ltd.
16. Mahanagar Telephone 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

01 A circle has 29 points arranged in a clockwise manner numbered from 0 to 28, as shown in the figure below. A bug moves clockwise around the circle according to the following rule. If it is at a point i on the circle, it moves clockwise in 1 second by (1 + r) places, where r is the reminder (possibly 0) when i is divided by 11. Thus if it is at position 5, it moves clockwise in one second by (1 + 5) places to point 11. Similarly if it is at position 28 it moves (1 + 6) or 7 places to point 6 in one second.
If it starts at point 23, at what point will it be after 2012 seconds?
(a) 1 (b) 7 (c) 15 **(d) 20**

02 Consider an equilateral triangle of side length n, which is divided into unit triangles, as shown. Let f(n) be the number of paths from the triangle in the top row to the middle triangle in the bottom row, such that adjacent triangles in our path share a common edge and the path never travels up (from lower row to a higher row) or revisits a triangle. An example of one such path is illustrated below for n = 5. Determine the value of f(2005)



(a) f(2005)=(2001)! (c) f(2005) = (2011)!
(b) f(2005)=(2004)! (d) f(2005) = (2020)!

03 Jake can dig a well in 16 days. Paul can dig the same well in 24 days. Jake, Paul and Hari together dig the well in 8 days. Hari alone can dig the well in
(a) 32days **(b) 48 days** (c) 96 days (d) 24 days

04 $P(x) = (x^{2012} + x^{2011} + x^{2010} + \ldots + x + 1)^2 - x^{2012}$
$Q(x) = x^{2011} + x^{2010} + \ldots + x + 1$
The reminder when P (x) is divided by Q (x) is
(a) x + 1 **(b) 0** (c) 1 (d) x – 1

05 An organization has three committees. Only two persons are members of all three committees, but every pair of committees has three members in common. What is the LEAST possible number of the members on any one committee?
(a) 4 (b) 6 (c) 7 (d) 5

06 Jake is faster than Paul. Jake and Paul each walk 24 km. The sum of their speeds is 7 km/h and the sum of time taken by them is 14 hours. Then Jake's speed is equal to :
(a) 7 kmph (b) 3 kmph (c) 5 kmph **(d) 4 kmph**

07 If a lemon and an apple together cost Rs. 12.00, a tomato and a lemon cost Rs. 4.00 and an apple cost Rs.8.00 more than a tomato or a lemon then which of the following can be the price of a lemon?
(a) Rs 2 (b)Rs 4 (c) Rs 1 (d) Rs 3

1

08 3 mangoes and 4 apples costs Rs 85. 5 apples and 6 peaches costs Rs. 122. 6 mangoes and 2 peaches cost Rs.114. what is the combined price of 1 apple, 1peach and 1 mango?
(a) 37 Rs (b) 39 Rs (c) 35 Rs (d) 36 Rs

09 A child was looking for his father. He went 90 metres in the East before turning to his right. He went 20 metres before turning to his right again to look for his father at his uncle's place 30 metres from this point. His father was not there. From here he went 100 metres to the North before meeting his father in a street. How far did the son meet his father from the starting point?
(a) 90 (b) 30 (c) 80 **(d) 100**

10 If YWUSQ is 25 - 23 - 21 - 19 - 17 then MKIGF is
(a) 13 - 11 - 9 - 7 - 6 (c) 9 - 8 - 7 - 6 - 5
(b) 1 - 2 - 3 - 5 - 7 (d) 7 - 8 - 4 - 5 - 3

11 The addition 641 + 852 + 973 = 2456 is incorrect. What is the largest digit that can be changed to make the addition correct?
(a) 5 (b) 6 (c) 4 **(d) 7**

12 Raj drives slowly along the perimeter of a rectangular park at 24 kmph and completes one full round in 4 minutes. If the ratio of the length to the breadth of the park is 3:2, what are its dimensions?
(a)450m x 300m (b)150m x 100m **(c)480m x 320m** (d) 100m x 100m

13 Ahmed, Babu, Chitra, David and Eesha each choose a large different number. Ahmed says, " My number is not the largest and not the smallest". Babu says, "My number is not the largest and not the smallest". Chitra says, "My number is the largest". David says, " My number is the smallest". Eesha says, " My number is not the smallest".
Exactly one of the five children is lying. The others are telling the truth. Who has the largest number?
(a) Eesha (b) David (c) Chitra (d) Babu

14 In the equation A + B + C + D + E = FG where FG is the two digit number whose value is 10F + G and letters A, B , C , D , E, F and G each represent different digits. If FG is as large as possible. What is the value of G?
(a) 4 **(b) 2** (c) 1 (d) 3

15 In a G6 summits beings held at London, a French, a German, An Italian, a British, a Spanish and a Polish diplomat represent their respective countries and participate in a round table conference to strengthen co-operation between these countries. There are exactly six chairs evenly spaced around a circular table. The chairs are numbered 1 through 6, with successively numbers chairs next to each other and chair number 1 next to chair 6. Each chair is occupied by one of the diplomats. The following condition apply :
-Polish sits immediately next to the British
-German sits immediately next to Italian, British, or both
-French does not sit immediately next to Italian
-If Spanish sits immediately next to Polish, Spanish does not sit immediately next to

Italian.

Which one of the following sitting arrangements of the six diplomats in chairs 1 through 6 would NOT violate the stated conditions?

(A) French, Polish, British, Italian, Spanish, German
(B) French, German, Italian, Polish, British, Spanish
(C) French, German, Italian, Spanish, Polish, British
(D) French, Spanish, Polish, British, German, Italian
(E) French, British, German, Spanish, Italian, Polish

(a) C (b) D (c) A **(d) B**

16 In this question, A^B means A raised to power B. If x*y^2*z < 0, then which one of the following statements must also be true?

I. xz < 0
II. z < 0
III. xyz < 0

(a) I and II (b) III only (c) None of the above **(d) I only**

17 At 12.00 hours Jake starts to walk from his house at 6 kms an hour. At 13.30 hours, Paul follows him from Jake's house on his bicycle at 8 kms per hour. When will Jake be 3 kms behind Paul?

(a) 19:00 hrs (b) 18:30 hrs (c) 20:00 hrs **(d) 19:30 hrs**

18 There is a set of 9 numbers that relate to each other in a certain way. Find the way the first set of boxes works. The numbers in the second set work in exactly the same way. Find the number that must go in the empty box in the second set.

20	6	22	12	15	3
5	8	12	6		12
75	42	102	54	81	45

(a) 16 (b) 9 **(c) 12** (d) -21

19 A farmer has a rose garden. Every day he either plucks 7 or 6 or 24 or 23 roses. The rose plants are intelligent and when the farmer plucks these numbers of roses, the next day 37 or 36 or 9 or 18 new roses bloom in the garden respectively. On Monday, he counts 189 roses in the garden. He plucks the roses as per his plan on consecutive days and the new roses bloom as per intelligence of the plants mentioned above. After some days which of the following can be the number of roses in the garden?

(a) 4 (b) 7 (c) 30 (d) 37

20 What is the value of $(44444445*88888885*44444442+44444438)/44444444^2$

(a) 88888883 (b) 88888884 (b) 88888888 (b) 44444443

21 A cow and a horse are bought for Rs.200000. The cow is sold at a profit of 20% and the horse is sold at a loss of 10%. The overall gain is Rs.4000. The cost price of the cow is:

(a) Rs.1,30,000 **(b) Rs.80,000** (c) Rs.70,000 (d) Rs.1,20,000

22 When numbers are written in base b, we have 12 * 25 = 333. The value of b is

(a)8 (b) 6 (c) None of these **(d) 7**

23 If X^Y denotes X raised to the power Y, Find the last two digits of (1941 ^ 3843) + (1961 ^ 4181).

(a)12 (b) 22 (c) 42 **(d)82**

24 George can do some work in 8 hours, Paul can do the same work in 10 hours while Hari can do the same work in 12 hours. All the three of them start working at 9 a.m while George stops work at 11 a.m and remaining two complete the work. Approximately at what time will the work be finished?

(a) 12 noon (b) 11.30 am (c) 12.30 pm **(d) 1 pm**

25 At the end of 1994 Rohit was half as old as his grandmother. The sum of the years in which they were born is 3844. How old Rohit was at the end of 1999?

(a) 48 (b) 55 (c)49 **(d) 53**

26 If M is 30% of Q, Q is 20% of P and N is 50% of P then M/N =

(a) 4/3 **(b) 3/25** (c) 6/5 (d) 3/250

27 There are 5 sweets – Jumun, Kulfi, Peda, Laddu and Jilabi that I wish to eat on 5 consecutive days – Monday through Friday, one sweet a day, based on the following self imposed constraints:

1) Laddu is not eaten on Monday
2) If Jamun is eaten on Monday, then Laddu must be eaten on Friday
3) If Laddu is eaten on Tuesday, Kulfi should be eaten on Monday
4) Peda is eaten the day following the day of eating Jilabi

Based on the above, peda can be eaten on any day except?

(a) Tuesday **(b) Monday** (c) Wednesday (d) Friday

28 In a office, at various times during the day the boss gives the secretary a letter to type, each time putting the letter on the top of the pile in the secretary's inbox. When there is time, the secretary takes the top letter off the pile and type's it. If there are five letter in all , and the boss delivers in the order of 1 2 3 4 5, which of the following could NOT be the order in which secretary types them.

(a) 2 4 3 5 1 **(b) 4 5 2 3 1** (c) 3 2 4 1 5 (d) 1 2 3 4 5

29 For which of the following "n" is the number $2^{74} + 2^{2058} + 2^{2n}$ a perfect square?

(a) 2012 (b) 2100 (c) 2011 **(d) 2020**

30 Raj writes a number. He sees that the number of two digits exceeds four times the sum of its digit by 3. If the number is increased by 18, the result is the same as the number formed by reversing the digit. Find the number

(a) 35 (b) 57 (c) 42 (d) 49

TCS1 – Detailed Solution

01 Ans (d)

A bug moves clockwise starting from point 23.

Points (N)	Remainder(r) (N/11)	Points to be moved (1 + r)	New point position	Time (sec)
23	1	2	25	1
25	3	4	0	2
0	0	1	1	3
1	1	2	3	4
3	3	4	7	5
7	7	8	15	6
15	4	5	20	7
20	9	10	1	8
1	1	2	3	9
3	3	4	7	10

We can see a pattern emerging in the point positions from the 3rd second onwards…1, 3, 7, 15, 20 and then the cycle keeps repeating. After 5 s, 10 s, 15 s, the bug's position is 7. So after 2010s, the position should be 7. The position after 2011s is 15, and after 2012s it is 20.

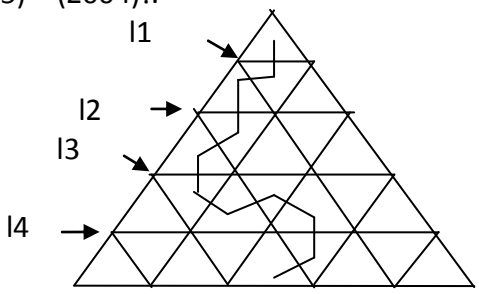
02 Ans (b)

We shall show that f(n) = (n − 1)!.

Label the horizontal line segments in the triangle l1, l2 , . . . as in the diagram below.

Since the path goes from the top triangle to a triangle in the bottom row and never travels up, the path must cross each of l1, l2, . . , ln−1 exactly once. The diagonal lines in the triangle divide lk into k unit line segments and the path must cross exactly one of these k segments for each k. (In the diagram below, these line segments have been highlighted.) The path is completely determined by the set of n − 1 line segments which are crossed. So as the path moves from the kth row to the (k + 1)st row, there are k possible line segments where the path could cross lk. Since there are $1 \cdot 2 \cdot 3 \cdot \cdot \cdot (n-1) = (n-1)!$ ways that the path could cross the n − 1 horizontal lines, and each one corresponds to a unique path, we get f(n) = (n − 1)!.

Therefore f(2005) = (2004)!.



03 Ans (b)

Total number of work to be done= 48 Units (LCM of 16,24,8)

Jake's one day work = 48/16 = 3 Units

Paul's one day work = 48/24 = 2 Units

Jake, Paul and Hari one day work = 48/8 = 6 Units

We know that Jack does 3 units and Paul does 2.

3+2+Hari = 6 Units

Hari = 1 Unit/day = 48/1 = 48 days

Hari does 1 unit per day and can dig a well in 48 days.

04 Ans (b)

Substituting 1 for x, the numerator is $2013^2 - 1^2$

This can be written in the form (2013 + 1) (2013 -1) = (2014)(2012)

The denominator is 2012 and since the numerator is a multiple of 2012, the remainder is exactly 0.

05 Ans (a)

Let there be a total of 5 people (a, b, c, d and e).

I committee	II committee	III committee
a	A	a
b	B	b
c	C	d
d	E	e

These satisfy the conditions given in the question and there should at least be 4 members in the committee.

06 Ans (d)

Given that speed of Jake is greater than Paul.

Distance = 24 km

Sum of their speed is 7 km/h = J+P

So possible speed ratio between J & P is

Go by Option

6:1 Not in option

5:2 = (24/5)+(24/2) ≠ 14 Hours

4:3 = (24/4)+(24/3) = 14 Hours

So Jake's speed is 4km/h.

07 Ans (a)

Let cost of a Lemon is L

Let cost of a Apple is A

Let cost of a Tomato is T

L+A = 12 – (1)

T+L = 4 - (2)

A = 8+L - (3)

A = 8+T - (4)

Sub (3) in (1)

L+8+L = 12

L = 2, A = 10, T = 2.

08 Ans (a)

3M + 4A = 85 - (1)

5A + 6P = 122 – (2)

6M + 2P= 114 – (3)

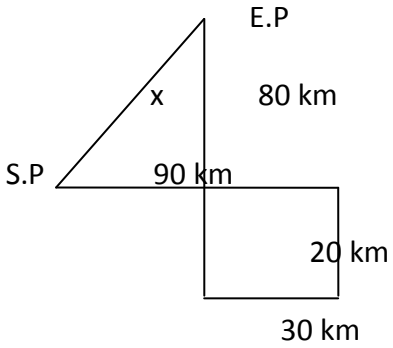
From 2 and 3,

5A + 6P = 122

18M + 6P = 342

From the above we get, 18M – 5A = 220 – 4
Solving 1 and 4, we get A = 10 and M = 15. We get P = 12.
Cost of 1 apple, 1 peach and 1 mango is equal to 37 (10+15+12).

09 Ans (d)



$x=\sqrt{(60^2+80^2)}$
x=100

10 Ans (a)
Each letter represents their position in the alphabetical order.

11 Ans (d)

6	4	1
8	5	2
9	**7**	3
24	**6**	6

So the largest digit that cane be changed is 7 in order to bring the solution as 2456.

12 Ans (c)
S = 24km/h = 24*(5/18) = 20/3 m/sec
T = 4 min = 240 sec
Perimeter = 2(l+b) = (20/3)*240
2(l+b) = 1600 m
l+b = 800 m
l:b = 3:2
l = (3/5)*800 = 480 m
b = (2/5)*800 = 320 m

13 Ans (a)
Ahmed and Babu cannot lie because each of them say two facts (not the largest, not the smallest) and there is no chance for both the facts to be wrong. David says “My number is smallest”. If David lies, one of the remaining four should lie. But exactly one person lies in this problem. So David says the truth. If David’s statement is true, Eesha’s statement is also true. The one who lies is Chitra and Eesha has the largest number.

14 Ans (b)
FG is as large as possible and all the 7 numbers should be different.
Let’s try out a few possibilities..
9 + 8 + 7 + 6 + 5 = 35…5 is getting repeated twice.
9 + 8 + 7 + 6 + 4 = 34…4 is getting repeated
9 + 8 + 7 + 5 + 4 = 33…3 repeats

9 + 8 + 6 + 5 + 4 = 32
None of the numbers repeat in the above case and 32 is the maximum number FG can have. The value of G is 2.

15 Ans (d)
Going through the options, one can rule out A, C, D and E as they violate the given conditions. Only B obeys.

16 Ans (d)
y^2 is a positive number, so definitely x or z should be negative for the product to be a negative value. This means that xz always results in a negative value.

17 Ans (d)
Jake starts at 12.00 and covers 6 km/h
Paul starts at 1.30 and covers 8 km/h
Relative speed between Jake & paul is 2 kmph, where Paul stating Jake is 9 km ahead of Paul. From 13.30 hours paul takes 4.30 hrs to meet Jake. Again he needs 1.30 hrs to lead Jake by 3 km Relative speed. Totally he takes 6 hrs. so 13.30+6 = 19.30 hrs.

18 In any particular column, the third number is the sum of the first and second multiplied by 3. 81 is 15 plus 12 multiplied by 3.

19 Ans (a)
We can ignore 7 and 6 and we can check with 24 and 23 as the number of roses has decreased. If he plucks 24, the next day 9 new roses bloom. The numbers go on decreasing by 15. If you keep decreasing 15 starting from 189, we find that none of the options match. Let's check this for 23. When he plucks 23, 18 new roses bloom every day and it goes decreasing by 5 each day. If you keep decreasing 5 from 189, you'll get 4 at a point.

20 Ans (a)
Let 44444444 = x

$$\frac{(x+1)*(2x-3)*(x-2)+(x-6)}{x^2}$$

$$\frac{(x^2-x-2)(2x-3)+(x-6)}{x^2}$$

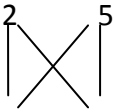
$$\frac{2x^3-2x^2-4x-3x^2+3x+6+x-6}{x^2}$$

$$\frac{2x^3-5x^2}{x^2} = 2x-5$$

= 2(44444444)-5 = 88888883

21 Ans (a)
Let the cost price of cow and horse is C and H Respectively
C + H = 200000 - (1)
1.2C + .8H = 204000 - (2)
Solving euation (1) & (2)
C = 80000.

22 2 5



1 2
3 3 3

5 times 2 is 10, but we have 3 in the solution. This means that there is a change in base. In base 7, 13 corresponds to 10 in base 10 system. One can see it works for the remaining numbers too. So the base is 7.

23 Ans (d)
1941^2 ends in 81. 1941^3 ends in 21, 1941^4 ends in 61, 1941^5 ends in 01 and 1941^6 ends in 41 and this cycle keeps repeating. Similarly the cycle for 1961 powers is 61, 21, 81, 41, 01 and the cycle repeats. After adding up the final two digits of these numbers for their respective powers, we find that the sum is 82.

24 Ans (d)
Total number of work to be done= 120 Units (LCM of 8,10,12)
George's one hour work = 120/8 = 14 Units
Paul's one hour work = 120/10 = 12 Units
Hari's one hour work = 120/12 = 10 Units
Units of work finished at 11 AM = (14+12+10)*2 = 74
Remaining work to be done = 120-74 = 46 units
One hour Paul + Hari work = 22 units
Approximately they will take two hours to finish the work
So the work will get finished at 1 PM

25 Ans (d)
End of 1994 Rohit = Grandmother/2
$R_B+G_B = 3844$
1999 Rohit age = ?
[1994-(G/2)]+[1994-G] = 3884
-3G/2 = -144
G = 48
Then Rohit age in 1994 = 48 years
Five years later in 1999, Rohit's age was 53 years.

26 Ans (b)
M is 30% of Q
Q is 20% of P
Nis 50 % of P
Then M/N = ?
Let P= 100
N = 50
Q = 20
M = 6
M/N = 6/ 50 =3/25.

27 Ans (b)

Peda can be had only after having Jilabi. So Peda can never be had on the starting day, which is Monday.

28 Ans (b)
Going by the options and checking logically which order is possible, we can see that all given orders are possible except the order in option (b).

29 Ans (d)
$2^{2*37} + 2^{2058} + 2^{2n}$
$a^2 + 2ab + b^2$
$(2^{37})^2 + (2^n)^2 + 2*2^{37}*2^n$
Here $a = 2^{37}$, $b = 2^n$,$2ab = 2^1*2^{37}*2^n$
$2^{38+n} = 2^{2058}$
$38+n = 2058$
$n = 2020$

30 Ans (a)
Going by the options, 35 = 8(4) + 3. So option (a).

01 Hanuman can complete a bridge in 10 days and Ravanan can complete the same bridge in 20 days. Now they are working together and they are completing the bridge in 20 days. What is the contribution of Ravanan in constructing the bridge?

(a) Half the work (c) Two-fourth of the bridge

(b) One-third of the work **(d) Destructing the bridge**

02 (a% of a) + (b% of b) = 2% of ab, then what percentage of a is b?

(a) 50% (b) 75% **(c) 100%** (d) Cannot be determined.

03 When numbers are written in base b, we have 15*22 = 414, the value of b is

(a) 8 (b) 7 **(c) 6** (d) None of these

04 5 coffee and 4 tea costs Rs.96, 5 badam milk and 6 coffee costs Rs. 32 and 7 tea and 6 badam milk costs Rs.37. What is the combined price of 1tea, 1 coffee and 1 badam milk?

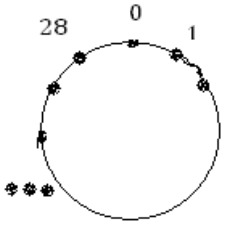
(a) 12 **(b) 15** (c) 20 (d) 16

05 There is a set of numbers that relate to each other in a certain way. Find the way the first set of boxes works. The numbers in the second set work in exactly the same way. Find the number that must go in the empty box in the first set.

30	11	128	67		219
6	3	6	3	6	3
144	19	634	131	1724	435

(a) 343 **(b) 346** (c) 349 (d) 643

06 A circle has 29 points arranged in a clockwise manner numbered from 0 to 28, as shown in the figure below. A bug moves clockwise around the circle according to the following rule. If it is at a point i on the circle, it moves clockwise in 1 second by (1 + r) places, where r is the reminder (possibly 0) when i is divided by 11. Thus if it is at position 5, it moves clockwise in one second by (1 + 5) places to point 11. Similarly if it is at position 28 it moves (1 + 6) or 7 places to point 6 in one second.
If it starts at point 28, at what point will it be after 9994 seconds?



(a) 1 (b) 5 (c) 7 **(d) 3**

07 Jake is faster than Paul. Jake and Paul each walk 40 km. The sum of their speeds is 13 km/h and the sum of time taken by them is 13 hours. Then Jake's speed is equal to :

(a) 7Kmph **(b) 8Kmph** (c) 13Kmph (d) 9Kmph

08 $P(x) = (x^{999} + x^{998} + x^{997} + \ldots + x + 1)^2 - x^{999}$

$Q(x) = x^{998} + x^{997} + \ldots + x + 1$

The reminder when P (x) is divided by Q (x) is

(a) x + 1 **(b) 0** (c) 1 (d) x – 1

09 A Samsung duo and a Galaxy are bought for Rs.40000. The Duo is sold at a profit of 33.33% and the Galaxy is sold at a loss of 20%. There was no loss or gain. Find the cost price of the Samsung duo ?

(a) Rs.15,000 (b) Rs.25,000 (c) Rs.20,000 (d) Rs.18,000

10 If a Strawberry and a Butterscotch together cost Rs. 18.00, a Vanilla and a Strawberry cost Rs. 9.00 and a Butterscotch cost Rs.9.00 more than a Vanilla or a Strawberry then which of the following can be the price of a Butterscotch?

(a) Rs. 13.5 (b) Rs.10 (c) Rs. 12 (d) Rs. 13

11 If KMNOQ is 7- 5 - 4 - 3 - 1 and DEFIJ is 4-5-6-9-8 and RSWYZ is 2-3-7-9-8 then AGVXH is

(a) 1 - 7 - 6- 8 - 8 (b) 1 - 7 - 3 - 5 - 7 (c) 9 - 3 - 7 - 6 - 5 (d) 7 - 8 - 4 - 5 - 3

12 My next door neighbour lies a lot. In fact, he only tells the truth on one day a week! One day he told me, "I lie on Mondays and on Tuesdays."The next day he said, "Today is either Thursday, Saturday or Sunday."The next day he said, "I lie on Wednesdays and Fridays."
On which day of the week does my neighbour tell the truth?

(a) Monday (b) Tuesday **(c) Wednesday** (d) None of these

13 The addition 457 + 982 + 896 = 2345 is incorrect. What is the least digit that can be changed to make the addition correct?

(a) 5 (b) 7 (c) 6 (d) 3

14 A child was looking for his father. He went 42 metres in the East before turning to his right. He went 20 metres before turning to his right again to look for his father at his uncle's place 30 metres from this point. His father was not there. From here he went 25 metres to the North before meeting his father in a street. How far did the son meet his father from the starting point?

