K.L.N. COLLEGE OF ENGINEERING

POTTAPALAYAM - 630 612 (11KM from Madurai City)

SIVAGANGAI DISTRICT, TAMILNADU, INDIA

(Sponsored by K.L.N. Sourashtra College of Engineering Council)

An ISO 9001:2015 Certified Institution

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Approved by AICTE, New Delhi

Permanently Affiliated to Anna University, Chennai

Accredited by NBA up to 30.06.2019

Research Centre of Anna University

STUDENTS HAND BOOK

For B.E. – EEE

VII – Semester

Odd Semester 2017 – 2018

K.L.N. COLLEGE OF ENGINEERING
Department of Electrical and Electronics Engineering
STUDENTS HAND BOOK
B.E. – EEE – VII – Semester – Odd Semester of 2017 – 2018

This book contains the following:

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION AND MISSION OF THE COLLEGE

VISION:

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

MISSION:

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

VISION AND MISSION OF THE DEPARTMENT

VISION:

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

MISSION:

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

HISTORY OF THE DEPARTMENT

<table>
<tr><th colspan="2">B.E. - EEE</th><th colspan="2">M.E. - PSE</th><th colspan="2">Ph.D.</th></tr>
<tr><td rowspan="4">Year of start & History of Intake</td><td>1994, with an intake of 40</td><td rowspan="4">Year of start & History of Intake</td><td>2004, with an intake of 18</td><td>Year of Recognition as Research Centre</td><td>2012</td></tr>
<tr><td>1996, with an intake of 60</td><td rowspan="3">2012, with an intake of 24</td><td rowspan="3">First Renewal</td><td rowspan="3">2015, upto December 2018</td></tr>
<tr><td>2002, with an intake of 90</td></tr>
<tr><td>2011, with an intake of 120</td></tr>
<tr><td colspan="6">Both UG & PG programs are permanently affiliated to Anna University, Chennai.</td></tr>
<tr><th colspan="6">Accreditation status</th></tr>
<tr><th>First Accreditation</th><th>Second Accreditation</th><th>Third Accreditation</th><th colspan="3">Fourth Accreditation</th></tr>
<tr><td>3 YEARS W.E.F. 19-3-2004</td><td>3 YEARS W.E.F. 19-7-2008</td><td>2 YEARS W.E.F. 05-08-2013</td><td colspan="3">Academic Year 2016-17,2017-18 and 2018-19, i.e., upto 30-06-2019</td></tr>
</table>

FACULTY PROFILE as on July 2017

Ph.D's	Doing Ph.D	M.E.
10	8	13

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

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

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

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

PEO3: to work in international and multi-disciplinary Environments

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

Electrical and Electronics Engineering Graduates will be able to:

PSO1:

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

PSO2:

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

PSO3:

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

PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

OUTCOME BASED EDUCATION (OBE)

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

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

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

BENEFITS AND SIGNIFICANCE OF ACCREDITATION

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

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

Accreditation signifies different things to different stakeholders. These are:

Benefits to Institutions

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

Benefits to Students

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

Benefits to Employers

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

Benefits to the Public

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

Catalyst for International Accreditations

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

Benefits to Industry and Infrastructure Providers

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

Benefits to Parents

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

Benefits to Alumni

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

Benefits to Country

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

ENGINEERING ETHICS

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

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

Electrical Engineering Ethics

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

IEEE code of Ethics

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

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

Engineering Ethics in College/Education

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

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

Engineering Ethics in the Professional World

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

Engineering Ethics in Companies

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

BLOOM'S TAXONOMY

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

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

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

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

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

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

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

List of Action Words Related to Critical Thinking Skills

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

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

ACADEMIC CALENDAR - ODD Semester of 2017 - 2018.

UG & PG COURSES – III, V, VII SEMESTER – SUMMARY (Revised)

S.No	Date	Programme / Events	Day
		June 2017	
1.	12.06.2017 (Mon)	Student development and training programmes : (12th June- 24th June 2017) - Departments	
2.	19.06.2017 (Mon)	Faculty Meeting - I	
3.	21.06.2017(Wed)	Reopening Day - III,V&VII Semester UG classes Class Committee Meeting - I	01
4.	22.06.2017 (Thu)	Student Counsellor Meeting – I	02
5.	26.06.2017 (Mon)	***Ramzan – Holiday***	
6.	29.06.2017 (Thu)	Grievance redressal Committee Meeting	07
7.	30.06.2017(Fri)	IIPC & IDCA review meeting-I	08
		July 2017	
8.	03.07.2017 (Mon)	*Commencement of Classes – III & V Semester M.E, MBA & MCA Courses*	09
9.	12.07.2017 (Wed)	Class Test-I- (12th – 19th July 2017)	17
10.	24.07.2017 (Mon)	Anti-Ragging Committee Meeting	26
11.	27.07.2017 (Thu)	Faculty Meeting - II	29
12.	31.07.2017 (Mon)	CIT – I – 31st July – 07th August 2017	31
		August 2017	
13.	01.08.2017(Tue)	*Commencement of Classes-First year B.E./B.Tech.*	32
14.	08.08.2017 (Tue)	*Remedial / Retest Classes*	37
15.	14.08.2017 (Mon)	***Krishna Jeyanthi – Holiday***	
16.	15.08.2017(Tue)	***Independence Day – Holiday***	
17.	18.08.2017 (Fri)	Student Counsellor Meeting – II	44
18.	21.08.2017 (Mon)	Class Test-II- 21st – 28th Aug 2017. Class Committee Meeting - II	45
19.	25.08.2017 (Fri)	***Vinayagar Chathurthi – Holiday***	
20.	26.08.2017 (Sat)	Parents – Teachers Meeting	49
		September 2017	
21.	02.09.2017 (Sat)	*Bakrid – Holiday*	
22.	04.09.2017 (Mon)	**Faculty Meeting - III**	55
23.	11.09.2017 (Mon)	**CIT – II– 11th – 18th Sep 2017.**	61
24.	25.09.2017 (Mon)	**Model Practical Examinations 25th –28th Sep. 2017.**	72
25.	28.09.2017 (Thu)	**NBA – CO attainment – Even Semester of 2016 – 2017 - Finalization**	75
26.	29.09.2017 (Fri)	***Ayutha Pooja- Holiday***	
27.	30.09.2017 (Sat)	***Vijaya Thasami – Holiday***	
		October 2017	
28.	01.10.2017 (Sun)	***Moharam - Holiday***	
29.	02.10.2017 (Mon)	***Gandhi Jeyanthi - Holiday***	
30.	03.10.2017 (Tue)	Class Test- III - 3rd -5th Oct 2017 Students feedback on faculty, college facility, Course Outcome Survey	76
31.	05.10.2017 (Thu)	Class Committee Meeting - III	78
32.	06.10.2017 (Fri)	Faculty meeting - IV	79
33.	09.10.2017 (Mon)	Anna University Practical Examinations – Tentative – Slot – I-Tentative	80
34.	13.10.2017 (Fri)	Model Theory Examinations (14th – 23rd Oct 2017)	84
35.	18.10.2017 (Wed)	***Deepavali – Holiday***	
36.	19.10.2017 (Thu)	Program Assessment Committee meeting-PO-Assessment-2013-2017 Batch-Planning for DAC meeting	88
37.	21.10.2017 (Sat)	Last Working Day-III,V,VII Semester B.E./B.Tech	-
38.	30.10.2017(Mon)	***Commencement of end semester Examinations (III,V & VII semester B.E./B.Tech, III Semester M.E.,M.B.A.,and III,V semester MCA***	96
39.	06.11.2017(Mon)	Winter vacation-Phase –I-	

Reopening day for the staff after Winter Vacation: 11.12.2017 (Monday)

Reopening day for the Even semester of 2017 – 2018: 18.12.2017 (Monday).

Academic Performance evaluation of faculty-2017-2018 (Odd Semester) – 11th – 15th Dec 2017.

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

Department of Electrical and Electronics Engineering

CLASS WISE TIME TABLE -2017-2018 (ODD)

Year/Sem/Sec : IV / VII / A **Faculty In-charge : M.Jegadeesan**

TIME→ DAY↓	09.00 – 09.50	09.50 – 10.40	10.55- 11.45	11.45- 12.35		01.15- 02.05	02.05- 02.55	02.55- 03.45	04.00- 04.45
PERIOD→	I	II	III	IV		V	VI	VII	VIII
MON	**SEM** PLT	**MBSD** RSD	**HVE** SPS/VS	**PSG** MGK	*L U N C H*	**PSS LAB** MJ,NVRV			-
TUE	**PQ** MJ	**HVE** SPS/VS	**HVE** SPS/VS	**POM** SVN		**SEM** PLT	**MBSD** RSD	**PSG** MGK	**POM** SVN
WED	**POM** SVN	**HVE** SPS/VS	**HVE** SPS/VS	**SEM** PLT		**PQ** MJ	**COMPREHENSION** MGK, SM		
THU	**PSG** MGK	**POM** SVN	**PQ** MJ	**SEM** PLT		**PSG** MGK	**MBSD** RSD	**PQ** MJ	**POM** SVN
FRI	**MBSD** RSD	**PQ** MJ	**PROJECT** CVR(3,4)			**SEM** PLT	**PSG** MGK	**MBSD** RSD	-

Year/Sem/Sec : IV / VII / B **Faculty In-charge:R.Jeyarohini.**

TIME→ DAY↓	09.00 – 09.50	09.50 – 10.40	10.55- 11.45	11.45- 12.35		01.15- 02.05	02.05- 02.55	02.55- 03.45	04.00- 04.45
PERIOD→	I	II	III	IV		V	VI	VII	VIII
MON	**PQ** MJ	**HVE** NVRV	**MBSD** RJR	**PSG** APSR	*L U N C H*	**POM** SVN	**SEM** SV	**POM** SVN	-
TUE	**PSG** APSR	**POM** SVN	**HVE** NVRV	**PQ** MJ		**MBSD** RJR	**PSS LAB** NVRV , VS		
WED	**SEM** SV	**PQ** MJ	**PROJECT** MML(3,4)			**PSG** APSR	**SEM** SV	**PQ** MJ	**POM** SVN
THU	**MBSD** RJR	**SEM** SV	**POM** SVN	**PSG** APSR		**HVE** NVRV	**COMPREHENSION** AMJ, JS		
FRI	**HVE** NVRV	**MBSD** RJR	**SEM** SV	**MBSD** RJR		**PQ** MJ	**PSG** APSR	**HVE** NVRV	-

Year/Sem/Sec : IV / VII / C **Faculty In-charge : Dr..A.S.S.Murugan.**

TIME→ DAY↓	09.00 – 09.50	09.50 – 10.40	10.55- 11.45	11.45- 12.35		01.15- 02.05	02.05- 02.55	02.55- 03.45	04.00- 04.45
PERIOD→	I	II	III	IV		V	VI	VII	VIII
MON	**HVE** VS	**POM** AMJ	**SEM** PLT	**PSG** KG	*L U N C H*	**COMPREHENSION** AMJ, MGK			-
TUE	**MBSD** EJ	**SEM** PLT	**PSG** KG	**PQ** ASSM		**POM** AMJ	**PQ** ASSM	**PROJECT** RSD (7,8)	
WED	**SEM** PLT	**PQ** ASSM	**POM** AMJ	**PSG** KG		**MBSD** EJ	**PSS LAB** ASSM, VS		
THU	**PQ** ASSM	**POM** AMJ	**MBSD** EJ	**HVE** VS		**PSG** KG	**SEM** PLT	**PQ** ASSM	**HVE** VS
FRI	**POM** AMJ	**HVE** VS	**PSG** KG	**MBSD** EJ		**HVE** VS	**MBSD** EJ	**SEM** PLT	-

SUB CODE	SUBJECT NAME		STAFF NAME		
			Section - A	Section - B	Section - C
EE6701	High Voltage Engineering	HVE	Dr.S.Parthasarathy/V.Sindhu	N.Vimal Radha Vignesh	V.Sindhu
EE6702	Protection and Switchgear	PSG	M. Ganesh Kumari	Dr.A.P.S. Rama Lakshmi	Dr.K.Gnanambal
EE6703	Special Electrical Machines	SEM	P.Loganthurai	Dr.S.Venkatesan	P.Loganthurai
MG6851	Principles of Management	POM	Dr. S.Venkata Narayanan	Dr. S.Venkata Narayanan	A.Manoj
EE6005	Power Quality(Elective – II)	PQ	M.Jegadeesan	M.Jegadeesan	Dr.A.S.S.Murugan
EE6008	Microcontroller Based System Design (Elective – III)	MBSD	R. Sridevi	R. Jeyarohini	E.Jeyasri
EE6711	Power System Simulation Laboratory	PSS LAB	M.Jegadeesan	N.Vimal Radha Vignesh	Dr.A.S.S.Murugan
EE6712	Comprehension	Comprehension	M. Ganesh Kumari	A.Manoj	A.Manoj
-	Project work	Project	Dr.C.Vimalarani	Dr.M.Mahalakshmi	R.Sridevi

EE6701 HIGH VOLTAGE ENGINEERING LT P C
3 0 0 3

OBJECTIVES:

- To understand the various types of over voltages in power system and protection methods.
- Generation of over voltages in laboratories.
- Measurement of over voltages.
- Nature of Breakdown mechanism in solid, liquid and gaseous dielectrics.
- Testing of power apparatus and insulation coordination.

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS 9

Causes of over voltages and its effects on power system – Lightning, switching surges and temporary overvoltages, Corona and its effects – Reflection and Refraction of Travelling waves- Protection against overvoltages.

UNIT II DIELECTRIC BREAKDOWN 9

Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids, Maintenance of oil Quality – Breakdown mechanisms in solid and composite dielectrics.

UNIT III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 9

Generation of High DC, AC, impulse voltages and currents - Triggering and control of impulse generators.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS 9

High Resistance with series ammeter – Dividers, Resistance, Capacitance and Mixed dividers - Peak Voltmeter, Generating Voltmeters - Capacitance Voltage Transformers, Electrostatic Voltmeters – Sphere Gaps - High current shunts- Digital techniques in high voltage measurement.

UNIT V HIGH VOLTAGE TESTING & INSULATION COORDINATION 9

High voltage testing of electrical power apparatus as per International and Indian standards – Power frequency, impulse voltage and DC testing of Insulators, circuit breakers, bushing, isolators and transformers- Insulation Coordination.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and analyze power system operation, stability, control and protection.

TEXT BOOKS:

1. S.Naidu and V. Kamaraju, ‘High Voltage Engineering’, Tata McGraw Hill, Fifth Edition, 2013.
2. E. Kuffel and W.S. Zaengl, J.Kuffel, ‘High voltage Engineering fundamentals’, Newnes Second Edition Elsevier , New Delhi, 2005.
3. Subir Ray,’ An Introduction to High Voltage Engineering’ PHI Learning Private Limited, New Delhi, Second Edition, 2013.

REFERENCES:

1. L.L. Alston, ‘High Voltage Technology’, Oxford University Press, First Indian Edition, 2011.
2. C.L. Wadhwa, ‘High voltage Engineering’, New Age International Publishers, Third Edition, 2010.

EE6702 PROTECTION AND SWITCHGEAR L T P C
3 0 0 3

OBJECTIVES:

- To educate the causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
- To introduce the characteristics and functions of relays and protection schemes.
- To impart knowledge on apparatus protection
- To introduce static and numerical relays
- To impart knowledge on functioning of circuit breakers

UNIT I PROTECTION SCHEMES 9

Principles and need for protective schemes – nature and causes of faults – types of faults – fault current calculation using symmetrical components – Methods of Neutral grounding – Zones of protection and essential qualities of protection – Protection schemes

UNIT II ELECTROMAGNETIC RELAYS 9

Operating principles of relays - the Universal relay – Torque equation – R-X diagram – Electromagnetic Relays – Overcurrent, Directional, Distance, Differential, Negative sequence and Under frequency relays.

UNIT III APPARATUS PROTECTION 9

Current transformers and Potential transformers and their applications in protection schemes - Protection of transformer, generator, motor, busbars and transmission line.

UNIT IV STATIC RELAYS AND NUMERICAL PROTECTION 9

Static relays – Phase, Amplitude Comparators – Synthesis of various relays using Static comparators – Block diagram of Numerical relays – Overcurrent protection, transformer differential protection, distant protection of transmission lines.

UNIT V CIRCUIT BREAKERS 9

Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking – re-striking voltage and recovery voltage - rate of rise of recovery voltage - resistance switching - current chopping - interruption of capacitive current - Types of circuit breakers – air blast, air break, oil, SF6 and vacuum circuit breakers – comparison of different circuit breakers – Rating and selection of Circuit breakers.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and analyze power system operation, stability, control and protection.

TEXT BOOKS:

1. Sunil S.Rao, ‘Switchgear and Protection’, Khanna Publishers, New Delhi, 2008.
2. B.Rabindranath and N.Chander, ‘Power System Protection and Switchgear’, New Age International (P) Ltd., First Edition 2011.
3. M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarti, ‘A Text Book on Power System Engineering’, Dhanpat Rai & Co.,1998.

REFERENCES:

1. Badri Ram ,B.H. Vishwakarma, ‘Power System Protection and Switchgear’, New Age International Pvt Ltd Publishers, Second Edition 2011.
2. Y.G.Paithankar and S.R.Bhide, ‘Fundamentals of power system protection’, Second Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. C.L.Wadhwa, ‘Electrical Power Systems’, 6th Edition, New Age International (P) Ltd., 2010
4. Ravindra P.Singh, ‘ Switchgear and Power System Protection’, PHI Learning Private Ltd., New Delhi, 2009.
5. Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chotani,’Protection and Switchgear’ Oxford University Press, 2011.

EE6703 SPECIAL ELECTRICAL MACHINES LT P C
3 0 0 3

OBJECTIVES:

- To impart knowledge on Construction, principle of operation and performance of synchronous reluctance motors.
- To impart knowledge on the Construction, principle of operation, control and performance of stepping motors.
- To impart knowledge on the Construction, principle of operation, control and performance of switched reluctance motors.
- To impart knowledge on the Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
- To impart knowledge on the Construction, principle of operation and performance of permanent magnet synchronous motors.

UNIT I SYNCHRONOUS RELUCTANCE MOTORS 9

Constructional features – Types – Axial and Radial flux motors – Operating principles – Variable Reluctance Motors – Voltage and Torque Equations - Phasor diagram - performance characteristics – Applications.

UNIT II STEPPER MOTORS 9

Constructional features – Principle of operation – Variable reluctance motor – Hybrid motor – Single and multi stack configurations – Torque equations – Modes of excitation – Characteristics – Drive circuits – Microprocessor control of stepper motors – Closed loop control-Concept of lead angle– Applications.

UNIT III SWITCHED RELUCTANCE MOTORS (SRM) **9**

Constructional features – Rotary and Linear SRM - Principle of operation – Torque production – Steady state performance prediction- Analytical method -Power Converters and their controllers – Methods of Rotor position sensing – Sensor less operation – Characteristics and Closed loop control – Applications.

UNIT IV PERMANENT MAGNET BRUSHLESS D.C. MOTORS 9

Permanent Magnet materials – Minor hysteresis loop and recoil line-Magnetic Characteristics – Permeance coefficient -Principle of operation – Types – Magnetic circuit analysis – EMF and torque equations –Commutation - Power Converter Circuits and their controllers – Motor characteristics and control– Applications.

UNIT V PERMANENT MAGNET SYNCHRONOUS MOTORS (PMSM) **9**

Principle of operation – Ideal PMSM – EMF and Torque equations – Armature MMF – Synchronous Reactance – Sine wave motor with practical windings - Phasor diagram – Torque/speed characteristics - Power controllers - Converter Volt-ampere requirements– Applications.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to model and analyze electrical apparatus and their application to power system

TEXT BOOKS:

1. K.Venkataratnam, 'Special Electrical Machines', Universities Press (India) Private Limited, 2008.
2. T.J.E. Miller, 'Brushless Permanent Magnet and Reluctance Motor Drives', Clarendon Press, Oxford, 1989.
3. T. Kenjo, 'Stepping Motors and Their Microprocessor Controls', Clarendon Press London, 1984.

REFERENCES:

1. R.Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.
2. P.P. Aearnley, 'Stepping Motors – A Guide to Motor Theory and Practice', Peter Perengrinus London, 1982.
3. T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London, 1988.
4. E.G. Janardanan, 'Special electrical machines', PHI learning Private Limited, Delhi, 2014.

MG6851 PRINCIPLES OF MANAGEMENT LT P C
3 0 0 3

OBJECTIVES:

- To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, " Management", Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", Pearson Education, 6th Edition, 2004.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" Pearson Education, 7th Edition, 2011.
2. Robert Kreitner & Mamata Mohapatra, " Management", Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich "Essentials of Management" Tata McGraw Hill,1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999.

EE6005 **POWER QUALITY** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the power quality problem
- To educate on production of voltages sags, over voltages and harmonics and methods of control.
- To study overvoltage problems
- To study the sources and effect of harmonics in power system
- To impart knowledge on various methods of power quality monitoring.

UNIT I INTRODUCTION TO POWER QUALITY 9

Terms and definitions: Overloading - under voltage - over voltage. Concepts of transients - short duration variations such as interruption - long duration variation such as sustained interruption. Sags and swells - voltage sag - voltage swell - voltage imbalance - voltage fluctuation - power frequency variations. International standards of power quality. Computer Business Equipment Manufacturers Associations (CBEMA) curve.

UNIT II VOLTAGE SAGS AND INTERRUPTIONS 9

Sources of sags and interruptions - estimating voltage sag performance. Thevenin's equivalent source - analysis and calculation of various faulted condition. Voltage sag due to induction motor starting. Estimation of the sag severity - mitigation of voltage sags, active series compensators. Static transfer switches and fast transfer switches.

UNIT III OVERVOLTAGES 9

Sources of over voltages - Capacitor switching – lightning - ferro resonance. Mitigation of voltage swells - surge arresters - low pass filters - power conditioners. Lightning protection – shielding - line arresters - protection of transformers and cables. An introduction to computer analysis tools for transients, PSCAD and EMTP.

UNIT IV HARMONICS 9

Harmonic sources from commercial and industrial loads, locating harmonic sources.Power system response characteristics - Harmonics Vs transients. Effect of harmonics - harmonic distortion - voltage and current distortion - harmonic indices - inter harmonics – resonance. Harmonic distortion evaluation - devices for controlling harmonic distortion - passive and active filters. IEEE and IEC standards.

UNIT V POWER QUALITY MONITORING 9

Monitoring considerations - monitoring and diagnostic techniques for various power quality problems - modeling of power quality (harmonics and voltage sag) problems by mathematical simulation tools - power line disturbance analyzer – quality measurement equipment - harmonic / spectrum analyzer - flicker meters - disturbance analyzer. Applications of expert systems for power quality monitoring.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and analyze power system operation, stability, control and protection.

TEXT BOOKS:

1. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.Wayne Beaty, 'Electrical Power Systems Quality' McGraw Hill,2003.(For Chapters1,2,3, 4 and 5).
2. **Eswald.F.Fudis and M.A.S.Masoum, "Power Q**uality in Power System and Electrical Machines," Elseviar Academic Press, 2013.
3. J. Arrillaga, N.R. Watson, S. Chen, 'Power System Quality Assessment', Wiley, 2011.

REFERENCES:

1. G.T. Heydt, 'Electric Power Quality', 2nd Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994). (For Chapter 1, 2, 3 and 5)
2. M.H.J Bollen, 'Understanding Power Quality Problems: Voltage Sags and Interruptions', (New York: IEEE Press, 1999). (For Chapters 1, 2, 3 and 5)
3. G.J.Wakileh, "Power Systems Harmonics – Fundamentals, Analysis and Filter Design," Springer 2007.
4. E.Aeha and M.Madrigal, "Power System Harmonics, Computer Modelling and Analysis, " Wiley India, 2012.
5. R.S.Vedam, M.S.Sarma, "Power Quality – VAR Compensation in Power Systems," CRC Press 2013.
6. C. Sankaran, 'Power Quality', CRC press, Taylor & Francis group, 2002.

EE6008 MICROCONTROLLER BASED SYSTEM DESIGN L T P C
3 0 0 3

OBJECTIVES:
- To introduce the architecture of PIC microcontroller
- To educate on use of interrupts and timers
- To educate on the peripheral devices for data communication and transfer
- To introduce the functional blocks of ARM processor
- To educate on the architecture of ARM processors

UNIT I INTRODUCTION TO PIC MICROCONTROLLER 9

Introduction to PIC Microcontroller–PIC 16C6x and PIC16C7x Architecture–PIC16cxx–- Pipelining - Program Memory considerations – Register File Structure - Instruction Set - Addressing modes – Simple Operations.

UNIT II INTERRUPTS AND TIMER 9

PIC micro controller Interrupts- External Interrupts-Interrupt Programming–Loop time subroutine - Timers-Timer Programming– Front panel I/O-Soft Keys– State machines and key switches– Display of Constant and Variable strings.

UNIT III PERIPHERALS AND INTERFACING 9

I^2C Bus for Peripherals Chip Access– Bus operation-Bus subroutines– Serial EEPROM—Analog to Digital Converter–UART-Baud rate selection–Data handling circuit–Initialization - LCD and keyboard Interfacing -ADC, DAC, and Sensor Interfacing.

UNIT IV INTRODUCTION TO ARM PROCESSOR 9

ARM Architecture –ARM programmer's model –ARM Development tools- Memory Hierarchy –ARM Assembly Language Programming–Simple Examples–Architectural Support for Operating systems.

UNIT V ARM ORGANIZATION 9

3-Stage Pipeline ARM Organization– 5-Stage Pipeline ARM Organization–ARM Instruction Execution- ARM Implementation– ARM Instruction Set– ARM coprocessor interface– Architectural support for High Level Languages – Embedded ARM Applications.