(a) 7 (b) 25 **(c) 13** (d) 11

15 At the end of 1994 Rohit was $1/4^{th}$ as old as his grandmother. The sum of the years in which they were born is 3843. How old Rohit was at the end of 2001?

(a) 48 **(b) 36** (c) 29 (a) 34

16 Raj writes a number. He sees that the number of two digits is 9 less than 3 times the number. If the number is increased by 45, the result is the same as the number formed by reversing the digit. Find the number.

(a) 35 **(b) 27** (c) 36 (d) 49

17 Find the value of "n" where $3^{48} + 3^{1996} + 3^{3943} + 3^{3n}$.

(a) 1963 (b) 1964 (c) 1960 (d) 1991

18 There are 5 sweets – Milk peda, Ice cream, Rasagulla Paper sweet and Rasamalai that I wish to eat on 5 consecutive days – Monday through Friday, one sweet a day, based on the following self imposed constraints:

1) Paper sweet is not eaten on Monday
2) If Milk peda is eaten on Monday, then Paper sweet must be eaten on Friday
3) If Paper sweet is eaten on Tuesday, Ice cream should be eaten on Monday
4) Rasagulla should be eaten on the day preceding to the day of eating Milk peda.

Based on the above, Rasagulla can be eaten on any day except?

(a) Tuesday (b) Monday (c) Wednesday **(d) Friday**

19 Raj drives slowly along the perimeter of a rectangular park at 24 kmph and completes one full round in 4 minutes 30 seconds. If the ratio of the length to the breadth of the park is 5 : 7, what are its dimensions?

(a)1500m x 700m **(b) 375m x 525m** (c) 35m x 49m (d) 100m x 100m

20 In a office, at various times during the day the boss gives the secretary a letter to type, each time putting the letter on the top of the pile in the secretary's inbox. When there is time, the secretary takes the top letter off the pile and type's it. If there are five letter in all , and the boss delivers in the order of 5 4 3 2 1, which of the following could be the order in which secretary types them.

(a) 2 4 3 5 1 **(b) 4 5 2 3 1** (c) 1 2 3 5 4 (d) 3 1 2 5 4

21 Daniel can do some work in 12 hours, Roy can do the same work in 10 hours while Hillari can do the same work in 15 hours. All the three of them start working at 9 a.m while Daniel stops works at 11 a.m and remaining two complete the work. Approximately at what time will the work be finished?

(a) 1.30 pm (b) 12.30 am **(c) 2.00 pm** (d) 1.00 pm

22 In the equation A + B + C + D + E = FG where FG is the two digit number whose value is 10F + G and letters A, B , C , D , E, F and G each represent different digits. If FG is as small as possible. What is the value of G?

(a) 4 (b) 2 **(c) 0** (d) 3

23 In this question, A^B means A raised to power B. If x^2*y*z < 0, then which one of the following statements must also be true?

I. yz < 0
II. z < 0
III. x < 0

(a) I only (b) III only (c) I & II only (d) None of the above

24 At 12.00 hours Ravi starts to walk from his house at 8 kms an hour. At 13.30 hours, Shankar follows him from Ravi's house on his bicycle at 12 kms per hour. When will Ravi be 6 kms behind Paul?

(a) 18:00hrs (b)18:30hrs (c) 20:00hrs (d) 19:30hrs

25 What is the value of (222224*444445*222221+666668)/222222^2

(a) 444444 **(b) 444447** (c) 222224 (d) 444222

26 Seven varsity basket ball players (A, B, C, D, E, F and G) are to be honoured at a special luncheon. The players will be seated on the dias in a row. A and G have to leave the luncheon early and so must be seated at the extreme right .B will receive the most valuable player's trophy and so must be in the centre to facilitate presentation .C and D are bitter rivals and, therefore must be seated as far apart as possible.

Which of the following pair cannot occupy the seats on either side of B?

(a) F and D (b) D and E **(c) E and G** (d) C and F

27 An organization has 4 committees. Only 3 persons are members of all four committees, but every pair of committees has 4 members in common. What is the LEAST possible number of the members on any one committee?

(a) 4 **(b) 6** (c) 7 (d) 5

28 Aravind can do a work in 24 days. Mani can dig the same well in 36 days. Aravind, Mani and Hari can do a work together in 8 days. Hari alone can do the work in

(a) 12days **(b) 18 days** (c) 16 days (d) 24 days

29 A farmer has a rose garden. Every day he either plucks 7 or 6 or 24 or 23 roses. The rose plants are intelligent and when the farmer plucks these numbers of roses, the next day 37 or 36 or 9 or 18 new roses bloom in the garden respectively. On Monday, he counts 189 roses in the garden. He plucks the roses as per his plan on consecutive days and the new roses bloom as per intelligence of the plants mentioned above. After some days which of the following can be the number of roses in the garden?

(a) 26 **(b) 249** (c) 232 (d) 27

30 What is the unit's digit of 21^3 *21^2*34^7*46^8*77^8 ?

(a) 4 (b) 8 (c) 6 (d) 2

01 Ans(d)

If they are both doing a positive work then they would have completed the work in less than 10 days, but still they are consuming 20 days together. This is possible only when one of them is doing a negative work. If Hanuman is doing the negative work then the bridge won't get completed. So the only other person to do the negative work should be Ravanan. Thus Ravanan's contribution in constructing the bridge is Destructing it.

02 Ans(c)

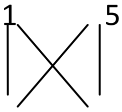
(a/100)* a +(b/100) * b = (2/100) ab

a^2+b^2 =2ab and $(a-b)^2 = 0$

a=b

03 Ans(c)

1 5



2 2

4 1 4

5 times 2 is 10, but we have 4 in the solution. This means that there is a change in base. In base 6, 14 corresponds to 10 in base 10 system. One can see it works for the remaining numbers too. So the base is 6.

04 Ans(b)

5C+4T=96; 5B+6C=32; 7T+6B=37;

Therefore 5C+4T+5B+6C+7T+6B =96+32+37

i.e., 11C+11T+11B=165

then 1C+1T+1B=15.Rs

05 Ans(b)

First Row follows the pattern x^3+3…

Second row follows y^2+2

Third row follows the (product of first set and second set) – (Sum of first set and second set)

06 Ans (d)

A bug moves clockwise starting from point 23.

Points (N)	Remainder(r) (N/11)	Points to be moved (1 + r)	New point position	Time (sec)
23	1	2	25	1
25	3	4	0	2
0	0	1	1	3
1	1	2	3	4
3	3	4	7	5
7	7	8	15	6
15	4	5	20	7
20	9	10	1	8
1	1	2	3	9

We can see a pattern emerging in the point positions from the 3rd second onwards…1, 3, 7, 15, 20 and then the cycle keeps repeating. After 5 s, 10 s, 15 s, the bug's position is 7. So after 2010s, the position should be 7. The position after 2011 s is 15, and after 2012 s it is 20.

07 Ans (b)

Given that speed of Jake is greater than Paul.

Distance = 40 km

Sum of their speed is 13 km/h = J+P

So possible speed ratio between J & P is

Go by Option
12:1, 11:2, 10:3, Not in option
8:5= (40/8)+(40/5) = 13 Hours
So Jake's speed is 8km/h.

08 Ans(b)
Substituting 1 for x, the numerator is $1000^2 - 1^2$
This can be written in the form (1000 + 1) (1000 -1) = (1001)(999)
The denominator is 999 and since the numerator is a multiple of 999,the remainder is exactly 0

09 Ans (a)
x+y= 40000
1.33x+ 0.8y= 40000
By solving these two equations:
The price of Samsung Duo, ie, x=15094 ~15000

10 Ans (a)
Butterscotch costs 9 more than a strawberry or Vanilla means Strwberry= Vanilla.
Since Vanilla +Strawberry=9
Vanilla= 4.5 and Strawberry = 4.5
Then we know that Butterscotch + Strawberry= 18
So Butterscotch= 18-4.5=13.5.

11 Ans(a)
A-1 B-2 C-3 D-4 E-5 F-6 G-7 H-8 I-9 J-8 K-7 L-6 M-5 N-4 O-3 P-2 Q-1 R-2 S-3 T-4 U-5 V-6 W-7 X-8 Y-9 Z-1
then AGVXH is 17688

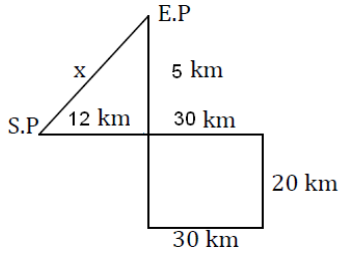
12 Ans(c)
The first statement is made on Thurs, he lies.
Second on Friday, Again he lies saying its Thurs, Sat or Sun.
On sat again he has to lie , he says wed and Fri he lies, on fri he lies is true , So the false statement is that he lies on Wednesdays.

13 Ans (a)

4	**5**	7
9	8	2
8	9	6
23	**4**	5

So the smallest digit that cane be changed is 5 in order to bring the solution as 2345.

14 Ans(c)



Therefore $X=\sqrt{(12^2+5^2)}$
$X= \sqrt{169}$
X=13 Km

15 Ans (b)
End of 1994 Rohit = Grandmother/4
R_B+G_B = 3843
1999 Rohit age = ?

[1994-(G/4)]+[1994-G] = 3843
5G/4 = 145
G = 29*4
Then Rohit age in 1994 = 29 years
Seven years later in 2001, Rohit's age was 36 years.

16 Ans(b)
Going by the options, 27 = 3(27) – 9
27+45=72(number reversed).

17 Ans(a)
It is in the format as
$a^3+3a^2b+3ab^2+b^3$
i.e., $(3^{16})^3+ 3.3^{32}.3^n+ 3.3^{16}.3^{2n}+3^{3n}=3^{48} + 3^{1996} + 3^{3943}+3^{3n}$
From this we can say that $3^{33+n}=3^{1996}$
33+n=1996
n=1963.

18 Ans(d)
Rasagulla should be eaten on the day preceding to the day on which uh eat milk peda. Friday is the last day and hence cannot be preceded by any other day.

19 Ans(b)
He travels at 24km/hr for 4min 30 sec.
Converting into m/s his speed is 20/3m/s.
He travels so for 4*60+30sec=270sec.
So he travels (20/3)*270 m = 1800m = 2(l+b) = l+b = 900
We know that the length and breadth are in the ratio 5:7
So 5x+ 7x= 900
X=75
Hence 5x=375 and 7x= 525.

20 Ans(b)
Only the Second option is feasible as
5 → 1st
4 → 2nd
3 → 4th
2 → 3rd
1 →
Here the only one in the stack left out is 1, which is taken out in the last place.

21 Ans(c)
Let the total work be 60 .
That means Daniel will do 5 parts , Hillary 4 parts and oy 6 parts.
Total work they do together in an hour is 15 parts. So from 9am to 11am in two hours they complete 30 parts.
Next Daniel leaves Hillary+Roy do 4+6=10 parts/hour.
Hence next 30 parts will be completed in 3 hours.
Hence the work will be over by 2pm.

22 Ans(c)
The minimum values substituted here are 4+5+6+7=8=30 ,
Hence G=0.

23 Ans(a)
We know that x^2*y*z<0
X^2 will always be positive, hence it is obvious that y*z has to be negative to make the

equation correct.
Thus y*z<0 is correct.

24 Ans(a)
The distances travelled by Shankar and Ravi.

Time	Ravi	Shankar
1.00	8	0
2.00	16	6
3.00	24	18
4.00	32	30
5.00	40	42
6.00	48	54

So at 6pm the distance between them is 6km.

25 Ans(b)
The tens and units place of the dividend are 2 and 8
The units place of divisor is 4.
28/4=7
The number should end with 7.

26 Ans (c)
The pair E and G cant occupy it as G will have to be at the end since he is leaving early.

27 Ans (b)
The least number will be 6.
If it is 5 then The arrangements would be
ABCDE
ABCDF
ABCEF,but in the last arrangement it cant be possible to have 4 people common as it has to be ABC D/E/F asnd some other person X.
So with 6 the arrangement would do better.

28 Ans (b)
Let the total work be 72 parts.
So A does 3 parts.
M does 2parts and (A+M+H) do 9 parts Hence H alone does 4 parts.
If he did the work alone he could have completed it in 72/4=18 days.

29 Ans(b)
IF he plucks 7, increase is of 30 flowers.
If he plucks 6. Increase is of 30 flowers.
If again he plucks 24, decrease of 15 flowers.
And in case of 23, decrease of 5 flowers.
And option B definitely satisfies the criteria.

30 Ans(a)
For 21^5 unit digit will be 1
For 34^7 it will be 4,
For 46^8, it will be 6
And for 77^8, it will be 1
So the total unit digit will be what 1*4*6*1 has, ie 4.

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

General Aptitude

Q. No. 1 – 5 Carry One Mark Each

1. Which of the following combinations is incorrect?

(A) Acquiescence – Submission

(B) Wheedle – Roundabout

(C) Flippancy – Lightness

(D) Profligate – Extravagant

Answer: (B)

2. Given set A = {2, 3, 4, 5} and Set B = {11, 12, 13, 14, 15}, two numbers are randomly selected, one from each set. What is probability that the sum of the two numbers equals 16?

(A) 0.20 (B) 0.25 (C) 0.30 (D) 0.33

Answer: (A)

Exp: $4 \times 5 = 20$ Total mass

$$\left.\begin{matrix}5,11\\4,12\\3,13\\2,14\end{matrix}\right\} 4 \text{ favorable}$$

$$\therefore \frac{4}{20} = \frac{1}{5} = 0.2$$

3. Which of the following options is the closest in meaning to the sentence below?

She enjoyed herself immensely at the party.

(A) She had a terrible time at the party.

(B) She had a horrible time at the party.

(C) She had a terrific time at the party

(D) She had a terrifying time at the party

Answer: (C)

4. Based on the given statements, select the most appropriate option to solve the given question.

If two floors in a certain building are 9 feet apart, how many steps are there in a set of stairs that extends from the first floor to the second floor of the building?

Statements:

(I) Each step is ¾ foot high.

(II) Each step is 1 foot wide.

(A) Statement I alone is sufficient, but statement II alone is not sufficient.

(B) Statement II alone is sufficient, but statement I alone is not sufficient.

(C) Both statements together are sufficient, but neither statement alone is sufficient.

(D) Statement I and II together are not sufficient.

Answer: (A)

5. Didn't you buy _____ when you went shopping?

(A) any paper (B) much paper (C) no paper (D) a few paper

Answer: (A)

Q. No. 6 – 10 Carry Two Marks Each

6. The given statement is followed by some courses of action. Assuming the statement to be true, decide the correct option.

Statement:

There has been a significant drop in the water level in the lakes supplying water to the city.

Course of action:

(I) The water supply authority should impose a partial cut in supply to tackle the situation.

(II) The government should appeal to all the residents through mass media for minimal use of water.

(III) The government should ban the water supply in lower areas.

(A) Statements I and II follow.

(B) Statements I and III follow

(C) Statements II and III follow.

(D) All statements follow.

Answer: (A)

7. The number of students in a class who have answered correctly, wrongly, or not attempted each question in an exam, are listed in the table below. The marks for each question are also listed. There is no negative or partial marking.

Q No	Marks	Answered Correctly	Answered Wrongly	Not Attempted
1	2	21	17	6
2	3	15	27	2
3	1	11	29	4
4	2	23	18	3
5	5	31	12	1

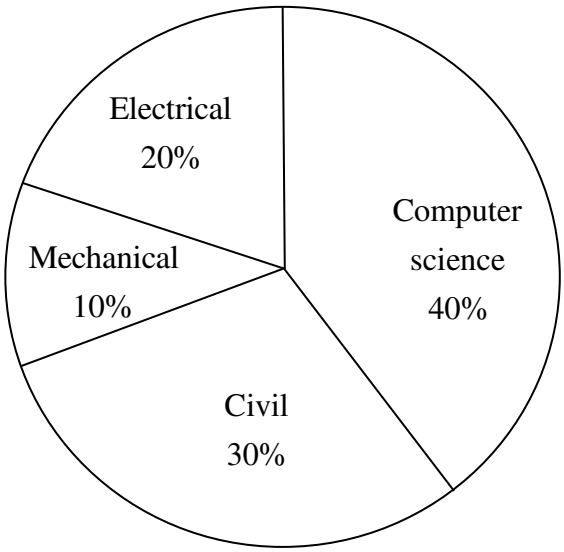
What is the average of the marks obtained by the class in the examination?

(A) 2.290 (B) 2.970 (C) 6.795 (D) 8.795

Answer: (C)

Exp: $\frac{21\times 2+15\times 3+11\times 1+23\times 2+31\times 5}{44}=6.795$

8. The pie chart below has the breakup of the number of students from different departments in an engineering college for the year 2012. The proportion of male to female students in each department is 5:4. There are 40 males in Electrical Engineering. What is the difference between numbers of female students in the Civil department and the female students in the Mechanical department?



Answer: 32

Exp: Electrical male students $= 40$

$\therefore$ Electrical Female students $= \frac{4}{5} \times 40 = 32$

$\therefore$ Total no. of Student $= 40 + 32 = 72$

Mechanical Strength is $10\% = 20 + 16 = 36$

Civil Strength is $30\% = 50 + 48 = 98$

Difference of civil female to mechanical female $= 48 - 16 = 32$

9. Select the alternative meaning of the underlined part of the sentence.

The chain snatchers took to their heels when the police party arrived.

(A) took shelter in a thick jungle

(B) open indiscriminate fire

(C) took to flight

(D) unconditionally surrendered

Answer: (C)

10. The probabilities that a student passes in Mathmatics, Physics and Chemistry are m,p, and c respectively. Of these subjects, the student has 75% chance of passing in at least one, a 50% chance of passing in at least two and a 40% chance of passing in exactly two. Following relations are drawn in m, p, c:

(I) p + m + c = 27/20

(II) p + m + c = 13/20

(III) (p) × (m) × (c) = 1/10

(A) Only relation I is true

(B) Only relation II is true

(C) Relations II and III are true.

(D) Relations I and III are true.

Answer: (A)

Exp: P(atleast two) – p(exat 2)

$= 0.5 - 0.4 = 0.1$

$0.75 = p + m + c + 0.1 - (0.5 + 0.11 \times 2)$

$\therefore p + mc = 0.65 + 0.7$

$= 1.35$

$= \frac{27}{20}$

Electrical Engineering

Q. No. 1 – 25 Carry One Mark Each

1. A moving average function is given by $y(t) = \frac{1}{T}\int_{t-T}^{t} u(\tau)dt$. If the input u is a sinusoidal signal of frequency $\frac{1}{2T}$ Hz, then in steady state, the output y will lag u (in degree) by _____.

Answer: 90

Exp: $u(\tau) = \sin(\omega\tau)$

$\omega = 2\pi f = 2\pi.\frac{1}{2T} = \frac{\pi}{T}$

$\omega T = \pi$

$$y(t) = \frac{1}{T}\int_{t-T}^{t} \sin(\omega\tau)d\tau = \frac{\cos(\omega\tau)}{\omega T}\Big|_{t}^{t-T} = \frac{1}{\pi}\left[\cos\omega(t-T) - \cos\omega t\right]$$

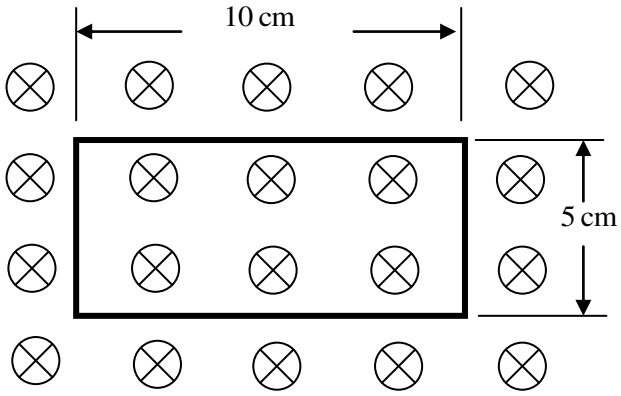
$$= \frac{1}{\pi}\left[\cos\omega t\cos\omega T + \sin\omega t\sin\omega T - \cos\omega t\right]$$

$$y(t) = -\frac{2}{\pi}\cos\omega t = \frac{2}{\pi}\sin(90 + \omega t)$$

$x(t) = \sin\omega t$

$\phi = 90°$

2. Consider a one-turn rectangular loop of wire place in a uniform magnetic field as shown in the figure. The plane of the loop is perpendicular to the field lines. The resistance of the loop is 0.4Ω, and its inductance is negligible. The magnetic flux density (in Tesla) is a function of time, and is given by $B(t)=0.25\sin\omega t$, where $\omega=2\pi\times50$ radian/second. The power absorbed (in Watt) by the loop from the magnetic field is _____.



Answer: 0.192

Exp: $P=\dfrac{V_{emf}^2}{R}$

$V_{emf}=\dfrac{-d\psi}{dt}$

$\psi=\int_S B.dS=B.S.=\dfrac{1}{800}\sin\omega t$

$V_{emf}=\dfrac{-d\psi}{dt}=\dfrac{-1}{8}\pi\cos\omega t$

$p=\dfrac{\pi^2}{64}\cos^2\omega t\times\dfrac{1}{R}$

$p=\dfrac{\pi^2}{0.4\times64}\left[\dfrac{1+\cos2\omega t}{2}\right]$

$p_{avg}=\dfrac{\pi^2}{20\times0.4\times64}+\dfrac{\pi^2}{0.4\times64\times2}\cos2\omega t$

$p_{avg}=\dfrac{\pi^2}{20\times0.4\times64}=0.192W$

3. If the sum of the diagonal elements of a 2 × 2 matrix is -6, then the maximum possible value of determinant of the matrix is _____.

Answer: 9

Exp: Sum of the diagonals elements is -6 for 2×2 matrix

The possible eigen value are

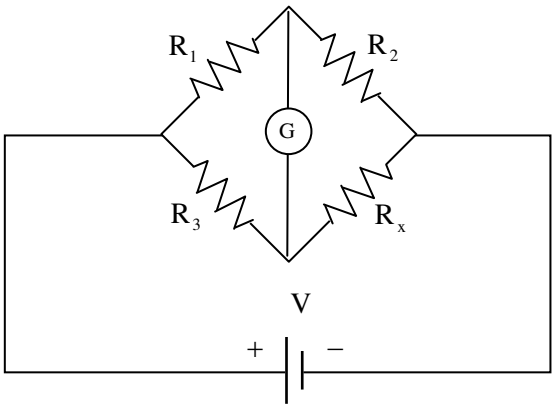
→ $-1,-5$ $-5,-1,$ $-8,2$

$-2,-3$ $-4,-2$ $-9,3$ – – – – –

$-3,-1$ $-3,-3$ $-10,4$

Maximum possible value of determinant is -3×-3 = 9.

4. When the Wheatstone bridge shown is used to find value of resistance R_x, the Galvanometer G indicates zero current when $R_1 = 50\Omega, R_2 = 65\Omega$ & $R_3 = 100\Omega$. If R_3 is known with $\pm 5\%$ tolerance on its nominal value of 100Ω, what is range of R_x in ohms?



(A) [123.5, 136.5] (B) [125.898, 134.12]

(C) [117, 143] (D) [120.25, 139.75]

Answer: (A)

Exp: Weinbridge is balanced, $R_1, R_x = R_2R_3$

$50 \times R_x = 65 \times 100$

$R_x = 130\Omega$

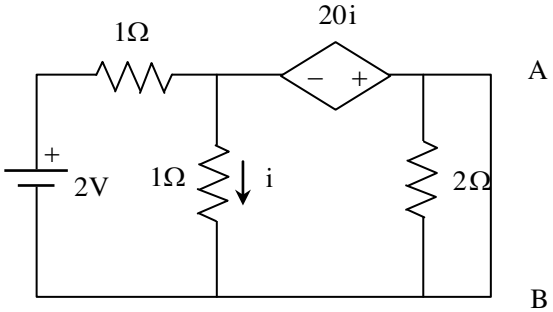
Now $R_3 = 100 \pm 100 \times 0.05 = 100 \pm 5 = 95/105\Omega$

$$R_x = \frac{R_2R_3}{R_1} = \frac{65 \times 105}{50} = 136.5\Omega$$

$$R_x = \frac{65 \times 95}{50} = 123.5\Omega$$

Range of R_x is 123.5Ω to 136.5Ω

5. For the given circuit the Thevenin equivalent is to be determined. The Thevenin voltage, V_{Th} (in volt), seen from terminal AB is _____.



Answer: 3.36

Exp: $V_{th} = 2i_1$

$2 = 1[i+i_1]+i = 2i+i_1$

$i(1) = -20i + 2i_1$

$\therefore 21i = 2i_1$

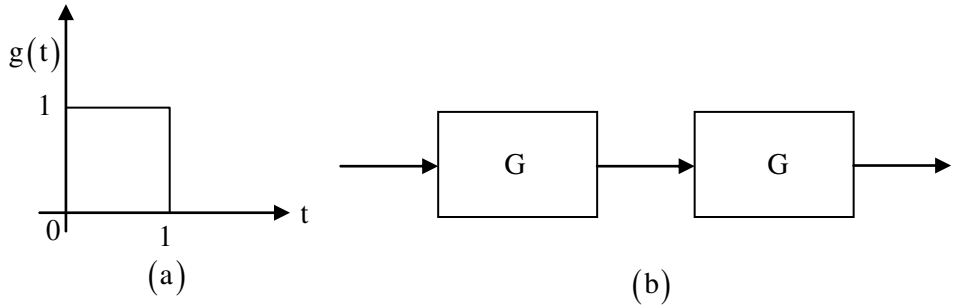
$$i = \left(\frac{2}{21}\right) i_1$$

$$2 = 2i + i_1 = 2\left(\frac{2}{21}\right) i_1 + i_1 = \left(\frac{4}{21} + 1\right) i_1 = \frac{25}{21} i_1$$

$$i_1 = \frac{42}{25} = 1.68$$

$$V_{th} = 2i_1 = 3.36V$$

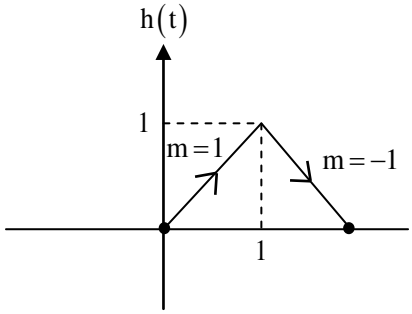
6. The impulse response g(t) of a system, G, is as shown in Figure (a). What is the maximum value attained by the impulse response of two cascaded blocks of G as shown in Figure (b)?



(A) $\frac{2}{3}$ (B) $\frac{3}{4}$ (C) $\frac{4}{5}$ (D) 1

Answer: (D)

Exp: Overall impulse response = g(f)*g(t)
h(f) = g(f)*g(f)



7. Base load power plants are

P: wind farms.

Q: run-of-river plants.

R: nuclear power plants.

S: diesel power plants.

(A) P, Q and S only (B) P, R and S only (C) P, Q and R only (D) Q and R only

Answer: (C)

Exp: Wind farms along with combine cycle gas turbine supplies the base load.

Considering economic criteria, environmental issues and requirements, it is favorable to use wind generated electricity to meet the base load.

8. Of the four characteristic given below, which are the major requirements for an instrumentation amplifier?

P: High common mode rejection ratio

Q: High input impedance

R: High linearity

S: High output impedance

(A) P, Q and R only (B) P and R only (C) P, Q and S only (D) Q, R and S only

Answer: (A)

Exp: Additional characteristics include very low DC offset, low drift, low noise, very high open-loop gain, very high common-mode rejection ratio, and very high input impedances. Instrumentation amplifiers are used where great accuracy and stability of the circuit both short and long-term are required.

9. A random variable X has probability density function f(x) as given below:

$$f(x)=\begin{cases} a+bx & \text{for } 0<x<1 \\ 0 & \text{otherwise} \end{cases}$$

If the expected value $E[X]=2/3$, then $Pr[X<0.5]$ is _____.

Answer: 0.25

Exp: $\int_{-\infty}^{\infty} f(x)dx=1$

$\text{so}\int_0^1 (a+bx)dx=1$

$a+\frac{b}{2}=1$

$2a+b=2 \quad \_\_\_\_(1)$

$\text{given } E[X]=2/3=\int_0^1 x[a+bx]dx$

$\frac{2}{3}=\frac{a}{2}+\frac{b}{3}$

$3a+2b=4 \quad \_\_\_\_(2)$

$\text{from}(1)\text{and}(2)$

$a=0$

$b=2$

$p_r[X<0.5]=\int_0^{0.5} f(x)dx=2\int_0^{0.5} x\,dx=0.25$

10. Consider a function $\bar{f} = \frac{1}{r^2}\hat{r}$, where r is the distance from the origin and $\hat{r}$ is the unit vector in the radial direction. The divergence of the function over a sphere of radius R, which includes the origin, is

(A) 0 (B) 2π (C) 4π (D) $R\pi$

Answer: (A)

Exp: $F = \frac{1}{r^2}a_r$

$$\nabla.F = \frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2F_r\right) + \frac{1}{r\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta F_\theta\right) + \frac{1}{r\sin\theta}\frac{\partial F_\phi}{\partial\phi}$$

$$\nabla.F = \frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2 + \frac{1}{r^2}\right) + 0 + 0$$

$$\nabla.F = 0$$

11. A separately excited DC generator has an armature resistance of 0.1Ω and negligible armature inductance. At rated field current and rated rotor speed, its open-circuit voltage is 200 V. When this generator is operated at half the rated speed, with half the rated field current, an un-charged 1000 μF capacitor is suddenly connected across the armature terminals. Assume that the speed remains unchanged during the transient. At what time (in microsecond) after the capacitor is connected will the voltage across it reach 25V?

(A) 62.25 (B) 69.3 (C) 73.25 (D) 77.3

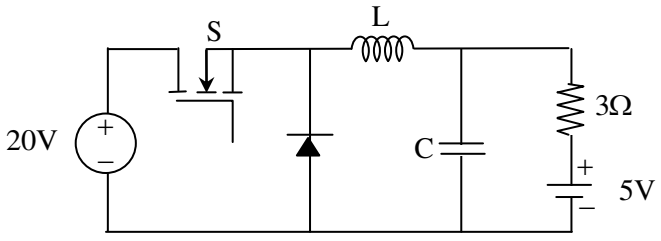
Answer: (B)

Exp: $\frac{E_{b2}}{E_{b1}} = \frac{N_2\phi_2}{N_1\phi_2} = \frac{0.5N_1 \times 0.5\phi_1}{N_1 \times \phi_{51}} \Rightarrow E_{b2} = 0.25 \times E_{b1} = 0.25 \times 200 = 50$

$\tau = R \times C = 0.1 \times 1000\mu$

$50 = 2000e^{-t/100\times10^{-6}} \Rightarrow t = 69.3\mu\text{sec}$

12. In the following chopper, the duty ratio of switch S is 0.4. If the inductor and capacitor are sufficiently large to ensure continuous inductor current and ripple free capacitor voltage, the charging current (in Ampere) of the 5 V battery, under steady-state, is _____.



Answer: 1

Exp: $V_0 = DV_S = 0.4 \times 20 = 8V$

$I_0 = \frac{V_0 - E}{R} = \frac{8-5}{3} = \frac{3}{3} = 1A$

13. If a continuous function f(x) does not have a root in the interval [a, b], then which one of the following statements is TRUE?

(A) $f(a).f(b)=0$

(B) $f(a).f(b)<0$

(C) $f(a).f(b)>0$

(D) $f(a)/f(b)\le 0$

Answer: (C)

Exp: We know that, (Intermediate value theorem)

If $f(a)f(b)<0$ then $f(x)$ has at least one root in (a, b)

f(x) does not have root is (a, b) means $f(a)f(b)>0$

14. The primary mmf is least affected by the secondary terminal conditions in a

(A) power transformer (B) potential transformer

(C) current transformer (D) distribution transformer

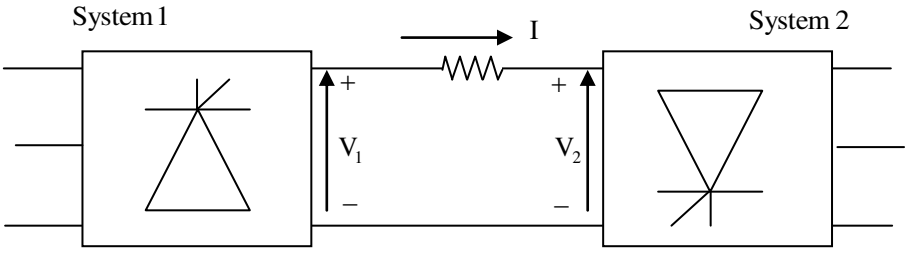
Answer: (C)

Exp: Primary winding of CT is connected in series with the circuit whose current is to be sensed & across the secondary of CT's the operating coil of the relay is connected.

In protection CT, one tube of primary winding i.e., the conductor of the circuit itself forms the primary of the CT.

$\because$ The primary is connected in series with the power circuit, the voltage drop across its terminals is very small and the primary current is independent of the secondary current contrary to power transformer where the primary current depends upon the secondary current.

Q15. Consider a HVDC link which uses thyristor based line-commutated converters as shown in the figure. For a power flow of 750 MW from System 1 to System 2, the voltages at the two ends, and the current, are given by: V_1 =500 kV, V_2 =485 kV and I=1.5 kA. If the direction of power flow is to be reversed (that is, from System 2 to System 1) without changing the electrical connections, then which one of the following combinations id feasible?



If power is to be reversed

(A) $V_1=-500kV, V_2=-485kV$ and $I=1.5kA$

(B) $V_1=-485kV, V_2=-500kV$ and $I=1.5$ kA

(C) $V_1=500kV, V_2=485kV$ and $O=-1.5kA$

(D) $V_1=-500kV, V_2=-485kV, I=-1.5kA$

Answer: (B)

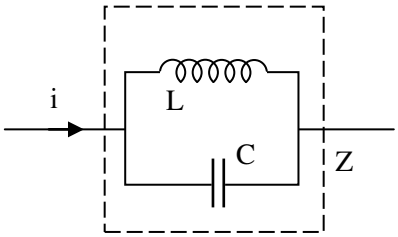
Exp: Initially, $I = \frac{V_1 - V_2}{R} \left[\because V_1 > V_2\right]$

For power flow to be reversed, polarity of voltage is changed keeping the direction of current unchanged.

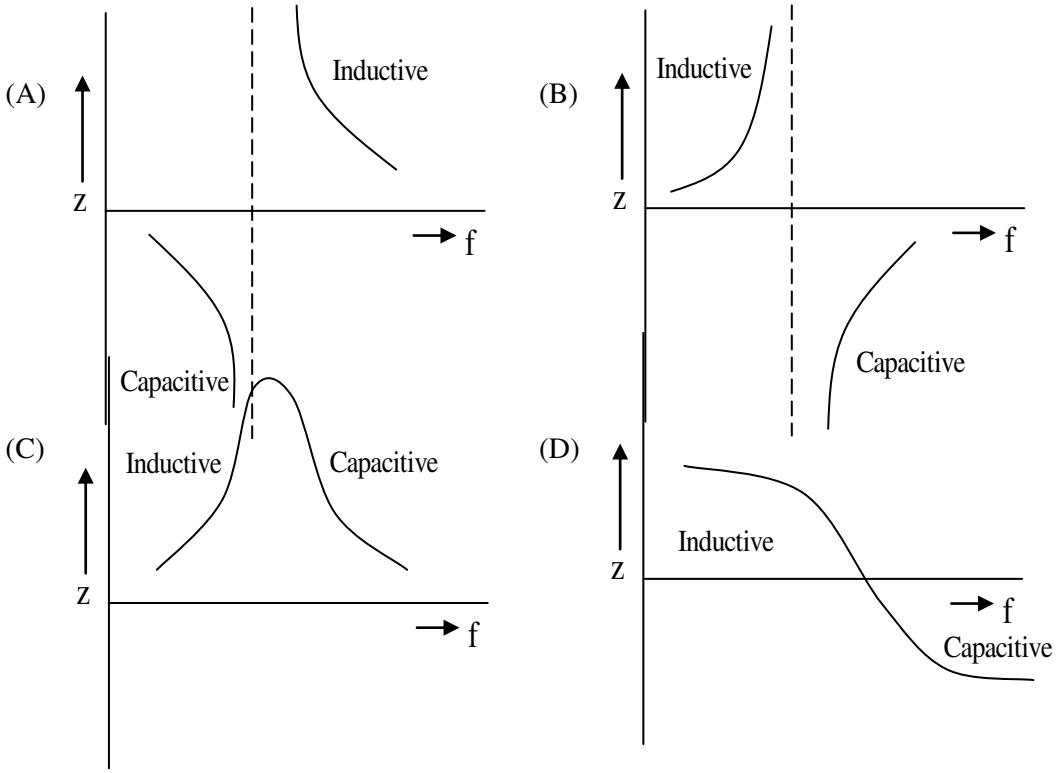
$\therefore I(+ve) = \frac{V_1 - V_2}{R}$

Here $V_1 > V_2 \Rightarrow -485 > -500 \Rightarrow I(+ve)$

16. An inductor is connected in parallel with a capacitor as shown in the figure.



As the frequency of current i is increased, the impedance (Z) of the network varies as



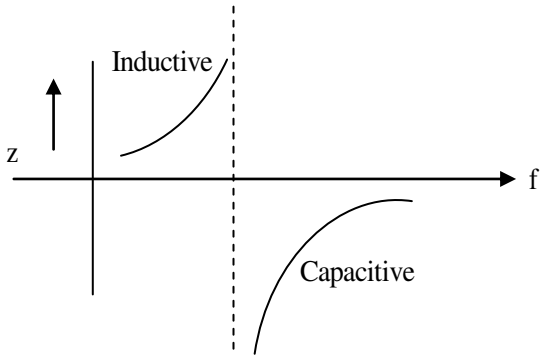
Answer: (B)

Exp: $Z = Z_L // Z_C$

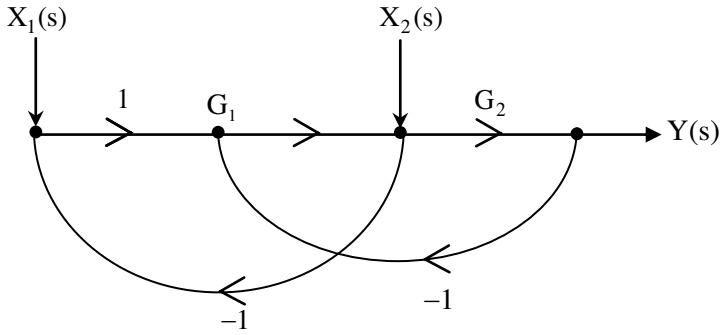
$$Z = \frac{j\omega L \times \frac{1}{j\omega C}}{\left(j\omega L + \frac{1}{j\omega C}\right)}$$

$$Z = \frac{j\omega L}{\left(1+(-1)\omega^2 LC\right)}$$

$$Z = j\left[\frac{\omega L}{1-\omega^2 LC}\right]$$



17. For the signal-flow graph shown in the figure, which one of the following expressions is equal to the transfer function $\left.\frac{Y(s)}{X_2(s)}\right|_{X_1(s)=0}$?



(A) $\frac{G_1}{1+G_2(1+G_1)}$ (B) $\frac{G_2}{1+G_1(1+G_2)}$ (C) $\frac{G_1}{1+G_1G_2}$ (D) $\frac{G_2}{1+G_1G_2}$

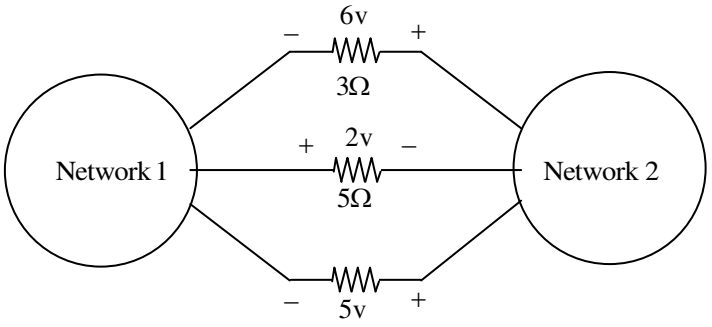
Answer: (B)

Exp: $P_1 = G_2$

$$\Delta = 1-\left[-G_1G_2 - G_1\right] = 1+G_1\left(1+G_2\right)$$

$$TF = \frac{P_1\Delta_1}{\Delta} = \frac{G_2}{1+G_1\left[1+G_2\right]}$$

18. The voltages developed across the 3Ω and 2Ω resistors shown in the figure are 6V and 2V respectively, with the polarity as marked. What is the power (in Watt) delivered by the 5V voltage source?



(A) 5 (B) 7 (C) 10 (D) 14

Answer: A

Exp: $I = \frac{6V}{3\Omega} = 2A$

$I = \frac{2V}{2\Omega} = 1A$

$I + 1 = 2$

$I = 1A$

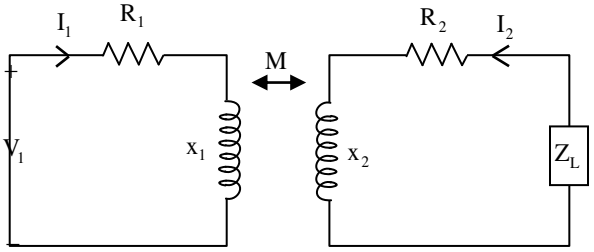
$P = 5 \times 1 = 5W$

19 The self inductance of the primary winding of a single phase, 50 Hz, transformer is 800 mH, and that of the secondary winding is 600 mH. The mutual inductance between these two windings is 480 mH. The secondary winding of this transformer is short circuited and the primary winding is connected to a 50 Hz, single phase, sinusoidal voltage source. The current flowing in both the winding is less than their respective rated currents. The resistance of both windings can be neglected. In this connection, what is the effective inductance (in mH) seen by the source?

(A) 416 (B) 440 (C) 200 (D) 920

Answer: (A)

Exp:



$$Z_{in} = \frac{V_1}{I_1} = (R_1 + jX_1) + \frac{\omega^2 M^2}{R_2 + jX_2 + Z_L}$$

Given, $L_1 = 800$ mH

$L_2 = 600$ mH

$M = 480$ mH

$W = 314$ rad/sec

$Z_L = 0$

R_1 R_2 neglected

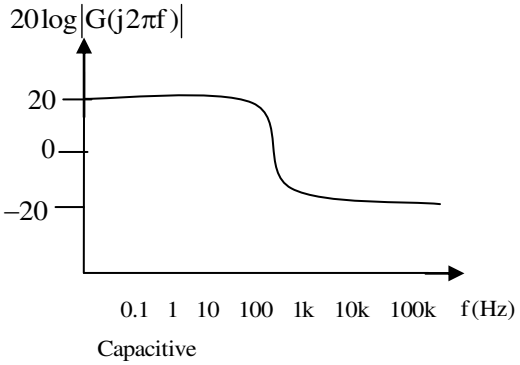
$$\therefore Z_{in} = jX_1 + \frac{\omega^2 M^2}{jX_2} = j\left[X_1 - \frac{\omega^2 M^2}{X_2}\right]$$

$$= j\left[314 \times 0.8 - \frac{314^2 \times 0.48^2}{0.6 \times 314}\right] = j[251.32 - 120.576]$$

$$= j130.744 = j_w L_{eff} = j314.L_{eff}$$

$$\therefore L_{eff} = 0.416 = 416\,mH$$

20. A Bode magnitude plot for the transfer function G(s) of a plant is shown in the figure. Which one of the following transfer functions best describes the plant?

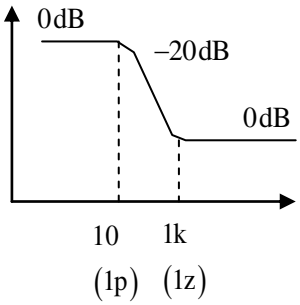


(A) $\frac{1000(s+10)}{s+1000}$ (B) $\frac{10(s+10)}{s(s+1000)}$ (C) $\frac{s+1000}{10s(s+10)}$ (D) $\frac{s+1000}{10(s+10)}$

Answer: (D)

Exp:

$$\therefore G(S)=\frac{K.\left(1+\frac{1}{1000}.S\right)}{\left(1+\frac{1}{10}S\right)}$$



M_{dB} = 20dB @ initial frequency

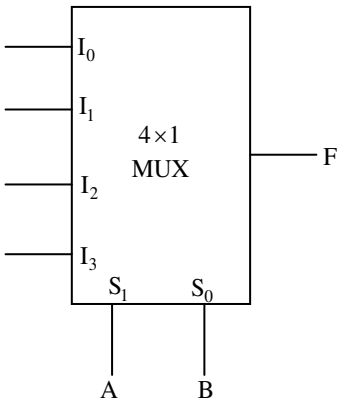
20 log M = 20

20 log K = 20

K = 10

$$G(S)=\frac{10(S+1000)\times 10}{1000(S+10)\times 1}=\frac{(S+1000)}{10(S+10)}$$

21. In the 4×1 multiplexer, the output F is given by $F=A\oplus B$. Find the required input '$I_3I_2I_1I_0$'.



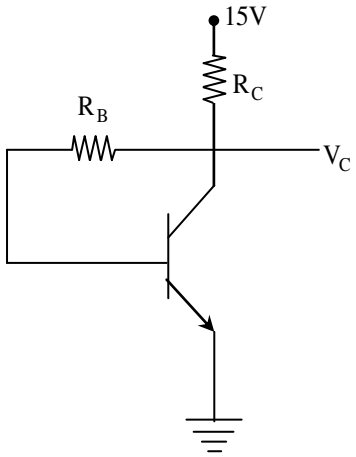
(A) 1010 (B) 0110 (C) 1000 (D) 1110

Answer: (B)

Exp: $F = A \oplus B = AB' + A'B$

AB / S_1S_0			
00	$A'B'$	I_0 0	$I_0 = 0$
01	$A'B$	I_1 1	$I_1 = 1$
10	AB'	I_2 1	$I_2 = 1$
11	AB	I_3 0	$I_3 = 0$

22. In the given circuit, the silicon transistor has $\beta = 75$ and collector voltage $V_c = 9V$. Then the ratio of R_B and R_C is _____.



Answer: 105.1

Exp: $I_C + I_B = \dfrac{6}{R_C}$

$I_B = \dfrac{8.3}{R_B},$

$\Rightarrow \beta = 75,\ I_C = \beta I_B$

$(76) I_B = \dfrac{6}{R_C},\ I_B = \dfrac{8.3}{R_B}$

$76 \times \dfrac{8.3}{R_B} = \dfrac{6}{R_C}$

$\dfrac{R_B}{R_C} = \dfrac{76 \times 8.3}{6} = 105.1$

23. A (0-50A) moving coil ammeter has a voltage drop of 0.1 V across its terminals at full scale deflection. The external shunt resistance (in milliohms) needed to extend its range to (0-500A) is _____.

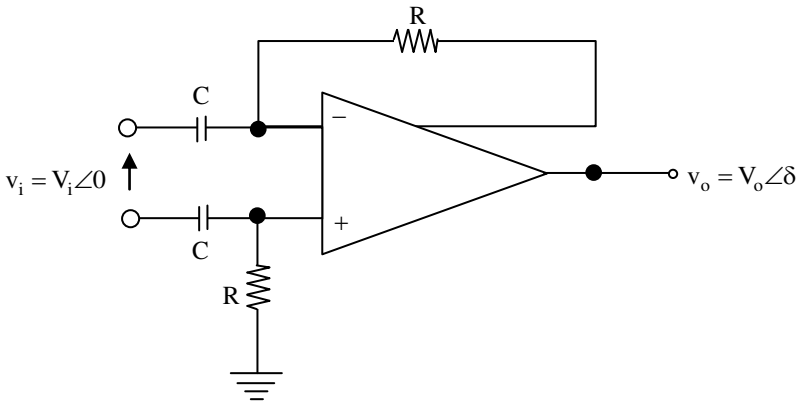
Answer: 0.22

Exp: $I_2 = 500, I_1 = 500$

$I_2 - I_1 = 450$

$450 \times R_{sh} = 0.1 \Rightarrow R_{sh} = 0.1/450 = 0.22\,m\Omega$

24. Consider the circuit shown in the figure,. In this circuit $R = 1k\Omega$, and $C = 1\mu F$. The input voltage is sinusoidal with a frequency of 50 Hz, represented as phasor with magnitude V_i and phase angle 0 radian as shown in the figure. The output voltage is represented as a phasor with magnitude V_0 and phase angle δ radian. What is the value of output phase angle δ(in radian) relative to the phase angle of the input voltage?