TOTAL: 45 PERIODS

OUTCOMES:
- To understand and apply computing platform and software for engineering problems.
- To understand ethical issues, environmental impact and acquire management skills.

TEXT BOOKS:

1. Peatman,J.B., "Design with PIC Micro Controllers"PearsonEducation,3rd Edition, 2004.
2. Furber,S., "ARM System on Chip Architecture" Addison Wesley trade Computer Publication, 2000.

REFERENCE:

1. Mazidi, M.A.,"PIC Microcontroller" Rollin Mckinlay, Danny causey Printice Hall of India, 2007.

EE6711 POWER SYSTEM SIMULATION LABORATORY LT P C
0 0 3 2

OBJECTIVES:

To provide better understanding of power system analysis through digital simulation

LIST OF EXPERIMENTS:

1. Computation of Parameters and Modelling of Transmission Lines
2. Formation of Bus Admittance and Impedance Matrices and Solution of Networks.
3. Load Flow Analysis - I : Solution of load flow and related problems using Gauss-Seidel Method
4. Load Flow Analysis - II: Solution of load flow and related problems using Newton Raphson.
5. Fault Analysis
6. Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System
7. Transient Stability Analysis of Multi machine Power Systems
8. Electromagnetic Transients in Power Systems
9. Load – Frequency Dynamics of Single- Area and Two-Area Power Systems
10. Economic Dispatch in Power Systems.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and analyze power system operation, stability, control and protection.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Personal computers (Pentium-IV, 80GB, 512 MBRAM) – 25 nos
2. Printer laser- 1 No.
3. Dot matrix- 1 No.
4. Server (Pentium IV, 80GB, 1GBRAM) (High Speed Processor) – 1 No.
5. Software: any power system simulation software - 5 licenses
6. Compliers: C, C++, VB, VC++ - 25 users

EE6712 COMPREHENSION L T P C
0 0 2 1

OBJECTIVES:

To encourage the students to comprehend the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise.

METHOD OF EVALUATION:

The students will be assessed 100% internally through weekly test with objective type questions on all the subject related topics

TOTAL : 30 PERIODS

OUTCOMES:

- Ability to review, prepare and present technological developments

K.L.N. COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
LECTURE SCHEDULE

Degree/Program: **B.E / EEE** Course code &Name: **EE6701 HIGH VOLTAGE ENGINEERING**
Duration: **July -Oct 2016** Semester: **VII** Section: **A, B &C**
Staff: **SPS, NVRV & VS** Regulation: **2013/AUC**

Aim:

To understand High voltage engineering concepts

Objectives:

- To understand the various types of over voltages in power system and protection methods.
- Generation of over voltages in laboratories.
- Measurement of over voltages.
- Nature of Breakdown mechanism in solid, liquid and gaseous dielectrics.
- Testing of power apparatus and insulation coordination.

Prerequisites: Transmission and Distribution and Power system analysis.

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

Course	Course Outcome	POs	PSOs
C401.1	Identify the causes of over voltage and its effects in power system.	1,2,4, 6	1,3
C401.2	Classify the breakdown Mechanisms in Solid, Liquid, gases and Composite dielectrics		
C401.3	Design different type of Generating circuit for high voltage D.C and high voltage A.C		
C401.4	Measure A.C and D.C high voltage and current using appropriate method		
C401.5	Test the transformer ,insulator , circuit breakers, surge diverters and cables also discuss the insulation coordination		

S. No	Date	Period Number	Topics to be covered	Book No [Page No]
UNIT I			**OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS**	**Target Periods 09**
1			Introduction	Notes
2			Causes of over voltages and its effects on power system	T1[285-286]
3			Lightening	T1[286-296]
4			Switching surges & temporary over voltage	T1[314-319]
5			Temporary over voltages & other abnormal conditions	T1[319-322]-
6			Corona and its consequences	Notes
7			Protection against over voltages	T1[322-327]
8				
9			Reflection and refraction of travelling waves	T1[298-307]
Class Test I				Total planned periods : 09
UNIT II			**DIELECTRIC BREAKDOWN**	**Target Periods 09**
10			Gas breakdown and breakdown theories	T1[29-44]
11			Gaseous breakdown in uniform & non-uniform fields	T1[47-52]
12			Corona discharges	T1[47-52]
13			Vacuum breakdown and the classification of breakdown mechanism	T1[58-62]
14			Conduction & breakdown in pure liquids	T1[76-78]
15			Conduction & breakdown in commercial liquids	T1[79-82]
16			Breakdown mechanisms in solids Dielectric	T1[94-98]
17				

18			Breakdown mechanisms in Composite Dielectric	T1[98-103]
CIT I (Unit-I&II)				Total planned periods : 09
Assignment -I				
UNIT III			**GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS**	**Target Periods 09**
19			Generation of High D.C Voltages	T1[142-145]
20			Simple voltage doubler circuit	T1[145-158]
21			Generation of high alternating voltages	T1[161-166]
22			Generation of high frequency A.C high voltages	T1[167-169]
23			Standard Impulse Wave shape	T1[169-179]
24			Generation of Switching surges	T1[182-187]
25			Multistage impulse generators	T1[179-182]
26			Impulse current& voltage generation	T1[185-189]
27			Tripping and control of Impulse generators	T1[189-191]
Assignment - II Class test-II-Unit-III				Total Planned periods: 09
UNIT IV			**MEASUREMENTS OF HIGH VOLTAGES AND HIGH CURRENTS**	**Target Periods 09**
28			High Resistance with series ammeter	T1[206-208]
29			Dividers, Resistance, Capacitance and Mixed dividers	T1[237-251]
30				
31			Peak Voltmeter, Generating Voltmeters	T1[209-211] T1[223-227]
32			Capacitance Voltage Transformers	T1[218-220]
33			Electrostatic Voltmeters & Sphere Gaps	T1[221-236]
34				
35			High current shunts	T1[253-260]
36			Digital technique in high voltage Measurement	T1[267-272]
37				
38			Quiz-1	
39			Seminar-1	
Assignment: III CIT –II-(Unit-III,IV)				Total planned periods : 12
UNIT V			**HIGH VOLTAGE TESTING AND INSULATION COORDINATION**	**Target Periods 09**
40			High voltage testing of electrical power apparatus	Notes
41			Testing of Insulator : Power frequency, impulse voltage and DC testing	T1[399-404]
42				
43				
44			Testing of bushing	T1[404-406]
45			Testing of isolators and circuit breaker.	T1[406-410]
46			Testing of transformer	T1[415-420]
47			Insulation coordination	T1[336-346]
48				
49			Quiz -2	
50			Seminar-2	
51			***Content beyond syllabus:*** Testing cables and surge diverters	
Class test-III-Unit-V				Total planned periods : 12

Test/Ref	Title of the book	Author	Publisher/Edition
T1	High Voltage Engineering	S.Naidu and V.Kamaraju	Tata McGraw Hill, Fifth Edition, 2013
T2	High voltage Engineering fundamentals	E. Kuffel and W.S. Zaengl, J.Kuffel	Newnes Second Edition Elsevier ,2005
T3	An Introduction to High Voltage Engineering	Subir Ray	PHI Learning Private Limited, Second Edition, 2013.
R1	High Voltage Technology	L.L. Alston	Oxford University Press, First Indian Edition, 2011
R2	High voltage engineering	C.L. Wadhwa	New Age International Publishers, Third Edition, 2010

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C401.1	1	1	-	2	-	2	-	-	-	-	-	-	1	-	1
C401.2	1	1	-	2	-	2	-	-	-	-	-	-	1	-	1
C401.3	1	1	-	2	-	2	-	-	-	-	-	-	1	-	1
C401.4	1	1	-	2	-	2	-	-	-	-	-	-	1	-	1
C401.5	1	1	-	2	-	2	-	-	-	-	-	-	1	-	1
C401	**1**	**1**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**

Content Beyond syllabus Added (CBS)	POs	Unit
Testing of cables and surge diverters	PO4 & PO6	V

PSOs	PROGRAMME OUTCOMES(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
PSO1	3	3	3	3	2	1	1	1	1	1	1	1
PSO2	1	1	1	1	3	1	1	1	3	1	1	3
PSO3	1	1	2	2	1	3	3	3	2	3	2	1

Faculty In-Charge **HOD/EEE**

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

Lecture Schedule

Course/Branch : **B.E / EEE** Subject: **PROTECTION AND SWITCHGEAR** Duration: **June-October 2017.**
Subject Code : **EE6702** Semester : **VII** Section: **'A, B & C'** Regulation: **2013**
Staff Handling : **Dr. K. GNANAMBAL, M. GANESH KUMARI, Dr. A.P.S. RAMALAKSHMI**

AIM

To introduce the students to the various abnormal operating conditions in power system and describe the apparatus and system protection schemes. Also to describe the phenomena of current interruption to study the various switchgears.

OBJECTIVES

- To educate the causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
- To introduce the characteristics and functions of relays and protection schemes.
- To impart knowledge on apparatus protection
- To introduce static and numerical relays
- To impart knowledge on functioning of circuit breakers

PRE-REQUISITE; Measurements and Instrumentation, Power System Analysis.

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

Course	Course Outcome	POs	PSOs
C402.1	Summarize the causes and effects of faults in power system and explain the necessity of protection in power system.	1,2,3,6,7	1,3
C402.2	Describe the operation of electromagnetic relays and draw their characteristic curves.	1,2,3,6,7	1,3
C402.3	List out the various faults that can occur on alternator, transformer, busbar and transmission line and select the suitable protection schemes.	1,2,3,6,7	1,3
C402.4	Synthesize the static relays using comparators and explain numerical relays.	1,2,3,6,7	1,3
C402.5	Derive the expression for RRRV, critical resistance value and compare the various types of circuit breakers.	1,2,3,6,7	1,3

S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I: PROTECTION SCHEMES				**Target Periods : 9**
1			Principles and need for protective schemes	6 (1-6)
2			Nature and causes of faults	6(2-3),7 (1-13)
3			Types of faults	6(3-4),7 (1-13)
4			Fault current calculation using symmetrical components	6(107-114), 6(146-151)
5				
6			Methods of Neutral grounding- Effective, Resistance, Resonant grounding	6(200-212)
7			Reactance, Voltage transformer grounding, Grounding through grounding transformer	
8			Zones of protection	6(9-11)
9			Essential qualities of protection	6 (11-12)
10			Protection schemes	6(19-20)
11				
Assignment 1		*Date of Announcement :*	*Date Of Submission :*	
Test-I-Class test – I ()				***Total Planned Periods:11***
UNIT II: ELECTROMAGNETIC RELAYS				**Target Periods : 9**
12			Operating principles of relays	1 (656-660)
13			Universal relay, Torque equation – R-X diagram	
14			Electromagnetic Relays	
15			Non directional over current relays – PSM, TMS, Time characteristics	1 (663-666)
16			Directional Relay. Directional over current Relay.	1 (666-669)
17			Distance Relay. Impedance Relay – Types – Construction, Principle and Characteristics	1 (670-672)
18			Reactance Relay and Mho Relay – Types – Construction, Principle and Characteristics.	1 (673-675)
19			Differential Relay – Demerits. Biased Differential Relay. Voltage differential relay.	1 (679-682)
20			Negative sequence and Under frequency relays.	1 (685-687), 3(1242-1245)
21			Quiz I	
Test-II- CIT-I ()				***Total Planned Periods:10***
UNIT III: APPARATUS PROTECTION				**Target Periods : 9**
22			CTs and their applications in protection schemes	6 (65-93)
23			PTs and their applications in protection schemes	6 (65-93)
24			Transformer Protection – Protection against internal fault, over fluxing, Over voltage.	1 (704-713)

25			Generator Protection – Protection against Stator Faults	1 (691-696)
26			Protection against Rotor Faults	1 (697-704)
27			Motor protection	1 (716),
28			Bus bar Protection	1(719-720)
29			Transmission line protection	1(722-735)
30			Feeder Protection	
31			Carrier current protection	
32			Quiz II	1(722-735)
Assignment 2		*Date of Announcement : Date Of Submission :*		
Test-III-Class test II ()				***Total Planned Periods:11***
UNIT IV: STATIC RELAYS AND NUMERICAL PROTECTION				**Target Periods : 9**
33			Basis of Static relay development	5(180-187)
34			Classification of Static Relays	5(180-187)
35			Phase Comparator	5(219-220)
36			Amplitude Comparator	5(213-219)
37			Synthesis of various relays using Static comparators	7(204-210)
38			Block diagram of Numerical relays	7(223-224)
39			Over current protection of transmission lines	7(243-244)
40			Transformer differential protection of transmission lines	7(245)
41			Distant protection of transmission lines	7(243-247)
42			Quiz III	
Test-IV- CIT-II ()				***Total Planned Periods:10***
UNIT V: CIRCUIT BREAKERS				**Target Periods : 9**
43			Physics of arcing phenomenon and arc interruption	1 (593)
44			DC and AC circuit breaking	1 (635-636), 1 (593-595)
45			Re-striking voltage and recovery voltage, rate of rise of recovery voltage	1 (595-597)
46			Resistance switching - current chopping - interruption of capacitive current	1 (604-607), 1 (603-604)
47			Types of circuit breakers – air blast, air break	1(608)6(547-548),1 (615-619)
48			Oil circuit breaker	1 (608-612), 1 (613-615)
49			SF6 and vacuum circuit breakers	1 (626-630)
50			Comparison of different circuit breakers	1(189),5(334)
51			Rating and selection of Circuit breakers	6(565-570), 6(114-115), 5(362-363)
52			Content Beyond syllabus — High voltage testing of cables and circuit breakers & ANSI coding of protective relays	
53			Seminar I	-
Assignment -3		*Date of Announcement : Date Of Submission :*		***Total Planned Periods:12***
Test-V-CT – III ()			*Model Theory Exam ()*	

Books: Text/Reference

S. No	Title of the Book	Author	Publisher	Year
1	A Text Book on Power System Engineering	Soni.M.L, Gupta.P.V, Bhatnagar.V.S, Chakrabarti.A,	Dhanpat Rai & Co.,	1998.
2	A Text book of Power System Engineering	Rajput.R.K,	Laxmi Publications	2007
3	Switchgear and Protection	Sunil S. Rao	Khanna publishers	1986
4	Electrical Power Systems	Wadhwa.C.L	New Age International (P) Ltd,	2000
5	Power System Protection & Switchgear	Ravindranath.B and Chander.N,	New Age International Pvt Ltd Publishers	2011
6	Power System Protection and Switchgear	Badri Ram, Vishwakarma	Tata McGraw Hill	2001
7	Fundamentals of Power System Protection	Paithankar Y.G. and Bhide S.R	Prentice Hall of India	2003
8	Switchgear and Protection	J.B.Gupta	S.K.Kataria & Sons	2013

Course	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO 3
C402.1	3	2	1	-	-	1	1	-	-	-	-	-	2	-	1
C402.2	3	2	1	-	-	1	1	-	-	-	-	-	2	-	1
C402.3	3	2	1	-	-	1	1	-	-	-	-	-	2	-	1
C402.4	3	2	1	-	-	1	1	-	-	-	-	-	2	-	1
C402.5	3	2	1	-	-	1	1	-	-	-	-	-	2	-	1
C402	3	2	1	-	-	1	1	-	-	-	-	-	2	-	1

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
High voltage testing of cables and circuit breakers & ANSI coding of protective relays	PO5 (1) vacant filled	C402.2 / II

WEB REFERENCE:www.nptel.iitm.ac.in

STAFF INCHARGE **HOD/EEE**

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

Lecture Schedule

Degree/Program: **B.E / EEE.**Course code &Name: **EE6703** –Special Electrical Machines.

Duration: **June -Oct 2017.** Semester: VII**.** Section: A Staff: P.LOGANTHURAI. Regulation: **2013.**

AIM: To expose the students to the construction, principle of operation and performance of special electrical machines as an extension to the study of basic electrical machines

OBJECTIVES

To impart knowledge on

i. Construction, principle of operation and performance of synchronous reluctance motors.
ii. Construction, principle of operation and performance of stepping motors.
iii. Construction, principle of operation and performance of switched reluctance motors.
iv. Construction, principle of operation and performance of permanent magnet brushless D.C. motors.
v. Construction, principle of operation and performance of permanent magnet synchronous motors.

Prerequisites: Electrical machines-I, Electrical machines-II, Electromagnetic theory, Power electronics.

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

C403.1	Explain the necessity to improve the saliency of synchronous reluctance motor and its characteristics	**POs**	**PSOs**
C403.2	Compare the various methods of excitation of different types of stepper motor and its driver circuits	**1,2, 5**	1
C403.3	Describe the operation of switched reluctance motor with and without sensors		1
C403.4	Explain the electronic commutation of permanent magnet brushless D.C. motors and to determine the torque production		1
C403.5	Derive the expression for emf and torque of permanent magnet synchronous motors and choose power controller for permanent magnet synchronous motors.		1

S.No	Date	No. of Periods	Topics to be Covered	Book No [Page No]
UNIT I - SYNCHRONOUS RELUCTANCE MOTORS				**Target Periods: 9**
1			Constructional features	R4 (1.1-1.10)R5(7.1-7.7)
2			Axial air gap motors	R5(7.1-7.7)
3			Radial air gap motors	R5(7.1-7.7).
4			Operating principle	R5(7.7-7.8)
5			Variable Reluctance motor	R5(7.15-7.18)
6			Hybrid Motors	R4(1.10-1.11)
7			Synchronous Reluctance	R4(1.13-1.15)
8			Voltage and Torque Equations	R4(1.15-1.23)
9			Phasor diagram	R4(1.23-1.24)
10			Characteristics	R5(7.10)
11			CBS-1	
UNIT II - STEPPER MOTORS				**Target Periods: 9**
12			Constructional features	R4(2.1-2.6)
13			Principle of operation	R4(2.1-2.6).
14			Variable reluctance motor -Various modes of operation	R4(2.6-2.10)
15			Permanent magnet - Various modes of operation	R4(2.7-2.26)
16			Hybrid motor	R4(2.9-2.31)
17			Multi stack configurations	R4(2.12-.13)
18			Theory of torque predictions	R4(2.31-2.38)
19			Modes of excitations	
20				R5(2.24-2.32)
21			Characteristics of stepper motor	R4(2.38-2.46)
22			Drive circuits	R4(2.46-2.68)
23			Microprocessor control of stepping motors	R4(2.75-2.78)

24			Closed loop control & Applications	R4(2.74)
25			**Self study/Seminar/Quiz**	
UNIT III SWITCHED RELUCTANCE MOTORS				**Target Periods : 9**
26			Constructional features Rotary and Linear SRMs	R4(3.1-3.10)
27			Principle of operation	R4(3.11-3.15)
28			Torque production	R4(3.41-3.44)
29			Steady state performance prediction- Analytical method	R4(3.24-3.31)
30			Power Converters and their controllers	R4(3.15-3.24)
31				R4(3.15-3.24)
32			Methods of Rotor position sensing	R4(3.32-3.34)
33			Sensorless operation of SRM	R4(3.56-33.57)
34			Closed loop control of SRM	R4(3.53-3.56)
35			Characteristics &applications	R4(3.46-3.48)
36			**Self study/Seminar/Quiz**	
UNIT IV - PERMANENT MAGNET BRUSHLESS D.C. MOTORS				**Target Periods : 9**
37			Permanent Magnet materials	R4(4.1-4.5)
38			Magnetic Characteristics- Permeance coefficient	R4(4.5-4.9)
39			Principle of operation.	R4(4.23-4.27)
40				
41			Magnetic circuit analysis	R4(4.64-4.68)
42			EMF equations	R4(4.42-4.46)
43			Torque equations	R4(4.48.4.51)
44			Commutation	
45			Power controllers	R4(4.40.4.42)
46			Motor characteristics and control	R4(4.52.4.63)
47				
48			CBS-2	
UNIT V . PERMANENT MAGNET SYNCHRONOUS MOTORS				**Target Periods 9**
49			Principle of operation. Ideal PMSM	R4(5.1.5.6)
50			EMF equations	R5(6.5.6.9)
51			Torque equations	R5(6.11.6.15)
52			Armature reaction MMF	R4(5.21.5.23))
53			Synchronous Reactance	R4(5.2.4)
54			Sinewave motor with practical windings	R4(5.24.5.26)
55			Phasor diagram	R4(5.27.5.30))
56			Torque speed characteristics	R4(5.31.5.32)
57			Power controllers	R4(5.31.5.32)
58			Converter Volt.ampere requirements.	R4(5.43.5.44)
59			**Self study/Seminar/Quiz**	
Class Test-III-3rd -5th- Oct 2017				
Class Test.I. **(12th – 19th July 2017)**				
C.I.T.I **CIT – I – 31st July– 07th August 2017**				
Class Test.II **Class Test-II-21st - 28th August 2017**				

C.I.T.II	**CIT – II– 11th – 18th Sep 2017**
Class Test.III	**Class Test-III-3rd -5th- Oct 2017**

Text/Ref	**Title of the Book**	**Author**	**Publisher/Edition**
T1	Special Electrical Machines	K.Venkataratnam	Universities Press (India) Private Limited2008
T2	Brushless Permanent Magnet and Reluctance Motor Drives'	T.J.E. Miller	Oxford /1989
T3.	Stepping Motors and Their Microprocessor Controls	Kenjo	Clarendon Press London /1984
R1.	Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application	Krishnan.R,	CRC Press, New York, 2001
R2.	Stepping Motors – A Guide to Motor Theory and Practice.	Aearnley.P.P	Peter Perengrinus, London /1982
R3.	Permanent Magnet and Brushless DC Motors	Kenjo.T and Nagamori.S,	Clarendon Press, London/1988
R4	Special Electrical Machines	R.Senthil Kumar S.Prakash	Charulatha/2008
R5	Special Electrical Machines	K.Dhayalini	Anuradha/2013
R6	'Special electrical machines	E.G. Janardanan	PHI learning Private Limited, Delhi, 2014.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
C403.1	3	2	.	.	1	.	.	.	.	.	.	.	1	.	.
C403.2	3	2	.	.	1	.	.	.	.	.	.	.	1	.	.
C403.3	3	2	.	.	1	.	.	.	.	.	.	.	1	.	.
C403.4	3	2	.	.	1	.	.	.	.	.	.	.	1	.	.
C403.5	3	2	.	.	1	.	.	.	.	.	.	.	1	.	.
C403	3	2	.	.	1	.	.	.	.	.	.	.	1	.	.

Content Beyond Syllabus Added(CBS)	POs	Unit
Synchronous Reluctabce Motor/Alternator for Flywheel Energy Storage System.High speed SRM design.Energy storage system.greater reliability and lower cost	PO11(l)	I
Simplified Sensorless Control for BLDC Motor, Using DSP Technology.simple way to control, in a sensorless way, a Brushless DC (BLDC) motor for electric vehicle applications.	PO11(1)	IV

STAFF INCHARGE **HOD/EEE**

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

Lecture Schedule

Degree/Program: **B.E / EEE.** Course code &Name: MG6851 –Principles of Management
Duration: **June -Oct 2017.** Semester: VII**.** Section : A,B & C
Staff : Dr.S.Venkatanarayanan,A.Manoj Regulation : **2013.**

AIM: To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

OBJECTIVES

To impart knowledge on
(i). To learn the basic and Evaluation of Management .
(ii). To learn the various Planning and decision making techniques.
(ii) To learn Organizing and HR management
(iv) To learn about Directing with motivation and job satisfaction
(v). To learn the various Controlling techniques such as budgetary and non budgetary control.

Prerequisites: Not defined and not required as this is the basic course.

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

C404.1	Describe the basic of management and its types, skills, management roles, types of business organizations and current trends in business.	**POs**	**PSOs**
C404.2	Explain the nature and purpose of planning , types, objective of planning and decision process	**4,6, 7,9, 11, 12**	**1 1 1 1 1**
C404.3	Compare the different organization structures, Authorities and responsibilities, Human resource management and training and development.		
C404.4	Estimate the individual and group behavior, motivation, job satisfaction, types and theories of leadership, communication and IT.		
C404.5	Apply the knowledge using the various System and process of controlling, budgetary and non-budgetary control techniques, use of computers and IT in Management control, reporting.		