(A) 0 (B) π (C) $\frac{\pi}{2}$ (D) $-\frac{\pi}{2}$

Answer: D

Exp: It acts as differential amplifier

$V_1 = V_i,\ V_2 = -V_i,\ R_f = R$

$V_0 = -2V_{in}Rj\omega C$

$= -j2V_{in}R \times 2\pi f \times C$

$= -j2V_{in} \times 1m \times 2\pi \times 50$

$= KV_{in} \angle -90^0$

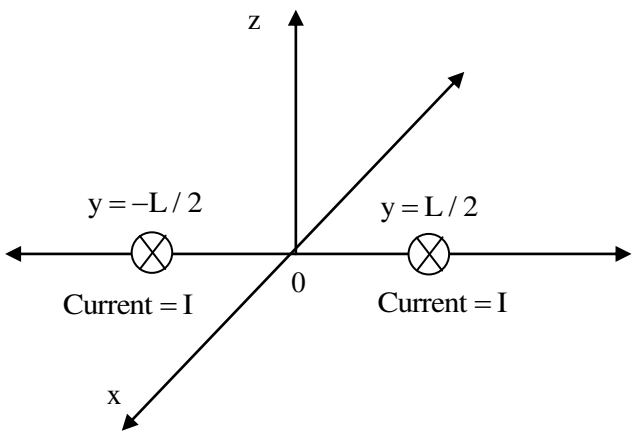
So $\delta = -90^0$ or $\frac{-\pi}{2}$

25. A steady current I is flowing in the –x direction through each of two infinitely long wires at $y = \pm\frac{L}{2}$ as shown in the figure. The permeability of the medium is μ_0. The $\vec{B}$ – field at (0,L,0) is

(A) $-\frac{4\mu_0 I}{3\pi L}\hat{z}$

(B) $+\frac{4\mu_0 I}{3\pi L}\hat{z}$

(C) 0



(D) $-\frac{3\mu_0 I}{4\pi L}\hat{z}$

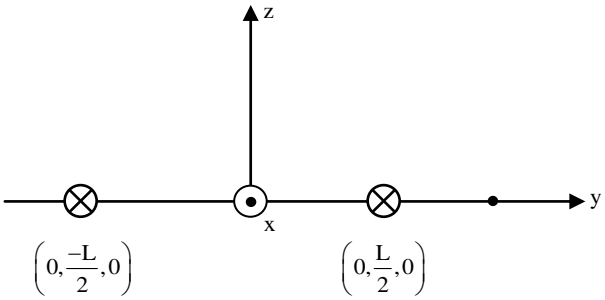
Answer: (A)

Exp: $H = H_1 + H_2$

$$= \frac{I}{2\pi(L/2)}(-a_z) + \frac{I}{2\pi\left(\frac{3L}{2}\right)}(-a_z)$$

$$= \frac{I}{2\pi}(-a_z)\left[\frac{2}{L} + \frac{2}{3L}\right]$$

$$= \frac{4I}{3\pi L}(-a_z)$$



Q. No. 26 – 55 Carry Two Marks Each

26. Consider a discrete time signal given by

$x[n] = (-0.25)^n u[n] + (0.5)^n u[-n-1]$

The region of convergence of its Z-transform would be

(A) the region inside the circle of radius 0.5 and centered at origin.

(B) the region outside the circle of radius 0.25 and centered at origin.

(C) the annular region between the two circles, both centered at origin and having radii 0.25 and 0.5.

(D) the entire Z plane.

Answer: (C)

Exp: $x[n] = \underbrace{(-0.25)^n u[n]}_{\downarrow} + \underbrace{(0.5)^n u[-n-1]}_{\downarrow}$

$ROC_1 : |Z| > |-0.25| \qquad ROC_2 : |Z| < |0.5|$

$ROC = ROC_1 \cap ROC_2$

$\therefore 0.25 < |Z| < 0.5$

27. Two players, A and B, alternately keep rolling a fair dice. The person to get a six first wins the game. Given that player A starts the game, the probability that A wins the game is

(A) 5/11 (B) 1/2 (C) 7/13 (D) 6/11

Answer: (D)

Exp: Probability of getting 6 is $= \frac{6}{36} = \frac{1}{6}$

i.e,. Probability of A wins the game $= \frac{1}{6}$

Probability of A not wins the game $= 1 - \frac{1}{6} = \frac{5}{6}$

Probability of B wins the game $=\frac{1}{6}$

Probability of B not win the game $=\frac{5}{6}$

If a starts the game, Probability A win the game

$$=P(A)+P(\bar{A})P(\bar{B})P(A)+P(\bar{A})P(\bar{B})P(\bar{A})P(\bar{B})P(A)+.....$$

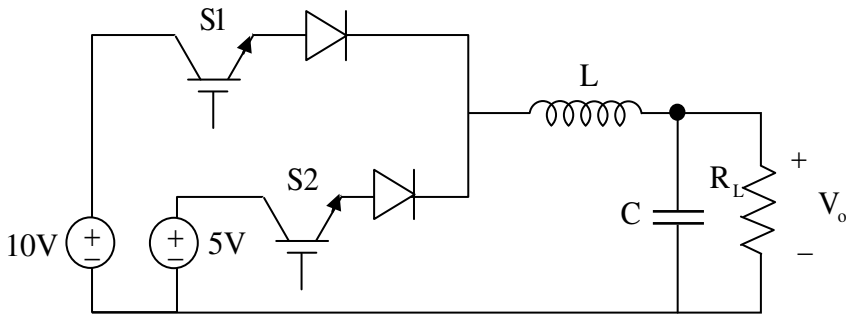
$$=\frac{1}{6}+\frac{5}{6}\frac{5}{6}\frac{1}{6}+\frac{5}{6}\frac{5}{6}\frac{5}{6}\frac{5}{6}\frac{1}{6}+.....$$

$$=\frac{1}{6}\left[1+\frac{5}{6}\frac{5}{6}+\frac{5}{6}\frac{5}{6}\frac{5}{6}\frac{5}{6}+.....\right]$$

$$=\frac{1}{6}\left[1+\left(\frac{5}{6}\right)^2+\left(\frac{5}{6}\right)^4+.....\right]$$

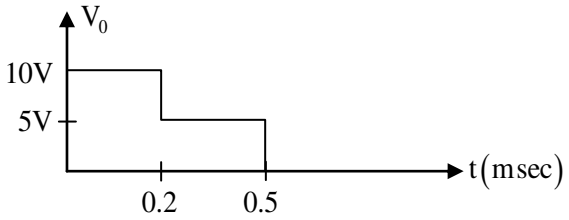
$$=\frac{1}{6}\left[\frac{1}{1-\left(\frac{5}{6}\right)^2}\right]=\frac{1}{6}\times\frac{3}{6}=\frac{6}{11}$$

28. The circuit shown is meant to supply a resistive load R_L from two separate DC voltage sources. The switches S_1 and S_2 are controlled so that only one of them is ON at any instant. S1 is turned on for 0.2 ms and S2 is turned on for 0.3 ms in a 0.5 ms switching cycle time period. Assuming continuous conduction of the inductor current and negligible ripple on the capacitor voltage, the output voltage V_0(in Volt) across R_L is _____.



Answer: (7)

Exp:



$$V_0=\frac{10\times0.2+5\times0.3}{0.5}=7V$$

29. Determine the correctness or otherwise of the following Assertion [a] and the Reason p[r].

Assertion: Fast decoupled load flow method gives approximate load flow solution because it uses several assumptions.

Reason: Accuracy depends on the power mismatch vector tolerance.

(A) Both [a] and [r] are true and [r] is the correct reason for [a].

(B) Both [a] and [r] are true and [r] is not the correct reason for [a].

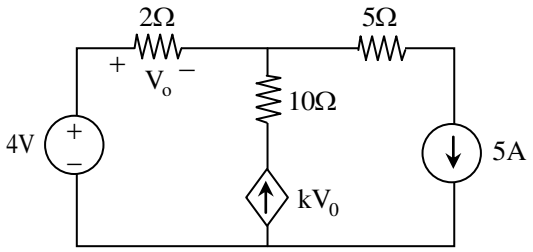
(C) Both [a] and [r] are false.

(D) [a] is false and [r] is true.

Answer: (D)

Exp: Fast decoupled load flow method gives moderate solution considering two approximations. It doesn't use several assumptions.

30. In the given circuit, the parameter k is positive, and the power dissipated in the 2Ω resistor is 12.5 W. The value of k is _____.



Answer: 0.5

Exp: $P_{2\Omega} = 12.5\,W$

$$i_{2\Omega} = \sqrt{\frac{12.5}{2}} = 2.5$$

$$V_0 = 2 \times 2.5 = 5V$$

$$2.5 + KV_0 = 5$$

$$KV_0 = 2.5$$

$$K = \frac{2.5}{5} = \frac{1}{2} = 0.5$$

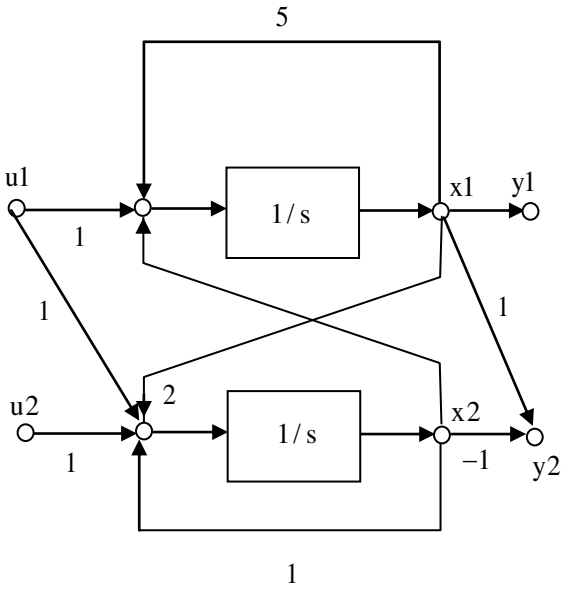
31. In the signal flow diagram given in the figure, u_1 and u_2 are possible inputs whereas y_1 and y_2 are possible outputs. When would the SISO system derived from this diagram be controllable and observable?

(A) When u_1 is the only input and y_1 is the only output.

(B) When u_2 is the only input and y_1 is the only output.

(C) When u_1 is the only input and y_2 is the only output.

(D) When u_2 is the only input and y_2 is the only output.



Answer: (B)

32. In a linear two-port network, when 10 V is applied to Port 1, a current of 4 A flows through Port 2 when it is short-circuited. When 5V is applied to Port1, a current of 1.25 A flows through a 1Ω resistance connected across Port 2. When 3V is applied to Port 1, then current (in Ampere) through a 2Ω resistance connected across Port 2 is _____.

Answer: 0.545

Exp: $I_1 = y_{11}v_1 + y_{12}v_1$ $\quad I_2 = 0.4\times 3 - 0.6[2I_2]$

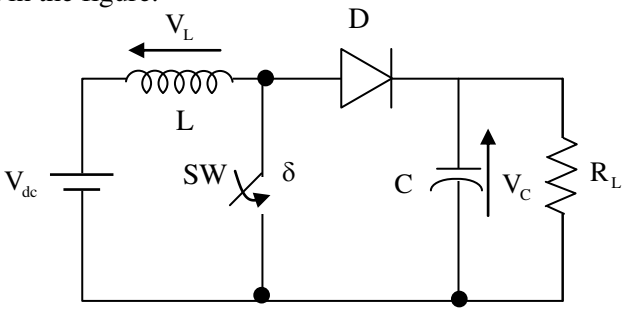
$I_2 = y_{21}v_1 + y_{22}v_2$ $\quad = 1.2 - 1.2I_2$

$4 = 10y_{21} \rightarrow y_{21} = 0.4$ $\quad I_2 = 0.545A.$

$1.25 = 0.4v_1 + 1.25y_{22} = 0.4$

$y_{22} = -0.6$

33. A self commutating switch SW, operated at duty cycle δ is used to control the load voltage as shown in the figure.



Under steady state operating conditions, the average voltage across the inductor and the capacitor respectively, are

(A) $V_L = 0$ and $V_C = \dfrac{1}{1-\delta}V_{dc}$

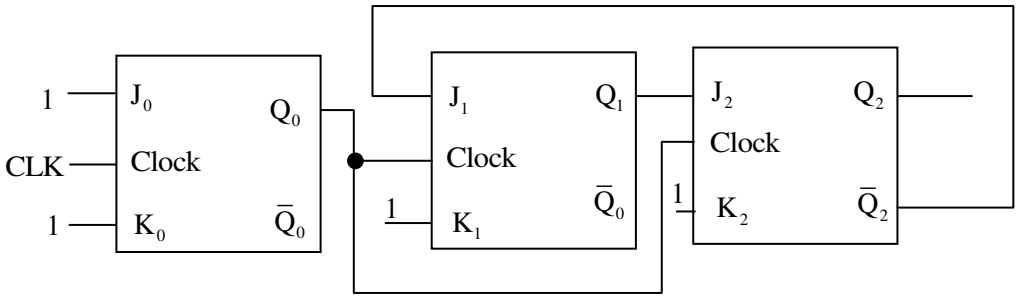
(B) $V_L = \dfrac{\delta}{2}V_{dc}$ and $V_c = \dfrac{1}{1-\delta}V_{dc}$

(C) $V_L = 0$ and $V_C = \dfrac{\delta}{1-\delta}V_{dc}$

(D) $V_L = \dfrac{\delta}{2}V_{dc}$ and $V_C = \dfrac{\delta}{1-\delta}V_{dc}$

Answer: (A)

34. The figure shown a digital circuit constructed using negative edge triggered J-K flip flops. Assume a starting state of $Q_2Q_1Q_0 = 000$. This state $Q_2Q_1Q_0 = 000$ will repeat after _____ number of cycles of the clock CLK.



Answer: 6

Exp: First flip flop acts as mod-2 counter

Second 2 flip flops from mod (2n-1) Johnson counter = mod counter

∴ overall modulus = mod – 6 counter

35. The signum function is given by

$$\text{sgn}(x)=\begin{cases}\dfrac{x}{|x|}; x\neq 0\\ 0; \quad x=0\end{cases}$$

The Fourier series expansion of $\text{sgn}(\cos(t))$ has

(A) only sine terms with all harmonics.

(B) only cosine terms with all harmonics

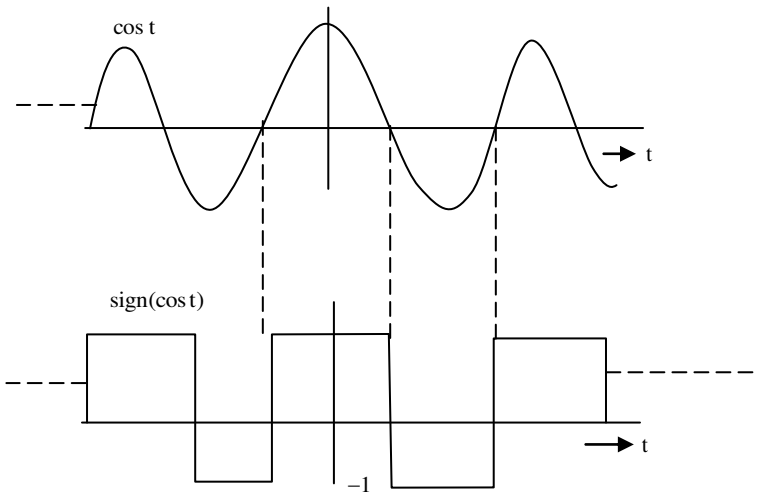
(C) only sine terms with even numbered harmonics.

(D) only cosine terms with odd numbered harmonics.

Answer: (D)

Exp: $\text{sgn}(\cos t)=1; \cos t>0$

$=-1; \cos t<0$



it represents square wave, which is even and half wave symmetry function, it contains cosine terms for all odd harmonics.

36. A DC motor has the following specifications: 10 hp, 37.5 A, 230V; flux/pole = 0.01 Wb, number of poles = 4, number of conductors = 666, number of parallel paths = 2. Armature resistance = 0.267Ω. The armature reaction is negligible and rotational losses are 600W. The motor operates from a 230V DC supply. If the motor runs at 1000 rpm, the output torque produced in (in Nm) is _____.

Answer: 14.14

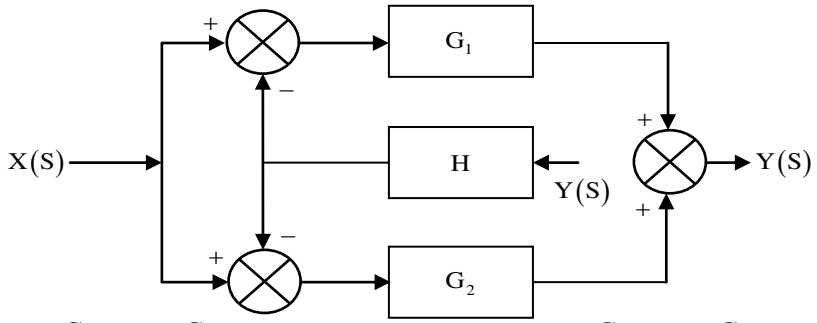
Exp: $E=\dfrac{\phi 2Np}{60A}=\dfrac{0.01\times 666\times 4\times 1000}{60\times 2}=55.5$

Internal power =EI=55.5×37.5=2081.25

Pout=2081.25-600=1481.25

$$T = \frac{Pout}{w} = \frac{1481.25}{2\pi \times \frac{1000}{60}} = 14.14 \text{ Nm}$$

37. Find the transfer function $\frac{Y(s)}{X(s)}$ of the system given below.



(A) $\frac{G_1}{1-HG_1} + \frac{G_2}{1-HG_2}$

(B) $\frac{G_1}{1+HG_1} + \frac{G_2}{1+HG_2}$

(C) $\frac{G_1+G_2}{1+H(G_1+G_2)}$

(D) $\frac{G_1+G_2}{1-H(G_1+G_2)}$

Answer: (C)

Exp: From the block diagram

$$Y = G_1(X - HY) + G_2(X - HY)$$

$$Y = X(G_1 + G_2) - HY(G_1 + G_2)$$

$$Y\left[1 + H(G_1 + G_2)\right] = X(G_1 + G_2)$$

$$\Rightarrow \frac{Y}{X} = \frac{G_1 + G_2}{1 + H(G_1 + G_2)}$$

38. The transfer function of a second order real system with a perfectly flat magnitude response of unity has a pole at (2-j3). List all the poles and zeroes.

(A) Poles at (2±j3), no zeroes

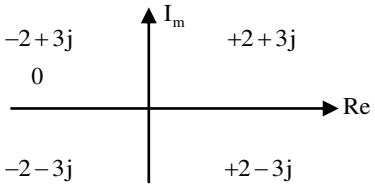
(B) Poles at (±2-j3), one zero at origin

(C) Poles at (2-j3), (-2+j3), zeroes at (-2-j3), (2+j3)

(D) Poles at (2±j3), zeroes at (-2±j3)

Answer: (D)

Exp: This is an APF

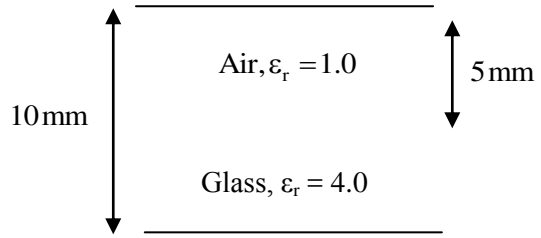


39. Two single-phase transformers T_1 and T_2 each rated at 500 kVA are operated in parallel. Percentage impedances of T_1 and T_2 are (1+j6) and (0.8+j4.8), respectively. To share a load of 1000 kVA at 0.8 lagging power factor, the contribution of T_2 (in kVA) is _____.

Answer: 555

Exp: $S_{T2} = S \times \frac{z_1}{z_1 + z_2} = 1000 \times \frac{6.08\angle 80.53}{10.94\angle 80.53} = 555\text{KVA}$

40. A parallel plate capacitor is partially filled with glass of dielectric constant 4.0 as shown below. The dielectric strengths of air and glass are 30 kV/cm and 300 kV/cm, respectively. The maximum voltage (in kilovolts), which can be applied across the capacitor without any breakdown, is _____.



Answer: 18.75

Exp: $C_1 = \frac{A \in_0}{d}$

$C_2 = \frac{4A \in_0}{d}$

$C_{eq} = \frac{C_1 C_2}{C_1 + C_2} = \frac{4A \in_0}{5d}$

$D_n = \rho_s = \frac{Q}{A} = \frac{CV}{A} = \frac{C_{eqv}}{A}$

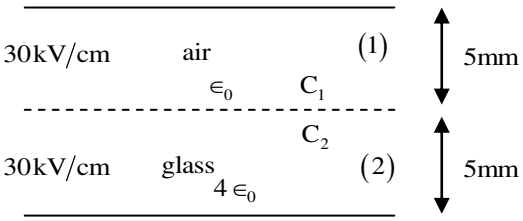
$D_n = \frac{4A \in_0}{5dA} V$

$D_n = \left(\frac{4 \in_0}{5d}\right) V$

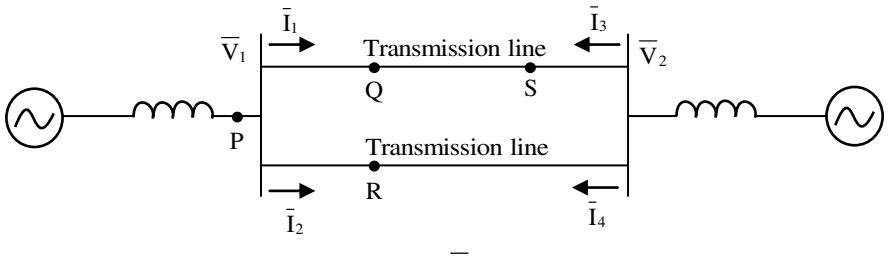
$E_1 = \frac{D_n}{\in_0} = \frac{4}{5d} V$

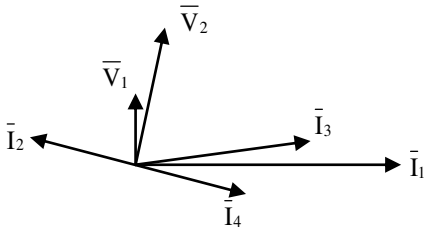
$30 \times 10^5 = \frac{4V}{4d} \Rightarrow V = \frac{30 \times 5 \times 5 \times 10^{-3} \times 10^5}{4}$

$V = 18.75\text{kV}$



41. A sustained three-phase fault occurs in the power system shown in the figure. The current and voltage phasors during the fault (on a common reference), after the natural transients have died down, are also shown. Where is the fault located?





(A) Location P (B) Location Q (C) Location R (D) Location S

Answer: (B)

42. The maximum value of "a" such that the matrix $\begin{pmatrix} -3 & 0 & -2 \\ 1 & -1 & 0 \\ 0 & a & -2 \end{pmatrix}$ has three linearly independent real eigenvectors is

(A) $\frac{2}{3\sqrt{3}}$ (B) $\frac{1}{3\sqrt{3}}$ (C) $\frac{1+2\sqrt{3}}{3\sqrt{3}}$ (D) $\frac{1+\sqrt{3}}{3\sqrt{3}}$

Answer: (B)

Exp: The characteristic equation of A is

$|A-XI| = 0$

$\Rightarrow f(x) = x^3+6x^2+11x+6+2a$

$= (x+1)(x+2)(x+3)+2a = 0$

f(x) cannot have all 3 real roots (if any) equal

for if $f(x) = (x-k)^3$, then comparing coefficients, we get

$6 = -3k,\ 3k^2 = 11$

No such k exists

(a) Thus f(x) = 0 has repeated (2) roots (say) α,α,β

or

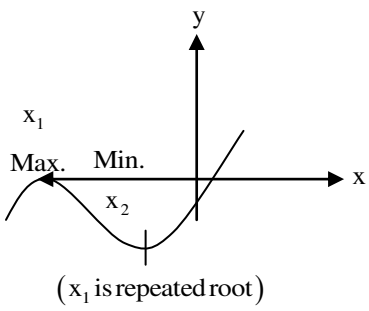
(b) f(x) = 0 has real roots (distance)(say) α,β,δ

Now $f'(x) = 0 \Rightarrow x_1 = \frac{-6-\sqrt{3}}{3} \approx -2.577a; \qquad x_2 = \frac{-6+\sqrt{3}}{3} \approx -1.422$

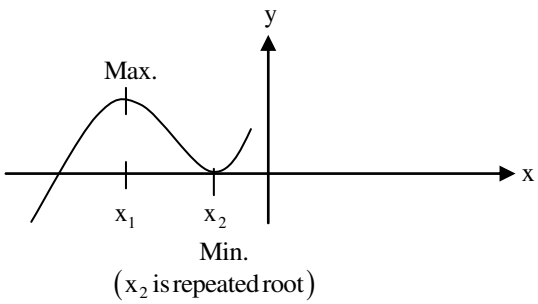
At x_1, f(x) has relative max.

At x_2, f(x) has relative min.

The graph of f(x) will be as below

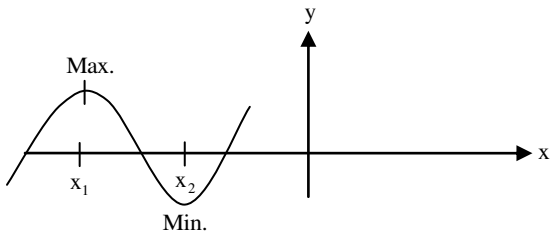


$(x_1$ is repeated root$)$



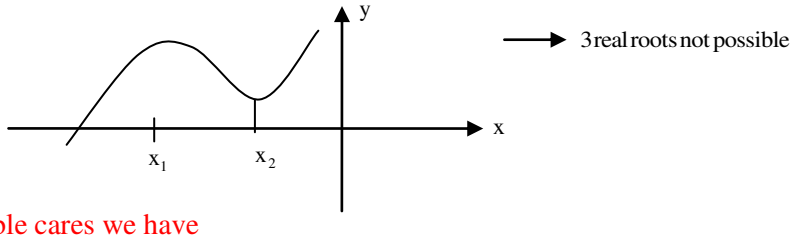
$(x_2$ is repeated root$)$

Case (a) repeated roots (α,α,β)



Case (b) distinct roots

Note that the graph of f(x) cannot be like the one given below



Thus in all possible cares we have

$$f(x_2)\le 0 \Rightarrow 2\left(a-\frac{\sqrt{3}}{9}\right)\le 0 \Rightarrow a\le \frac{1}{3\sqrt{3}}$$

43. The open loop poles of a third order unity feedback system are at 0,-1,-2. Let the frequency corresponding to the point where the root locus of the system transits to unstable region be K. Now suppose we introduce a zero in the open loop transfer function at -3, while keeping all the earlier open loop poles intact. Which one of the following is TRUE about the point where the root locus of the modified system transits to unstable region?

(A) It corresponds to a frequency greater than K

(B) It corresponds to a frequency less than K

(C) It corresponds to a frequency K

(D) Root locus of modified system never transits to unstable region

Answer: (D)

44. A 200/400V, 50 Hz, two-winding transformer is rated at 20 kVA. Its windings are connected as an auto-transformer of rating 200/600V. A resistive load of 12Ω is connected to the high voltage (600V) side of the auto-transformer. The value of equivalent load resistance (in Ohm) as seen from low voltage side is _____.

Answer: 1.33

Exp:

$$R_{eq(LV)}=\frac{R_{H.V}}{K^2}\left[\text{where } K=1^3\left(\frac{600}{200}\right)\right]$$

$$=\frac{12}{9}=1.33$$

45. Consider the economic dispatch problem for a power plant having two generating units. The fuel costs in Rs/MWh along with the generation limits for the two units are given below:

$$C_1(P_1) = 0.01P_1^2 + 30P_1 + 10;\quad 100\,MW \le P_1 \le 150\,MW$$
$$C_2(P_2) = 0.05P_2^2 + 10P_2 + 10;\quad 100MW \le P_2 \le 180\,MW$$

The incremental cost (in Rs/MWh) of the power plant when it supplies 200 MW is _____.

Answer: 20

Exp:

$$C_1(p_1) = (0.01)p_1^2 + 30p_1 + 10 \Rightarrow \frac{dc_1}{dp_1} = 0.02p_1 + 30 \quad ;100 \le p_1 \le 150$$

$$C_2(p_2) = 0.05p_2^2 + 10p_2 + 10 \Rightarrow \frac{dc_2}{dp_2} = 0.1p_2 + 10 \quad ;100 \le p_2 \le 180$$

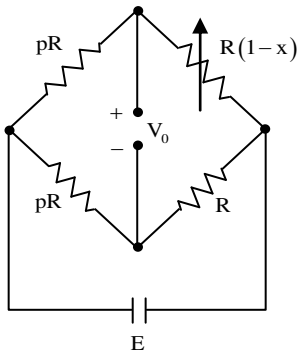
$$\lambda_1^{min} = 0.02(100) + 30 = 32;\ \lambda_1^{max} = 0.02(150) + 30 = 33$$

$$\lambda_2^{min} = 0.1(100) + 10 = 20;\ \lambda_2^{max} = 0.1(180) + 10 = 28.$$

We always prefer low value of incremental cost.

$$\therefore \lambda = 20\ Rs / hwhr.$$

46. An unbalanced DC Wheatstone bridge is shown in the figure. At what value of p will the magnitude of V_0 be maximum?



(A) $\sqrt{(1+x)}$

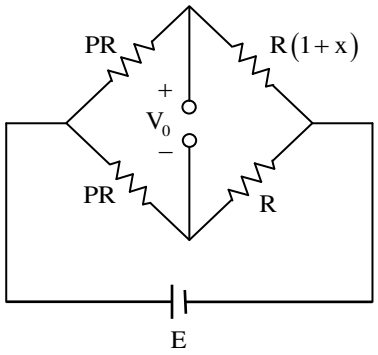
(B) (1+x)

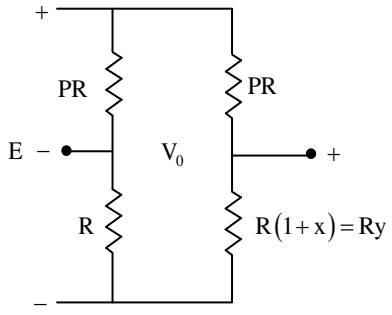
(C) $1/\sqrt{(1+x)}$

(D) $\sqrt{(1-x)}$

Answer: (A)

Exp:





Let $1 + x = y$

$$V_{0(-)} = \frac{RE}{R+PR} = \frac{E}{1+P}$$

$$V_{0(+)} = \frac{R.y}{Ry+PR}.E = \left(\frac{y}{p+y}\right)E$$

$$V_0 = V_{0(+)} - V_{0(-)} = \left[\frac{y}{p+y} - \frac{1}{1+p}\right]E$$

$$\frac{dV_0}{dp} = \left[\frac{-y}{(p+y)^2} + \frac{1}{(1+p)^2}\right]E = 0$$

$$\frac{1}{(1+P)^2} = \frac{y}{(p+y)^2}$$

$$\frac{1}{1+p} = \frac{\sqrt{y}}{p+y} \Rightarrow p+y = \sqrt{y} + p\sqrt{y}$$

$$p\left(1-\sqrt{y}\right) = \sqrt{y} - y = \sqrt{y}\left[1-\sqrt{y}\right]$$

$$p = +\sqrt{y} = +\sqrt{1+x}$$

47. A separately excited DC motor runs at 1000 rpm on no load when its armature terminals are connected to a 200V DC source and the rated voltage is applied to the field winding. The armature resistance of this motor is 1Ω. The no-load armature current is negligible. With the motor developing its full load torque, the armature voltage is set so that the rotor speed is 500 rpm. When the load torque is reduced to 50% of the full load value under the same armature voltage conditions, the speed rises to 520 rpm. Neglecting the rotational losses, the full load armature current (in Ampere) is _____.

Answer: (100)

Exp:

$$\left.\begin{array}{l} N_0 = 1000\,\text{rpm} \\ E_0 = 200\text{V} \\ N_{full} = 500\,\text{rpm} \end{array}\right\} \begin{array}{l} E \propto N\phi \\ \dfrac{200}{E_{full}} = \dfrac{1000}{500} \end{array}$$

$$E_{full} = 100\text{V} = V - I_a r_a = 200 - I_a$$

$$I_a = 100\text{A}$$

48. A solution of the ordinary differential equation $\frac{d^2y}{dt^2} + 5\frac{dy}{dt} + 6y = 0$ is such that y(0) = 2 and $y(1) = -\frac{1-3e}{e^3}$. The value of $\frac{dy}{dt}(0)$ is _____.

Answer: (-3)

Exp: Roots, $-3, -2$

$$y(t) = C_1 e^{-3t} + C_2 e^{-2t}$$

$$y(0) = C_1 + C_2 = 2$$

$$y(1) = -\left(\frac{1-3e}{e^3}\right) = -e^{-3} + 3e^{-2} = C_1 e^{-3} + C_2 e^{-2}$$

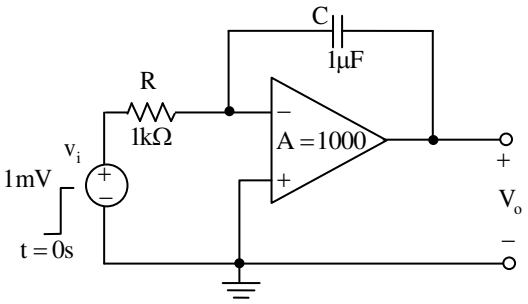
So, $C_1 = -1, C_2 = -3$

So,

$$y(t) = -e^{-3t} + 3e^{-2t}$$

$$\frac{dy(t)}{dt} = 3e^{-3t} - 6e^{-2t}, \quad \frac{dy(0)}{dt} = 3 - 6 = -3$$

49. The op-amp shown in the figure has a finite gain A = 1000 and an infinite input resistance. A step-voltage V_i = 1 mV is applied at the input at time t = 0 as shown. Assuming that the operational amplifier is not saturated, the time constant (in millisecond) of the output voltage V_0 is



(A) 1001 (B) 101

(C) 11 (D) 1

Answer: (A)

Exp: $V_0 = -x.A = -1000x$

By nodal analysis

$$\frac{x - V_i}{1k} + C\frac{d(x - V_0)}{dt} = 0$$

$$\text{so, } x = -\frac{V_0}{1000}$$

$$-\frac{V_0}{1M} - \frac{V_i}{1k} - \frac{1\mu \times 1001}{1000}\frac{dV_0}{dt} = 0$$

$$\frac{dV_0}{dt} + \frac{1000}{1001}V_0 = \frac{-1}{1\mu \times 1000}V_i$$

By LT on both sides

$$V_0\left(S + \frac{1000}{1001}\right) = \frac{-1}{S.1\mu \times 1001}$$

$$V_0 = -\frac{10^6}{1001}\left[\frac{1}{S\left(S + \frac{1000}{1001}\right)}\right]$$

$$V_0 = -\frac{10^3}{\left(S + \frac{1000}{1001}\right)} + \frac{10^3}{S} = 10^3\left(1 - e^{\frac{-1000t}{1001}}\right)u(t)$$

$$\tau = \frac{1001}{1000} = 1001\text{ms}$$

50. A 3-phase 50 Hz square wave (6-step) VSI feeds a 3-phase, 4 pole induction motor. The VSI line voltage has a dominant 5^{th} harmonic component. If the operating slip of the motor with respect to fundamental component voltage is 0.04, the slip of the motor with respect to 5^{th} harmonic component of voltage is _____.

Answer: 1.16

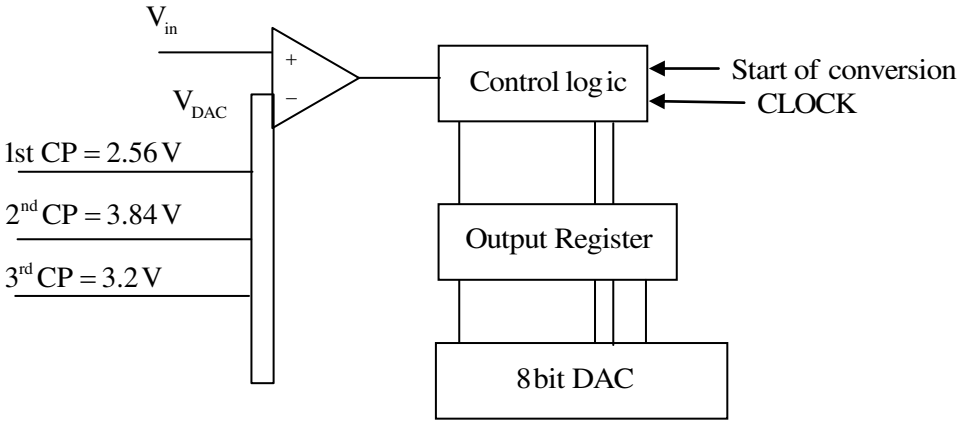
Exp: Slip of motor w.r.t 5th harmonics $= \frac{6-5s}{h} = \frac{6-5\times 0.04}{5} = 1.16$

51. An 8 bit unipolar Successive Approximation Register type ADC is used to convert 3.5V to digital equal output. The reference voltage is +5V. The output of ADC at end of 3rd clock pulse after the start of conversion is _____.

(A) 1010 0000 (B) 1000 0000 (C) 0000 0001 (D) 0000 0011

Answer: (A)

Exp: The block diagram of SAR type ADC is as follows



Unipolar means all the voltages will be +ve i.e. nothing is –ve.

The functionality of SAR type DAC is, it will load a value to output register with MSB=1 and remaining bit=0, and it will cross check a logic as follows.

if $V_{in} \geq V_{DAC} \Rightarrow$ maintain the loaded bit

$V_{in} < V_{DAC} \Rightarrow$ clear the loaded bit.

This process continues upto 8 number of clock pulses

The output of DAC=(Resolution)×(Decimal equivalent of applied binary).

From the given information

$$\text{Resolution} = \frac{5}{2^8 - 1} \simeq 20\ \text{mV}.$$

when SOC is applied

on 1st clock the value located to output register is $'(10000000)_2' = (128)_{10}$

then $V_{DAC} = 128 \times 20\text{mv} = 2.56\text{V}$

So 3.5>2.56V $\Rightarrow$ maintain the bit

So at the end of 1st clock pulse the output is 10000000.

On second clock pulse the value loaded to output register is $(10100000)_2 = (192)_{10}$

then $V_{DAC} = 195 \times 20mv = 3.84V$

So $3.5 < 3.84V \Rightarrow$ clear the loaded bit

So at the end of 2^{nd} clock pulse output is $(10000000)_2$.

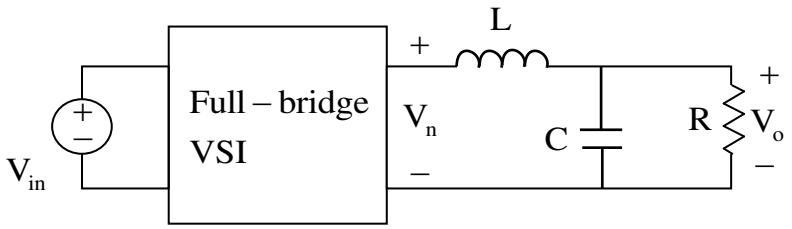
On third clock pulse the value loaded to output register is $(10100000)_2 = (160)_{10}$

then $V_{DAC} = 160 \times 20mv = 3.2V$

So $3.5 > 3.2V \Rightarrow$ ma int ain the loaded bit

So at the end of 3^{rd} clock pulse output is $(10100000)_2$.

52. The single-phase full-bridge voltage source inverter (VSI), shown in figure, has an output frequency of 50 Hz. It uses unipolar pulse width modulation with switching frequency of 50 kHz and modulation index of 0.7. For V_m = 100 V DC, L = 9.55 mH, C = 63.66 μF, and R = 5Ω, the amplitude of the fundamental component in the output voltage V_0 (in volt) under steady-state is _____.



Answer: (56.72V)

Exp: $\mu = \frac{\delta}{\pi} \rightarrow$ pulse width

$\delta = \mu\pi = 0.7 \times 180° = 126°$

The amplitude of fundamental component in $V_0 = \frac{2V_{dc}}{\pi}\sin\frac{\delta}{2}$

$= \frac{2 \times 100}{\pi}\sin\frac{126}{2} = 56.72V$

53. f(A,B,C,D) = Πm (0,1,3,4,5,7,9,11,12,13,14,15) is a maxterm representation of a Boolean function f(A,B,C,D) where A is the MSB and D is the LSB. The equivalent minimized representation of this function is

(A) $\left(A + \overline{C} + D\right)\left(\overline{A} + B + D\right)$ (B) $A\overline{C}D + \overline{A}BD$

(C) $\overline{A}C\overline{D} + A\overline{B}C\overline{D} + A\overline{B}\overline{C}\overline{D}$

(D) $\left(B + \overline{C} + D\right)\left(A + \overline{B} + \overline{C} + D\right)\left(\overline{A} + B + C + D\right)$

Answer: (C)

Exp: $f(A,B,C,D)=\bar{A}C\bar{D}+A\bar{B}\bar{D}$

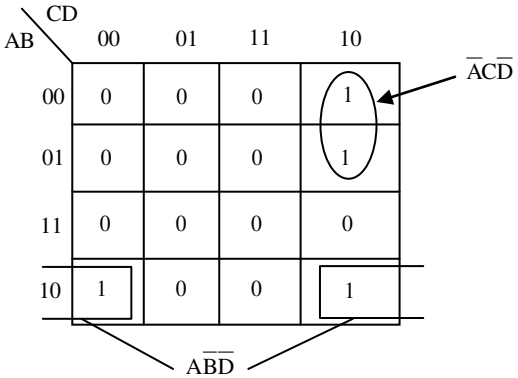
In option (C)

$$f(A,B,C,D)=\bar{A}C\bar{D}+A\bar{B}C\bar{D}+A\bar{B}\bar{C}\bar{D}$$

$$=\bar{A}C\bar{D}+A\bar{B}\bar{D}\left(C+\bar{C}\right)$$

$$=\bar{A}C\bar{D}+A\bar{B}\bar{D}.1$$

$$=\bar{A}C\bar{D}+A\bar{B}\bar{D}$$

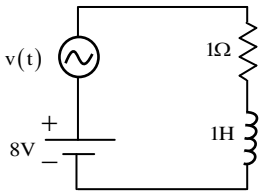


54. A 50Hz generating unit has H-constant of 2 MJ/MVA. The machine is initially operating in steady state at synchronous speed, and producing 1 pu of real power. The initial value of the rotor angle δ is 5^{o}, when a bolted three phase to ground short circuit fault occurs at the terminal of the generator. Assuming the input mechanical power to remain at 1 pu, the value of δ in degrees, 0.02 second after the fault is _____.

Answer: 5.9

Exp: At end $\delta_1=\delta_0+\Delta\delta_1=5+0.9=5.9$

55. The circuit shown in the figure has two sources connected in series. The instantaneous voltage of the AC source (in volt) is given by v(t) = 12 sin t. If the circuit is in steady-state, then the rms value of the current (in Ampere) flowing in the circuit is _____.



Answer: (10)

Exp: $Y(S)=\frac{1}{Z(S)}=\frac{1}{(1+j\omega)}$

$$Y(S)=\frac{1}{\sqrt{1+\omega^2}}\angle-\tan^{-1}(u)$$

$$v_{in}(t)=8+12\sin t$$

$$i(t)=8.\frac{1}{\sqrt{1+0}}\angle-\tan^{-1}(0)+\frac{1.2}{\sqrt{1+1}}\sin(t-45^{\circ})$$

$$i(t)=8+\frac{12}{\sqrt{2}}\left(\sin t.\frac{1}{\sqrt{2}}-\cos t\frac{1}{\sqrt{2}}\right)$$

$$i(t)=8+6\sin t-6\cos t$$

$$I_{rms}=\sqrt{8^2+\left(\frac{6}{\sqrt{2}}\right)^2+\left(\frac{6}{\sqrt{2}}\right)^2}=10$$

General Aptitude

Q. No. 1 – 5 Carry One Mark Each

1. A generic term that includes various items of clothing such as a skirt, a pair of trousers and a shirt as

(A) fabric (B) textile (C) fibre (D) apparel

Answer: (D)

2. Choose the statement where underlined word is used correctly.

(A) The industrialist had a personnel jet.

(B) I write my experience in my personnel diary.

(C) All personnel are being given the day off.

(D) Being religious is a personnel aspect.

Answer: (C)

3. Based on the given statements, select the most appropriate option to solve the given question.

What will be the total weight of 10 poles each of same weight?

Statements:

(I) One fourth of the weight of a pole is 5 kg

(II) The total weight of these poles is 160 kg more than the total weight of two poles.

(A) Statement II alone is not sufficient

(B) Statement II alone is not sufficient

(C) Either I or II alone is sufficient

(D) Both statements I and II together are not sufficient.

Answer: (C)

4. Consider a function $f(x)=1-|x|$ on $-1\le x\le 1$. The value of x at which the function attains a maximum, and the maximum value of function are:

(A) $0,-1$ (B) $-1,0$ (C) 0, 1 (D) -1, 2

Answer: (C)

Exp: $f(x)=1-|x|$ on $-1\le x\le 1$

$f(-1)=1-|-1|=1-1=0$

$f(-0.5)=1-|-0.5|=1-0.5=0.5$

$f(0)=1-|0|=1$

$f(0.5)=1-|0.5|=0.5$

$f(1)=1-|1|=1-1=0$

$\therefore$ maximum value occurs at x = 0 and maximum value is 1.

5. We _____ our friend's birthday and we _____ how to make it up to him.

(A) completely forgot --- don't just known

(B) forget completely --- don't just know

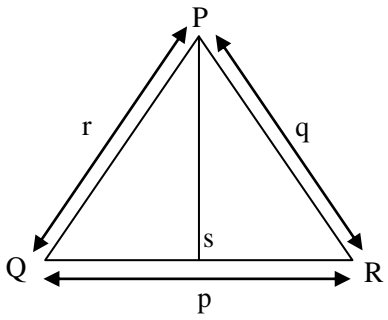
(C) completely forget --- just don't know

(D) forgot completely --- just don't know

Answer: (C)

Q. No. 6 – 10 Carry Two Marks Each

6. In a triangle PQR, PS is the angle bisector of $\angle QPR$ and $\angle QPS = 60^{o}$. What is the length of PS?



(A) $\frac{(q+r)}{qr}$ (B) $\frac{qr}{(q+r)}$ (C) $\sqrt{(q^2+r^2)}$ (D) $\frac{(q+r)^2}{qr}$

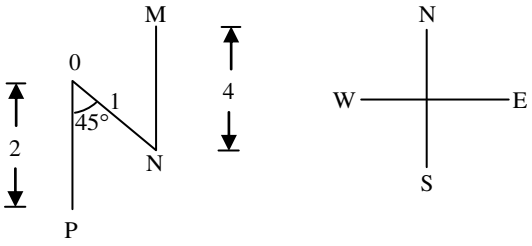
Answer: (B)

7. Four branches of a company are located at M,N,O, and P. M is north of N at a distance of 4 km; P is south of O at a distance of 2 km; N is southeast of O by 1 km. What is the distance between M and P in km?

(A) 5.34 (B) 6.74 (C) 28.5 (D) 45.49

Answer: (A)

Exp:



8. If p, q, r, s are distinct integers such that:

f (p, q, r, s) = max (p, q, r, s)

g (p, q, r, s) = min (p, q, r, s)

h (p, q, r, s) = remainder of $(p \times q)/(r \times s)$ if $(p \times q) > (r \times s)$ or remainder of $(r \times s)/(p \times q)$ if $(r \times s) > (p \times q)$

Also a function fgh (p, q, r, s) = f(p, q, r, s) × g(p, q, r, s) × h(p, q, r, s)

Also the same operations are valid with two variable function of the form f(p, q).

What is the value of fg (h(2, 5, 7, 3), 4, 6, 8)?

Answer: 8

Exp: f g (h(2,5,7,3),4,6,8)

=fg(1,4,6,8)

=f(1,4,6,8)xg(1,4,6,8)=8x1=8

9. If the list of letters, P, R, S, T, U is an arithmetic sequence, which of the following are also in arithmetic sequence?

I. $2P, 2R, 2S, 2T, 2U$

II. $P-3, R-3, S-3, T-3, U-3$

III. P^2, R^2, S^2, T^2, U^2

(A) I only

(B) I and II

(C) II and III

(D) I and III

Answer: (B)

10. Out of the following four sentences, select the most suitable sentence with respect to grammer and usage:

(A) Since the report lacked needed information, it was of no use to them.

(B) The report was useless to them because there were no needed information in it.