S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I - Introduction to Management and Organizations				**Target Periods : 10**
1			Definition of Management – Science or Art Manager Vs Entrepreneur	T1[11-30] R3[1-5],R4[1.2]
2			Types of managers -managerial roles and skills Evolution of Management	T2[24-80] R3[6-9] R4[1.2]
3			Scientific, human relations , system and contingency approaches	T1[37-70] R3[24-26] R4[1.3]
4			Types of Business organization	T1[75-85] R3[38-50] R4[1.5]
5			Sole proprietorship, partnership	T1[14-30] R4[1.5]
6			Company-public and private sector enterprises	T1[18] R4[1.8]
7			Organization culture	T1[66-70] R4[1.8]
8			Environment in business	T1[84-100] R4[2.26]
9			Current trends and issues in Management Role of managers	T1[101-126] R4[5.54]
10			Case Studies (Content beyond syllabus)	
			Class Test –I	
Assignment - 1				
UNIT II Planning				**Target Periods : 10**
11			Planning – Introduction	T1 [204-210] R3[1-10] R4[2.2]
12			Nature and purpose of planning	T1 [206] R3[18-30] R4[2.2-2.3]
13			Planning process	R2 [185-220] R3[24-26]
14			Types of Plans	T1 [208] R3[26-33] R4[2.8]
15			Objectives - Managing by objectives (MBO)	T1 [221] R3[49-61] R4[2.16]
16			Types of strategies	T1[224-229]R3[63-65] R4[2.22]
17			Policies - Decision Making - Types of decision	T1[171-176] R3[67] R4[2.31]
18			Decision Making Process - Rational Decision Making	T1[176]R3[70] R4[2.39]
19			Decision Making under different conditions	T1[178] R3[68-75] R4[2.45]
20			Case studies(Content Beyond Syllabus)	
CIT - I				
Assignment 2				
UNIT III Organizing				**Target Periods : 12**
21			Introduction to organizing	T1[296] R3[3.1-3.4] R4[3.2]
22			Nature and purpose of organizing	T1[297-299] R3[5-7] R4[3.3]

23			Organization structure	T1[302-307] R3[19] R4[3.17]
24			Formal and informal groups	T[308] R3[22-25] R4[3.8]
25			organization - Line authority	T1[296] R2[31-68] R4[3.33]
26			Staff authority	T1[296] R2[31-68] R4[3.33}
27			Departmentation - Span of control Centralization and Decentralization	T1[297] R2[69-111] R3[29]
28			Delegation of authority - Staffing - Selection and Recruitment – Orientation	T1[310-320] R4[3.43,3.50]
29			Career Development - Career stages	T1[384-389] R3[3.33-3.35]
30			Training - Performance Appraisal Case studies (CBS)	T1[387] R2[147-160] R3[41-45]
31			NPTEL Lecture	
32			Revision	
Class Test –II				
Assignment -3				
UNIT IV Directing				**Target Periods : 13**
33			Creativity and Innovation	T1[498-502]R3[4.1-72] R4[4.4]
34			Motivation	T1[503-505] R4[4.21]
35			Satisfaction	R4[4.21]
36			Introduction to Motivation	T1[506-507] R3[4.9] R4[4.26]
37			Motivation Theories	T1[506-507] R3[4.9] R4[4.26]
38			Leadership Styles	T1[530-539] R3[19-27] R4[4.8]
39			Leadership theories	T1[540-542] R3[4.40] R4[4.8]
40			Communication - Barriers to effective communication	T1[322-347] R3[4.40 R4[4.55]
41			Organization Culture	T1[296-301]
42			Elements and types of culture	T1[302-303]R3[49-47]
43			Managing cultural diversity	T1[310-313]
44			Case studies (Content Beyond Syllabus)	T1[272-276]
45			NPTEL Lecture	
CIT II				
Assignment – 4				
UNIT V Controlling				**Target Periods : 11**
45			Process of controlling	T1[638-639] R4[1.2] R3[40-45]
46			Types of control	T1[640-642R3[45-49] R4[5.6]
47			Budgetary and non-budgetary control techniques	T1[644-647] R3[50-53]R4[5.10]
48			Managing Productivity	T1[648] R3[55-60] R4[5.23]
49			Cost Control	T1[649] R3[70-74] R4[5.10]
50			Purchase Control	T1[650] R3[62-63] R4[5.10]
51			Maintenance Control	T1[651] R3[85-87] R4[5.51]
52			Quality Control	T1[653] R3[92-96]
53			Planning operations	T1[657] R3[94-95] R4[5.30]
54			Application of POM in Engineering(CBS)	Case references
55			Revision and case studies	Notes
56			Seminar /Case study	T1,T2,R1.R2,R3,R4 AND R5
57			Seminar/Case study	T1,T2,R1.R2,R3,R4 AND R5
58			Seminar /Case study	T1,T2,R1.R2,R3,R4 AND R5
59			Seminar /Case study	T1,T2,R1.R2,R3,R4 AND R5
CIT III/ Model Test				

Tex/Ref	Title of the Book	Author	Publisher/Edition
T.1	Management	Stephen P. Robbins and Mary Coulter,	Prentice Hall of India 10th edition./2009
T.2	Management.	JAF Stoner, Freeman R.E and Daniel R Gilbert	Pearson Education, 6th Edition /2004
R.1	Fundamentals of Management	Stephen A. Robbins & David A. Decenzo & Mary Coulter	Pearson Education, 7th Edition/ 2011
R.2	Management	Robert Kreitner & Mamata Mohapatra	Biztantra /2008
R.3	Essentials of Management	Harold Koontz & Heinz Weihrich	Tata McGraw Hill,1998.
R4	Principles of Management	Tripathy PC & Reddy PN	Tata Mcgraw Hill/1999
R5	Principles of Management	S.Bhaskar	Anuradha Publications/2011
	Website reference	NPTEL, You tube http://www.casestudyinc.com/	

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C404.1	-	-	-	3	-	2	2	-	1	-	3	3	1	1	1
C404.2	-	-	-	3	-	2	2	-	1	-	3	3	1	1	1
C404.3	-	-	-	3	-	2	2	-	1	-	3	3	1	1	1
C404.4	-	-	-	3	-	2	2	-	1	-	3	3	1	1	1
C404.5	-	-	-	3	-	2	2	-	1	-	3	3	1	1	1
C404	-	-	-	3	-	2	2	-	1	-	3	3	1	1	1

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Application of POM in Engineering	PO10 (1)(Vacant filled)	C404.5 / V

Staff in charge **HOD/EEE**

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

Lecture Schedule

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

Course code &Name: **EE6005- POWER QUALITY** Duration: **July -Oct 2017**

Semester: **VII** Section : A,B & C Regulation : **2013/AUC**

Staff handling : **Mr.M.Jegadeesan & Dr.A.S.S.Murugan**

AIM: To study the various issues affecting Power Quality, their production, monitoring and suppression.

OBJECTIVES

To introduce the power quality problems

To educate the production of voltage sags, overvoltage and harmonics and methods of control

To study over voltage problems.

To study the sources and effect of harmonics in power system

To impact knowledge on various methods of power quality monitoring

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

CO	Course Outcomes	PO	PSO
C405E4.1	Discuss the various types of power quality problem	1,2,3,5,6	1,3
C405E4.2	Analyze the sources ,types and mitigation of voltage sag problem	1,2,3,5,6	1,3
C405E4.3	Analyze the sources ,types and mitigation of over voltage issues and model of over voltage problem with computer software tools.	1,2,3,5,6	1,3
C405E4.4	Evaluate the effects of harmonics on power system equipments and analyze the methods of controlling of harmonics.	1,2,3,5,6	1,3
C405E4.5	Explain the principle of operation of various types of power quality monitoring devices.	1,2,3,5,6	1,3

S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I - INTRODUCTION TO POWER QUALITY				**Target Periods: 9**
1			Introduction-Importance of power quality	1 (1-10)4(1)
2			Terms and definitions for power quality issues.	1(19)
3			Short and long duration disturbances	1(15-19)4(3,4)
4			Sag-swell- interruption	1(20-23) 4(2)
5			Under voltage-over voltage- sustained interruption	1(17-19)
6			voltage imbalance –Distorted waveforms	1(20-24) 4(2-6)
7			Harmonics-THD-TDD	
8			Voltage fluctuation - power frequency variations	1(28-31) 4(11-15)
9			International standards of power quality-IEEE-IEC	3 (477-483)4(19-30)
10			Computer Business Equipment Manufacturers Associations (CBEMA) curve.	1(40-42)4(30-33)
Total Periods		**13**	**Test-I [Class test-1]**	
		UNIT II	**VOLTAGE SAGS AND INTERRUPTIONS**	**Target Periods: 9**
11			Types, sources and impacts of sags and interruptions	1(43-47)
12			Estimating voltage sags performance	1(47-59)
13			Thevenin's equivalent source	1(52-59)
14			Analysis and calculation of various faulted condition	1(52-59)
15			Voltage sags due to induction motor starting	1(78-80) ,3(248-251)
16			Estimation of the sag severity due to motor starting	1(80,81)
17			Different techniques for mitigation of voltage sags	1(59-73)
18			Active series compensators	1(64,65)
19			Static transfer switches- Fast transfer switches	1(71-73),3(404,405)
20			NPTEL Lecture	Material
Total Periods		**12**		
Assignment –I Due Date:			**Test-II [CIT-1]**	
UNIT III OVERVOLTAGES				**Target Periods: 9**
21			Sources of over voltages-Types of over voltages	1(15-19)

22			Capacitor switching	1(111-116)
23			Lightning - ferro resonance	1(117-127)
24			Mitigation of voltage swells - surge arresters -	1(133-136)
25			Low pass filters- Power conditioners protection	1(136-140)
26			Lightning -Shielding - line arresters	1(145-149)
27			Protection of transformers and cables	1(149-157)
28			An introduction to computer analysis tools for transients	PSCAD Manual 1(164)
29			PSCAD and EMTP	
30			NPTEL Lecture	Material
Total Periods		**10**		
Assignment-II	***Due Date:***		**Test-III [Class Test-2]**	
		UNIT IV	**HARMONICS**	**Target Periods : 9**
31			Harmonic sources from commercial and industrial loads	1(184-196)4(6-11)
32			Locating harmonic sources.	1(197-199)
33			Power system response characteristics	1(199-209)
34			Harmonics Vs transients - Effect of harmonics	1(172,209-220)
35			Voltage and current distortion - Harmonic indices - inter harmonics- Resonance	1(171,181-184, 220-223,203-208) 4(34-43)
36			Harmonic distortion evaluation	1(225-233)
37			Devices for controlling harmonic distortion	1(248-264)
38			Passive and active filters.	1(252-264)
39			IEEE and IEC standards.	1(282-292)4(35-40)
Total Periods		**9**		
		Assignment-III	***Due Date:***	**Test-IV [CIT-2]**
			UNIT V - POWER QUALITY MONITORING	**Target period -9**
40			Monitoring considerations	1(456)
41			Monitoring and Diagnostic techniques for various power quality problems.	1(457-467)
42			Modeling of power quality (harmonics)problems with mathematical simulation tools	1(237-248)
43			Modeling of power quality (voltage sag)problems with mathematical simulation tools	Material
44			Power line disturbance Analyzer	1(475)
45			Harmonic / spectrum Analyzer	1(477-479)4(132-140)
46			Combination disturbance and harmonic analyzers	1(479-480)
47			Flicker meters	1(480-487)4(144-155)
48			Applications of expert systems for power quality monitoring	1(498-502)
49			Measurement of Harmonics-A practical approach (CBS)	Practical
50			Seminar	PPT
51			Seminar	PPT
52			Quiz	Material
Total Periods		**13**	**Test-V [CIT-3]**	

Books: Text/Reference

S.L.No	Text/Ref	Title of the Book	Author	Publisher	Year
1	T1	Electrical Power Systems Quality	Roger. C. Dugan	McGraw Hill (For Chapters1,2,3, 4 and 5)	2004

2	R1	'Electric Power Quality	G.T. Heydt,	2nd Edition. (West Lafayette, IN, Stars in a Circle Publications). (For Chapter 1, 2, 3 and 5)	1994
3	R2	Understanding Power Quality Problems: Voltage Sags and Interruptions',	M.H.J Bollen	(New York: IEEE Press, 1999). (For Chapters 1, 2, 3 and 5)	1999
4	R3	Power System Quality Assessment	J. Arrillaga, N.R. Watson, S. Chen	(New York: Wiley, 1999). (For Chapters 1, 2, 3, 4 and 5)	1999
5	R4	PSCAD User Manual	M.M. El-Wakil	McGraw Hill 1984	2007

Website Reference

1. **http:// en.wikipedia.org/wiki/Power_quality**
2. **http:// iitk.ac.in/infocell/announce/electric_power**
3. **http:// fluke.com/fluke/inen/solutions/pq/**
4. **http:// www.em-ea.org/**

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Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C405E4.1	2	1	1	-	1	2	-	2	-	-	-	-	-	-	-
C405E4.2	3	3	1	-	2	3	-	3	-	-	-	-	-	-	-
C405E4.3	3	3	3	-	3	3	-	3	-	-	-	-	-	-	-
C405E4.4	3	3	3	-	3	3	-	3	-	-	-	-	-	-	-
C405E4.5	2	1	1	-	3	2	-	3	-	-	-	-	-	-	-
C405E4	**3**	**2**	**2**	**-**	**2**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Measurement of harmonics-A practical approach	PO4(3) (vacant filled)	405E4.5 / V

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K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM - 630 612
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
Lecture Schedule

Degree/Program: **B.E / EEE** Course code &Name: **EE6008 –Microcontroller Based System Design**
Duration: **June -Oct 2017** Semester: **VII** Section: **C** Regulation: **2013** Staff: **E.Jeyasri**

AIM: To expose the students to the concepts of PIC microcontroller and ARM processor with its programming

OBJECTIVES:

- To introduce the architecture of PIC microcontroller
- To educate on use of interrupts and timers
- To educate on the peripheral devices for data communication and transfer
- To introduce the functional blocks of ARM processor
- To educate on the architecture of ARM processors

PREREQUISITES: Digital Logic Circuits, Microprocessors and Microcontrollers, Embedded Systems

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

Course	Course Outcome	POs	PSOs
C406E4.1	Describe the basic architecture of PIC16cxx and apply the instruction set for simple operations.	**1,2,3,4,6,10**	**1,3**
C406E4.2	Explain about the PIC micro controllers interrupts and write the interrupt programs	**1,2,3,4,5,9,11**	**1,2,3**
C406E4.3	Apply the program to interface I/O devices with controller like LCD, Keyboard, and Sensors etc.,	**1,2,3,4,5,6,12**	**1,2,3**
C406E4.4	Develop simple applications using ARM assembly language programs	**1,2,3,6,7,8**	**1,3**
C406E4.5	Explain about ARM Organization and ARM Coprocessor interface	**1,2,3,4,6**	**1,2,3**

S. No.	Date	Period	Topics to be Covered	Book & Page. No.
UNIT -I - INTRODUCTION TO PIC MICROCONTROLLER Target periods :10				
1.			Introduction to PIC Microcontroller	T1(2-6)
2.			PIC 16C6x and PIC16C7x Architecture	T1(13-14)
3.			PIC16cxx-Pipelining	T1(13-14)
4.			Program Memory considerations	T1(14-18)
5.				
6.			Register File Structure	T1(18-21)
7.			Instruction Set	T1(24-28)
8.				
9.			Addressing modes	T1(30-32)
10.			Simple Operations	T1(32)
Class test –I- 19.07.17				
Assignment –1 Date of Announcement : 20.07.2017 Date of Submission : 27.07.2017				
UNIT II - INTERRUPTS AND TIMER Target periods :10				
11.			PIC micro controller Interrupts	T1(74-75)
12.			External Interrupts	T1(109-113)
13.			Interrupt Programming	Lecture Notes
14.				
15.			Loop time subroutine	T1(80-81)
16.			Timers	T1(114-126)
17.			Timer Programming	T1(114-126)
18.			Front panel I/O-Soft Keys	T1(157-159)
19.			State machines and key switches	T1(159-163)
20.			Display of Constant and Variable strings	T1(163-171)
Assignment –2 Date of Announcement : 10.08.2017 Date of Submission : 17.08.2017				
Centralized Internal Test – I- 07.08.17				
UNIT III - PERIPHERALS AND INTERFACING Target Periods :10				
21.			I2C Bus for Peripherals Chip Access	T1(177-180)
22.			Bus operation-Bus subroutines	T1(180-184)
23.			Serial EEPROM	T1(188-192)
24.			Analog to Digital Converter	T1(195-204)
25.			UART	T1(206-208)
26.			Baud rate selection	T1(209-210)
27.			Data handling circuit	T1(210-213)
28.			Initialization	T1(210-213)

29.			LCD and keyboard Interfacing	Lecture Notes
30.			ADC, DAC, and Sensor Interfacing	Lecture Notes
31.			Seminar	
Class test-II- 28.08.17				
UNIT IV INTRODUCTION TO ARM PROCESSOR Target Periods :10				
32.			ARM Architecture	T2(35-39)
33.				
34.			ARM programmer's model	T2(39-43)
35.			ARM Development tools	T2(43-47)
36.			Memory Hierarchy	T2(269-290)
37.			ARM Assembly Language Programming	T2(49-69)
38.				
39.			Simple Examples	T2(69-72)
40.				
41.			Architectural Support for Operating systems	T2(291-317)
Assignment –3 Date of Announcement : 20.09.2016 Date of Submission : 27.09.2016				
Centralized Internal Test – II- 18.09.17				
UNIT V ARM ORGANIZATION Target Periods :10				
42.			3-Stage Pipeline ARM Organization	T2(75-77)
43.			5-Stage Pipeline ARM Organization	T2(78-81)
44.			ARM Instruction Execution	T2(83-85)
45.			ARM Implementation	T2(86-100)
46.			ARM Instruction Set	T2(105-149)
47.				
48.			ARM coprocessor interface	T2(101-103)
49.				
50.			Architectural support for High Level Languages	T2(151-187)
51.			Embedded ARM Applications	T2(347-360)
52.			**CONTENT BEYOND SYLLABUS**: Programming of ARM processor using KEIL	Beyond Syllabus
53.			Quiz	-
Class test-III – 05.10.17				

Book Reference:

Text/Ref	**Title of the Book**	**Author**	**Publisher/Edition**
T1	"Design with PIC Micro Controllers"	Peatman,J.B.,	PearsonEducation,.3rdEdition, 2004
T2.	"ARM System on Chip Architecture"	Furber,S.,	Addison Wesley trade Computer Publication,2000.
R1.	"PIC Microcontroller"	Mazidi, M.A.	Rollin Mckinlay, Danny causey Printice Hall of India, 2007.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C406E4.1	2	1	1	2	-	3	-	-	-	2	-	-	2	-	2
C406E4.2	2	1	1	2	1	-	-	-	1	-	2	-	2	1	1
C406E4.3	2	1	1	2	1	2	-	-	-	-	-	1	2	1	1
C406E4.4	2	1	1	-	-	1	1	1	-	-	-	-	1	-	1
C406E4.5	2	1	1	1	-	-	1	1	1	-	-	1	1	1	1
C406E4	2	1	1	1	-	1	-	-	-	-	-	-	2	1	2

Content Beyond Syllabus Added(CBS)	POs	Unit
Programming of ARM processor using KEIL	PO4(2), PO9(2), PO12(2), PSO2(2) (strengthened)	V

STAFF INCHARGE **HOD/EEE**

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6701–High Voltage Engineering- **[C401]**

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

S.No.	**1. Questions.**	COs	POs
Q1.1	Explain briefly about power frequency over voltages in power systems.	1	1.2,4
Q1.2	Discuss the mechanism of lightning strokes including high over voltages on transmission lines.	1	1.2,4
Q1.3	Discuss about cloud and charge formation with the aid of various theories	1	1,2,6
Q1.4	Examine the behavior of travelling waves at open circuited transmission line.	1	1.2,4
Q1.5	What is corona? Explain the consequences of corona and how it can be mitigated	1	1,2,6
Q2.1	Explain in detail the breakdown mechanism in non-uniform fields and phenomenon ofCorona discharge.	2	1.2,4
Q2.2	Describe the ageing and breakdown in composite dielectrics due to partial discharge and the thermal breakdown mechanism of solid dielectrics.	2	1.2,4
Q2.3	Explain composite dielectric and how breakdown occur in it.	2	1,2,6
Q2.4	Explain various process which involved in electric breakdown in vaccum.	2	1.2,4
Q2.5	Discuss briefly about various theories that explain the breakdown mechanism in liquid dielectrics.	2	1.2,4
Q3.1	What is Tesla Coil? How are damped high frequency oscillations obtained from it and explain in detail about Electrostatic generators.	3	1,2,6
Q3.2	Explain tripping and control of impulse generators with Trigatron gap arrangements.	3	1,2,6
Q3.3	Explain generation of high DC voltages using Vande Graff generators with neat diagram.	3	1.2,4
Q3.4	Explain different scheme of cascade connection of transformer for producing very high AC voltages.	3	1,2,6
Q3.5	How the impulse current is generated using capacitor bank. Explain in detail.	3	1.2,4
Q3.6	Explain the operation of simple voltage doubler circuit.	3	1.2,4
Q4.1	Describe the generating voltmeter method for measuring high DC voltages and state its merits and demerits.	4	1,2,6
Q4.2	Explain the working principle and operation of electrostatic voltmeter.	4	1,2,6
Q4.3	Explain the sphere gap arrangement method of high voltage measurements and give the factors influencing the measurement with neat diagram.	4	1.2,4
Q4.4	What are the different types of resistive shunts used for impulse current measurements.	4	1.2,4
Q4.5	What is CVT? Explain how a tuned capacitance voltage transformer can be used for voltage measurement in power system.	4	1,2,6
Q5.1	What are the tests conducted on isolators and circuit breakers explain in detail?	5	1,2,6
Q5.2	Explain the power frequency and impulse voltage test conducted on bushings.	5	1.2,4
Q5.3	How are the protective device chosen for optimal insulation level in a power system?	5	1.2,4

Q5.4	Explain the following (i) Flashover voltage **(ii)** Withstand voltage **(iii)** Impulse voltage **(iv)** Creep age voltage	5	1.2,4
Q5.5	Explain about the testing of transformer.	5	1,2,6
	2. Assignment Questions.		
A2.1	Discuss about the streamer or 'Kanal' mechanism in gaseous dielectric.	C02	1,2,4
A2.2	List out the electrical problems caused by the corona discharge.	CO2	1,2,6
A2.3	Mention the properties of good dielectric material.	CO2	1,2,4
A2.4	Briefly explain the surge voltages, their distribution and control in the power system equipments.	CO2	1,2,4
A2.5	Elaborate the effect of electron attachment on the breakdown criteria.	CO2	1,2,4
A2.6	Discuss the various factor which affect breakdown of gases.	CO2	1,2,6
A3.1	What is the need for generation of high voltages?	CO3	1,2,4
A3.2	Discuss about the generation of high voltage using series resonant circuit.	CO3	1,2,6
A3.3	With neat diagram explain the principle of generation of high frequency AC high voltage.	CO3	1,2,6
A3.4	How do we rectify the difficulties in single stage impulse generator?	CO3	1,2,4
A3.5	Give short notes about tripping and control of impulse generator.	CO3	1,2,4
A4.1	Explain about Faradays generator (or) magneto optic method based current generation.	CO4	1,2,6
A4.2	Mention the methods to find out the peak value and RMS value of the voltage.	CO4	1,2,6
A4.3	Draw the block diagram of High voltage measuring system and also mention the function of each block.	CO4	1,2,4
A4.4	What is meant by "rogowski Coil"?	CO4	1,2,4
A4.5	Explain about Potential divider method for impulse voltage measurements.	CO4	1,2,6

Staff In-Charge HOD/EEE

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6702- Protection And Switchgear [C402]

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

S.No.	**1. Important Questions**	COs	POs
Q.1.1.	(i) Explain the nature and causes of faults. Discuss the consequences of faults on power system.(ii) What are the types of faults?	C402.1	1,2,3,6,7
Q.1.2.	Explain different types of earthing of neutral point of the power system. Derive an expression for the reactance of the Peterson coil in terms of capacitance of the protected line.	C402.1	1,2,3,6,7
Q.1.3.	i)Explain the overlapping of protective zones with neat sketch. (ii)Classify the different types of faults in power system. Which of these are more frequents?	C402.1	1,2,3,6,7
Q.1.4.	Explain the importance of protective schemes employed in power system (ii) Write the essential qualities of protection.	C402.1	1,2,3,6,7
Q.1.5.	(i)Discuss about the various zones of protection used for a modern power system. (ii) What are the essential qualities of a protective relay? Explain	C402.1	1,2,3,6,7
Q.1.6.	(i) Derive the three phase power in terms of symmetrical components ii) Discuss the role of back up protection and explain how the backup protection is achieved in graded time over current protection of transmission lines	C402.1	1,2,3,6,7
Q.1.7.	(i) Illustrate the protective zones in the generating station with a neat diagram. (ii) A short circuit to earth occurs near the terminals of phase A of a 3 phase alternator, star connected with neutral point earthed and the current to the earth being 100Amps. If the alternator is not supplying any normal current, calculate the positive, negative and zero sequence components of currents of all phases. Positive and negative sequence currents are zero.Zero sequence current = (100/3) = 33.33 Amps.	C402.1	1,2,3,6,7
Q.1.8.	Explain in detail the different methods of protection against over voltages.	C402.1	1,2,3,6,7
Q.2.1.	What are the different types of electromagnetic relays? Discuss their field of applications.	C402.2	1,2,3,6,7
Q.2.2.	What are the various types of over current relays? Discuss their area of application.	C402.2	1,2,3,6,7
Q.2.3.	Describe the operating principle, constructional features and area of applications of reverse power or directional relay.	C402.2	1,2,3,6,7
Q.2.4.	Describe the construction and principle of operation of an induction type directional over current relay.	C402.2	1,2,3,6,7
Q.2.5.	Explain the working principle of distance relays.	C402.2	1,2,3,6,7
Q.2.6.	Write a detailed note on differential relays.	C402.2	1,2,3,6,7
Q.2.7.	a)What are the various over current protective schemes? Discuss their merits, demerits and field of application. explain any one in detail. b)Discuss the difference between Electromagnetic and solid state relays.	C402.2	1,2,3,6,7
Q.2.8.	Discuss in what ways is distance protection superior to over current protection for protection of transmission lines. How impedances relay are used in three zones of protection?	C402.2	1,2,3,6,7
Q.2.9.	(i) Derive the universal torque equation.	C402.2	1,2,3,6,7

	(ii) Explain with sketches the construction and operation of induction type over current relay. Also derive the equation for the torque developed by such a relay.		
Q.3.1.	Discuss the types of fault encountered in a transformer.	C402.2	1,2,3,6,7
Q.3.2.	Explain in detail about the stator and rotor protection schemes used in generator.	C402.2	1,2,3,6,7
Q.3.3.	Describe the differential protection scheme of transformer.	C402.2	1,2,3,6,7
Q.3.4.	With neat sketches, explain the different types of protective schemes for transmission lines.	C402.2	1,2,3,6,7
Q.3.5.	Write brief notes on (i) Generator protection (ii) Bus bar protection	C402.2	1,2,3,6,7
Q.3.6.	Explain about stator inter turn protection scheme for alternators	C402.2	1,2,3,6,7
Q.3.7.	A 3 phase 11/6.6 KV star/delta transformer is protected by means of differential protection system. If the CTs on LV side have the ratio of 600/5 A., Determine the ratio of CTs on HV side.	C402.2	1,2,3,6,7
Q.3.8.	(i) Discuss the protection scheme employed against loss of excitation of an alternator. (ii) With neat block diagram explain the concepts of carrier current protection.	C402.2	1,2,3,6,7
Q.3.9.	Explain the balance earth fault protection of alternators	C402.2	1,2,3,6,7
Q.4.1.	What is a static relay and what is the basis for its development? In what way has it been successful in replacing the conventional electromagnetic relays?	C402.2	1,2,3,6,7
Q.4.2.	Name different types of static relays. Discuss the advantanges and disadvantages of static relays as protective devices.	C402.2	1,2,3,6,7
Q.4.3.	Describe different types of static amplitude comparators. Discuss their relative advantages and disadvantages.	C402.2	1,2,3,6,7
Q.4.4.	What are the different types of phase comparator? Describe the coincidence type of phase comparator.	C402.2	1,2,3,6,7
Q.4.5.	Explain synthesis of various relays using Static comparators.	C402.2	1,2,3,6,7
Q.4.6.	Explain Over current and Distant protection of transmission lines.	C402.2	1,2,3,6,7
Q.4.7.	Describe in detail about Transformer differential protection of transmission lines.	C402.2	1,2,3,6,7
Q.5.1.	(a) In a 132KV system the reactance per phase up to the location of the circuit breaker is 6Ω and capacitance to earth is 0.02μF. calculate (i) Maximum value of restriking voltage ,(ii) Maximum value of RRRV and (iii) The frequency of the transient oscillation. (b) Derive the epression for restriking voltage and rate of rise of recovery voltage.	C402.2	1,2,3,6,7
Q.5.2.	(i)Enumerate briefly on (a) Current chopping (b) Interruption of capacitive current (c) Resistance switching (ii)Describe the operating principle of DC circuit breaker.	C402.2	1,2,3,6,7
Q.5.3.	Explain the physics of arc phenomena. On what factor does the arc phenomenon depends? Explain the operation of zero crossing in circuit breaker.	C402.2	1,2,3,6,7
Q.5.4.	A 3-ph, 50Hz, alternator with grounded neutral has inductance of 1.6 mH per phase and is connected to bus barthrough a circuit breaker. The capacitance to earth between the alternator and circuit breaker is 0.0003 μF per phase. The CB opens when rms value of current is 7500 A. Determine Maximum rate of rise of restriking voltage, time for maximum RRRV and frequency of oscillations.	C402.2	1,2,3,6,7
Q.5.5.	With neat sketches, explain the construction and operating principle of air break and minimum oil circuit breaker.	C402.2	1,2,3,6,7
Q.5.6.	(a)Compare the performance, characteristics and application of different types of	C402.2	1,2,3,6,7

	circuit breakers. (b)Describe the various testing procedures of circuit breaker.		
Q.5.7.	With the help of neat block diagram, explain the construction, operating principle and advantages of SF6 circuit breaker and Vaccum circuit breaker .	C402.2	1,2,3,6,7
Q.5.8.	Describe with a neat sketch of air blast circuit breaker, its principle of operation and limitations.	C402.2	1,2,3,6,7
Q.5.9.	A three phase circuit breaker is rated at 1250A, 2000MVA,33KV, 4Sec. find the rated symmetrical breaking current, making current and short time rating.	C402.2	1,2,3,6,7
	Assignments		
A1.1	Explain different types of earthing of neutral point of the power system. Derive an expression for the reactance of the Peterson coil in terms of capacitance of the protected line.	C402.1	1,2,3,6,7
A1.2	A 30MVA , 13.8KV generator with neutral grounded through a 1-ohm resistance, has a three-phase fault MVA of 200MVA. Calculate the fault current and the terminal voltages for a single line-to-ground fault at one of the terminals of the generator. The negative and zero sequence reactances of the machine are 0.10pu and 0.05pu respectively. Neglect pre-fault current, and losses. Assume the pre-fault generated voltage at the rated value. The fault is of dead short-circuit type.[Ans:Ia=6747A]	C402.1	1,2,3,6,7
A1.3	A 132KV, 3 phase, 50 cycles, overhead line, 50Km long has a capacitance to earth for each line of 0.0157 μF/Km. Determine the inductance and KVA rating of the arc suppression coil.	C402.1	1,2,3,6,7
A3.1	In a 132KV system the reactance per phase up to the location of the circuit breaker is 5Ω and capacitance to earth is 0.03μF. calculate A. maximum value of restriking voltage B. Maximum value of RRRV C. The frequency of the transient oscillation. [Ans: A. 216 KV, B. 4.94 KV/micro sec, C. 729 Hz].	C402.3	1,2,3,6,7
A3.2	The short circuit current of a 132 KV system is 8000 Amps. The current chopping occurs at 2.5 %of peak value of the current. Calculate the prospective voltage. The value of stray capacitance to the earth is 100 pf.[Ans. 4.9 MV].	C402.3	1,2,3,6,7
A3.3	A 11KV, 100 MVA generator is grounded through a resistance of 5 ohms. The CTs have a ratio of 1000/5. The relay is set to operate when there is an out of balance current of 1 Amp.	C402.3	1,2,3,6,7
A3.4	A 11 KV, 100 MVA alternator is provided with differential protection. The percentage winding to be protected against phase to ground fault is 85 %. The relay is set to operate when there is 20% out of balance current. Determine the value of resistance to be placed in the neural to ground connection.[Ans. 0.91 ohms]	C402.3	1,2,3,6,7
A 3.5	A generator is protected by restricted earth fault protection. The generator ratings are 13.2KV, 10MVA. The percentage of winding protected against phase to ground fault is 85%. The relay setting is such that it trips for 20% out of balance. Calculate the resistance to be added in the neutral to ground connection.	C402.3	1,2,3,6,7
A 5.1	In short circuit test on a 3 pole, 132KV, circuit breaker, the following observations are made. Power factor for fault=0.4, recovery voltage 0.9 times full line value, the breaking current symmetrical, frequency of oscillation of restriking voltage 16KHz. Assume neutral is grounded and fault is not grounded. Determine average RRRV.	C402.3	1,2,3,6,7
A 5.2	From the following data of a 50Hz generator:emf to neutral 7.5KV(rms), reactance of generator and connected system 4 ohms, distributed capacitance to neutral 0.01microfarad resistance negligible: find (a) the maximum voltage across the contacts of circuit breaker when it breaks a short-circuit current at zero current, (b) the frequency of the transient oscillation and (c) the average rate of rise of voltage up to the first peak of the oscillation.	C402.3	1,2,3,6,7

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6703- SPECIAL ELECTRICAL MACHINES [C403]

Important Questions /Assignments/Self study /Seminar topics.

S.No.	**4. Important Questions**	COs	POs
Q.1.1.	Draw and explain a typical Torque-speed Characteristics of Synchronous Reluctance Motor.	C403.1	1,2,5
Q.1.2.	Derive an expression for Reluctance torque of Sy.RM	C403.1	1,2,5
Q.1.3.	Compare Reluctance Motor with Induction Motor and Synchronous motor	C403.1	1,2,5
Q.1.4.	A 3Φ,230 Volts,60 HZ,4 pole Star Connected Reluctance Motor has Xd=22.5Ω and Xq=3.5Ω.The Armature Resistance is negligible. The Load torque is TL=12.5Nm.The Voltage to Frequency ratio is Maintained constant at the rated value. If the Supply frequency is 60 HZ. Determine i) The Torque Angle δ ii) The Line current iii)The Input Power Factor	C403.1	1,2
Q.1.5.	Explain the construction and working principle of axial and radial type Sy.RM	C403.1	1,2,5
Q.1.6.	What is saliency ratio of Sy.RM and how it can be improved?	C403.1	1,2,5
Q.1.7.	Explain the working of Vernier Motor with a neat Diagram.	C403.1	1,2,5
Q.2.1.	Explain the Construction and working principles of single stack VR Stepper Motor with a neat Diagrams	C403.2	1,2,5
Q.2.2.	Explain the Various Modes of Excitation in Stepper Motors	C403.2	1,2,5
Q.2.3.	Explain the working principles of Hybrid Motor with a neat Diagram	C403.2	1,2,5
Q.2.4.	Draw and explain the Characteristics of Stepper Motor	C403.2	1,2,5
Q.2.5.	Write short notes on Drive Circuits of Stepping Motors	C403.2	1,2,5
Q.2.6.	A stepper motor has a step angle of 2.5,Determine, i)Resolution. ii)Number of steps per shaft to make 25 revolutions iii)Shaft speed if Starting stepping frequency is 3600pulse/sec.	C403.2	1,2
Q.2.7.	Explain the Construction and working principles of multi stack VR Stepper Motor with a neat Diagrams	C403.2	1,2,5
Q.2.8.	Write short notes on micro stepping	C403.2	1,2,5
Q.2.9.	What is Stepping Motor? Calculate the Stepping Angle For a 3 Φ, 24 pole Stepper Motor.	C403.2	1,2,5
Q.2.10.	Compare holding torque and detent torque	C403.2	1,2,5
Q.2.11	Derive the torque equation of stepper motor	C403.2	
Q.3.1.	Explain the working principle of SRM.	C403.3	1,2,5
Q.3.2.	Explain why rotor position sensor is essential for the operation of SRM.	C403.3	1,2,5
Q.3.3.	Describe the various power controller circuits applicable to switched reluctance motor and also explain any one scheme operation with neat diagrams	C403.3	1,2,5
Q.3.4.	Sketch the general speed-torque curve of SR motor and discuss the type of control strategy used for different regions of the curve. Sketch the typical phase current waveforms of low speed operation	C403.3	1,2,5
Q.3.5.	Describe the hysteresis type and PWM type current regulator for one phase of a SRM	C403.3	1,2,5
Q.3.6.	Explain the various duty cycle schemes for a phase of three SR motor and its operation with phase current waveforms	C403.3	1,2,5
Q.3.7.	Discuss in detail about microprocessor based control of SRM	C403.3	1,2,5
Q.3.8.	Derive the torque equation of switched reluctance motor	C403.3	
Q.4.1.	Discuss in detail about the operation of an electronic commutator.	C403.4	1,2,5
Q.4.2.	Discuss the use of Hall sensors for position sensing in PMBLDC motors	C403.4	1,2,5
Q.4.3.	Derive emf equation of BLPM SQW DC Motors	C403.4	1,2,5
Q.4.4.	Explain the Construction and working principles of PMBLDC motors	C403.4	1,2,5
Q.4.5.	Explain the speed-torque characteristics of PMBLDC motors	C403.4	

Q.5.1.	Discus self control model of PM synchronous motor with revelent diagram	C403.5	1,2,5
Q.5.2.	Explain in detail the vector control of permanent magnet synchronous motor.	C403.5	1,2,5
Q.5.3.	Draw its phasor diagram of PMSM and derive its torque equation	C403.5	1,2,5
Q.5.4.	Explain the principle of operation of a sine wave PM synchronous machine in detail	C403.5	1,2,5
Q.5.5.	Draw and explain Speed torque Characteristic of PMSynchronous Motor	C403.5	1,2,5
Q.5.6.	A three phase, four pole, brushless PM rotor has 36 stator slots. Each phase winding is made up of three coils per pole with 20 turns per coil. The coil span is seven slots. If the fundamental component of magnet flux is 1.8 Mwb. Calculate the open circuit phase emf (Eq) at 3000 rpm	C403.5	1,2
Q.5.7.	Explain the function of power controllers for PMSM	C403.5	1,2,5

ASSIGNMENT- I,

C403.1

(1)A three phase, 230V, 60Hz, 4 pole, star connected reluctance motor has X_{sd} = 22.5 ohm and X_{sq} = 3.5 ohm. The armature resistance is negligible. The load torque is T_L = 12.5 N-m. The voltage to frequency ratio is maintained constant at rated value. If the supply frequency is 60Hz, determine (a) torque angle, (b) the line current (c) the input power factor

(2) Derive the torque equation of synchronous reluctance motor and Draw the phasor diagram

(3) Compare the constructional features of axial and radial gap synchronous reluctance motor

(4) Explain in detail about classification of synchronous reluctance motor rotor construction

ASSIGNMENT- II,

C403.2

(1) A VR Stepper Motor has 8 poles in the stator and they have five teeth in each pole. If the rotor has 50 teeth, calculate the step angle and resolution

(2) What is stepping angle? Calculate the stepping angle for a 3 phase 24 pole PM type Stepper Motor.

(3) Explain the mechanism of torque production in VR stepper motor

(4) Explain in detail about different types of power drive circuits for stepper Motor

(5) Explain the construction and working principle of Hybrid Stepper motor.

(6)A variable reluctance stepper motor has 8 poles in the stator and they have five teeth in each pole. If the rotor has 50 teeth, calculate the step angle and also resolution.

(7)A stepper motor has a step angle of 2.5, find (a) Resolution (b) Number of steps required for the shaft to make 25 revolutions (c) Shaft speed if stepping frequency is 3600 pulse/sec.

(8)A single stack 3phase VR motor has a stepping angle of 15^0 . Find the number of its stator and rotor poles?

(9)A stepper motor has a step angle of 1.8^0 and it is driven at 4000 pps. Determine (a) Resolution (b) Motor speed (c) number of pulses required to rotate the shaft through the 54^0 .

(10)Calculate the pulse rate required to obtain a rotor speed of 2400 rpm for a stepper motor having a resolution of 20 steps/rev.

ASSIGNMENT- III

C403.3

(1)Describe the Hysterisis type and PWM type current regulator for one phase of a Switched Reluctance Motor with relevant circuit diagram.

(2)What is the flux linkages,the aligned positon La=10.7 mH unalaingned positionLu=1.5mh When the phase current is 7A?.If the flux linkages is maintained constant while the rotor rotates from unaligned position to aligned position at low speed.Determine the energy conversion per stroke and average torque.

(3)Explain shaft position sensing of Switched Reluctance Motor

(4) With neat diagram, explain the microprocessor based control of Switched Reluctance Motor

(5) Explain the speed-torque characteristics of Switched Reluctance Motor

ASSIGNMENT- IV

C403.4

(1)What is the necessity of converter circuits for Switched Reluctance Motor? Draw and explain different types of converter circuits in detail

(2)Describe the operation of power controllers for PMBLDC Motor with neat diagram.

(3). Derive the Torque and EMF equations of PMBLDC Motor

(4) Draw IGBT based inverter circuit for delta connected PMBLDC Motor and sketch the firing sequence and phase current waveform for 120^0 mode

(5) Write a note on magnetic circuit analysis in PMBLDC Motor

(6) A BLPM motor has a no load speed of 6000 rpm when connected to 120V dc supply. The armature resistance is 2.5 ohm. Rotational and iron losses may be neglected. Determine the speed when the supply voltage is 60V and the torque is 0.5 Nm. No load speed when the supply voltage is 120V is 6000 rpm

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

MG6851 –Principles of Management **[C404]**

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

S.No.	**1. Questions.**	COs	POs
Q.1.1.	Explain about Manager Vs Entrepreneur	C404.1	04,06,07
Q.1.2.	Describe the various managerial roles and skills	C404.1	09
Q.1.3.	Explain the various management approaches with examples by the various authors	C404.1	11
Q.1.4.	Describe various types of Business organization	C404.1	12
Q.1.5.	How the Sole proprietorship, partnership are differing	C404.1	04,06,07
Q.1.6.	Compare public and private sector enterprises in details	C404.1	09
Q.1.7.	How the Organization culture affects the business	C404.1	11
Q.1.8.	Brief about the Environment in business	C404.1	12
Q.1.9.	Describe Current trends in management	C404.1	04,06,07
Q.1.10.	How can you give the solution for various issues in Management, explain with examples.	C404.1	09
Q.2.1.	Describe Planning process	C404.2	11
Q2.2.	Explain the Types of Plans with examples	C404.2	12
Q.2.3.	How Objectives are affecting the business and explain -Managing by objectives (MBO)	C404.2	04,06,07
Q2.4.	Why the strategies are important and discus about various types of strategies	C404.2	09
Q.2.5.	Explain how a Decision Making process in a organization	C404.2	11
Q.2.6.	Describe Rational Decision Making with examples	C404.2	12
Q2.7.	Explain and compare Production and Productivity	C404.2	04,06,07
Q.2.8.	Explain with example for decision Making under different conditions	C404.2	09
Q.3.1.	What is the need for organizing	C404.3	11
Q.3.2.	Explain Nature and purpose of organizing	C404.3	12
Q.3.3.	Why Organization structure varies company to company	C404.3	04,06,07
Q.3.4.	How groups are formed and compare Formal and informal groups	C404.3	09
Q.3.5.	Explain Line authority	C404.3	11
Q.3.6.	Describe Staff authority	C404.3	12
Q.3.7.	How the Departmentation carried our in an organisation and explain Span of control Centralization and Decentralization	C404.3	04,06,07
Q.3.8.	How to Delegate the authority and explain Selection and Recruitment – Orientation process	C404.3	09
Q.3.9.	How Career Development makes the organisation development s	C404.3	11
Q.3.10.	Describe Training	C404.3	12
Q.3.11.	Describe how Performance Appraisal are done in an organisation	C404.3	04,06,07
Q.4.1.	Describe how to Motivate the employees	C404.4	09
Q.4.3.	Why job Satisfaction are needed and explain the ways of making the employees satisfaction.	C404.4	11
Q.4.4.	Explain the various theories of motivation	C404.4	12
Q.4.5.	Describe how Motivation Theories are implemented in an organisation	C404.4	04,06,07
Q.4.6.	Why Leadership Styles are differ from others.	C404.4	09
Q.4.7.	Explain various Leadership theories	C404.4	11
Q.4.8.	What is Communication and Barriers to effective communication	C404.4	12
		C404.4	

Q.4.9.	What is Organization Culture	C404.4	04,06,07
Q.5.1.	Explain the Process of controlling	C404.5	09
Q5.2.	Explain Types of control	C404.5	11
Q.5.3.	Describe the Budgetary and non-budgetary control techniques	C404.5	12
Q.5.4.	How to Manage the Productivity in an organization	C404.5	04,06,07
Q.5.5.	Why Cost Control is needed	C404.5	09
Q.5.6.	What are the ways that Purchase Control can be implemented in an organization	C404.5	11
Q.5.7.	How Maintenance Control helps the employees to work effectively	C404.5	12
Q.5.8.	Describe about Quality Control	C404.5	04,06,07
Q.5.9.	Define Planning operations	C404.5	09
Q.5.10.	What are the importance of electronics media in management process	C404.5	11
	2. Assignment.		
A.1.1.	Explain over view of Management	C404.1	04,06,07
A.2.2.	Explain Evolution of nature and purpose of planning for a industry explain with example.	C404.2	09
A.3.3.	Explain about organisation and its structure and explain with your own examples.	C404.3	11
A.4.4.	Find out any one Business organization of your own and explain the processes of management	C404.4	12
A.5.5.	What are all the new technology implemented use of Management.	C404.5	04,06,07
	3. Self Study topics.		09
ST1.1	Explain the Global Management methods and how it affects other countries	C404.1	11
ST2.1	Describe and develop a plan for constructing a cement industry	C404.2	12
ST3.1	Explain Organisation structure about a hospitals	C404.3	04,06,07
ST4.1	How a Government in a country managing and explain the strategies	C404.4	09
ST5.1	Explain with example Application of POM in engineering	C404.5	11

K.L.N. COLLEGE OF ENGINEERING

Department of Electrical and Electronics Engineering

EE6005 –POWER QUALITY [C405E4]

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

S.No.	**1. Important Questions.**	COs	POs
Q.1.1.	Define power quality. What are the major power quality issues and explain them.	C405E4.1	1
Q.1.2.	Identify the sources and analyze the impacts of power quality on power system.	C405E4.1	1,2
Q.1.3	Discuss in detail about sags and swells.	C405E4.1	1
Q.1.4	Discuss in detail about transients.	C405E4.1	1
Q.1.5.	Define waveform distortion and explain the waveform distortion categories.	C405E4.1	1
Q.1.6	Explain total harmonic distortion and total demand distortion.	C405E4.1	1
Q.1.7.	Discuss about the CBEMA curves and explain the events described in the curve.	C405E4.1	1,2,6,8,10
Q.1.8.	With a waveform sketch, explain the terms. Voltage sag, Voltage interruption, Voltage swells and Sag with harmonics.	C405E4.1	1
Q.2.1.	When sag leads to interruption. What are the three levels of possible solutions to voltage sag and momentary interruption problems?	C405E4.2	1,2
Q2.2.	Discuss the sources of sags and interruption.	C405E4.2	1
Q.2.3	Discuss in detail about the sag performance evaluation indices.	C405E4.2	1
Q2.4.	Explain the sag performance evaluation methods.	C405E4.2	1,2,3
Q.2.5	Explain the various causes and effects of voltage sags.	C405E4.2	1
Q.2.6.	What are the different voltage sag mitigation techniques? Explain in detail.	C405E4.2	1,2,3
Q2.7.	Discuss in detail about the active series compensator.	C405E4.2	1
Q2.8.	Explain the solid state transfer switch with the transfer operation.	C405E4.2	1,2
Q2.9.	Explain the system adapted to estimate the severity of the sag occurred due to various sources.	C405E4.2	1,2
Q2.10.	Mention the standards associated with the voltage sag.	C405E4.2	1,2,6,8
Q2.11.	Analyze and calculate the various types of fault condition in power system	C405E4.2	1,2,3,5,10
Q.3.1.	What are transient over voltages? Explain the different types of transient over voltages.	C405E4.3	1
Q.3.2.	What are the different sources of transient over voltages? Discuss the Capacitor switching transient.	C405E4.3	1,2
Q.3.3.	Define lightning? Discuss in detail about the over voltages due to lightning and the problems associated with it.	C405E4.3	1,2
Q.3.4.	Draw the standardized waveform of the lightning induced voltage. Discuss about the wave shape of the lightning current.	C405E4.3	1,2
Q.3.5.	Explain the phenomena of ferro-resonance. Analyze the problems associated with ferro-resonance.	C405E4.3	1,2,3
Q.3.6.	What is the need for protection against over voltages? What are the basic principles of over voltages protection of load equipments?	C405E4.3	1,3
Q.3.7.	Explain in detail about various methods to mitigate voltage swells	C405E4.3	1,2
Q.3.8.	Explain in detail about the surge arrestors and surge suppressors. What are the advantages of surge arrestors?	C405E4.3	
Q.3.9.	Explain the following: Low pass filters (b) Power conditioners (c) Surge filters	C405E4.3	1
Q.3.10.	What is the need of Computer analysis tools for transient studies? List the advantages of computer analysis tools for transient studies. What is the need of SCAD/EMTDC? Give any two analysis examples available in PSCAD/EMTDC?	C405E4.3	1,2,3,5
Q.4.1	Differentiate between linear loads and non-linear loads. Explain in detail about classification of linear loads and non linear loads used in harmonic studies.	C405E4.4	1,2

Q.4.2	Explain for the following terms (i) Harmonic distortion (ii) Current distortion (iii) Voltage distortion	C405E4.4	1
Q.4.3	What are the two important harmonic indices used in power system? Explain about it briefly.	C405E4.4	1
Q.4.4	Explain briefly about the phenomena of how current distortion affects the voltage distortion under the presence of harmonics.	C405E4.4	1,2
Q.4.5	Explain the harmonic effects on power system equipments briefly.	C405E4.4	1
Q.4.6	What are the various classifications of harmonic sources and explain briefly about it?	C405E4.4	1
Q.4.7	Mention the IEEE and IEC standards for harmonics and discuss in detail	C405E4.4	1,6,8,10
Q.4.8	What is the need of locating harmonic sources? What are the general causes of harmonics in power system?	C405E4.4	1
Q.5.1	Bring out the significance of power quality monitoring. What are the important power quality monitoring objectives?	C405E4.5	1,8,10
Q.5.2	Write notes on power line disturbance analyzer.	C405E4.5	1,5
Q.5.3	What are the various instruments used for power quality measurements? What are the factors to be considered when selecting the instruments?	C405E4.5	1,5
Q.5.4	Explain Harmonic/Spectrum analyzer.	C405E4.5	1,5
Q.5.5	Define voltage flicker. Discuss some of the flicker sources. Write notes on common methods for mitigation of flicker.	C405E4.5	1
Q.5.6	Discuss in detail about the flicker meter.	C405E4.5	1,5
Q.5.7	Draw and explain the functional structure of expert systems.	C405E4.5	1,5
Q.5.8	Explain the steps involved in power quality monitoring. What is the information from monitoring site surveys?	C405E4.5	1,2
Q.5.9	Model the problem of harmonics and solve using mathematical simulation tools	C405E4.5	1,2,3
	Assignments/Seminar/Self study topics.		
A.1	Describe the function of DVR and STATCOM with its advantages and disadvantages over other devices used to mitigate voltage sag. (4 pages-assignment)	C405E4.2	1,2,3
A.2	How utilities can deal with problems related to Capacitor-switching transients. [Ref: Page No.140-144,Roger C. Dugan]	C405E4.3	1,2,3
A.3	(a). Harmonic filter design-A case study [Ref: Page No.264-273 Roger C.Dugan] (b). Describe the ideal procedure for performing a power systems harmonics study. How can we model the harmonic sources? Describe the computer tools for analysis of harmonics.(Self study topic) [Ref: Page No.238-247 Roger C.Dugan]	C405E4.4	1,2,3,5
S.1	Assessment of Power Quality Measurement Data- Example applications of expert Systems- Industrial power quality monitoring applications- Power quality monitoring and the Internet- Power Quality Monitoring Standards	C405E4.5	1,2,3,5,6,10