(C) Since the report did not contain the needed information, it was not real useful to them

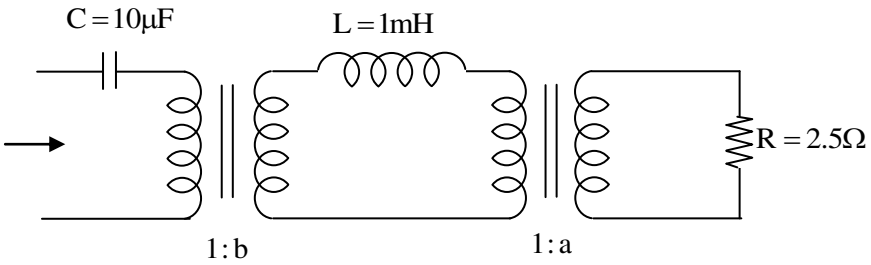
(D) Since the report lacked needed information, it would not had been useful to them.

Answer: (A)

Electrical Engineering

Q. No. 1 – 25 Carry One Mark Each

1. Find the transformer ratios a and b that the impedance (Z_{in}) is resistive and equal 2.5Ω when the network is excited with a sine wave voltage of angular frequency of 5000 rad/s.



(A) a = 0.5, b = 2.0

(B) a = 2.0, b = 0.5

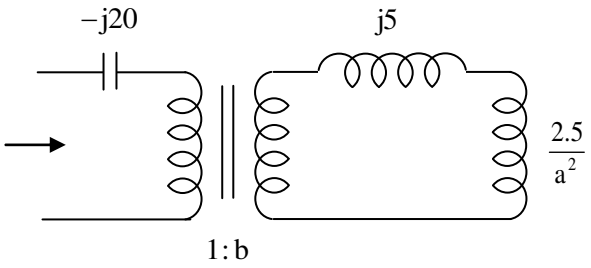
(C) a = 1.0, b = 1.0

(D) a = 4.0, b = 0.5

Answer: (B)

Exp: $X_c = -j20\,\Omega$

$X_L = j\,5\Omega$

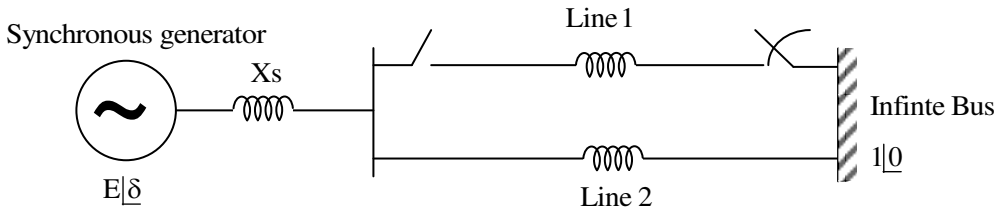


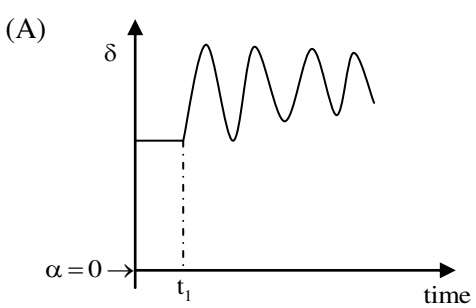
$$Z_{in} = \frac{1}{b^2}\left[\frac{2.5}{a^2} + j5\right] - j20 \qquad -20 + \frac{5}{b^2} = 0$$

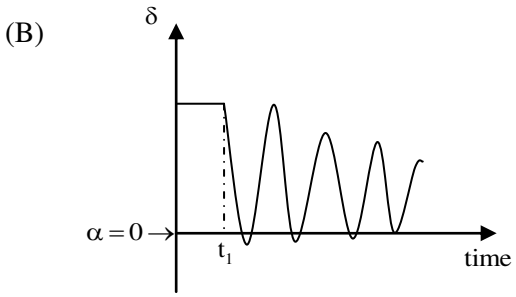
$$b = 0.5$$

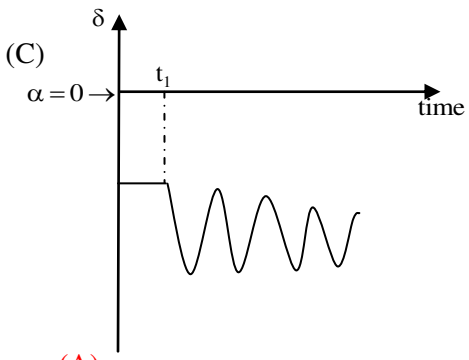
$$\frac{2.5}{a^2b^2} = 2.5 \Rightarrow a = 2$$

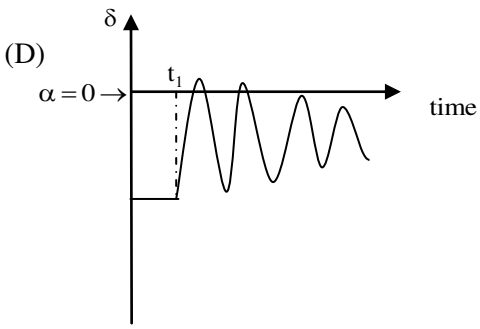
2. The synchronous generator shown in the figure is supplying active power to an infinite bus via two short, lossless transmission lines, and is initially in steady state. The mechanical power input to the generator and the voltage magnitude E are constant. If one line is tripped at time t_1 by opening the circuit breakers at the two ends (although there is no fault), then it is seen that the generator undergoes a stable transient. Which one of the following waveforms of the rotor angle δ shows the transient correctly?







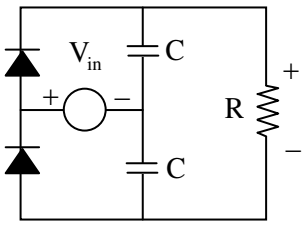




Answer: (A)

Exp: For generator δ is +Ve. After fault $\delta\uparrow$ increases

3. In the following circuit, the input voltage Vin is 100 $\sin(100\pi t)$. For $100\pi RC = 50$, the average voltages across R (in volts) under steady-state is nearest to



(A) 100 (B) 31.8 (C) 200 (D) 63.6

Answer: (C)

Exp: Given circuit is voltage doubler

V_m = Voltage across each capacitor = 100V

Voltage across two capacitors (in steady state)

$= 2V_m = 200V$

4. A 4-pole, separately excited, wave wound DC machine with negligible armature resistance is rated for 230 V and 5 kW at a speed of 1200 rpm. If the same armature coils are reconnected to forms a lap winding, what is the rated voltage (in volts) and power (in kW) respectively at 1200 rpm of the reconnected machine if the field circuit is left unchanged?

(A) 230 and 5 (B) 115 and 5 (C) 115 and 2.5 (D) 230 and 2.5

Answer: (B)

Exp In wave wound, no. of parallel paths is 2.

In lap wound, no of parallel paths is A = p = 4.

$$\therefore \text{Rated voltage} = \frac{230 \times 2}{4} = 115\text{V}$$

As no. of parallel paths is divided into four from two, the voltage reduces to half but power remains the same.

5. Given $f(z) = g(z) + h(z)$, where f, g, h are complex valued functions of a complex variable z. Which one of the following statements is TRUE?

(A) If f(z) is differential at z_0, then g(z) and h(z) are also differentiable at z_0.

(B) If g(z) and h(z) are differentiable at z_0, then f(z) is also differentiable at z_0.

(C) If f(z) is continuous at z_0, then it is differentiable at z_0.

(D) If f(z) is differentiable at z_0, then so are its real and imaginary parts.

Answer: (B)

Exp: Given $f(z) = g(z) + h(z)$

$f(z), g(z), h(z)$ are complex variable functions

(c) is not correct, since every continuous function need not be differentiable

(D) is also not correct

Let g(z) = x h(z) = iy

$\Rightarrow \quad g(z) = x + i0 \qquad h(z) = 0 + iy$

$u = x \quad v = 0 \qquad u = 0 \quad v = y$

$\frac{\partial x}{\partial x} = 1 \; \frac{\partial x}{\partial x} = 0 \qquad \frac{\partial y}{\partial x} = 0 \; \frac{\partial \vartheta}{\partial x} = 0$

$\partial \vartheta = 0 \; \partial \vartheta = 0 \qquad \frac{\partial x}{\partial y} = 0 \; \frac{\partial \vartheta}{\partial y} = 1$

Cauchy – rieman equation as of g(z), h(z) are failed.

$\therefore$ f(z) and g(z) are not differentiable

But $f(z) = x + iy$

$u + x \qquad v = y$

$\frac{\partial u}{\partial x} = 1 \qquad \frac{\partial v}{\partial x} = 0$

$\frac{\partial u}{\partial x} = \frac{\partial u}{\partial y} \qquad \frac{\partial u}{\partial y} = \frac{-\partial v}{\partial x}$

$\therefore$ f(z) in differentiable

$\therefore$ i.e, f(z) is differential need not imply g(z) and h(z) are differentiable

$\therefore$ Ans (B)

i.e, g(z) and h(z) are differentiable then f(z) = g(z) + h(z) is differentiable.

6. A 3-bus power system network consists of 3 transmission lines. The bus admittance matrix of the uncompensated system is

$$\begin{bmatrix} -j6 & j3 & j4 \\ j3 & -j7 & j5 \\ j4 & j & -j8 \end{bmatrix} \text{pu.}$$

If the shunt capacitance of all transmission line is 50% compensated, the imaginary part of the 3rd row 3rd column element (in pu) of the bus admittance matrix after compensation is

(A) $-j\,7.0$ (B) $-j\,8.5$ (C) $-j\,7.5$ (d) $-j\,9.0$

Answer: (B)

Exp: $y_{Bus} = \begin{bmatrix} y_{10} + y_{12} + y_{13} & -y_{12} & -y_{13} \\ -y12 & y_{20} + y_{21} + y_{23} & -y_{23} \\ -y_{13} & -y_{23} & y_{30} + y_{31} + y_{32} \end{bmatrix}$

$y_{31} = y_{13} = -j4$

$y_{32} = y_{23} = -j5$

$y_{30} + y_{31} + y_{32} = -j8$

$y_{30} + (-j4) + (-j5) = -j8$

$y_{30} = j1$

after compensating, $y_{30} = \frac{j1}{2}$

$\therefore y_{30} + y_{31} + y_{32}$ (new) $= j0.5 - j4 - j5 = -j8.5$

7. A shunt-connected DC motor operates at its rated terminal voltage. Its no-load speed is 200 radians/second. At its rated torque of 500 Nm, its speed is 180 radian/second. The motor is used to directly drive a load whose load torque T_L depends on its rotational speed (in radians/second), such that $T_L = 2.78 \times \omega_T$. Neglecting rotational losses, the steady-state speed (in radian/second) of the motor, when it drives this load is _____.

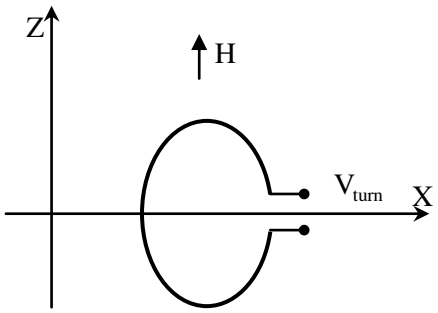
Answer: 179.86

Exp: Under steady state load torque = motor torque

$500 = 2.78 \times \omega_T$

$\therefore \omega_T = 178.88$ rad/sec

8. A circular turn of radius 1 m revolves at 60 rpm about its diameter aligned with the x-axis as shown in the figure. The value of μ_0 is $4\pi \times 10^{-7}$ in SI unit. If a uniform magnetic field intensity $\vec{H} = 10^7 \hat{z}$ A/m is applied, then the peak value of the inducted voltage, V_{turn} (in volts), is _____.



Answer: 247.92

Exp: $V_{emf} = \oint_L (\bar{V} \times \bar{B}).dl$

$= \oint_L (r\omega a_\phi \times \mu H a_z).dl$

$= \oint r\omega\mu H a_\rho .dl$

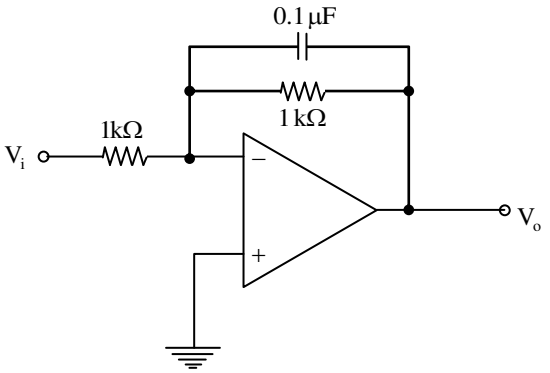
$= r\omega\mu H\left(\frac{2\pi r}{2}\right)$

$V_{emf} = \omega\mu H\pi r^2$

$= 6.28 \times 4\pi \times 10^{-7} \times 10^7 \times \pi(1)^2$

$\boxed{V_{emf} = 247.92\ V}$

9. The operational amplifier shown in the figure is ideal. The input voltage (in Volt) is $V_i = 2\sin(2\pi \times 2000t)$. The amplitude of the output voltage V_o (in Volt) is _____.



Answer: 1.25

Exp:

$$Z_1 = 1k; Z_2 = \frac{1\times10^3 \times \frac{1}{0.1\times10^{-6}s}}{10^3 + \frac{1}{0.1\times10^{-6}s}}$$

$$= \frac{10^3}{j0.1\times10^{-3}\omega + 1}$$

$$\omega = 2\pi \times 2000 \text{ rad/sec}$$

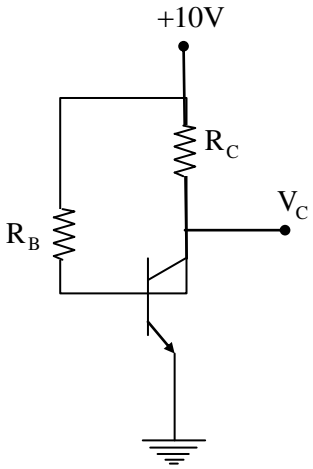
$$Z_2 = \frac{10^3}{1 + j0.1\times2\pi\times2000\times10^{-3}} = \frac{10^3}{1 + j1.25}$$

$$V_0 = \frac{-Z_2 V_i}{Z_1} = -\frac{10^3 \times 2\sin(2\pi\times2000t)}{(1+j1.25)\times10^3} = -\frac{2\sin(2\pi\times2000t)}{1.6\angle51.3}$$

$$V_0 = -1.25\sin(2\pi2000t - 51.3)$$

Amplitude of the output voltage =1.25V

10. In the following circuit, the transistor is in active mode and $V_C = 2V$. To get $V_C = 2V$. To get $V_C = 4V$, we replace R_C with R'_C. Then the ratio R'_C/R_C is _____.



Answer: 0.75

Exp: we have $V_c = 2V$;

$I_c R_c = 10 - 2 = 8$ … (i)

We have V_c=4V

$I_c R_c^{'} = 10 - 2 = 8$ … (ii)

$$\frac{(2)}{(1)}=\frac{I_c R_c^{'}}{I_c R_c}=\frac{6}{8};\quad \frac{R_c^{'}}{R_c}=\frac{3}{4}=0.75$$

11. The Laplace transform of $f(t)=2\sqrt{t/\pi}$ is $s^{-3/2}$. The Laplace transform of $g(t)=\sqrt{1/\pi t}$ is

(A) $3s^{-5/2}/2$ (B) $s^{-1/2}$ (C) $s^{1/2}$ (D) $s^{3/2}$

Answer: (B)

Exp: Given that laplace transform of $f(t)=2\sqrt{\frac{t}{\pi}}$ is $s^{-3/2}$.

Given as $g(f)=\frac{1}{\sqrt{\pi t}}$

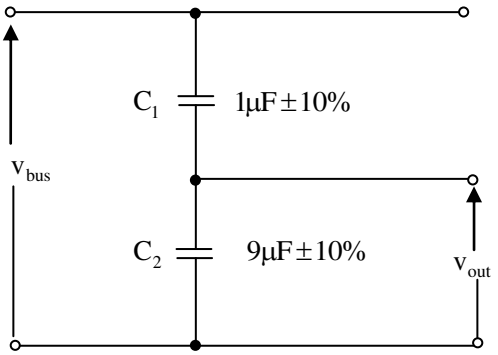
$$\Rightarrow g(t)=\frac{2\sqrt{t/\pi}}{2t}=\frac{f(t)}{2t}$$

$$L\{g(t)\}=L\left\{\frac{f(t)}{2t}\right\}=\frac{1}{2}\int_s^0\{f(t)\}ds$$

$$=\frac{1}{2}\int_s^\infty s^{-3/2}ds=\frac{1}{2}\left(\frac{s^{\frac{-3}{2}+1}}{\frac{-3}{2}+1}\right)_s^\infty$$

$$=\frac{1}{2}(-2)\left[0-s^{-1/2}\right]=s^{-1/2}=\frac{1}{\sqrt{s}}$$

12. A capacitive voltage divider is used to measure the bus voltage V_{bus} in a high-voltage 50 Hz AC system as shown in the figure. The measurement capacitor C_1 and C_2 have tolerances of $\pm 10\%$ on their normal capacitance values. If the bus voltage V_{bus} is 100 kV rms, the maximum rms output voltage V_{out} (in kV), considering the capacitor tolerance, is _____.



Answer: 12

Exp: $V_{out} = V_{bus}\left[\frac{X_{c_2}}{X_{c1}+X_{c_2}}\right] = V_{bus}\left[\frac{\frac{1}{c_2}}{\frac{1}{c_1}+\frac{1}{c_2}}\right]$

$= V_{bus}\left[\frac{c_1}{c_1+c_2}\right]$

$c_1 + c_2 = (1\mu F \pm 10\%) + (9\mu F \pm 10\%) = (1\mu \pm 0.1) + (9\mu + 0.9)$

$= (10\mu \pm 1) = 10\mu F \pm 10\%$

$\frac{c_1}{c_1+c_2} = \frac{1\mu \pm 10\%}{10\mu \pm 10\%} = 0.1 \pm 20\%$

$\therefore V_{out} = 100\times10^3 (0.1 \pm 20\%)$

$= 10\,kV \pm 20\% = 10k + 2k \text{ (or) } 10k - 2k = 12k \text{ or } 8k$

13. Match the following

P. Stokes's Theorem	1. $\oiint D.ds = Q$
Q. Gauss's Theorem	2. $\oint f(z)dx = 0$
R. Divergence Theorem	3. $\iiint (\nabla.A)dv = \oiint A.ds$
S. Cauchy's Integral Theorem	4. $\iint (\nabla \times A).ds = \oint A.dl$

(A) P-2, Q-1, R-4, S-3 (B) P-4, Q-1, R-3, S-2

(C) P-4, Q-3, R-1, S-2 (D) P-3, Q-4, R-2, S-1

Answer: (B)

14. Consider the following Sum of Products expression, F.

$F = ABC + \bar{A}\bar{B}C + A\bar{B}C + \bar{A}BC + \bar{A}\bar{B}\bar{C}$

The equivalent Product of Sums expression is

(A) $F = (A + \bar{B} + C)(\bar{A} + B + C)(\bar{A} + \bar{B} + C)$

(B) $F = (A + B + \bar{C})(A + B + C)(\bar{A} + \bar{B} + \bar{C})$

(C) $F = (\bar{A} + B + \bar{C})(A + \bar{B} + \bar{C})(A + B + C)$

(D) $F = (\bar{A} + \bar{B} + C)(A + B + \bar{C})(A + B + C)$

Answer: (A)

Exp: Given minterm is

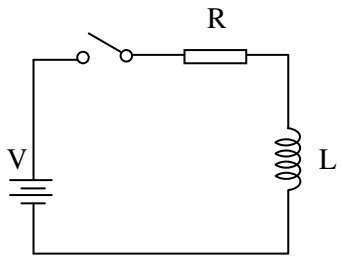
$F = \Sigma m(0,1,3,5,7)$

$F = \pi m(2,4,6)$

So product of sum expression is

$F = (A + \bar{B} + C)(\bar{A} + B + C)(\bar{A} + \bar{B} + C)$

15. A series RL circuit is excited at t = 0 by closing a switch as shown in the figure. Assuming zero initial conditions, the value of $\frac{d^2i}{dt^2}$ at $t = 0^+$ is



(A) $\frac{V}{L}$ (B) $\frac{-V}{R}$ (C) 0 (D) $\frac{-RV}{L^2}$

Answer: (D)

Exp: $i = i_L(t) = \frac{V}{R}\left(1 - e^{\frac{-Rt}{L}}\right)$

$$\frac{di_L}{dt} = \frac{V}{L}\left(e^{\frac{-Rt}{L}}\right)$$

$$\frac{di^2}{dt^2} = -\frac{R}{L^2}Ve^{\frac{-Rt}{L}}$$

$$\left.\frac{di^2}{dt^2}\right|_{t=0} = -\frac{RV}{L^2}$$

16. We have a set of 3 linear equations in 3 unknowns. '$X \equiv Y$' means X and Y are equivalent statements and '$X \equiv Y$' means X and Y are not equivalent statements.

P: There is a unique solution.

Q: The equations are linearly independent.

R: All eigenvalues of the coefficient matrix are nonzero.

S: The determinant of the coefficient matrix is nonzero.

Which one of the following is TRUE?

(A) $P \equiv R \equiv Q \equiv S$ (B) $P \equiv R \not\equiv Q \equiv S$

(C) $P \equiv Q \not\equiv R \equiv S$ (D) $P \not\equiv Q \not\equiv R \not\equiv S$

Answer: (A)

17. Match the following:

Instrument Type	Used for
P. Permanent magnet moving coil	1. DC only
Q. Moving iron connected through current transformer	2. AC only
R. Rectifier	3.AC and DC
S. Electrodynamometer	

(A)	P – 1 Q – 2 R – 1 S – 3	(B)	P – 1 Q – 3 R – 1 S – 2	(C)	P – 1 Q – 2 R – 3 S – 3	(D)	P – 3 Q – 1 R – 2 S – 1

Answer: (C)

18. Two semi-infinite dielectric regions are separated by a plane boundary at y=0. The dielectric constant of region 1 (y<0) and region 2 (y>0) are 2 and 5, Region 1 has uniform electric field $\vec{E} = 3\hat{a}_x + 4\hat{a}_y + 2\hat{a}_z$, where $\hat{a}_x, \hat{a}_y$, and $\hat{a}_z$ are unit vectors along the x, y and z axes, respectively. The electric field region 2 is

(A) $3\hat{a}_x + 1.6\hat{a}_y + 2\hat{a}_z$ (B) $1.2\,\hat{a}_x + 4\,\hat{a}_y + 2\hat{a}_z$

(C) $1.2\hat{a}_x + 4\hat{a}_y + 0.8\hat{a}_z$ (D) $3\hat{a}_x + 10\hat{a}_y + 0.8\hat{a}_z$

Answer: (A)

Exp: (1) $y < 0$

$E_1 = 3ax + 4ay + 2az$

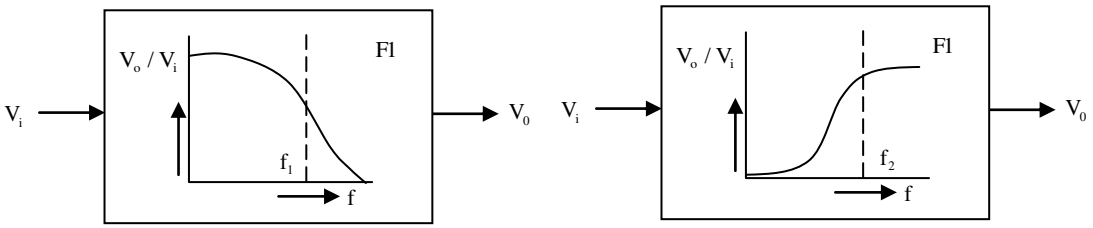
(2) $y > 0$

$E_z = y = 0$

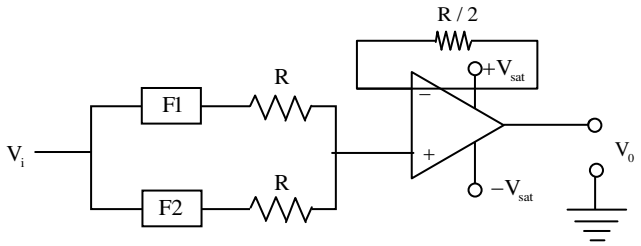
$E_2 = 3a_x + \frac{2}{5}(4a_y) + 2a_z$

$E_z = 3a_x + 1.6a_y + 2a_z$

19. The filters F1 and F2 having characteristics as shown in Figures (a) and (b) are connected as shown in Figure (c).



(a) (b)



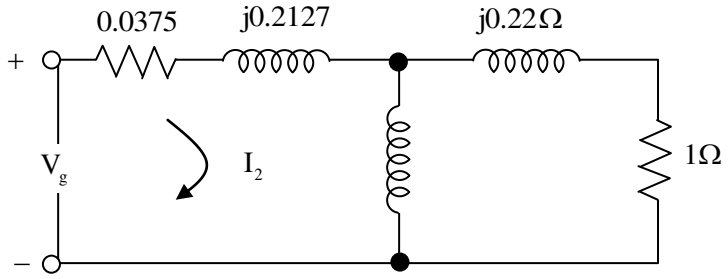
(c)

The cut-off frequencies of F1 and F2 are f_1 and f_2 respectively. If $f_1 < f_2$, the resultant circuit exhibits the characteristics of a

(A) Band-pass filter (B) Band-stop filter (C) All pass filter (D) High-Q filter

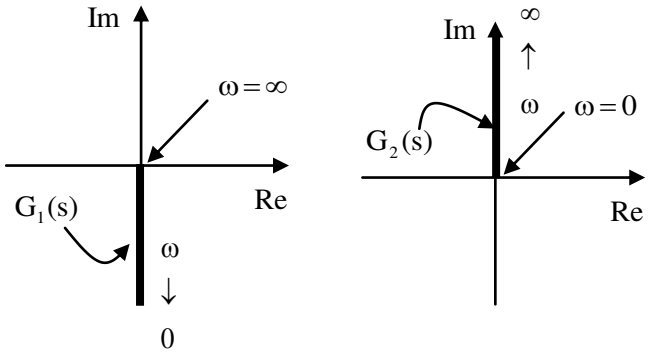
Answer: (B)

20. The figure shows the per-phase equivalent circuit of a two-pole three-phase induction motor operating at 50 Hz. The "air-gap" voltage, V_g across the magnetizing inductance, is 210 V rms, and the slip, is 0.005. The torque (in Nm) produced by the motor is _____.