K.L.N. College of Engineering, Pottapalayam.
Department of Electrical and Electronics Engineering
EE6008 –Microcontroller Based System Design
Important Questions/Assignments

S.No.	1. Important Questions	COs	POs
Q.1.1	Explain the block diagram of PIC microcontroller.	C406.1	1,3
Q.1.2	Draw the Pin configuration of 16C71 and explain the functions of each pin in brief.	C406.1	1,3
Q.1.3	Explain the structure of program memory in PIC microcontroller.	C406.1	1,2,3
Q.1.4	Discuss how instruction pipelining is implemented in PIC 16 microcontroller.	C406.1	1,2,4
Q.1.5	Explain the main features of PIC microcontrollers	C406.1	1,2,3
Q.1.6	What are the different addressing modes ?	C406.1	1
Q.1.7	Explain the various types of timers in PIC microcontroller. Differentiate betweenTimer1 and Timer2.	C406.1	1,3
Q.1.8	Explain the various CPU registers in PIC microcontroller.	C406.1	1,3
Q.2.1	Explain the PIC micro controller Interrupts	C406.2	1,3
Q.2.2	Explain the Timer operation of micro controller	C406.2	1
Q.2.3	Give short notes on state machine and key switches	C406.2	1
Q.2.4	Write the program to generate a 100μs positive – going pulse on the RC2/CCP1 pin.	C406.2	1,2
Q.2.5	Discuss in detail about Variable strings of PIC Microcontroller.	C406.2	1,3
Q.3.1	Write a detailed notes on I^2C bus.	C406.3	1,3
Q.3.2	Briefly explain the I^2C interfacing using PIC micro controller. Give the special function register involved & the corresponding wave form.	C406.3	1,3
Q.3.3	Write a short note on ADC interfacing in PIC micro controller with block diagram.	C406.3	1,3
Q.3.4	With neat block diagram Briefly explain the sensor interfacing using PIC micro controller	C406.3	1,3
Q.3.5	Explain the working of the UART in PIC micro controller with example.	C406.3	1,3
Q.3.6	Draw and explain the architecture of on chip ADC of PIC micro controller in detail and write a suitable assembly language program for configuring the ADC.	C406.3	1,3
Q.3.7	Discuss in detail about the following a.DAC b. Timers c. Interrupt	C406.3	1,3
Q.3.8	Explain how to interface LCD with micro controller with an assembly language program	C406.3	1
Q.3.9	Write a detailed note on the FLASH & EEPROM memories.	C406.3	1
Q.3.10	Draw the instruction pipeline and mention its significance	C406.3	1,3
Q.4.1	What are the advantages of writing in Assembly in ARM processor?	C406.4	1
Q.4.2	How will you flush the instruction Cache in ARM processor ?	C406.4	1
Q.4.3	What is called 'pipeline bubble' in ARM ?	C406.4	1
Q.4.4	How will you handle the Register Shortage problem in ARM ?	C406.4	1
Q.4.5	What are the types of addressing modes in ARM ?	C406.4	1,3
Q.4.6	Explain about 'Single Data Transfer' and 'Multiple Data Transfer' in ARM	C406.4	1,2
Q.4.7	What are the advantages of writing in Assembly in ARM processor?	C406.4	1,2
Q.5.1	Explain the 3-Stage Pipeline ARM Organization	C406.5	1,2
Q.5.2	Explain the 5-Stage Pipeline ARM Organization	C406.5	1,2
Q.5.3	Give some example for Embedded ARM Applications	C406.5	1
Q.5.4	Write a note on ARM Processor	C406.5	1,3
Q.5.5	With a neat diagram explain the model train controller	C406.5	1,3
Q.5.6	With examples explain various instruction sets in ARM	C406.5	1,3
Q.5.7	Write a note on CPU Programming input and output , Supervisor mode, exception and trap	C406.5	1,3

Assignments

A.1.1	Point out the role of watch dog timer in PIC micro controller.	C406.1	1,3,5
A.1.2	Point out the role of I/O port of PIC	C406.1	1,3
A.1.3	Write one example for immediate & direct addressing mode in PIC micro controller	C406.1	1,2,3
A.2.1	Write a program to (a) get the data "hello, my fellow world citizens" from Program ROM ,(b)calculate the checksum byte ,and (c)test the checksum byte for any data Error	C406.2	1,2,3
A.2.2	Program Timer-1to be an event counter .Use 16 bit mode, and display the binary count on Port-B and Port-D continuously, set the initial count to 20000	C406.2	1,2,3,4
A.2.3	Write a program to get an 8 bit binary number from PORT-B, convert it to ASCII, and save the result if the input is packed BCD of 00-0x99.Assume that PORT-B has 10001001 binary as input.	C406.2	1,2,3,4
A.4.1	Describe the programming model of ARM processor.	C406.4	1,2,3
A.4.2	Describe the operations carried out by the different data processing instructions in ARM processor.	C406.4	1,2,3
A.4.3	Explain how memory is organized in ARM processor	C406.4	1,3

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

Question Paper Code : 71784

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh Semester

Electrical and Electronics Engineering

EE 6701 — HIGH VOLTAGE ENGINEERING

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define: Corona Critical Disruptive Voltage.

2. What are the different methods employed for protection of over head lines against lightning?

3. State Paschen's Law.

4. Define Townsends first ionization coefficient

5. A 12 stage impulse generator has 0.12 μF capacitors. The Wave front and wave tail resistances connected are 400 Ω and 600 Ω respectively. If the load capacitor is 800pF, find the front and tail time of the impulse wave produced.

6. What is trigatron gap?

7. What are the different types of resistive shunts used for impulse and high frequency measurements?

8. What are the problems associated with measurement of very high impulse voltages?

9. List out the various electrical tests to be carried out for bushings.

10. Define: Air density correction factor.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the construction and working principle of expulsion gaps and protector tubes. (10)

(ii) Describe the causes for switching and power frequency over voltages. (6)

Or

(b) Explain the different theories of charge formation in clouds. (16)

12. (a) Discuss about the Various mechanisms of Vacuum breakdown. (16)

Or

(b) (i) Explain the various theories that explain breakdown in commercial liquid dielectrics. (10)

(ii) Discuss about the various properties of composite dielectrics. (6)

13. (a) (i) A Cockroft Walton type voltage multiplier has eight stages with capacitances, all equal to 0.05 μF. The supply transformer secondary voltage is 125 kV at a frequency of 125Hz. If the load current to be supplied is 4.5mA. Find (1) the % ripple, (2) the regulation. (8)

(ii) Describe the construction and working principle of a Van de Graff generator with a neat sketch. (8)

Or

(b) Describe the construction and principle of operation of a multistage Marx Generator. (16)

14. (a) (i) Explain how a sphere gap can be used to measure the peak value of voltages. (8)

(ii) A co axial shunt is to be designed to measure an impulse current of 40kA. If the bandwidth of the shunt is to be at east 10 MHz and if the voltage drop across the shunt should not exceed 50V.Find the ohmic value of the shunt and its dimensions. (8)

Or

(b) Explain the principle and construction of a generating voltmeter for the measurement of high dc voltages. List out its advantages and disadvantages. (16)

15. (a) Explain the method of impulse testing of high voltage transformers. What is the procedure adopted for locating the failure? (16)

Or

(b) (i) Write short notes on statistical methods for insulation coordination. (6)

(ii) Draw the layout for synthetic testing and explain the procedure. (10)

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

Question Paper Code : 80385

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Electrical and Electronics Engineering

EE 6701 — HIGH VOLTAGE ENGINEERING

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is back flashover?
2. Define Isokeraunic level or thunderstorm days.
3. What is ionization by collision?
4. Define Gas law.
5. What is a tesla coil?
6. What is Deltatron circuit?
7. What are the advantages of generating voltmeters?
8. List some advantages of Faraday generator.
9. Define 50% flash over voltage.
10. What are the tests need to be conducted on power transformer?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the mechanism of lightning stroke. (10)

(ii) Give the mathematical model for lightning discharges and explain them. (6)

Or

(b) Explain the different methods employed for lightning protection of overhead lines. (16)

12. (a) From the fundamental principles, derive Townsend's criteria for the breakdown of gaseous dielectric medium. (16)

Or

(b) Explain the various breakdown theories involved in commercial liquid dielectrics. (16)

13. (a) (i) Mention the necessity of generating high DC voltages. (4)

(ii) Explain with a neat diagram the generation of high DC voltages using Van-de-graff generator. State the factors which limit the voltage developed. (12)

Or

(b) Explain the working principle of Cockroft-Walton voltage multiplier circuit. Derive an expression for total voltage drop and total ripple voltage of n-stage voltage multiplier circuit and hence deduce the condition for optimum number of stages. (16)

14. (a) (i) Enumerate digital peak voltmeter. (8)

(ii) What is CVT? Explain how CVT can be used for high voltage AC measurement. (8)

Or

(b) Explain how a sphere gap can be used to measure the peak value of voltages? Also discuss the parameters and factors that influence such voltage measurement? (16)

15. (a) Discuss the various tests carried out in a circuit breaker at HV labs. (16)

Or

(b) Explain in sequence the various high voltage test being carried out in a power transformer. (16)

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

Question Paper Code : 71785

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh Semester

Electrical and Electronics Engineering

EE 6702 – PROTECTION AND SWITCHGEAR

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the types of fault.
2. Give the difference between circuit breaker and switch.
3. Why a shading ring is provide in a induction disc relay?
4. What are the difficulties of differential protection?
5. What is the need for instrument transformer?
6. What are the limitations of buchholz relay?
7. Define sampling theorem.
8. Write about numerical transformer differential protection.
9. Define restriking voltage.
10. What is rupturing capacity?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss in detail about different protection schemes.

(ii) Explain Arc suppression coil earthing with neat diagram.

Or

(b) Explain how fault current is calculated using symmetrical components.

12. (a) Explain the construction and operating principle of impedance type distance relay with R-X Diagram.

Or

(b) With the necessary sketches discuss in detail about electromagnetic attraction type relays relay.

13. (a) Give a detailed explanation for protection of transformer using differential protection which includes associated faults.

Or

(b) Give a detailed explanation about CT'S and PT's and its application to power system.

14. (a) Explain the block diagram of numerical relay with necessary diagram.

Or

(b) With a neat sketch discuss in detail about the synthesis of reactance relay using phase comparator.

15. (a) Write short notes on :

(i) Current chopping

(ii) Interruption of capacitive current.

Or

(b) With a neat diagram explain the construction and working principle of Air Blast circuit breaker and Vacuum circuit breaker.

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

Question Paper Code : 80386

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Electrical and Electronics Engineering

EE 6702 — PROTECTION AND SWITCHGEAR

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the difference between primary and back up protection?

2. What do you mean by dead spot in zones of protection?

3. What is the significance of PSM and TSM?

4. A relay is connected to 400/5 ratio current transformer with current setting of 150%. Calculate the plug setting multiplier when circuit carries a fault current of 4000A.

5. What is over fluxing? How it affect transformer?

6. Write two protection schemes used for protection of bus-bar.

7. Write two application of static relay.

8. State the difference between conventional relay and numerical relay.

9. What is the difference between re-striking voltage and recovery voltage?

10. State the difference between D.C. and A.C. circuit breaking.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain in detail about the need and different types of earthing scheme. (10)

(ii) A 132 KV, 3 phase, 50 cycles, overhead line, 50 Km long has a capacitance to earth for each line of 0.0157 μF/Km. Determine the inductance and KVA rating of the arc suppression coil. (6)

Or

(b) (i) Explain the essential qualities of protection and explain them in detail. (6)

(ii) Explain the method of calculating fault current using symmetrical components. (10)

12. (a) With a neat diagram explain the working principle of a directional over current relay. Derive the torque equation and also explain about directional relay connection. (6 + 4 + 6)

Or

(b) From the universal torque equation determine the condition of operation for impedance relay, reactance relay and admittance relay. (16)

13. (a) Draw and explain protection scheme of an A.C. induction motor. (16)

Or

(b) (i) A generator is protected by restricted earth fault protection. The generator ratings are 13.2 KV, 10 MVA. The percentage of winding protected against phase to ground fault is 85%. The relay setting is such that it trips for 20% out of balance. Calculate the resistance to be added in the neutral to ground connection. (8)

(ii) Explain a protection scheme for protection of transformer against incipient fault. (8)

14. (a) How will you synthesize a mho relay using static phase comparator? (16)

Or

(b) Explain the numerical over current protection and numerical transformer differential protection. (8 + 8)

15. (a) (i) Derive the expression for restriking voltage and maximum RRRV. (8)

(ii) In short circuit test on a 3 pole, 132 KV, circuit breaker, the following observations are made. Power factor for fault = 0.4, recovery voltage 0.9 times full line value, the breaking current symmetrical, frequency of oscillation of restriking voltage 16 KHZ. Assume neutral is grounded and fault is not grounded. Determine average RRRV. (8)

Or

(b) (i) With a neat sketch explain the principle of vacuum circuit breaker. (8)

(ii) Explain the phenomenon of interruption of capacitive current in a circuit breaker. (8)

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

Question Paper Code : 71786

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh Semester

Electrical and Electronics Engineering

EE 6703 — SPECIAL ELECTRICAL MACHINES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the types of rotor available in synchronous reluctance motor?
2. What are the applications of synchronous reluctance motor?
3. Draw the equivalent circuit of winding in stepper motor.
4. What are the applications of stepper motor?
5. Define energy ratio.
6. Draw the Torque — Speed characteristics of SRM.
7. What is electronic commutator?
8. Write the EMF equation of a P.M. Brushless D.C Motor?
9. What are the types of materials used in permanent magnet motor?
10. What is self control in PMSM?

PART B — (5 × 16 = 80 marks)

11. (a) Explain the working principle and construction details of different types of Synchronous reluctance motor. (16)

Or

(b) (i) Derive the torque equation of a Synchronous Reluctance motor and draw the Torque- Angle characteristic. (8)

(ii) Derive the expression for d-axis synchronous reactance of a permanent magnet Synchronous reluctance motor. (8)

12. (a) Describe construction and working of variable reluctance stepper motor with neat diagram. (16)

Or

(b) (i) Explain in detail the power driver circuits of stepper motor. (10)

(ii) Write in detail the microprocessor based closed loop operation of stepper motor. (6)

13. (a) (i) Explain in detail the power controllers for switched reluctance motor. (10)

(ii) Explain the role of microprocessors in control of switched reluctance motor.

Or

(b) (i) Describe the construction and working principle of SRM. (12)

(ii) What are the applications and advantages of SRM? (4)

14. (a) Derive the emf and torque equation of a Brushless permanent magnet square wave motor. (16)

Or

(b) Explain the construction of PMBLDC motor also compare conventional dc motor and PMBLDC motor. (16)

15. (a) Describe the construction and performance of PMSM with neat diagram. (16)

Or

(b) Derive the emf and torque equation of a Brushless permanent magnet since wave DC motor. (16)

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

Question Paper Code : 80387

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Electrical and Electronics Engineering

EE 6703 — SPECIAL ELECTRICAL MACHINES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by reluctance torque in synchronous reluctance motor?

2. Write down the applications of synchronous reluctance motor.

3. Define lead angle.

4. What is the need of suppressor circuits in stepper motor?

5. What is the need of a rotor positioning sensor in Switched Reluctance Motor?

6. Write any four applications of SRM.

7. What are the merits of the brushless dc motor drives?

8. Write the difference between electronic and mechanical commutator.

9. Classify the different types of PMSM.

10. Differentiate square wave and sine wave motor.

PART B — (5 × 16 = 80 marks)

11. (a) Explain with neat diagram, the construction, working principle and types of synchronous reluctance motor. (16)

Or

(b) Draw the steady state phasor diagram of synchronous reluctance motor and derive the expression for torque of synchronous reluctance motor. (16)

12. (a) (i) Explain in detail the multi stack construction of stepper motor. (8)

(ii) Explain the modes of excitation of a stepper motor with neat diagram. (8)

Or

(b) (i) A stepper motor has resolution of 180 steps/rev. Find the pulse rate required in order to obtain a rotor speed of 2400 rpm. (8)

(ii) Explain in detail, the static and dynamic characteristics of a stepper motor. (8)

13. (a) (i) Explain with neat diagram, the microprocessor based control of Switched reluctance motor. (10)

(ii) Derive the expression for static torque in SRM. (6)

Or

(b) (i) Explain with the neat diagram any two converter topologies for SRM. (8)

(ii) Explain the torque speed characteristics of SRM in detail. (8)

14. (a) Explain the construction and principle of operation of PMBLDC motor. (16)

Or

(b) (i) Explain in detail, the power controllers for PMBLDC. (8)

(ii) A BLPM motor has a no load speed of 6000 rpm when connected to a 120 V DC supply. The armature resistance is 2 Ω. Rotational and iron losses may be neglected. Determine the speed when the supply voltage is 60 V and the torque is 0.5 N-m. (8)

15. (a) Derive the Torque equation of PMSM along with the phasor diagram. (16)

Or

(b) (i) Derive the EMF equation of PMSM. (10)

(ii) Explain the torque speed characteristics of PMSM. (6)

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

Question Paper Code : 72208

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Fourth/Fifth/Sixth/Seventh/Eighth Semester

Civil Engineering

MG 6851 – PRINCIPLES OF MANAGEMENT

(Common to : Mechanical Engineering (Sandwich) / Aeronautical Engineering / Automobile Engineering / Electrical and Electronics Engineering / Electronics and Communication Engineering / Electronics and Instrumentation Engineering/ Environmental Engineering / Geoinformatics Engineering / Industrial Engineering / Industrial Engineering and Management / Instrumentation and Control Engineering / Mechanical Engineering / Mechanical and Automation Engineering / Mechatronics Engineering / B.E. Robotics and Automation Engineering / Polymer Technology

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define management.
2. What is an organizational culture?
3. State the purpose of planning.
4. List the planning tools available in business management.
5. What is delegation of authority?
6. Why performance management is important?
7. What is personality?
8. What do you understood on the term 'job enrichment'?
9. What is preventive control in management?
10. Why controlling is important?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the different roles and functions of a manager.

Or

(b) Explicate the different types of business organizations.

12. (a) Explain the general planning process adopted by the business organizations.

Or

(b) Discuss the eight steps of decision making process.

13. (a) Explain the different types of organizational structures followed by the companies.

Or

(b) Describe the Human Resource Management activities in a business organization.

14. (a) Discuss the contemporary theories of motivation.

Or

(b) Identify the barriers in communication and explain how to overcome them.

15. (a) Describe in detail about the three steps in the control process.

Or

(b) Discuss the uses of computers and IT in Management control.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the issues of organizational culture in modern business organizations.

Or

(b) "Job performance of individual is significantly influenced by the employee's attitude" — Discuss.

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

Question Paper Code : 80701

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Electrical and Electronics Engineering

MG 6851 – PRINCIPLES OF MANAGEMENT

(Common to Robotics and Automation Engineering, Polymer Technology, Fourth Semester Industrial Engineering and Management and Fifth Semester Industrial Engineering, Sixth Semester Mechanical Engineering (Sandwich), Aeronautical Engineering, Automobile Engineering, Electronics and Communication Engineering, Environmental Engineering, Geoinformatics Engineering, Mechanical Engineering, Mechanical and Automation Engineering, Mechatronics Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the functions of a Manager?

2. Give the current trends in Management.

3. What is meant by policies?

4. Define MBO.

5. Define "Departmentation".

6. What is meant by performance appraisal?

7. What are the elements in the Maslow's hierarchy of needs?

8. What is effective communication?

9. What are the uses of computers in management control?

10. Discuss the productivity problems in a management.

PART B — (5 × 16 = 80 marks)

11. (a) Explain in detail about the different types of business organization. (16)

Or

(b) Discuss in detail the evolution of management. (16)

12. (a) Discuss in detail about the classification of planning practices. (16)

Or

(b) Explain briefly about the decision making steps and process. (16)

13. (a) Explain briefly about the various types of departmentation. (16)

Or

(b) (i) Discuss the types of Centralization. (8)

(ii) Explain about the organizational Culture. (8)

14. (a) Explain the various types of Leadership with its different styles. (16)

Or

(b) (i) Explain the different barriers and breakdowns of communication process. (8)

(ii) Difference between motivation and satisfaction. (8)

15. (a) Discuss in detail about the budgetary and non - budgetary control techniques. (16)

Or

(b) Impact of IT in management concepts - Discuss. (16)

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

Question Paper Code : 71753

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh Semester

Electrical and Electronics Engineering

EE 6005 — POWER QUALITY

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How can power quality problems be detected?
2. What are the components of waveform distortion?
3. What are the causes of sag?
4. What the main functions of DVR?
5. When does Ferro resonance occur in power system?
6. Give any two analysis examples available in PSCAD/EMTP.
7. Differentiate between linear loads and non-linear loads.
8. Mention the harmonic sources from industrial loads.
9. List the advantages of power quality monitoring.
10. What is Spectrum analyzer?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain short duration and long duration voltage variation. (8)

(ii) Discuss the standards of power quality. (8)

Or

(b) Explain briefly about the characterization of power quality issues. (16)

12. (a) How does the load influence on voltage sag on adjustable speed drives? (16)

Or

(b) Explain the role of compensators in mitigation of voltage sags. (16)

13. (a) Discuss the sources of overvoltage due to following phenomena.

(i) Capacitor switching (8)

(ii) Ferro resonance. (8)

Or

(b) Describe the following mitigation techniques of over voltages with diagrams.

(i) Shielding. (8)

(ii) Cable protection. (8)

14. (a) Discuss the characteristics of harmonics generated by different types of industrial and commercial load. (16)

Or

(b) Explain the IEEE and IEC standards on harmonics distortion. (16)

15. (a) Discuss the power quality monitoring considerations in detail. (16)

Or

(b) Explain Flicker meter and flicker measurement techniques in detail. (16)

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

Question Paper Code : 80360

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Electrical and Electronics Engineering

EE 6005 – POWER QUALITY

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How can be the power quality problems detected?
2. What are the components of waveform distortion?
3. What are the causes of sag?
4. What are the main functions of DVR?
5. What is Ferro resonance?
6. Give any two analysis examples available in PSCAD/EMTP.
7. Differentiate between linear loads and non-linear loads.
8. Mention the harmonic sources from industrial loads.
9. List the advantages of power quality monitoring.
10. What is Spectrum analyzer?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain about the short duration and long duration voltage variation. (8)

(ii) Discuss the standards of power quality. (8)

Or

(b) Explain briefly about the characterization of power quality issues. (16)

12. (a) How does the load influence on voltage sag on adjustable speed drives? (16)

Or

(b) Explain the role of compensators in mitigation of voltage sags. (16)

13. (a) Discuss the sources of overvoltage due to following phenomena.

(i) Capacitor switching. (8)

(ii) Ferro resonance. (8)

Or

(b) Describe the following mitigation techniques of over voltages with diagrams.

(i) Shielding. (8)

(ii) Cable protection. (8)

14. (a) Discuss the characteristics of harmonics generated by different types of industrial and commercial load. (16)

Or

(b) Explain the IEEE and IEC standards on harmonics distortion. (16)

15. (a) Discuss the power quality monitoring considerations in detail. (16)

Or

(b) Explain the Flicker meter and flicker measurement techniques in detail. (16)

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

Question Paper Code : 71757

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017

Seventh Semester

Electrical and Electronics Engineering

EE 6008 — MICROCONTROLLER BASED SYSTEM DESIGN

(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. What are the benefits of having RISC architecture?

2. Define Brown out reset mode.

3. Mention the interrupts available in FTC Microcontroller.

4. Write an ALP to initialize the PORT A using PIC microcontroller.

5. Microcontroller based control is more advantageous than conventional control — Justify.

6. How is temperature sensor is interfaced with PIC Microcontroller?

7. Define Context Switching.

8. State the function of ARMulator and define its operations at various levels of accuracy.

9. Draw the structure of multicycle instruction of three stage pipeline operation.

10. What is the role of a co-pressure?

PART B — (5 × 16 = 80 marks)

11. (a) With neat functional block diagram explain the architecture of PIC16C7X Microcontroller in detail.

Or

(b) (i) Discuss in detail about memory organization of a PIC microcontroller. (8)

(ii) Explain the various addressing modes in PIC, for accessing data memory. (8)

12. (a) Explain the process and procedure to display constant strings and variable strings.

Or

(b) Explain the concept of interrupt logic and interrupt structure of PIC microcontroller with an example.

13. (a) Illustrate with suitable example how I^2C communication is carried out in PIC Microcontroller.

Or

(b) Explain the operation of ADC interfacing with PIC Microcontroller.

14. (a) (i) Explain the Arm Programmer's Model in detail, with supporting diagram. (10)

(ii) Write the subroutine program to output a text string following a CALL Instruction using ARM processor. (6)

Or

(b) Write short notes on ARM MMU architecture.

15. (a) Elaborate the working principle of VLSI ISDN subscriber processor in detail.

Or

(b) Write short notes on

(i) 5 stage pipeline ARM organization.

(ii) Coprocessor data and register transfer.

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

Question Paper Code : 80363

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Electrical and Electronics Engineering

EE 6008 — MICROCONTROLLER BASED SYSTEM DESIGN

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

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write about the Status Register of PIC Microcontroller.

2. List out all the addressing Modes in PIC Microcontroller.

3. What is the minimum and maximum clock frequency for PIC 16CXX?

4. What is the role of TRISx register in I/O Port Management?

5. What is the value to be loaded into SPBRG register if we want 19200 baud rate with 10MHz clock source.

6. List the registers associated with UART.

7. What is the purpose of Program Counter?

8. List out some of ARM Development Tools.

9. What is five stage pipeline in ARM PROCESSOR?

10. List few embedded Application for ARM processor.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw and explain the architecture of PIC 16 Microcontroller. (10)

(ii) Explain about the instruction set of PIC Microcontroller. (6)

Or

(b) Explain about the Various Memory organization of PIC Microcontroller. (16)

12. (a) Explain the functionality of TIMER for PIC Microcontroller with a suitable program. (16)

Or

(b) What is Interrupt? Explain the Interrupt structure of PIC Microcontroller with neat diagram. (16)

13. (a) What is meant by I^2C module? Explain how I^2C is interfaced with PIC Microcontroller. (16)

Or

(b) Using Suitable circuits, construct and explain how ADC is interfaced with PIC microcontroller. (16)

14. (a) With Neat sketch explain the functional block diagram ARM architecture. (16)

Or

(b) Explain the various Operating modes Programmers model in Arm Processor. (16)

15. (a) Using Suitable example, explain the various instruction set of ARM processor. (16)

Or

(b) Explain how does the coprocessor interface of the ARM work. (16)

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

RULES OF THE EXAMINATIONS

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

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

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

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

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

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

CONTROLLER OF EXAMINATIONS

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

(11 km from Madurai City)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

STUDENTS LEAVE APPLICATION FORM

Date:

Name of the Student :

Roll No. : **Sem / Sec. :**

Details of leave availing (b) / applied (a) :

Date & Day (a) : **No. of. Days (a):**

Reason for Leave :

No. of days, leave & OD, already availed (b): **Total. No. of. Days (a+b):**

% of Attendance as on : _____ is _____

Signature of the Student

Signature of Parent / Guardian

Name :

Mobile No. :

Recommended / Not Recommended

Class Coordinator **HOD/EEE**

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINERING

NORMS FOR ATTENDING WORKSHOP / SEMINAR/ TECHNICAL SYMPOSIUM/ CONFERENCE / TECHNICAL CONTEST etc.

Students are regularly encouraged to attend skill development programmes such as workshop / seminar / Technical Symposium / Conference / Technical Contest etc., outside the college. This is to facilitate to improve their technical skills and competency. However, frequently attending such events, will reduce their academic performance, as they are not consistent in attending regular Theory / Practical classes. Also, it was reported that, few students were absent for class tests /CIT's and regular practical classes, in order to attend such skill development programmes. Hence, the following norms are framed, in order to balance the academic performance and facilitate the students to attend skill development programmes.

1. A student will be permitted, to attend skill development programme, not **more than three events per semester (6 days – OD- maximum).**
2. Academic performance of the students will be considered, before permitting a student to attend skill development programmes **(Upto 3 arrears, passed 4 subjects in Class test / CIT's – only will be permitted).**
3. Attendance of the student should **not be less than 90% as on date.**
4. No history of disciplinary action taken on the students**.**
5. Students will not be permitted during class test / Centralized Internal Test to attend Skill development programme. However students with high academic performance will be permitted, considering the nature of the event during class tests.
6. Students will be permitted to attend such events, only in the higher learning Institutions. (IITs, IISC, NITs, Anna University, MIT, NAAC accredited (A grade), Deemed Universities, NBA accredited, Government & Government Aided Institutions and Self financing Engineering Colleges).
7. Students are instructed to refer the academic calendar of the College, regularly so as to know the Internal test schedule and other events.
8. Students registering any events, without following above norms and not obtaining prior permission, **will not be granted ON DUTY and no RETEST** will be conducted. Necessary action will be taken against defaulters.
9. ON DUTY form is revised, accordingly, in order to incorporate all the above details.
10. Class co-ordinators / Academic Co-ordinators are instructed to recommend for OD, as per the above norms.

HOD/EEE

Cc to Principal for information

Cc to Staff & Students notice board,

Cc to file.

K.L.N.COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Format No.: F127

ON DUTY REQUISITION FORM

STUDENTS – TO ATTEND SKILL DEVELOPMENT PROGRAMMES

(Workshop / Seminar / Symposium etc.)

Date: _____

To,

The Principal,

KLNCE.

Pottapalayam.

Respected Sir,

Sub.: Request for OD to attend _____

(Workshop / Conference / Value added course / Symposium / Project Contest / Seminar / Certificate Course / In-plant training / Internship)

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

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

Discipline / misbehavior, reported if any :

Clash with Internal test if any :

Recommended by		
Class co-ordinator	HOD	
	OD Permitted	OD Approved

A BRIEF HISTORY OF THE COLLEGE

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

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

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

Campus :

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

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

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

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

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

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

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

An Indoor stadium cum Auditorium of 2,221 sq. metre has been constructed on the northern side of the administrative block.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SALIENT FEATURES OF THE DEPARTMENT

1. GENERAL

- Started offering B.E. in Electrical and Electronics Engineering in the year 1994 with an intake of 40 (No.-732-50-8/RC/94, dated 11th August 1994, AICTE) with the latest intake of 120 in 2011 (F.No.Southern/1-400215781/2011/EOA, dated 01.09.2011, AICTE).
- Started offering M.E. in Power Systems Engineering in the year 2005 with an intake of 20 and increased intake to 24 in 2012 (F.No.Southern/1-687512981/2012/EOA, dated 10.05.2012, AICTE).
- Accredited in March 2004 (First time – F.No.NBA/ACCR-242/2003, dated 24/03/04) and Re-accredited (Second time – F.No.NBA/ACCR-242/2003, dated July 19, 2008) by National Board Accreditation, New Delhi. Re-accredited (Third time - For 2 years w.e.f. 28-08-2012) by National Board Accreditation, New Delhi. Re-accredited (Fourth time – For 3 years w.e.f. July 2016, upto 30.06.2019, F.No. 33-01/20100-NBA, dated 04.02.2017) by National Board Accreditation, New Delhi.
- Recognized Research Centre No.4490408, Approved by Anna University, Chennai with effect from December 2012, offering guidance for M.S & Ph.D.(Full time/Part time).
- Both UG and PG programs are permanently affiliated to Anna University, Chennai with effect from December 2012.
- MODROB fund of Rs.5 lakhs was allotted for the year 2011-2012 for the Power Electronics laboratory (No.8024/RIFD/MOD-131(pvt)/Policy-III/2011-2012, dated 06.03.2012).

2. INFRASTRUCTURE

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

3. STAFF

- Teams of well qualified, and experienced 31 faculties with cadre ratio as per AICTE, are guiding the students to attain the best educational objectives.
- Excellent research environment promotes the staff and students to participate, present and publish their research works in the National/International Journals and National/International conferences.
- Facility and experienced faculty available for guiding Ph.D. scholars.
- Staff development Programme / Faculty development programme / Workshop/ Seminar are organized regularly to share the knowledge of our experienced faculty with parent institution and other colleges staff and students and Industrial persons.

4. RESEARCH AND DEVELOPMENT

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

5. STUDENTS

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

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FACULTY LIST

S.No.	Name of the Faculty	Designation	Mobile No.	Email id
1.	Dr.S.M.Kannan	Professor & Head	9442035859	smkeeeklnce@gmail.com
2.	Dr.S.Venkatesan	Professor	9790672188	vensenn@yahoo.com
3.	Dr.K.Gnanambal	Professor	-	gnans_balu@rediffmail.com
4.	Dr. S.Parthasarathy	Professor	9443402901	sarathy_sps@yahoo.co.in
5.	Dr. S.Venkatanarayanan	Professor	9677320576	venjey@yahoo.co.uk
6.	A.Marimuthu	Associate Professor	9865002712	marimuthu_a@yahoo.com
7.	P.Loganthurai	Associate Professor	9952112115	loganthurai@yahoo.co.in
8.	M.Jegadeesan	Associate Professor	9524499063	m_jegadeesan07@rocketmail.com
9.	Dr.A.S.S.Murugan	Associate Professor	9344661182	assm17174@yahoo.co.in
10.	Dr. C.Vimala Rani	Associate Professor	-	jaysanjayvim@gmail.com
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12.	S.Manoharan	AP(Sr.Gr.)	9715585524	sharpmano@yahoo.com
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15.	Dr.A.P.S.Ramalakshmi	Assistant Professor	-	ramalakshmi.aps@gmail.com
16.	Dr.M.Maha Lakshmi	Assistant Professor	-	mmahalakshmi36@gmail.com
17.	K.R.Jeyavelumani	Assistant Professor	-	krjeya35@gmail.com
18.	M.Balamurugan	Assistant Professor	9677564275	murugan.bala10@gmail.com
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20.	R.Jeyapandiprathap	Assistant Professor	9788671119	jprathap03@gmail.com
21.	S.Rajalingam	Assistant Professor	9790248476	rajalingamrcet@gmail.com
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23.	A.Manoj	Assistant Professor	9487526428	manojhails@gmail.com
24.	R.Jeyarohini	Assistant Professor	-	rjreee2008@gmail.com
25.	R.C.Hemesh	Assistant Professor	9443675916	kirthihemesh@gmail.com
26.	Dr.S.P.Rajaram	Assistant Professor	9786614484	ramraja798@gmail.com
27.	E.Jeyasri	Assistant Professor	-	jeyasrieswaran@gmail.com
28.	V.Sindhu	Assistant Professor	-	savisindhu@yahoo.co.in
29.	R.Divya	Assistant Professor	-	divyaraajagopal@gmail.com
30.	R.Sridevi	Assistant Professor	-	sridevirs87@gmail.com
31.	M. Bharani lakshmi	Assistant Professor	-	bharanilakshmi.m@gmail.com

PLACEMENT ACTIVITY – REMINDER

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

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

All India Installed Capacity (in MW) of Power Stations

This is a **list of states and territories of India by installed capacity of power utilities** with electricity generation mode break-up as on **31 January 2017** with figures in Megawatts.

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

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

(As on 31.01.2017)

State	Ownership / Sector	Modewise breakup							Grand Total
		Thermal				Nuclear	Hydro (Renewable)	RES (MNRE)	
		Coal	Gas	Diesel	Total				
Andhra Pradesh	State	3085.91	235.40	0.00	3321.31	0.00	1808.87	89.50	5219.68
	Private	3650.00	3074.11	16.97	6741.08	0.00	0.00	3660.99	10402.07
	Central	1540.30	0.00	0.00	1540.30	127.16	0.00	0.00	1667.46
	Sub-Total	**8276.21**	**3309.51**	**16.97**	**11602.69**	**127.16**	**1808.87**	**3750.49**	**17289.22**
Telangana	State	5406.59	0.00	0.00	5406.59	0.00	2245.66	0.00	7652.25
	Private	270.00	1570.89	19.83	1860.72	0.00	0.00	1230.21	3090.93
	Central	1799.88	0.00	0.00	1799.88	148.62	0.00	0.00	1948.50
	Sub-Total	**7476.47**	**1570.89**	**19.83**	**9067.19**	**148.62**	**2245.66**	**1230.21**	**12691.68**
Karnataka	State	4220.00	0.00	127.92	4347.92	0.00	3599.80	155.33	8103.05
	Private	2060.00	0.00	25.20	2085.20	0.00	0.00	5949.21	8034.41
	Central	2028.46	0.00	0.00	2028.46	475.86	0.00	0.00	2504.32
	Sub-Total	**8308.46**	**0.00**	**153.12**	**8461.58**	**475.86**	**3599.80**	**6104.54**	**18641.78**
Kerala	State	0.00	0.00	159.96	159.96	0.00	1881.50	145.02	2186.48
	Private	0.00	174.00	0.00	174.00	0.00	0.00	119.36	293.36
	Central	1073.69	359.58	0.00	1433.27	228.60	0.00	0.00	1661.87
	Sub-Total	**1073.69**	**533.58**	**159.96**	**1767.23**	**228.60**	**1881.50**	**264.38**	**4141.71**
Tamil Nadu	State	4660.00	524.08	0.00	5184.08	0.00	2203.20	122.70	7509.98
	Private	2950.00	503.10	411.70	3864.80	0.00	0.00	10249.07	14113.87
	Central	4255.10	0.00	0.00	4255.10	986.50	0.00	0.00	5241.60
	Sub-Total	**11865.10**	**1027.18**	**411.70**	**13303.98**	**986.50**	**2203.20**	**10371.77**	**26865.45**
NLC	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Central	100.17	0.00	0.00	100.17	0.00	0.00	0.00	100.17
	Sub-Total	**100.17**	**0.00**	**0.00**	**100.17**	**0.00**	**0.00**	**0.00**	**100.17**
Puducherry	State	0.00	32.50	0.00	32.50	0.00	0.00	0.00	32.50
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
	Central	249.32	0.00	0.00	249.32	52.78	0.00	0.00	302.10
	Sub-Total	**249.32**	**32.50**	**0.00**	**281.82**	**52.78**	**0.00**	**0.03**	**334.63**
Central - Unallocated		1643.08	0.00	0.00	1643.08	300.48	0.00	0.00	1943.56
Total (Southern Region)	State	17372.50	791.98	287.88	18452.36	0.00	11739.03	512.55	30703.94
	Private	8930.00	5322.10	473.70	14725.80	0.00	0.00	21208.87	35934.67
	Central	12690.00	359.58	0.00	13049.58	2320.00	0.00	0.00	15369.58
	Grand Total	**38992.50**	**6473.66**	**761.58**	**46227.74**	**2320.00**	**11739.03**	**21721.42**	**82008.19**

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

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT AND ENTERPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

ADVANCED TRAINING INSTITUTE

(AN ISO 29990 : CERTIFIED)
Guindy, CHENNAI, Tamilnadu
Phone : 044-22501211/0252 Fax : 044-22501460, Email : atichn@vsnl.com, atichn@yahoo.com, Url : www.atichennai.org.in

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ATI Chennai : Regular Course Training Schedule
Advanced Vocational Training Scheme (AVTS) - Short Term Programme
Annual Training calendar 2017 – 2018
(Short Term Skill Training Programme)

	Course Code	Course Title	Duration (Week)	Date	
				From	To
GROUP:1	**ELECTRICAL CONTROL MAINTENANCE**				
	01.01	Protective Relays , Circuit Breakers, & Switch Gear Protection	01	03-04-2017	07-04-2017
				15-05-2017	19-05-2017
				05-06-2017	09-06-2017
				10-07-2017	14-07-2017
				21-08-2017	25-08-2017
				09-10-2017	13-10-2017
				13-11-2017	17-11-2017
				18-12-2017	22-12-2017
				29-01-2018	02-02-2018
				19-02-2017	23-02-2017
	01.02	Operation and Maint. Of Power Transformers	01	17-04-2017	21-04-2017
				12-06-2017	16-06-2017
				17-07-2017	21-07-2017
				04-09-2017	08-09-2017
				23-10-2017	27-10-2017
				20-11-2017	24-11-2017
				01-01-2018	05-01-2018
				05-02-2018	09-02-2018
				26-02-2017	02-03-2017
				19-03-2017	23-03-2017
	01.03	Operation & Control of Industrial AC / DC Motors	01	24-04-2017	28-04-2017
				22-05-2017	26-05-2017
				19-06-2017	23-06-2017
				24-07-2017	28-07-2017
				28-08-2017	01-09-2017
				18-09-2017	22-09-2017
				31-10-2017	03-11-2017
				04-12-2017	08-12-2017
				08-01-2018	12-01-2018
				05-03-2018	09-03-2018
	01.04	Electrical Safety at Work Place and First Aid	01	01-05-2017	05-05-2017
				29-05-2017	02-06-2017
				03-07-2017	07-07-2017
				07-08-2017	11-08-2017
				11-09-2017	15-09-2017
				06-11-2017	10-11-2017
				04-12-2017	08-12-2017
				15-01-2018	19-01-2018
				12-02-2018	16-02-2018
				12-03-2018	16-03-2018

Phone : 044-22501211/0252
Fax : 044-22501460

Email : atichn@vsnl.com, atichn@yahoo.com

Url : www.atichennai.org.in

GOVERNMENT OF INDIA
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Guindy, CHENNAI, Tamilnadu

ATI Chennai : Regular Course Training Schedule
Advanced Vocational Training Scheme (AVTS) - Short Term Programme
Annual Training calendar 2017 – 2018
(Short Term Skill Training Programme)

GROUP:1	**ELECTRONIC CONTROL MAINTENANCE**			
Course Code	Course Title	Duration (Week)	**Date**	
			From	To
02.01	Power Electronics and its Industrial Applications	01	03-04-2017	07-04-2017
			05-06-2017	09-06-2017
			02-10-2017	06-10-2017
			04-12-2017	08-12-2017
			19-02-2018	23-02-2018
02.02	8051 Programming & Applications	01	10-04-2017	14-04-2017
			12-06-2017	16-06-2017
			31-07-2017	04-08-2017
			21-08-2017	25-08-2017
			09-10-2017	13-10-2017
			11-12-2017	15-12-2017
			26-02-2018	02-03-2018
02.03	PIC Micro Controller Programming & Applications	01	24-07-2017	28-07-2017
			25-09-2017	29-09-2017
02.04	Siemens S7-400 PLC Step-7 (Level-1)	01	17-04-2017	21-04-2017
			19-06-2017	23-06-2017
			07-08-2017	11-08-2017
			16-10-2017	20-10-2017
			18-12-2017	22-12-2017
			04-09-2017	08-09-2017
			05-03-2018	09-03-2018
02.05	Computer Hardware maintenance & Net Working	01	24-04-2017	28-04-2017
			26-06-2017	30-06-2017
			11-09-2017	15-09-2017
			23-10-2017	27-10-2017
			25-12-2017	29-12-2017
			05-02-2018	09-02-2018
			12-03-2018	16-03-2018
02.06	Siemens S7-400 PLC Programming (TIA PORTAL) (Level-1)	01	01-05-2017	05-05-2017
			29-05-2017	02-06-2017
			03-07-2017	07-07-2017
			18-09-2017	22-09-2017
			30-10-2017	03-11-2017
			01-01-2018	05-01-2018
			19-03-2018	23-03-2018
02.07	Siemens PLC-S7-1200 & Drive for Position Control Applications	01	08-05-2017	12-05-2017
			10-07-2017	14-07-2017
			06-11-2017	10-11-2017
			08-01-2018	12-01-2018

List of PSUs through GATE Exam

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

Lists of TOP 10 software companies to offer jobs in India

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

Lists of TOP 10 core companies to offer Electrical jobs

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Lists of core companies to offer Electrical jobs in India

Types of Electrical Core Companies

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

Electrical motors and Generators

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

Consultancy (Electrical Engineering)

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

Electrical appliances

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

Electrical components companies

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

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

Lighting & luminaries

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

Power Generation

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

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

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

Electric wires & Cables

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

Electrical exporters

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

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

Measurements & Instrumentation

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

Power Distribution

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

Transformers

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

Green Energy Companies in India

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

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

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

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

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

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

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

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

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

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

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

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

Internationally renowned MNC's to offer electrical jobs

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

Top core companies in India to offer electrical jobs

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

Exclusive Government jobs for Electrical Engineers

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

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

K.L.N. COLLEGE OF ENGINEERING.
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
Circular

Ref: KLNCE/EEE/TPO/2017 **Date: 04/05/2017**

Training plan for the Academic Year 2017-2018

Year/TPO/ Department Activity	TPO	DEPARTMENT	STAFF
First Year	Path Transformations, ICE(Initiate Create Expose)	C,C++ Programming (Application Oriented Programming Skill is must) -3Days, BEC Training, Tell About Yourself TCS Campus Commune Registration(Test Portal) Smart India Hackathalon Code Vita, Enginx Awareness on GATE,TANCET, GMAT, IES, IAS, BOAT, TOEFL, NTPC, ISRO Attitude- Behavior-Dress coding-Personality-Hairstyle-Certificates Filing Awareness on Profile of the Core and IT Companies Direct Placement through Company Webportal Awareness on Bond Rules Real Time Projects	R.Divya M.S.C.Sujitha Mr. S. Rajalingam
Second Year	Level-I: Aptitude Training/ Verbal Reasoning/Quantitative Aptitude	LABVIEW,Core1,Core2, C,C++ Programming(Application Oriented Programming Skill is must), MOCK Awareness, MOCK GD, Tell About Yourself, Core Training-Data Pattern-Syllabus available-EDC,LIC,DLC TCS Campus Commune Registration(Test Portal) Project Contest Smart India Hackathalon Code Vita, Enginx CCNA Certification Awareness on GATE,TANCET, GMAT, IES, IAS, BOAT, TOEFL, NTPC, ISRO Attitude- Behavior-Dress coding-Personality-Hairstyle-Certificates Filing Direct Placement through Company Webportal Awareness on Bond Rules Real Time Projects	M.JeyaMurugan S.Manoharan Dr. M. Mahalakshmi Mr. S. Rajalingam
Third Year	Level-II: Aptitude Training/ Verbal Reasoning/Quantitative Aptitude AMCAT Specific Training(Aptitude, Core,	JAVA Programming (10 Days-Even Semester) C,C++ Programming (Application Oriented Programming Skill is must) Texas Instruments (5 Days-Odd Semester)[Java Certification must for ZOHO, MindTree, IVTL, Salary: 6.5	Dr. S. Venkatesan, Dr. K. Gnanambal, Dr. S. M. Kannan, Mr. A. Marimuthu, M. Ganeshkumari,

	Language-Syllabus available), AMCAT Exam(4 Hrs Exam-2 times) Resume Preparation Email writing NIIT Aptitude Exam TCS Webinar	Lakhs] MOCK Awareness, MOCK GD, Tell About Yourself Training-Data Pattern- Syllabus available-EDC,LIC,DLC TCS Campus Commune Registration(Test Portal) Project Contest Smart India Hackathalon Code Vita, Enginx CCNA Certification Awareness on GATE,TANCET, GMAT, IES, IAS, BOAT, TOEFL, NTPC, ISRO Attitude- Behavior-Dress coding-Personality-Hairstyle-Certificates Filing Direct Placement through Company Webportal Awareness on Bond Rules Real Time Projects	
Final Year	Level-III: Aptitude Training/ Verbal Reasoning/Quantitative Aptitude Company Specific Training Programme AMCAT Exam(4 Hrs Exam-2 times) Resume Preparation, Email writing MOCK Group Discussion, MOCK Interview Awareness Programme for Higher Education-Abroad TCS Webinar	IoT Techniques, C,C++ Programming(Application Oriented Programming Skill is must) MOCK GD Training-Data Pattern- Syllabus available-EDC,LIC,DLC,VLSI,MPMC,ES,DSP Jasmin InfoTech- C, C++,MPMC,DSP-Application Oriented CADENCE – CT(Salary: 8 Lakhs) TESSOLVE- EDC, LIC, DLC (Semiconductor Based) LABVIEW- CLAD Certification TCS Campus Commune Registration(Test Portal) Project Contest Smart India Hackathalon Code Vita, Enginx CCNA Certification, Oracle Certification Awareness on GATE,TANCET, GMAT, IES, IAS, BOAT, TOEFL, NTPC, ISRO Attitude-Behavior-Dress coding-Personality-Hairstyle-Certificates Filing Direct Placement through Company Webportal, Awareness on Bond Rules Real Time Projects	Dr. A.S.S. Murugan M. Jegadeesan R. Jeyarohini A. Manoj N.Vimal Radha Vignesh

www.guvi.com - **Real Time problem and Programming Skill**

Electrical Engineering

Q. No. 1 – 25 Carry One Mark Each

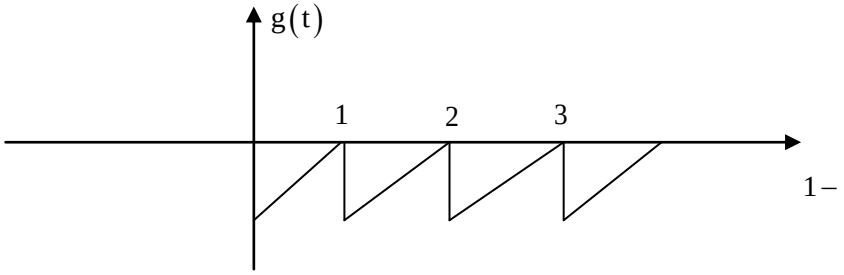
1. Consider $g(t)=\begin{cases} t-\lfloor t \rfloor, & t \geq 0 \\ t-\lceil t \rceil, & \text{otherwise} \end{cases}$, where $t \in \mathbb{R}$

Here, $\lfloor t \rfloor$ represents the largest integer less than or equal to t and $\lceil t \rceil$ denotes the smallest integer greater than or equal to t. The coefficient of the second harmonic component of the Fourier series representing g(t) is _____.

Key: 0 to 0

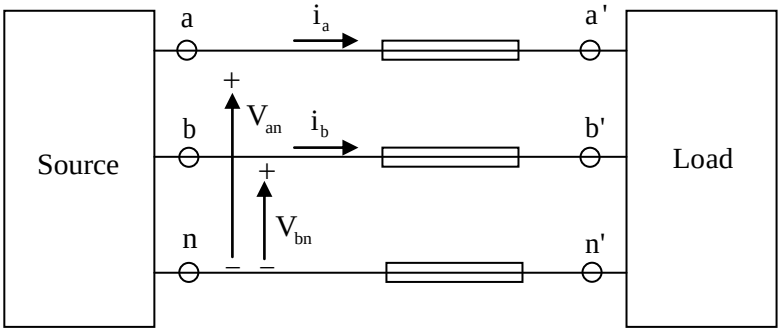
Exp: Given $g(t)=\begin{cases} t-\lfloor t \rfloor & +\geq 0 \\ t-\lceil t \rceil & \text{otherwise} \end{cases}$

If we plot the above signal, we get



Since this wave form contain hidden half wave symmetry, even harmonics does not exist.
Thus coefficient of second harmonic component of Fourier series will be zero.

2. A source is supplying a load through a 2-phase, 3-wire transmission system as shown in figure below. The instantaneous voltage and current in phase-a are $V_{an}=220\sin(100\pi t)$ V and $i_a=10\sin(100\pi t)$ A, respectively. Similarly for phase-b the instantaneous voltage and current are $V_{bn}=220\cos(100\pi t)$ V and $i_b=10\cos(100\pi t)$ A, respectively.