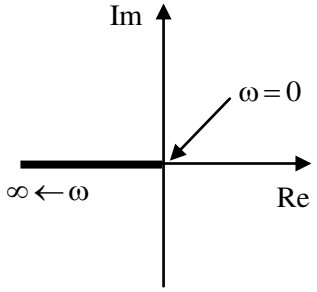
Answer: 401.88

21. Nyquist plot of two functions $G_1(s)$ and $G_2(s)$ are shown in figure.

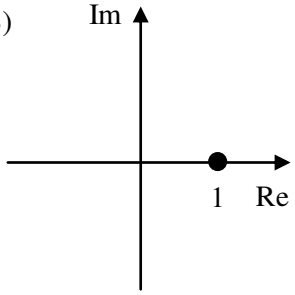


Nyquist plot of the product of $G_1(s)$ and $G_2(s)$ is

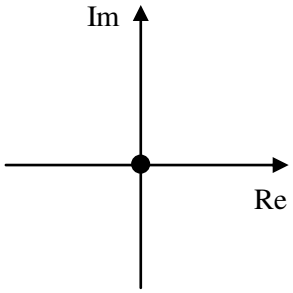
(A)



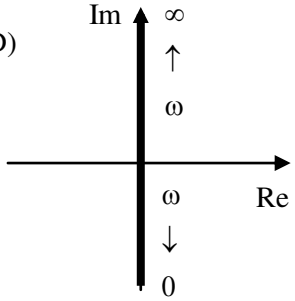
(B)



(C)



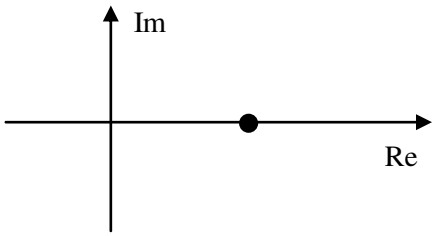
(D)



Answer: (B)

Exp: $G_1(s)=\frac{1}{s};G_2(s)=5$

$G_1G_2(s)=1$



22. A 3-phase balanced load which has a power factor of 0.707 is connected to balanced supply. The power consumed by the load is 5kW. The power is measured by the two-wattmeter method. The readings of the two wattmeters are

(A) 3.94 kW and 1.06 kW (B) 2.50 kW and 2.50 kW

(C) 5.00 kW and 0.00 kW (D) 2.96 kW and 2.04 kW

Answer: (A)

Exp: $P_1=V_LI_L\cos(30-\phi)$

$P_2V_LI_L\cos(30+\phi)$

$$\cos\phi=\cos\left[\tan^{-1}\frac{\sqrt{3}(p_1-p_2)}{p_1+p_2}\right]$$

$$=\cos\phi\left[\tan^{1}\sqrt{3}\left[\frac{3.94-1.06}{5}\right]\right]=45^{o}$$

satisfiying only for(A)

23. An open loop control system results in a response of $e^{-2t}(\sin 5t+\cos 5t)$ for a unit impulse input. The DC gain of the control system is _____.

Answer: 0.241

Exp: $g(t)=e^{-2}[\sin 5t+\cos 5t]$

$$G(s)=\frac{5}{(s+2)^2+5^2}+\frac{s+2}{\{s+2\}+5^2}$$

DC gain means $|G(s)|_s=0$

$$G(0)=\frac{5}{2^2+5^2}+\frac{2}{2^2+5^2}=\frac{7}{29}$$

24. When a bipolar junction transistor is operating in the saturation mode, which one of the following statement is TRUE about the state of its collector-base (CB) and the base-emitter (BE) junctions?

(A) The CB junction is forward biased and the BE junction is reverse biased.

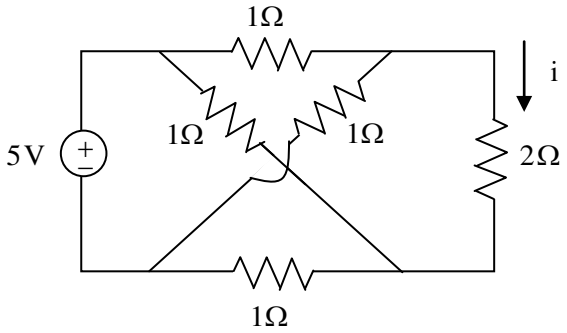
(B) The CB junction is reversed and the BE junction is forward biased.

(C) Both the CB and BE junctions are forward biased.

(D) Both the CB and BE junctions are reverse biased.

Answer: (C)

25. The current i (in Ampere) in the 2Ω resistor of the given network is ____ .



Answer: 0

Exp: The Network is balanced Wheatstone bridge.

$\Rightarrow i = 0$ Amp

Q. No. 26 – 55 Carry Two Marks Each

26. A 220 V, 3-phase, 4-pole, 50 Hz inductor motor of wound rotor type is supplied at rated voltage and frequency. The stator resistance, magnetizing reactance, and core loss are negligible. The maximum torque produced by the rotor is 225% of full load torque and it occurs at 15% slip. The actual rotor resistance is 0.03Ω/phase. The value of external resistance (in Ohm) which must be inserted in a rotor phase if the maximum torque is to occur at start is _____.

Answer: 0.17

Exp: $S_{mt} = \dfrac{r^2}{x_2}$

$$0.15 = \frac{r_2}{x_2} = \frac{0.03}{x_2} \Rightarrow x_2 = 0.2\Omega$$

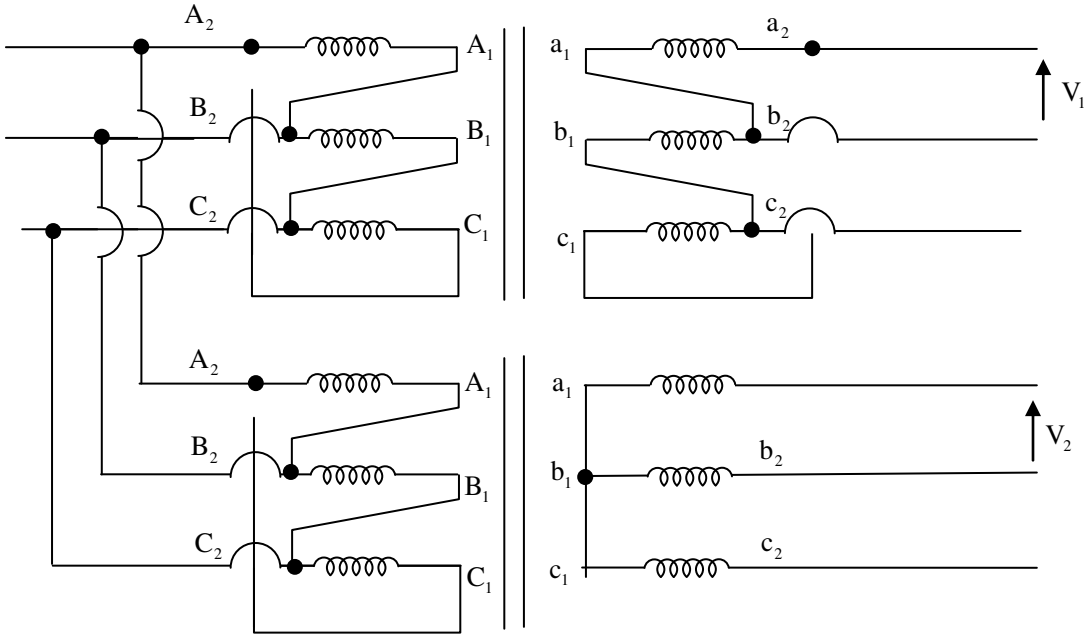
For $T_{est}=T_{emax}$,

$$\frac{T_{est}}{T_{em}} = \frac{2}{\dfrac{1}{s_{mT}} + S_{mT}} = 1 \Rightarrow S_{mT} = 1$$

$$1 = \frac{r_2'}{x_2} \Rightarrow r_2' = x_2 = 0.2\Omega$$

Extra resistance $= 0.2 - 0.03 = 0.17\Omega$/p4

27. Two three-phase transformers are realized using single-phase transformers as shown in the figure.



The phase different (in degree) between voltage V_1 and V_2 is _____.

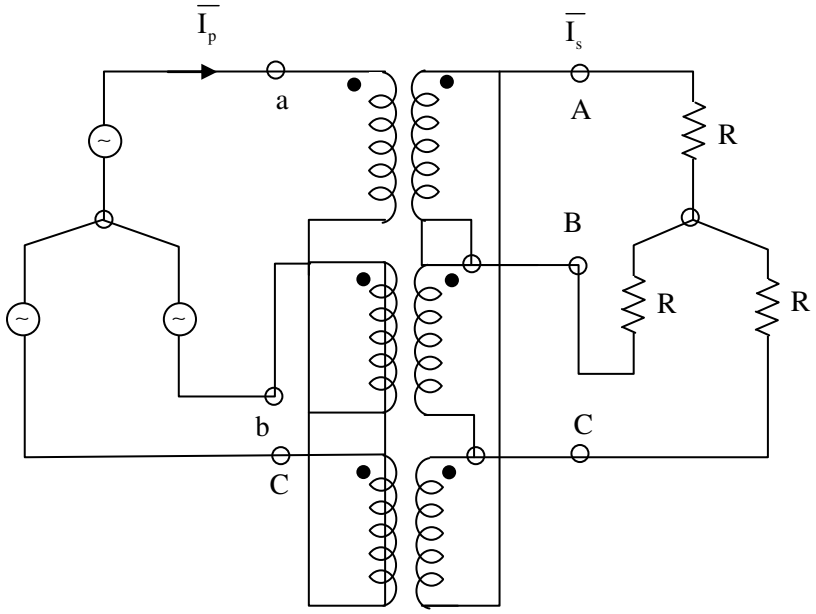
Answer: 30

Exp: Upper transformer secondary is connected in Δ

Bottom transformer secondary is connected in Y

Phase angle between delta voltage & star voltage is 30^{o}.

28. A balanced (positive sequence) three-phase AC voltage source is connected to a balanced, start connected through a star-delta transformer as shown in the figure. The line-to-line voltage rating is 230 V on the star side, and 115 V on the delta side. If the magnetizing current is neglected and $\overline{I}_s = 100\angle 0^{o}\,A$, then what is the value of $\overline{I}_p$ in Ampere?



(A) $50\angle 30^o$ (B) $50\angle -30^o$ (C) $50\sqrt{3}\angle 30^o$ (D) $200\angle 30^0$

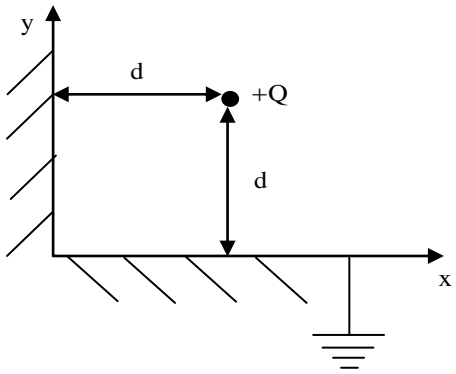
Answer: (A)

Exp: It's a Ydll connection.

$$\therefore \left[\frac{230}{\sqrt{3}}\angle -30^o\right] I_p = 115\angle 0\left(\frac{110\angle 0}{\sqrt{3}}\right)$$

$$\Rightarrow I_p = 50\angle 30^o$$

29. Two semi-infinite conducting sheets are placed at right angles to each other as shown in the figure. A point charge of +Q is placed at a distance of d from both sheets. The net force on the charge is $\frac{Q^2}{4\pi\varepsilon_0}\frac{K}{d^2}$, where K is given by



(A) 0 (B) $-\frac{1}{4}\hat{i}-\frac{1}{4}\hat{j}$

(C) $-\frac{1}{8}\hat{i}-\frac{1}{8}\hat{j}$

(D) $\frac{1-2\sqrt{2}}{8\sqrt{2}}\hat{i}+\frac{1-2\sqrt{2}}{8\sqrt{2}}\hat{j}$

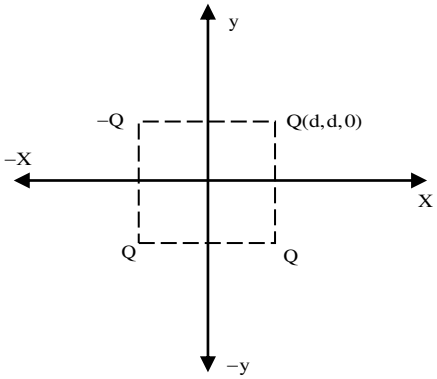
Answer: (D)

Exp: $F = F_1 + F_2 + F_3$

$$F = \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{(2d)^3}\left[-2da_x - 2da_y + \frac{1}{2\sqrt{2}}\left(2da_x + 2da_y\right)\right]$$

$$F = \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{d^2}\left[\frac{1-2\sqrt{2}}{8\sqrt{2}}a_x + \frac{1-2\sqrt{2}}{8\sqrt{2}}a_y\right]$$

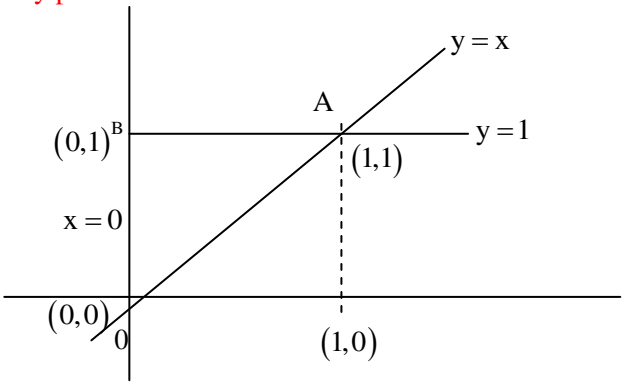
So, Ans : (D)



30. The volume enclosed by the surface $f(x,y) = e^x$ over the triangle bounded by the line x=y; x=0; y=1 in the xy plane is _____.

Answer: 0.72

Exp: Triangle is banded by x = y, x = 0, y = 1 is xy plane.



Required volume $= \int\int_{0AB} f(x,y)\,dxdy$

$$= \int_{x=0}^{1}\int_{y=x}^{1} e^{x}\,dxdy$$

$$= \int_{x=0}^{1} e^{x}.(y)_{x}^{1}\,dx$$

$$= \int_{x=0}^{1} e^{x}(1-x)\,dx = \int_{x=0}^{1}\left(e^{x}-xe^{x}\right)dx$$

$$= \left(e^{x}\right)_{0}^{1} - \left(e^{x}(x-1)\right)_{0}^{1}$$

$$= \left(e^{1}-1\right) - \left[0-(-1)\right] = e-2 = 0.72$$

31. For the system governed by the set of equations:

$dx_1/dt = 2x_1 + x_2 + u$

$dx_2/dt = -2x_1 + u$

$y = 3x_1$

the transfer function Y(s)/U(s) is given by

(A) $3(s+1)/(s^2-2s+2)$ (B) $3(2s+1)(s^2-2s+1)$

(C) $(s+1)/(s^2-2s+1)$ (D) $3(2s+1)(s^2-2s+2)$

Answer: (A)

Exp: $\frac{dx_1}{dt} = 2x_1 + x_2 + 4$

$\frac{dx_2}{dt} = -2x_1 + 4$

$y = 3x_1$

Considering the standard equation

$x_i = Ax + BU$

$y = Cx + DU$

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}2 & 1\\ -2 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}1\\ 1\end{bmatrix}[4]$$

$$y = [3 \quad 0]\begin{bmatrix}x_1\\ x_2\end{bmatrix}$$

Transform function $C(SI-A)^{-1}B$

$$G(s)=\begin{bmatrix}3 & 0\end{bmatrix}\left[\begin{bmatrix}s & 0\\ 0 & s\end{bmatrix}-\begin{bmatrix}2 & 1\\ -2 & 0\end{bmatrix}\right]^{-1}\begin{bmatrix}1\\ 1\end{bmatrix}$$

$$\begin{bmatrix}3 & 0\end{bmatrix}\begin{bmatrix}s-2 & -1\\ 2 & s\end{bmatrix}^{-1}\begin{bmatrix}1\\ 1\end{bmatrix}$$

$$\begin{bmatrix}3 & 0\end{bmatrix}\begin{bmatrix}s & 1\\ -2 & s-2\end{bmatrix}\begin{bmatrix}1\\ 1\end{bmatrix}$$

$$s^2-2s+2$$

$$=\frac{1}{s^2-s+2}\begin{bmatrix}3 & 0\end{bmatrix}\begin{bmatrix}s+1\\ -2+s-2\end{bmatrix}$$

$$=\frac{1}{s^2-2s+2}\begin{bmatrix}3 & 0\end{bmatrix}\begin{bmatrix}s+1\\ s-4\end{bmatrix}$$

$$=\frac{3(s+1)}{s^2-2s+2}$$

32. For linear time invariant systems, that are Bounded Input Bounded stable, which one of the following statement is TRUE?

(A) The impulse response will be integral, but may not be absolutely integrable.

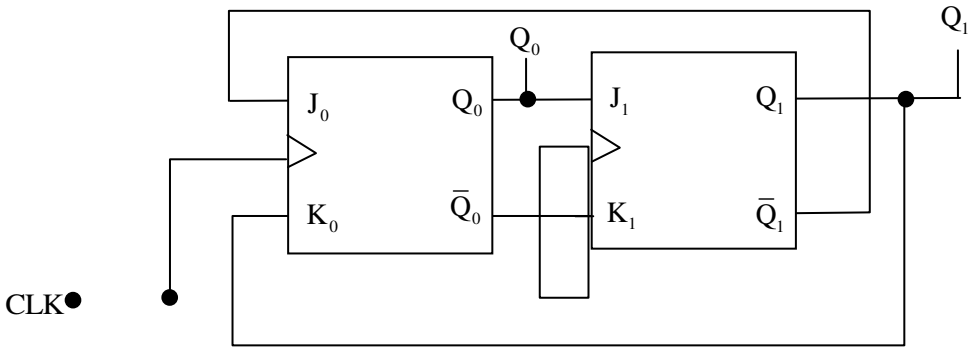
(B) The unit impulse response will have finite support.

(C) The unit step response will be absolutely integrable.

(D) The unit step response will be bounded.

Answer: (B)

33. In the following sequential circuit, the initial state (before the first clock pulse) of the circuit is $Q_1Q_0=00$. The state (Q_1Q_0), immediately after the 333rd clock pulse is



(A) 00 (B) 01 (C) 10 (D) 11

Answer: (B)

Exp:

$J_1(Q_0)$	$K_1(\bar{Q}_0)$	$J_0(\bar{Q}_1)$	$K_0(Q_1)$	Q_1	Q_0
–	–	–	–	0	0
0	1	1	0	0	1
1	0	1	0	1	1
1	0	0	1	1	0
0	1	0	1	0	0

If is a Johnson (MOD-4) counter. Divide 333 by 4, so it will complete 83 cycle and remainder clock is 1, at the completion of cycles output's in at $Q_1Q_0 = 00$ so, next at 333^{rd} clock pulse output is at $Q_1Q_0 = 01$.

34. A three-phase, 11 kV, 50 Hz, 2 pole, star connected, cylindrical rotor synchronous motor is connected to an 11 kV, 50 Hz source, Its synchronous reactance is 50Ω per phase, and its stator resistance is negligible. The motor has a constant field excitation. At a particular load torque, its stator current is 100A at unity power factor. If the load torque is increased so that the stator current is 120 A, then the load angle (in degrees) at this node is ____.

Answer: 47.27

Exp: $E_f = V_t - I_a \times S$

$$= \frac{11}{\sqrt{3}}\text{kV} - j100 \times 50 = 6350 - j5000$$

$$|E_f| = 8082.23$$

$$(I_a \times S)^2 = E_f{}^2 + V_t^2 - 2E_f V_t \cos\delta$$

$$(120 \times 50)^2 = 8082.23^2 + 6350^2 - 2 \times 8082.23 \times 6350 \times \cos\delta$$

$$\delta = 47.27°$$

35. Two coins R and S are tossed. The 4 joint events $H_RH_S, T_RT_S, H_RT_S, T_RH_S$ have probabilities 0.28, 0.18, 0.30, 0.24, respectively, where H represents head and T represents tail. Which one of the following is TRUE?

(A) The coin tosses are independent
(B) R is fair, R it not.
(C) S is fair, R is not
(D) The coin tosses are dependent

Answer: (D)

Exp: Given events H_RH_S, T_RT_S, H_RT_S, T_RH_S

If coins are independent

Corresponding probabilities will be

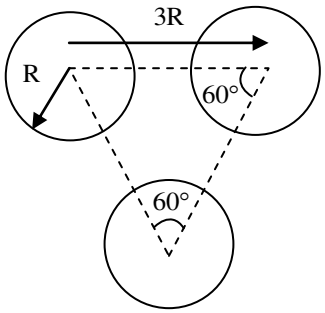
$$\frac{1}{2}.\frac{1}{2}, \frac{1}{2}.\frac{1}{2}, \frac{1}{2}.\frac{1}{2}, \frac{1}{2}.\frac{1}{2}$$

$$= \frac{1}{4}, \frac{1}{4}, \frac{1}{4}, \frac{1}{4} \text{ respectively}$$

But given probabilities are 0.28, 0.18, 0.3, 0.24 respectively we can decide whether R is fair or S is fair

$\Rightarrow$ The coin tosses are dependent.

36. A composite conductor consists of three conductors of radius R each. The conductors are arranged as shown below. The geometric mean radius (GMR) (in cm) of the composite conductor is kR. The value of k is _____.