The total instantaneous power flowing form the source to the load is

(A) 2200 W

(B) $2200\sin^2(100\pi t)$ W

(C) 440 W

(D) $2200\sin(100\pi t)\cos(100\pi t)$ W

Key: (A)

Exp: $P_{instaneous} = V_{an}\, i_a + V_{bn} i_b$

$= 220\sin(100\pi t)10\sin(100\pi t)t + 220\cos(100\pi t)10\cos(100\pi t)$

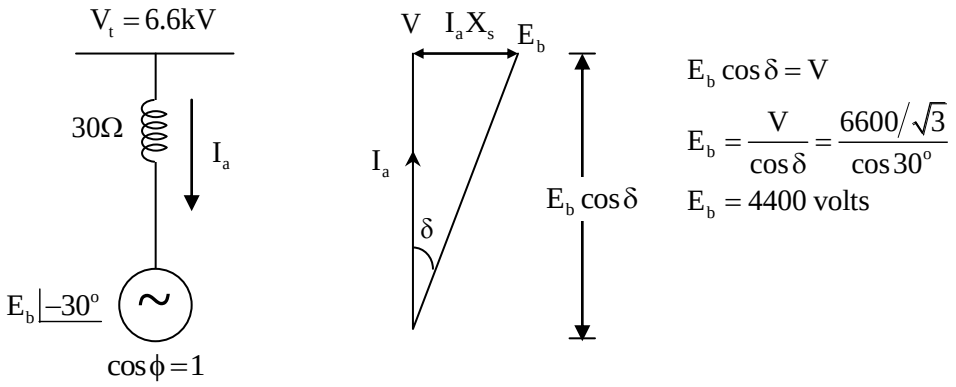
$= 2200\sin^2(100\pi t) + 2200\cos^2(100\pi t)$

$= 2200\,W$

3. A three-phase, 50Hz, star-connected cylindrical-rotor synchronous machine is running as a motor. The machine is operated from a 6.6 kV grid and draws current at unity power factor (UPF). The synchronous reactance of the motor is $30\,\Omega$ per phase. The load angle is 30^o. The power delivered to the motor in kW is _____.

Key: 835 to 842

Exp:



$E_b\cos\delta = V$

$E_b = \dfrac{V}{\cos\delta} = \dfrac{6600/\sqrt{3}}{\cos 30^o}$

$E_b = 4400$ volts

$P = 3.\dfrac{E_b.V}{X_s}\sin\delta = 3.\dfrac{4400\times 3810.51}{30} = \sin 30^o$

$P = 838.31\,kW$

4. For a complex number z, $\lim\limits_{z\to i}\dfrac{z^2+1}{z^3+2z-i(z^2+2)}$ is

(A) -2i (B) -i (C) i (D) 2i

Key: (D)

Exp: $\lim\limits_{z\to i}\dfrac{z^2+1}{z^3+2z-i(z^2+2)} = \lim\limits_{z\to i}\dfrac{z+i}{z^2+2} = \dfrac{2i}{-1+2} = 2i$

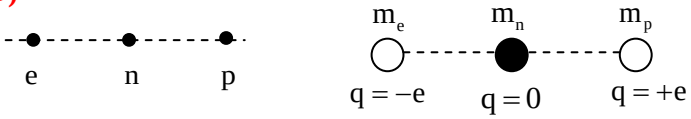
5. Consider an electron, a neutron and a proton initially at rest and placed along a straight line such that the neutron is exactly at the center of the line joining the electron and proton. At t=0, the particles are released but are constrained to move along the same straight line. Which of these will collide first?

(A) The particles will never collide (B) All will collide together

(C) Proton and Neutron (D) Electron and Neutron

Key: (D)

Exp:



The Gravitational force of alteration between any two particles shown above is made much negligible when compared to coloumbic force of alteration between electron and proton.

Force of alteration

$F = \frac{-e^2}{4\pi \in_o r^2}$, accelleration $q = \frac{F}{M}; q_e >> q_p$

Due to this force, the electron as well as the proton will move towards each other, since $m_e << m_p$, the speed and acceleration of the electron will be much greater than that of proton. This causes electron to collide with the neutron faster when compared to proton.

6. Let $z(t) = x(t) * y(t)$, where "$*$" denotes convolution. Let C be a positive real-valued constant. Choose the correct expression for z (ct).

(A) $c.x(ct) * y(ct)$ (B) $x(ct) * y(ct)$ (C) $c.x(t) * y(ct)$ (D) $c.x(ct) * y(t)$

Key: (A)

Exp: $z(t) = x(t) * y(t)$

$\Rightarrow z(s) = x(s).y(s)$

Converting into Laplace transform and applying time sealing property.

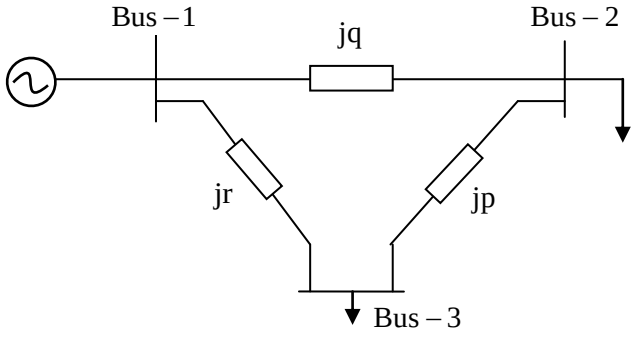
$z(ct) \leftrightarrow \frac{1}{c} z(s/c)$

$= \frac{1}{c} \times (s/c) y(s/c)$

$= c\frac{1}{c} \times (s/c)\frac{1}{c} y(s/c)$

$z(ct) = c.x(ct) * y(ct)$

7. A 3-bus power system is shown in the figure below, where the diagonal elements of Y-bus matrix are $Y_{11} = -j12pu$, $Y_{22} = -j15pu$ and $Y_{33} = -j7pu$



The per unit values of the line reactances p, q and r shown in the figure are

(A) $p = -0.2,\ q = -0.1,\ r = -0.5$ (B) $p = 0.2,\ q = 0.1,\ r = 0.5$

(C) $p = -5,\ q = -10,\ r = -2$ (D) $p = 5,\ q = 10,\ r = 2$

Key: (B)

Exp: $Y_{11} = y_{10} + y_{12} + y_{13} = -j12 = -\left(jq^1 + jr^1\right)$

$\therefore q^1 + r^1 = +12$

$Y_{22} = -j15 = y_{20} + y_{21} + y_{23} = -\left(jq^1 + jp^1\right)$

$\therefore p^1 + q^1 = +15$

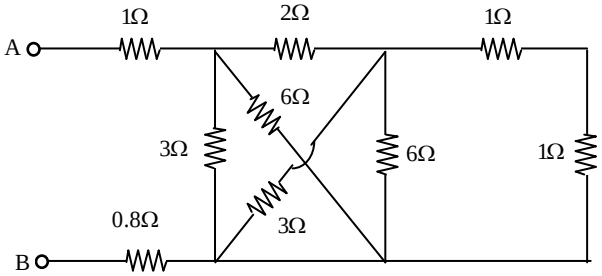
$Y_{33} = -j7 = y_{30} + y_{31} + y_{32} = -\left(jp^1 + jr^1\right)$

$\therefore p^1 + r^1 = +7$

solving $P^1 = +5, q^1 = +10, r^1 = +2\left(\text{admit tan ces}\right)$

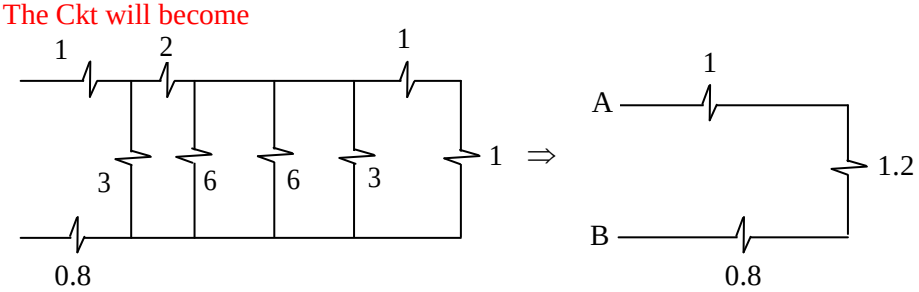
$P = +0.2, q = +0.1, r = +0.5\left(\text{reac tan ces}\right)$

8. The equivalent resistance between the terminals A and B is _____ Ω .



Key: 2.9 to 3.1

Exp: The Ckt will become



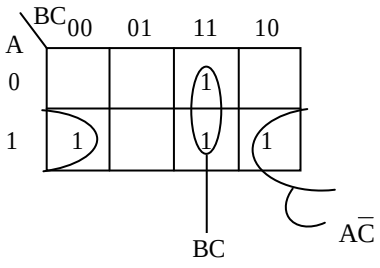
$R_{AB} = 1 + 1.2 + 0.8 = 3\Omega$

9. The Boolean expression $AB + A\bar{C} + BC$ simplifies to

(A) $BC + A\bar{C}$ (B) $AB + A\bar{C} + B$ (C) $AB + A\bar{C}$ (D) $AB + BC$

Key: (A)

Exp: $AB + \overline{AC} + BC$



$\Rightarrow BC + A\bar{C}$

10. The following measurements are obtained on a single phase load:
$V = 220V \pm 1\%$, $I = 5.0A \pm 1\%$ and $W = 555W \pm 2\%$. If the power factor is calculated using these measurements, the worst case error in the calculated power factor in percent is _____.

Key: 4 to 4

Exp: $P = VI\cos\phi$

$$\cos\phi = \frac{P}{V.I} = \frac{555 \pm 2\%}{(220 \pm 1\%)(5 \pm 1\%)} = \frac{555 \pm 2\%}{1100 \pm 2\%} = 0.504 \pm 4\%$$

11. The transfer function of a system is given by, $\frac{V_o(s)}{V_i(s)} = \frac{1-s}{1+s}$ Let the output of the system be $v_o(t) = V_m \sin(\omega t + \varphi)$ for the input $v_i(t) = V_m \sin(\omega t)$. Then the minimum and maximum values of φ (in radians) are respectively

(A) $\frac{-\pi}{2}$ and $\frac{\pi}{2}$ (B) $\frac{-\pi}{2}$ and 0 (C) 0 and $\frac{\pi}{2}$ (D) $-\pi$ and 0

Key: (D)

Exp: $\frac{V_o(s)}{V_i(s)} = \frac{1-s}{1+s} = H(s)$

$H(\omega) = 1 < -2\text{Tan}^{-1}\omega$, If $\omega = 0, \phi = 0$

If $\omega = \infty, \phi = -\pi$

$V_o(t) = V_m \sin(\omega t - 2\text{Tan}^{-1}(\omega))$

12. The matrix $A = \begin{bmatrix} \frac{3}{2} & 0 & \frac{1}{2} \\ 0 & -1 & 0 \\ \frac{1}{2} & 0 & \frac{3}{2} \end{bmatrix}$ has three distinct eigenvalues and one of its eigenvectors is $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$

Which one of the following can be another eigenvector of A?

(A) $\begin{bmatrix} 0 \\ 0 \\ -1 \end{bmatrix}$ (B) $\begin{bmatrix} -1 \\ 0 \\ 0 \end{bmatrix}$ (C) $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$ (D) $\begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$

Key: (C)

Exp: By the properties of Eigen values and Eigen vectors, another eigen vector of A is $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$

The eigen vectors corresponding to distinct eigen values of a real symmetric matrix are orthogonal i.e., pair wise dot product is zero.

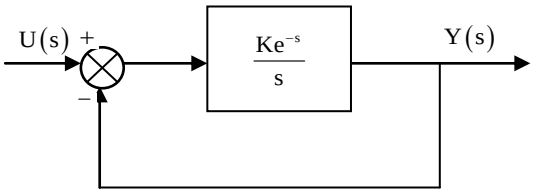
13. For the power semiconductor devices IGBT, MOSFET, Diode and Thyristor, which one of the following statements is TRUE?

(A) All of the four are majority carrier devices.
(B) All the four are minority carrier devices
(C) IGBT and MOSFET are majority carrier devices, whereas Diode and Thyristor are minority carrier devices.
(D) MOSFET is majority carrier device, whereas IGBT, Diode, Thyristor are minority carrier devices.

Key: (D)

Exp: MOSFET → Majority carrier device (NMOS, PMOS)
Diode → both majority & minority carrier device
Transister → Npn, pnp
IGBT → input is MOSFET, Output is BJT

14. Consider the unity feedback control system shown. The value of K that results in a phase margin of the system to be 30^o is _____.



Key: 1.01 to 1.06

Exp: $PM = 180 + \angle G_{\omega=\omega gc}$

$$G(s) = \frac{Ke^{-s}}{s}$$

$$For\ \omega gc \Rightarrow |G(s)| \Rightarrow \frac{K}{\omega} = 1$$

$$\omega gc = K \Rightarrow \angle G(s) = -\omega \times \frac{180}{\pi} - 90^o$$

$$30^o = 180^o - K \times \frac{180^o}{\pi} - 90^o$$

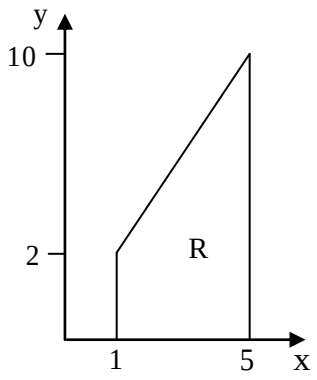
$$K\frac{180^o}{\pi} = 60 \Rightarrow K = \frac{\pi}{3} = 1.047$$

15. A solid iron cylinder is placed in a region containing a uniform magnetic field such that the cylinder axis is parallel to the magnetic field direction. The magnetic field lines inside the cylinder will
(A) bend closer to the cylinder axis
(B) bend farther away from the axis
(C) remain uniform as before
(D) cease to exist inside the cylinder

Key: (A)

Exp: Flux always chooses less reluctance path. So flux tried to flow inside the conductor and closer to the axis of the cylinder.

16. Let $I = c\int\int_R xy^2 dxdy$, where R is the region shown in the figure and $c = 6\times10^{-4}$. The value of I equals_____.



Key: 0.99 to 1.01

Exp: $\iint_R xy^2dxdy = \int\int_{R_1} xy^2dxdy + \int\int_{R_2} xy^2dxdy$

$$= \int_{x=1}^{5}\int_{y=0}^{2} xy^2dxdy + \int_{x=1}^{5}\int_{y=2}^{2x} xy^2dx = \left(\frac{x^2}{2}\right)_1^5\left(\frac{y^3}{3}\right)_0^2 + \int_1^5 x\left(\frac{y^3}{3}\right)_2^{2x}dx$$

$$= (12)\left(\frac{8}{3}\right) + \frac{1}{3}\int_1^5 x\left(8x^3-8\right)dx = 32 + \frac{1}{3}\left[8\left(\frac{x^5}{5}\right)_1^5 - 8\left(\frac{x^2}{2}\right)_1^5\right]$$

$$= 32 + \frac{1}{3}\left(\frac{24992}{5}\right) - 32 = \frac{24992}{15}$$

$$\therefore C\int\int_R xy^2dxdy = \frac{2}{5}(24992)\times 10^{-4} = 0.99968 \approx 1$$

OR

$$\iint_R xy^2dxdy = \int_{x=1}^{5}\left(\int_{y=0}^{2x} xy^2dy\right)dx$$

$$= \int_1^5 x\left(\frac{y^3}{3}\right)^{2x}dx = \frac{8}{3}\int_1^5 x\left(x^3\right)dx$$

$$= \frac{8}{3}\left(\frac{x5}{5}\right)_1^5 = \frac{8}{15}(3124) = \frac{24992}{15}$$

$$\therefore C\iint_R xy^2dxdy = \frac{24992}{15}\times 10^{-4}\times 6 = \frac{2}{5}\times 2.4992 = 0.9968 \approx 1$$

17. Consider the system with following input-output relation $y[n] = \left(1+(-1)^n\right)x[n]$ where, x[n] is the input and y[n] is the output. The system is

(A) invertible and time invariant
(B) invertible and time varying
(C) non-invertible and time invariant
(D) non-invertible and time varying

Key: (D)

Exp: Given $y[n] = \left(1+(-1)^n\right)x[n]$

For time invariance

$y'[n] = \left(1+(-1)^n\right)x(n-n_o) \rightarrow (1)$

$y(n-n_o) = \left(1+(-1)^{n-n_o}\right)x(n-n_o) \rightarrow (2)$

Since (1) is not equal to (2)

System is time variant

For inverse system

For each unique $x[n]$, there should be unique $y[n]$

If $x[n] = \delta[n-1]$

$y[n] = \left[1+(-1)^n\right]\delta[n-1]$

$\Rightarrow y[1]=0$

if $x[n]=2\delta[n-1]$

$y[n]=\left[1+(-1)^n\right]2\delta(n-1)$

y(1)=0

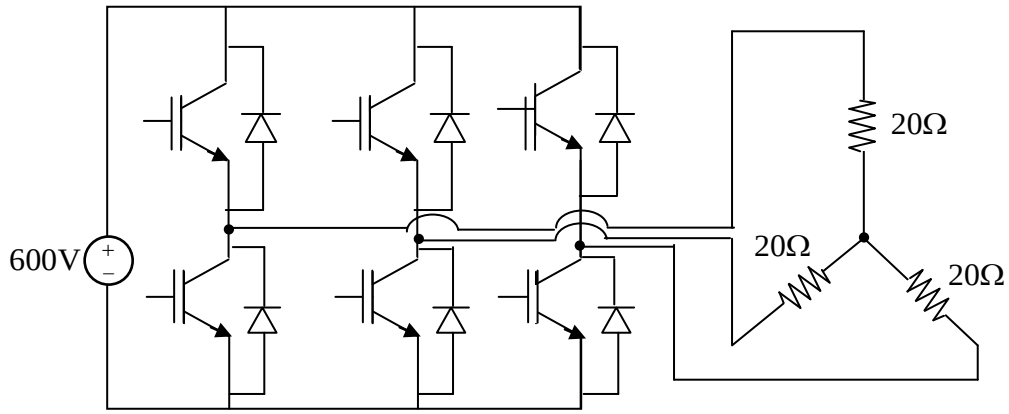
For two different inputs we have same output. Thus one to one mapping is not possible. Hence the systems is non invertible

18. The slope and level detector circuit in a CRO has a delay of 100 ns. The start-stop sweep generator has a response time of 50 ns. In order to display correctly, a delay line of
(A) 150 ns has to be inserted into the y-channel
(B) 150 ns has to be inserted into the x-channel
(C) 150 ns has to be inserted into both x and y channels
(D) 100 ns has to be inserted into both x and y channels

Key: (A)

Exp: The delay line should be inverted in VDP (Y-channel) only.

19. A 3-phase voltage source inverter is supplied from a 600V DC source as shown in the figure below. For a star connected resistive load of $20\,\Omega$ per phase, the load power for 120^o device conduction, in kW is _____.



Key: 8.5 to 9.5

Exp: $V_{dc}=600V$

$R_L=20\Omega/\text{Ph}\quad 120^o\,\text{mode}$

RMS value of phase voltage $(V_p)=0.4082V_{dc}=244.92V$

Load power $=\dfrac{3Vph^2}{R}=\dfrac{3\times244.92^2}{20}=8.99kW\approx 9kW$

20. A closed loop system has the characteristic equation given by $s^3+Ks^2+(K+2)s+3=0$. For this system to be stable, which one of the following conditions should be satisfied?
(A) $0<K<0.5$ (B) $0.5<K<1$ (C) $0<K<1$ (D) $K>1$

Key: (D)

Exp: Given $CE=s^3+ks^2+(k+2)s+3=0$

For stable

$k(k+2)>3$

$k^2+2k-3>0$

$(k-1)(k+3)>0$

$k>-1 \cap k>-3$

$k>1$

(OR)

By R-H criteria

s^3	1	$k+2$
s^2	k	3
s	$\frac{k(k+2)-3}{k}$	0
s^0	3	

$k>0 \cap (k+3)(k-1)>0$

$K>0 \cap k>1 \cap k>-3 \Rightarrow k>1$

21. A 4 pole induction machine is working as an induction generator. The generator supply frequency is 60 Hz. The rotor current frequency is 5 Hz. The mechanical speed of the rotor in RPM is

(A) 1350 (B) 1650 (C) 1950 (D) 2250

Key: (C)

Exp: $N_s=\frac{120\times 60}{4}=1800 \text{ rpm}$

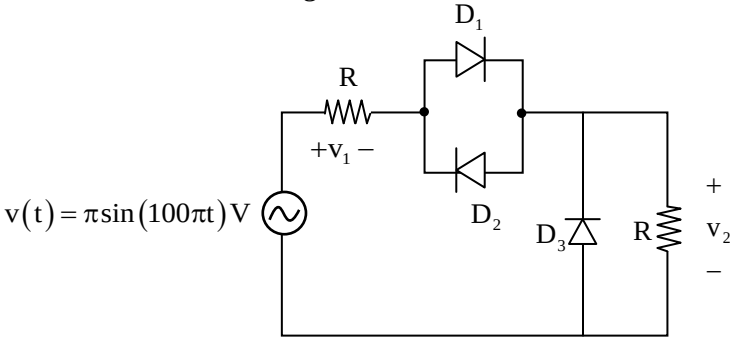
Rotor speed should be greater than syn.speeed, to ge inductance generator mode.

$S=\frac{N_r-N_S}{N_S}$

$\Rightarrow N_r=N_S(1+S)$ $\quad \left[f_r=sf \Rightarrow s=\frac{f_r}{f}=\frac{5}{60}=\frac{1}{12}\right]$

$N_r=1800\left(1+\frac{1}{12}\right)=1950 \text{ rpm}$

22. For the circuit shown in the figure below, assume that diodes D_1, D_2 and D_3 are ideal.



The DC components of voltages v_1 and v_2, respectively are

(A) 0 V and 1 V (B) -0.5 V and 0.5 V (C) 1 V and 0.5 V (D) 1 V and 1 V

Key: (B)

Exp: For half wave Rectifier $Vdc = \frac{V_m}{\pi}$

$$V_1 = V_{dc}\text{for} + \text{ve pulse} + V_{dc}\text{for} - \text{ve pulse} = \frac{\pi}{2\pi} + \left(\frac{-\pi}{\pi}\right) = \frac{1}{2} - 1 = -0.5\,V$$

$$V_2 = \frac{\pi}{2\pi} + 0 = 0.5V$$

23. A 10-bus power system consists of four generator buses indexed as G1, G2, G3, G4 and six load buses indexed as L1, L2, L3, L4, L5, L6. The generator bus G1 is considered as slack bus, and the load buses L3 and L4 are voltage controlled buses. The generator at bus G2 cannot supply the required reactive power demand, and hence it is operating at its maximum reactive power limit. The number of non-linear equations required for solving the load flow problem using Newton-Raphson method in polar form is _____.

Key: 14 to 14

Exp: Total no of buses=10

Given G_1=slack bus, G_2=generator/PQ bus

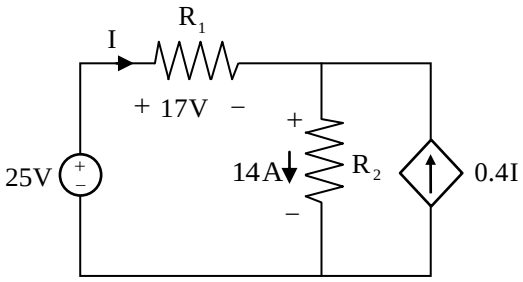
$\therefore G_3, G_4$ are PV buses

PQ buses $\rightarrow L_1, L_2, L_5, L_6$ (4)

Voltage controlled PV buses $\rightarrow L_3, L_4$ (2)

Minimum no of nonlinear equations to be solved $= 2\times10 - 2 - 4 = 14$

24. The power supplied by the 25 V source in the figure shown below is _____W.



Key: 248 to 252

Exp: KCL

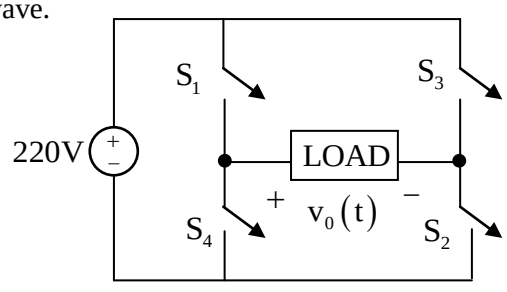
$I + 0.4I = 14$

$\Rightarrow 1.4I = 14$

$\Rightarrow I = 10A$

The power supplied by 25 V = $25\times10 = 250W$

25. In the converter circuit shown below, the switches are controlled such that the load voltage $v_o(t)$ is a 400 Hz square wave.



The RMS value of the fundamental component of $v_o(t)$ in volts is _____.