Answer: 1.193

Exp: $GMR = \left[0.7788R \times 3R \times 3R\right]^{1/3}$

$= 1.9137R = kR$

$k = 1.913$

37. The z-Transform of a sequence x[n] is given as $X(z) = 2z+4-4/z+3/z^2$. If y[n] is the first difference of x[n], then Y(z) is given by

(A) $2z+2-8/z+7/z^2-3/z^3$ (B) $-2z+2-6/z+1/z^2-3/z^3$

(C) $-2z-2+8/z-7/z^2+3/z^3$ (D) $4z-2-8/z-1/z^2+3/z^3$

Answer: (A)

Exp: y(n) is first difference of x(n) So

$g(n) = x(n) - x(n-1)$

$\Rightarrow Y(z) = x(Z)(1-z^{-1}) = X(z) - z^{-1}X(z)$

$Y(z) = \left[2z + 4 - 4z^{-1} + 3z^{-2}\right] - \left[2 + 4z^{-1} - 4z^{-2}\right]$

$= 2z + 4 - 4z^{-1} + 3z^{-2} - 2 - 4z^{-1} + 4z^{-2} - 3z^{-3}$

$= 2z + 2 - 8z^{-1} + 7z^{-2} - 3z^{-3}$

38. An open loop transfer function G(s) of a system is

$$G(s) = \frac{K}{s(s+1)(s+2)}$$

For a unity feedback system, the breakaway point of the root loci on the real axis occurs at,

(A) -0.42 (B) -1.58

(C) -0.42 and -1.58 (D) None of the above

Answer: (A)

Exp: $1 + G(s) = 0$

$$s\left(s^2+3s+2\right)+12=0$$

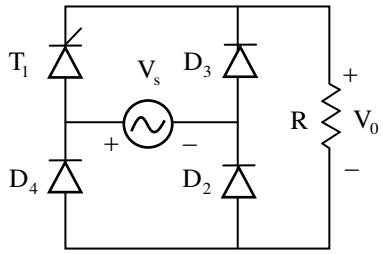
$$-k=s^3+3s^2+2s$$

$$\frac{dK}{ds}=0$$

$$3s^2+6s+s=0$$

S=-0.42 is the solution makes k>0

39. In the given rectifier, the delay angle of the thyristor T_1 measured from the positive going zero crossing of V_s is 30°. If the input voltage V_s is 100 sin(100πt)V, the average voltage across R (in Volt) under steady-state is _____.



Answer: 61.52

Exp: $\alpha=30°$

$$V_{in}=100\sin\left(100\pi t\right)$$

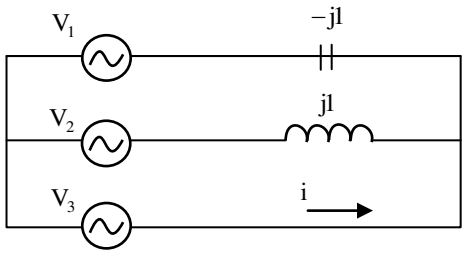
$$V_0=\frac{V_m}{2\pi}\left[3+\cos\alpha\right]$$

$$=\frac{100}{2\pi}\left(3+\cos 30°\right)=61.52V$$

40. Two identical coils each having inductance L are placed together on the same core. If an overall inductance of αL is obtained by interconnecting these two coils, the minimum value of α is _____.

Answer: 0

41. In the given network $V_1 = 100\angle 0°V$, $V_2 = 100\angle -120°V$, $V_3 = 100\angle +120°V$. The phasor current i (in Ampere) is



(A) 173.2∠-60° (B) 173.2∠-120° (C) 100.0∠-60° (D) 100.0∠-120°

Answer: (A)

Exp: $-i=\frac{(V_1-V_3)}{-j}+\frac{(V_2-V_3)}{j}$

$-i=\frac{100\angle 0^o-100\angle 120^o}{1\angle -90^o}+\frac{100\angle -120^o-100\angle 120^o}{1\angle 90^o}$

$i=173.2\angle -60^o$

42. A differential equation $\frac{di}{dt}-0.2i=0$ is applicable over -10< t <10. If i(4) = 10, then i(-5) is _____.

Answer: 1.65

Exp: $\frac{di}{dt}-0.2i=0$

$(D-0.2)i(t)=0$

$D=0.2$

$i(t)=k.e^{0.2t},-10<t<10$

$t=u;$

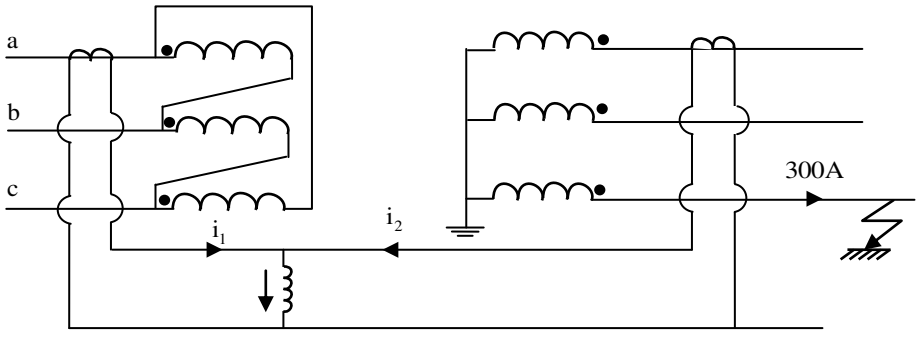
$10=K.e^{0.8}$

K=4.493

$\therefore i(-5)=4.493\times e^{-1}$

$i(-5)=1.65$

43. A 3-phase transformer rated for 33 kV/11 kV is connected in delta/star as shown in figure. The current transformers (CTs) on low and high voltage sides have a ratio of 500/5. Find the currents i_1 and i_2, if the fault current is 300A as shown in figure.



(A) $i_1=1/\sqrt{3}\,A, i_2=0A$ (B) $i_1=0A, i_2=0A$

(C) $i_1=0A, i_2=1/\sqrt{3}A$ (D) $i_1=1/\sqrt{3}A, i_2=1/\sqrt{3}A$

Answer: (A)

Exp: i_2 = 0 since entire current flows through fault

Primary kVA = Secondary kVA

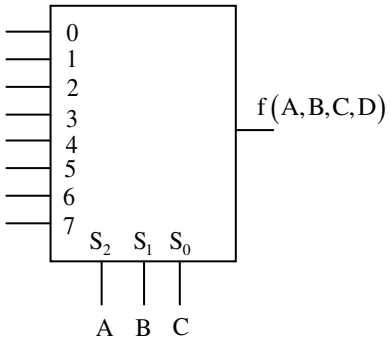
$$\sqrt{3}\times 33000\times I_L=\sqrt{3}\times 11000\times\left(300\times\frac{5}{500}\right)$$

$$I_L=1A$$

$$I_L=\sqrt{3}\,I_{Ph}$$

$$I_{ph}=i_1=\frac{1}{\sqrt{3}}A$$

44. A Boolean function f(A,B,C,D) = $\prod(1,5,12,15)$ is to be implemented using an 8×1 multiplexer (A is MSB). The inputs ABC are connected to the select inputs $S_2S_1S_0$ of the multiplexer respectively.



Which one of the following options gives the correct inputs to pins 0,1,2,3,4,5,6,7 in order?

(A) $D,0,D,0,0,0,\overline{D},D$ (B) $\overline{D},1,\overline{D},1,1,1,D,\overline{D}$

(C) $D,1,D,1,1,1,\overline{D},D$ (D) $\overline{D},0,\overline{D},0,0,0,D,\overline{D}$

Answer: (B)

Exp: Given maxterm $f(A,B,C,D)=\pi(1,5,12,15)$ so minterm

$$f(A,B,C,D)=\Sigma m(0,2,3,4,6,7,8,9,10,11,13,14)$$

	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7
$\overline{D}(0)$	0	2	4	6	8	10	12	14
$D(1)$	1	3	5	7	9	11	13	15
	$\overline{D}$	1	$\overline{D}$	1	1	1	D	$\overline{D}$

45. The incremental costs (in Rupees/MWh) of operating two generating units are functions of their respective powers P_1 and P_2 in MW, and are given by

$$\frac{dC_1}{dP_1}=0.2P_1+50$$

$$\frac{dC_2}{dP_2}=0.24P_2+40$$

Where

$20MW\le P_1\le 150$ MW

$20MW\le P_2\le 150MW$

For a certain load demand, P_1 and P_2 have been chosen such that dC_1/dP_1 = 76 Rs/MWh

and dC_2/dP_2 = 68.8 Rs/MWh. If the generations are rescheduled to minimize the total cost, then P_2 is _____.

Answer: 136.36

Exp: $\left.\begin{aligned}\frac{dc_1}{dP_1} = 76 = 0.2P_1 + 50 \Rightarrow P_1 = 130 \\ \frac{dc_2}{dP_2} = 68.8 = 0.24P_2 + 40 \Rightarrow P_2 = 120\end{aligned}\right\} P_1 + P_2 = 250$

For total cost minimization, $\frac{dc_1}{dp_1} = \frac{dc_2}{dp_2}$

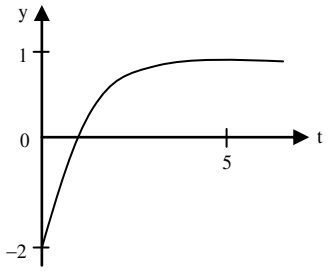
$0.2p_1 + 50 = 0.24p_2 + 40$

$0.2[250 - P_2] + 50 = 0.24P_2 + 40$

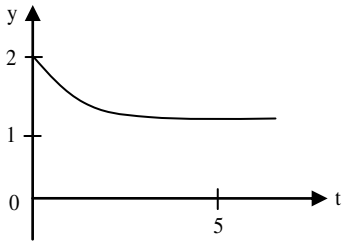
$P_2 = 136.36$

46. The unit step response of a system with the transfer function $G(s) = \frac{1-2s}{1+s}$ is given by which one of the following waveforms?

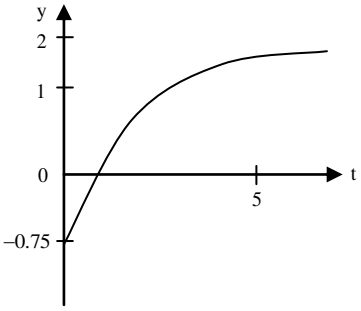
(A)



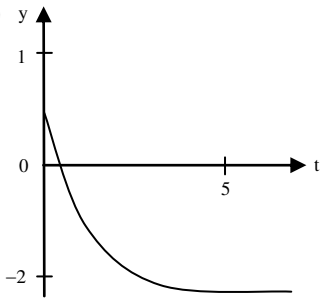
(B)



(C)

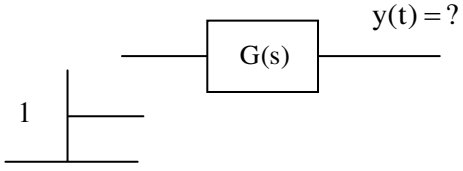


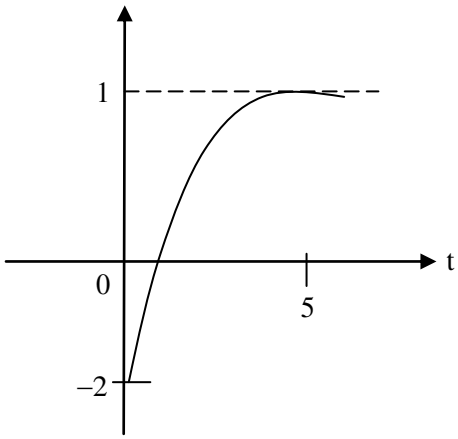
(D)



Answer: (A)

Exp:





$$Y(s) = G(s) \times U(s)$$

$$Y(s) = \frac{(1-2s)}{(1+s)} \cdot \frac{1}{s}$$

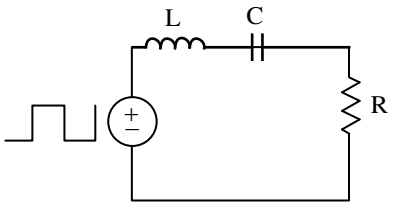
$$Y(s) = \frac{A}{(s)} + \frac{B}{(s+1)}$$

$$A = 1, B = -3$$

$$y(t) = u(t) - 3e^{-t}u(t)$$

$$y(t) = \left(1 - 3e^{-t}\right)u(t)$$

47. A symmetrical square wave of 50% duty cycle has amplitude of ±15V and time period of 0.4π ms. This square wave is applied across a series RLC circuit with R = 5Ω, L = 10 mH, and C = 4μF. The amplitude of the 5000 rad/s component of the capacitor voltage (in Volt) is _____.



Answer: 190.98

Exp: at $\omega_0 = \frac{2\pi}{T} = 5000 \text{rad/sec}$

$$V(t) = \frac{4 \times 15}{\pi} \sin \omega_0 t$$

at ω_0 circuit is under resonance

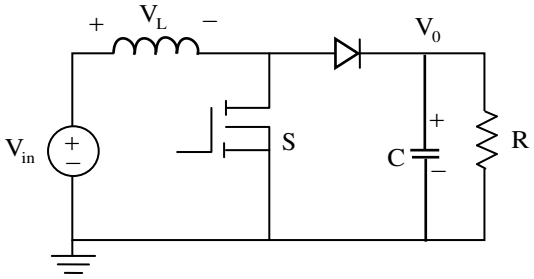
$$V_c = QV \angle -90$$

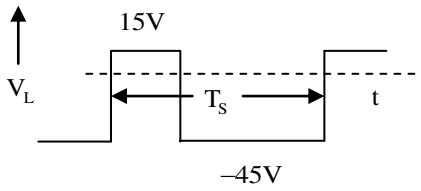
$$Q = \frac{\omega_0 L}{R} = \frac{5000 \times 10\text{m}}{5} = 10$$

$$V_c = \frac{10 \times 4 \times 15}{\pi} \angle -90$$

$$|V_c| = \frac{600}{\pi} = 190.98$$

48. For the switching converter shown in the following figure, assume steady-state operation. Also assume that the components are ideal, the inductor current is always positive and continuous and switching period is T_5. If the voltage V_L is as shown, the duty cycle of the switch S is _____.





Answer: 0.75

Exp: $V_S = 15V$

$V_S - V_0 = -45 \Rightarrow V_0 = V_S + 45 = 60V$

$V_0 = \dfrac{V_S}{1-D}$

$60 = \dfrac{15}{1-D} \Rightarrow D = 3/4 = 0.75$

49. With an armature voltage of 100V and rated field winding voltage, the speed of a separately excited DC motor driving a fan is 1000 rpm, and its armature current is 10A. The armature resistance is 1Ω. The load torque of the fan load is proportional to the square of the rotor speed. Neglecting rotational losses, the value of the armature voltage (in Volt) which will reduce the rotor speed to 500 rpm is _____.

Answer: 47.5

Exp: For separately excided DC motor,

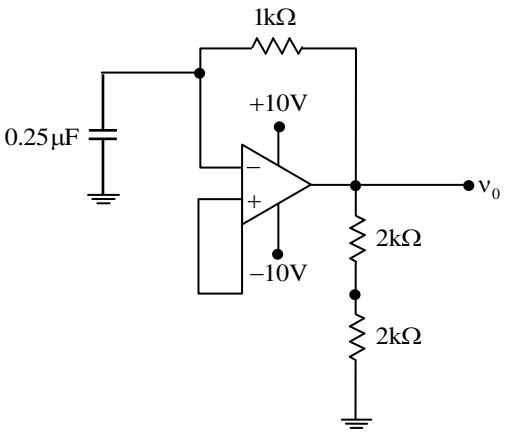
Torque = kI_a & $E=k\omega_m$.

For 1000 rpm, $E_1 = 100 - 10\times1 = 90V$; for 500 rpm, $E_2 = \dfrac{E_1}{2} = 45V$

$V = 45 + I_{a_2}R_a$, $\dfrac{I_{a1}}{I_{a2}} = \left(\dfrac{N_1}{N_2}\right)^2 \left[\because T \propto N^2\right] \Rightarrow Ia_2 = 10\times\left(\dfrac{500}{1000}\right)^2 = 2.5\ A$

$\Rightarrow V = 45 + 2.5A_1 = 47.5$

50. The saturation voltage of the ideal op-amp shown below is ±10V. The output voltage v_0 of the following circuit in the steady-state is



(A) Square wave of period 0.55 ms (B) Triangular wave of period 0.55 ms

(C) Square wave of period 0.25 ms (D) Triangular wave of period 0.25 ms

Answer: (A)

Exp: Astable multivibrator produces square wave.

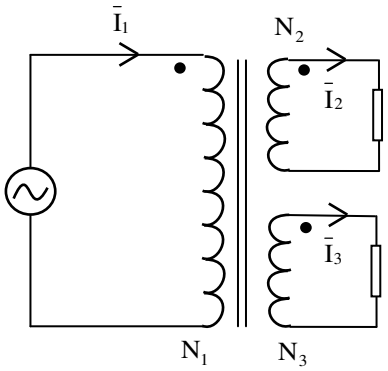
$\beta = \dfrac{R_2}{R_1 + R_2} = \dfrac{2}{4} = 0.5$

$$T = 2R_c \log\frac{(1+\beta)}{(1-\beta)} = 2\times1\times10^3\times0.25\times10^{-6}\times\log\left(\frac{1+0.5}{1-0.5}\right)$$

T= 0.55 ms

Square wave of period 0.55 ms.

51. A three-winding transformer is connected to an AC voltage source as shown in the figure. The number of turns are as follows: N_1 = 100, N_2 = 50. If the magnetizing current is neglected, and the currents in two windings are $\bar{I}_2 = 2\angle30°$ A and $\bar{I}_3 = 2\angle150°$ A, then what is the value of the current $\bar{I}_1$ in Ampere?



(A) $1\angle90°$ (B) $1\angle270°$ (C) $4\angle90°$ (D) $4\angle270°$

Answer: (A)

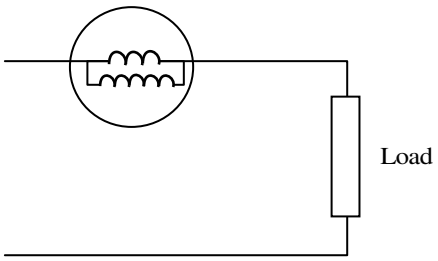
Exp: $I_1N_1 = I_2N_2 + I_3N_3$

$$I_1.100 = 2\angle30\times50 + 2\angle150\times50$$

$$\therefore I_1 = 1\angle30 + 1\angle150$$

$$= 1\angle90°$$

52. The coils of a wattmeter have resistances 0.01Ω and 1000Ω; their inductances may be neglected. The wattmeter is connected as shown in the figure, to measure the power consumed by a load, which draws 25A at power factor 0.8. The voltage across the load terminals is 30V. The percentage error on the wattmeter reading is _____.



Answer: 0.15

Exp: P_{load} = 30×25×08 = 600W

Wattmeter measures loss in pressure coil circuit

$$\text{loss in } P_c = \frac{V^2}{R_P} = \frac{30^2}{1000} = 0.9\text{W}$$

$$\text{error} = \frac{0.9}{600} \times 100 = 0.15\%$$

53. Consider a signal defined by

$$x(t) = \begin{cases} e^{j10t} & \text{for } |t| \le 1 \\ 0 & \text{for } |t| > 1 \end{cases}$$

Its Fourier Transform is

(A) $\dfrac{2\sin(\omega - 10)}{\omega - 10}$

(B) $\dfrac{2e^{j10}\sin(\omega - 10)}{\omega - 10}$

(C) $\dfrac{2\sin\omega}{\omega - 10}$

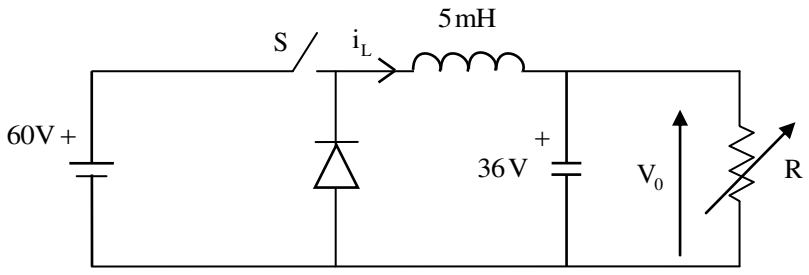
(D) $\dfrac{e^{j10\omega}2\sin\omega}{\omega}$

Answer: (A)

Exp: $X(\omega) = \int_{-1}^{1} e^{j10t}.e^{-j\omega t}dt = \int_{-1}^{1} e^{j(10-\omega)t}dt$

$$= \frac{e^{j(10-\omega)t}}{j(10-\omega)}\Bigg|_{-1}^{1} = \frac{2\sin(\omega - 10)}{(\omega - 10)}$$

54. A buck converter feeding a variable resistive load is shown in the figure. The switching frequency of the switch S is 100 kHz and the duty ratio is 0.6. The output voltage V_0 is 36V. Assume that all the components are ideal, and that the output voltage is ripple-free. The value of R (in Ohm) that will make the inductor current (i_L) just continuous is _____.



Answer: 2500

Exp: For Buck converter, for inductor current to be continuous,

$$R = \frac{2fL}{(1-D)} = \frac{2 \times 100 \times 10^3 \times 5 \times 10^{-3}}{1 - 0.6} = 2500$$

55. The following discrete-time equations result from the numerical integration of the differential equations of an un-damped simple harmonic oscillator with state variables x and y. The integration time step is h.

$$\frac{x_{k+1}-x_k}{h}=y_k$$

$$\frac{y_{k+1}-y_k}{h}=-x_k$$

For this discrete-time system, which one of the following statements is TRUE?

(A) The system is not stable for h>0

(B) The system is stable for $h>\frac{1}{\pi}$

(C) The system is stable for $0<h<\frac{1}{2\pi}$

(D) The system is stable for $\frac{1}{2\pi}<h<\frac{1}{\pi}$

Answer: (A)

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.

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.

ANNA UNIVERSITY : CHENNAI 600 025

OFFICE OF THE ADDITIONAL CONTROLLER OF EXAMINATIONS

(UNIVERSITY DEPARTMENTS)

GUIDELINES FOR AWARDING PUNISHMENTS TO MALPRACTICE CASES OF STUDENTS

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	I. - 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.	
4.	Any special marking in the answer script by the candidate.	
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 either possessing the question paper of another candidate or passing his question paper to another candidate with the question paper containing no additional writing on it.	
8.	The candidate possessing cell phones/programmable calculator(s)/any other electronic storage device(s) containing no incriminating materials.	II. - Fine of Rs.2000/- per subject.
9.	The candidate facilitating the other candidate(s) to copy from his/her answer script.	IIIA. – Invalidating the examination of the particular subject written by the candidate.
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.	IIIA, IIIB or IIIC IIIA – If the quantum of the incriminating material is less than that could normally be printed in two lines of A5 size paper, then punishment is restricted to the subject concerned only. IIIB – If the quantum is equal to or more than that could normally be printed in two lines and less than that could normally be printed in the full page of the A5 size paper then the punishment is invalidating the examination of the subject concerned and further the candidate is not considered for any moderation and revaluation in the current semester for any subject (including arrear subjects) IIIC – When the quantum is equal to or more than that could normally be printed in full page of A5 size paper, then the punishment would be 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 arrear subjects. If the candidate has registered for the arrear subjects only, invalidating the examinations of all the arrear-subjects registered by the candidate. The punishment does not include project work and the subjects with 100% internal evaluation.
11.	The candidate possessing cell phone(s)/programmable calculator(s)/any other electronic storage device(s) and containing incriminating materials (whether used or not)	
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.	

Contd 2..

Sl.No.	Nature of Malpractice	Maximum Punishment
16.	Vulgar/offensive writings by the candidate in the answer script.	IV. – Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears subjects registered by the candidate.
17.	The candidate possessing the answer script of another candidate.	
18.	The candidate passing his/her answer script to another candidate.	
19.	Appeal by the candidate in the answer script coupled with a promise of any form of consideration.	
20.	The candidate misbehaving in the examination hall.	**Va. – For candidates who have not completed the programme:** The examinations of all the theory and the practical subjects of the current semester and all the arrear subjects registered by the candidate are invalidated. Further, the candidate 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 arrear subjects upto the last semester during the debarred period. **Vb. – For candidates who have completed the programme:** The examinations of all the arrear subjects registered by the candidate are invalidated. Further, the candidate is prevented from writing the examinations of the arrear subjects for the two subsequent semesters.
21	Involved in any one or more of the malpractices of serial no.10 to 19 for the second or subsequent times.	
22.	Cases of Impersonation.	**For both the impersonator and the bonafide student for whom the impersonation was done.** VI. – The examinations of all the subjects registered by the candidate are invalidated and further the student is debarred from continuing his/her studies and debarred from writing the examinations permanently. He/She is not eligible for any further admission to any programme of the University.

Additional Controller of Examinations
University Departments

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**

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Recommended / Not Recommended

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

TO Date

The Principal

KLNCE

Pottapalayam

Sub: Requisition for Bonafide Certificate to me

****

Dear Sir,

Kindly issue Bonafide Certificate to me

Purpose :

Venue :

Name :

Father's Name :

Roll No. :

Department :

Year & Sem :

Thanking You,

Yours Sincerely

Date :

Station :

Recommended by :

Received :