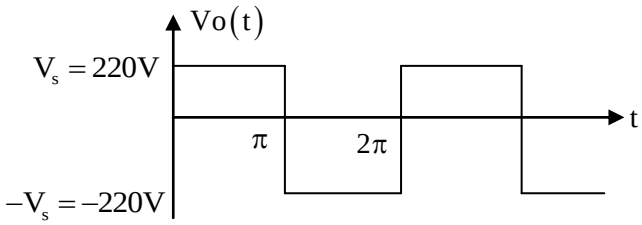
Key : 196 to 200

Exp: $Vo(t)=\frac{4V_s}{\pi}\left[\sin\omega t+\frac{1}{3}\sin 3\omega t+\frac{1}{5}\sin 5\omega t+\right]=\sum_{n=1,3,5}^{\infty}\frac{4V_S}{n\pi}\sin(n\omega t)$

$V_{on}=\frac{4}{\sqrt{2}}\frac{V_S}{n\pi}$

$V_{ol}=\frac{4}{\sqrt{2}}\times\frac{V_S}{\pi}=0.9V_S$

$=0.9\times 220=198.069V$



Q. No. 26 – 55 Carry Two Marks Each

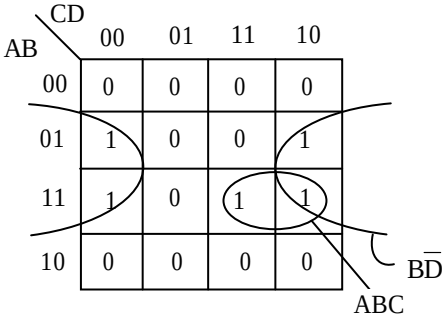
26. The output expression for the Karnaugh map shown below is

A B \ C D	00	01	11	10
00	0	0	0	0
01	1	0	0	1
11	1	0	1	1
10	0	0	0	0

(A) $B\bar{D}+BCD$ (B) $B\bar{D}+AB$ (C) $\bar{B}D+ABC$ (D) $B\bar{D}+ABC$

Key: (D)

Exp:



27. A 220 V DC series motor runs drawing a current of 30 A from the supply. Armature and field circuit resistances are 0.4Ω and 0.1Ω respectively. The load torque varies as the square of the speed. The flux in the motor may be taken as being proportional to the armature current. To reduce the speed of the motor by 50% the resistance in ohms that should be added in series with the armature is _____.

Key: 9.5 to 12

Exp: $E_{b_1}=220-30(0.5)=205$ volts

$E_{b_2}=220-I_{a_2}(0.5+R_X)$

Given $T\propto N^2$ and $\phi\propto I_R$

We know that, in series motor $\Rightarrow T\propto I_a^2$

$$T \propto I_a^2 \propto N^2$$

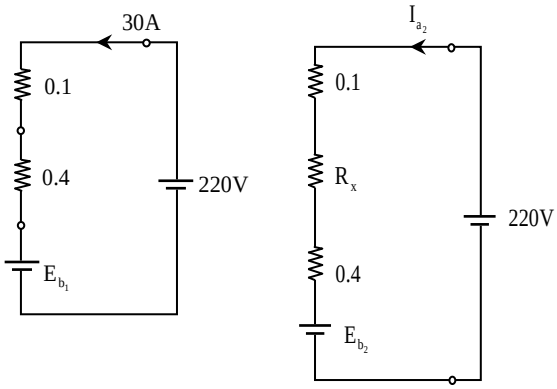
$$\frac{N_2}{N_1} = \frac{I_{a_2}}{I_{a_1}} \Rightarrow I_{a_2} = 0.5.I_{a_1} = 15\ \text{Amp}$$

$$N \propto \frac{E_b}{\phi}$$

$$\frac{N_2}{N_1} = \frac{E_{b_2}}{E_{b_1}} = \frac{\phi_1}{\phi_2}$$

$$\frac{0.5N_1}{N_1} = \frac{220 - 15(0.5 + R_x)}{205} \times \frac{30}{15}$$

$$\Rightarrow R_x = 10.75\,\Omega$$



28. The transfer function of the system Y(s)/U(s) whose state-space equations are given below is:

$$\begin{bmatrix}\dot{x}_1(t)\\ \dot{x}_2(t)\end{bmatrix} = \begin{bmatrix}1 & 2\\ 2 & 0\end{bmatrix}\begin{bmatrix}x_1(t)\\ x_2(t)\end{bmatrix} + \begin{bmatrix}1\\ 2\end{bmatrix}u(t)$$

$$y(t) = [10]\begin{bmatrix}x_1(t)\\ x_2(t)\end{bmatrix}$$

(A) $\frac{(s+2)}{(s^2-2s-2)}$ (B) $\frac{(s-2)}{(s^2+s-4)}$ (C) $\frac{(s-4)}{(s^2+s-4)}$ (D) $\frac{(s+4)}{(s^2-s-4)}$

Key: (D)

Exp: Given

$$\begin{bmatrix}\dot{x}_1(t)\\ \dot{x}_2(t)\end{bmatrix} = \begin{bmatrix}1 & 2\\ 2 & 0\end{bmatrix}\begin{bmatrix}x_1(t)\\ x_2(t)\end{bmatrix} + \begin{bmatrix}1\\ 2\end{bmatrix}u(t)$$

$$x(t) = Ax + Bu$$

Transfer function $= C[SI - A]^{-1}B + D$

Here D = 0

$$C = [1 \quad 0]$$

$$A = \begin{bmatrix}1 & 2\\ 2 & 0\end{bmatrix} \quad B = \begin{bmatrix}1\\ 2\end{bmatrix}$$

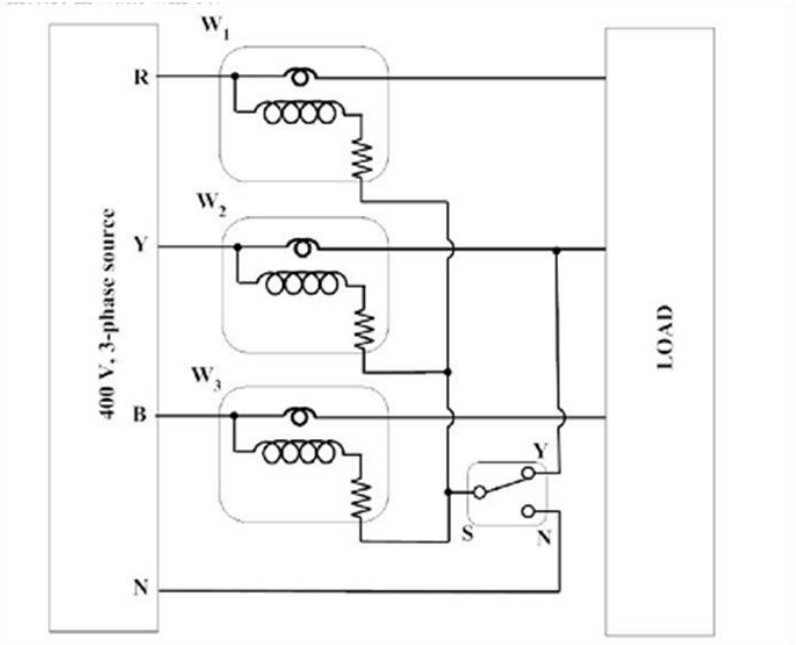
$$T/F = [1 \quad 0]\begin{bmatrix}s-1 & -2\\ -2 & s\end{bmatrix}^{-1}\begin{bmatrix}1\\ 2\end{bmatrix}$$

$$= [1 \quad 0]\frac{\begin{bmatrix}s & 2\\ 2 & s-1\end{bmatrix}\begin{bmatrix}1\\ 2\end{bmatrix}}{s^2-s-4}$$

$$= [1 \quad 0]\frac{\begin{bmatrix}s+4\\ 2+2s-2\end{bmatrix}}{s^2-s-4}$$

$$\Rightarrow T/F = \frac{s+4}{s^2-s-4}$$

29. The load shown in the figure is supplied by a 400 V (line to line) 3-phase source (RYB sequence). The load is balanced and inductive, drawing 3464 VA. When the switch S is in position N, the three watt-meters W_1, W_2 and W_3 read 577.35 W each. If the switch is moved to position Y, the readings of the watt-meters in watts will be:



(A) $W_1 = 1732 \text{ and } W_2 = W_3 = 0$

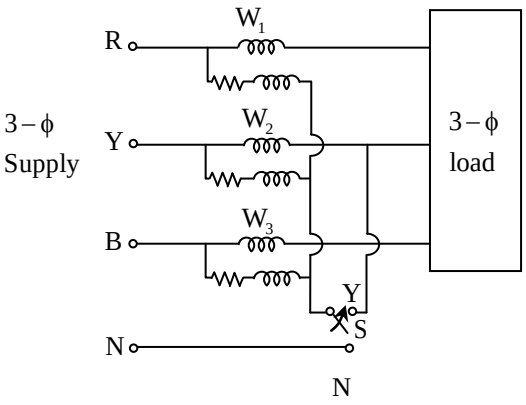
(B) $W_1 = 0, W_2 = 1732 \text{ and } W_3 = 0$

(C) $W_1 = 866, W_2 = 0, W_3 = 866$

(D) $W_1 = W_2 = 0 \text{ and } W_3 = 1732$

Key: (D)

Exp:



If the switch is connected to Neutral, then each wattmeter will read $1-\phi$ power.

$W_1 + W_2 + W_3 = 3.V_{ph}.I_{ph}\cos\phi = 1732.05$

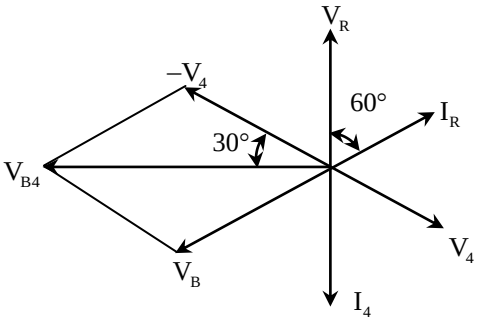
$\Rightarrow \cos\phi = 0.51 \text{agg.} \Rightarrow \phi = 60°$

Given that, load drawing Apparent power of 3464 VA.

$\sqrt{3}V_L I_L = 3464$

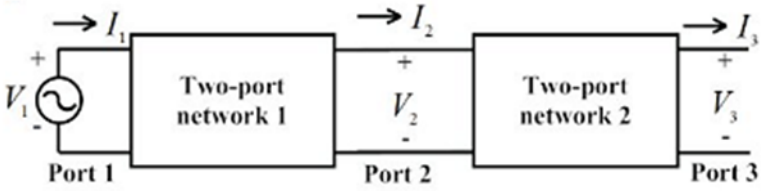
$I_L = \dfrac{3464}{\sqrt{3}\times 400} = 5A$

If the switch connected to "Y", then W_2=0



$$W_1 = V_{pc}\, I_{cc} \cos\left(V_{pc} \,\&\, I_{cc}\right) = V_{Ry}\, I_R \cos\left(V_{Ry} \,\&\, I_R\right)$$
$$= 400 \times 5 \cos\left(90°\right) = 0\,\text{W}$$
$$W_3 = V_{By} I_B \cos\left(V_{By} \,\&\, I_B\right) = 400 \times 5 \times \cos 30° = 1732\,\text{watts}$$

30. Two passive two-port networks are connected in cascade as shown in figure. A voltage source is connected at port 1.



Given $V_1 = A_1V_2 + B_1I_2$

$I_1 = C_1V_2 + D_1I_2$

$V_2 = A_2V_3 + B_2I_3$

$I_2 = C_2V_3 + D_2I_3$

$A_1, B_1, C_1, D_1, A_2, B_2, C_2$ and D_2 are the generalized circuit constants. If the Thevenin equivalent circuit at port 3 consists of a voltage source V_T and impedance Z_T connected in series, then

(A) $V_T = \dfrac{V_1}{A_1A_2}, Z_T = \dfrac{A_1B_2 + B_1D_2}{A_1A_2 + B_1C_2}$

(B) $V_T = \dfrac{V_1}{A_1A_2 + B_1C_2}, Z_T = \dfrac{A_1B_2 + B_1D_2}{A_1A_2}$

(C) $V_T = \dfrac{V_1}{A_1 + A_2}, Z_T = \dfrac{A_1B_2 + B_1D_2}{A_1 + A_2}$

(D) $V_T = \dfrac{V_1}{A_1A_2 + B_1C_2}, Z_T = \dfrac{A_1B_2 + B_1D_2}{A_1A_2 + B_1C_2}$

Key: (D)

Exp: We can write V_1, I_1 in terms of $V_3 + I_3$

$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} A_1 & B_1 \\ C_1 & D_1 \end{bmatrix} \begin{bmatrix} A_2 & B_2 \\ C_2 & D_2 \end{bmatrix} \begin{bmatrix} V_3 \\ I_3 \end{bmatrix}$$

$$\Rightarrow V_1 = \left(A_1A_2 + B_1C_2\right)V_3 + \left(A_1B_2 + B_1D_2\right)I_3$$

$$I_1 = \left(C_1A_2 + D_1C_2\right)V_3 + \left(C_1B_2 + D_1D_2\right)I_3$$

To find $V_{th}\,(\text{or})\,V_{oc}$ $I_3 = 0$

$$V_1 = \left(A_1A_2 + B_1C_2\right)V_{th}$$

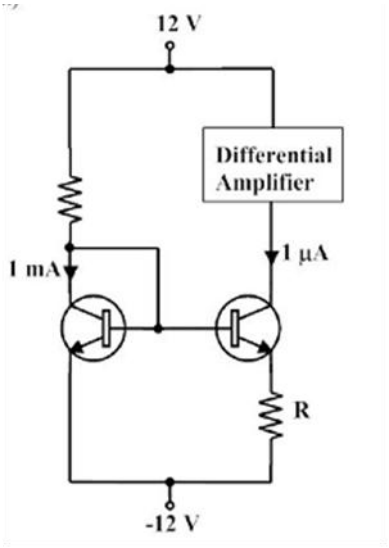
$$\Rightarrow V_{th} = V_{oc} = \frac{V_1}{A_1A_2 + B_1C_2}$$

To find I_{SC} $V_3 = 0$

$$V_1 = \left(A_1B_2 + B_1D_2\right)I_{SC} \Rightarrow I_{SC} = \frac{V_1}{A_1B_2 + B_1D_2}$$

To find R_{th} $R_{th} = \dfrac{V_{OC}}{I_{SC}} = \dfrac{A_1B_2 + B_1D_2}{A_1A_2 + B_1C_2}$

31. The circuit shown in the figure uses matched transistors with a thermal voltage $V_T = 25mV$. The base currents of the transistors are negligible. The value of the resistance R in $k\Omega$ that is required to provide $1\,\mu A$ bias current for the differential amplifier block shown is _____.



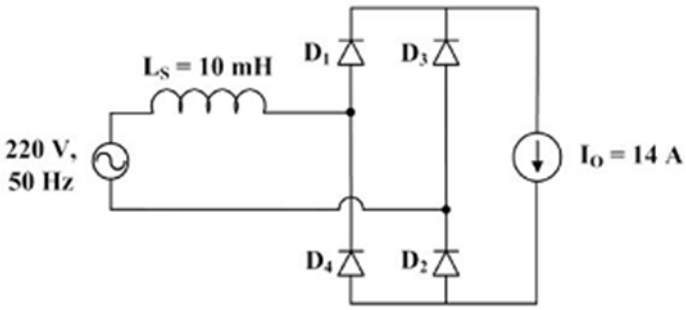
Key: 170 to 174

Exp: $R = \frac{V_T}{I_{C2}} \ln\left(\frac{I_{C1}}{I_{C2}}\right)$;

$I_{C1} = 1mA; I_{C2} = 1\mu A$

$R = \frac{25\times10^{-3}}{1\times10^{-6}} \ln\left[\frac{1\times10^{-3}}{1\times10^{-6}}\right] = 172.7k\Omega$

32. The figure below shows an uncontrolled diode bridge rectifier supplied form a 220 V, 50 Hz 1-phase ac source. The load draws a constant current $I_o = 14A$. The conduction angle of the diode D_1 in degrees is_____.



Key: 220 to 230

Exp: Average reduction in output voltage due to L_s

$\Delta V_o = 4f_s L_s I_o = 4\times50\times\left(10\times10^{-3}\right)\times14 = 28V$

$\Delta V_o = \frac{V_m}{\pi}\left[\cos\alpha - \cos(\alpha+\mu)\right]$

for a diode, $\alpha = 0$

$\therefore \Delta V_o = \frac{V_m}{\pi}\left[1-\cos\mu\right]$

$28 = \frac{220\sqrt{2}}{\pi}\left[1-\cos\mu\right] \Rightarrow \mu = 44.17^o$

$\therefore$ conduction angle of diode $= 180 + \mu = 224.17^o$

33. Consider the differential equation $\left(t^2-81\right)\frac{dy}{dt}+5ty=\sin(t)$ with $y(1)=2\pi$. There exists a unique solution for this differential equation when t belongs to the interval

(A) (-2,2) (B) (-10,10) (C) (-10,2) (D) (0,10)

Key: (A)

Exp: D.E is $\frac{dy}{dt}+\frac{5t}{t^2-81}y=\frac{\sin(t)}{t^2-81}$ is a first order linear eq.

I.F = $e^{\int\frac{5t}{t^2-81}dt}=e^{\frac{5}{2}\ln\left(t^2-81\right)}=\left(t^2-81\right)^{5/2}$

$\therefore$ Solution is $y\left(t^2-81\right)^{5/2}=\int\frac{\sin t}{t^2-81}\left(t^2-81\right)^{5/2}=\int\left(t^2-81\right)^{3/2}\sin t\,dt+c$

$\Rightarrow y=\frac{\int\left(t^2-81\right)^{3/2}.\sin t\,dt}{\left(t^2-81\right)^{5/2}}+\frac{C}{\left(t^2-81\right)^{5/2}}$

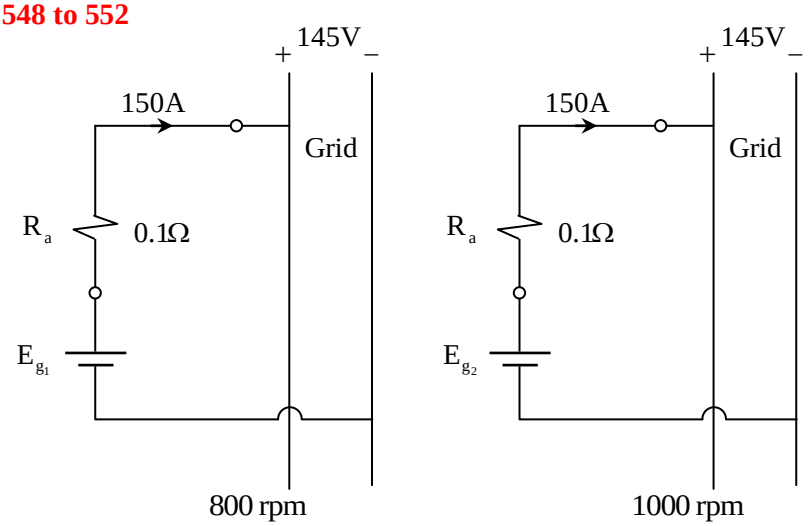
If $t\neq -9,9$ then the solution exists.

Options (b), (c), (d) contain either -9 or 9 or both. So answer is option A

34. A separately excited DC generator supplies 150 A to a 145 V DC grid. The generator is running at 800 RPM. The armature resistance of the generator is $0.1\,\Omega$. If the speed of the generator is increased to 1000 RPM, the current in amperes supplied by the generator to the DC grid is _____.

Key: 548 to 552

Exp:



$E_{g_1}=150\times0.1=145$

$E_{g_1}=160V$

$N\propto E_g\ (\because\phi=\text{constant})$

$\frac{N_2}{N_1}=\frac{E_{g_2}}{E_{g_1}}$

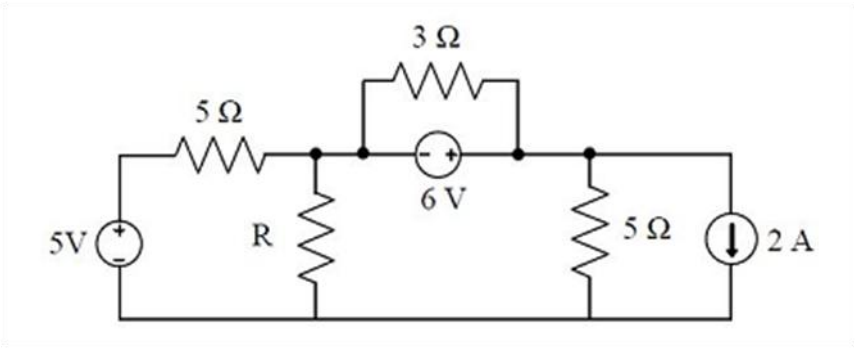
$E_{g_2}=\frac{1000}{800}\times160=200$ volts

$E_{g_2}-I_{a_2}\times0.1=145$

$200-145=I_{a_2}\times0.1\Rightarrow\frac{55}{0.1}=I_{a_2}$

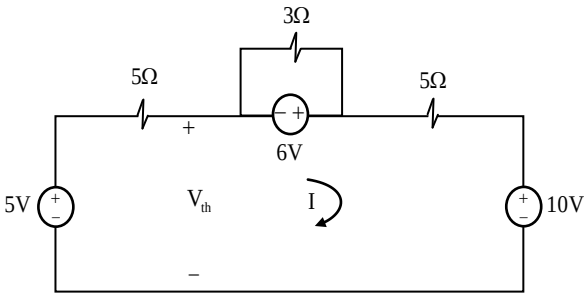
$I_{a_2}=550$ amps

35. In the circuit shown below, the maximum power transferred to the resistor R is _____ W.



Key: 3 to 3.1

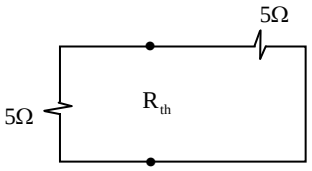
Exp: To find V_{th}



$$I=\frac{5+6+10}{10}=\frac{21}{10}=2.1A$$

$$V_{th}=5-5\times 2.1=-5.5V$$

To find R_{th}



$$\Rightarrow R_{th}=\frac{5\times 5}{5+5}=2.5\Omega$$

The maximum power transferred to

$$R=\frac{V_{th}^2}{4R_{th}}=\frac{5.5^2}{4\times 2.5}=3.025W$$

36. Let a causal LTI system be characterized by the following differential equation, with initial rest condition

$$\frac{d^2y}{dt^2}+7\frac{dy}{dt}+10y(t)=4x(t)+5\frac{dx(t)}{dt}$$

Where x(t) and y(t) are the input and output respectively. The impulse response of the system is (u(t) is the unit step function)

(A) $2e^{-2t}u(t)-7e^{-5t}u(t)$

(B) $-2e^{-2t}u(t)+7e^{-5t}u(t)$

(C) $7e^{-2t}u(t)-2e^{-5t}u(t)$

(D) $-7e^{-2t}u(t)+2e^{-5t}u(t)$

Key: (B)

Exp: Given causal LTI system

$$\frac{d^2y(t)}{dt^2}+\frac{7dy(t)}{dt}+10y(t)=ux(t)+\frac{5dx(t)}{dt}$$

$$\Rightarrow s^2y(s)+7sy(s)+10y(s)=u\,x(s)+5sx(s)$$

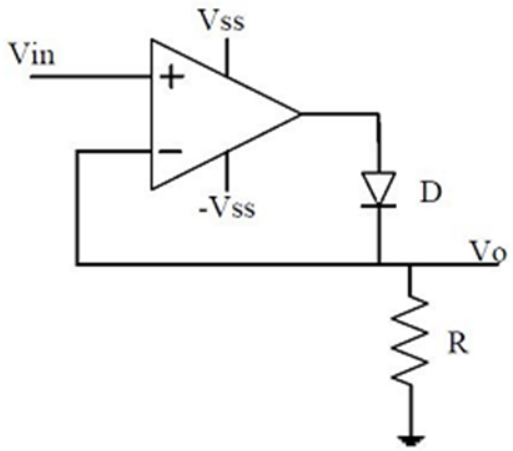
$$\Rightarrow \frac{Y(s)}{X(s)}=\frac{4+5s}{s^2+7s+10}\Rightarrow H(s)=\frac{5s+4}{(s+2)(s+5)}$$

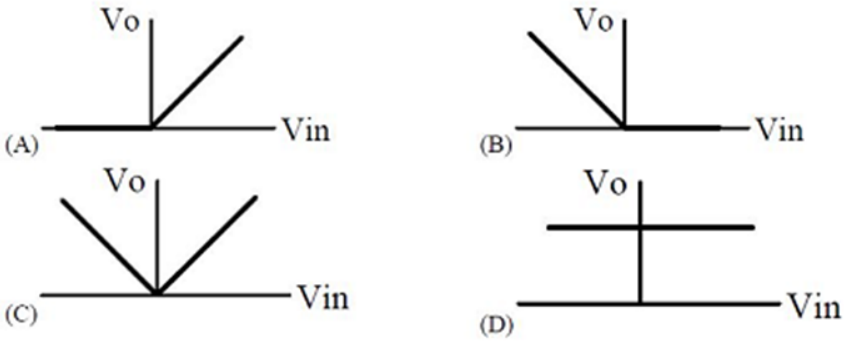
Inverse Laplace transform will give $h(t)$ (impulse response).

$$H(s)=\frac{-2}{s+2}+\frac{7}{s+5}$$

$$h(t)=-2e^{-2t}u(t)+7e^{-5t}u(t)$$

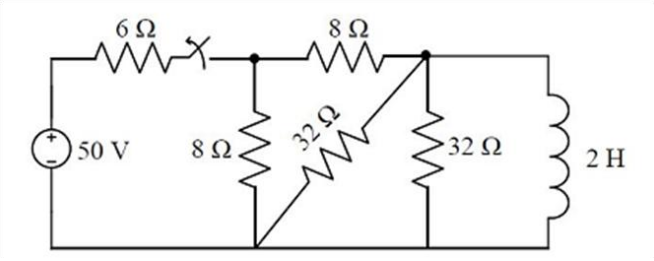
37. The approximate transfer characteristic for the circuit shown below with an ideal operational amplifier and diode will be





Key: (A)

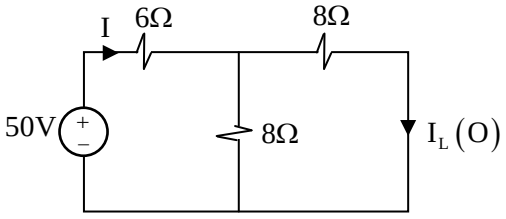
38. The switch in the figure below was closed for a long time. It is opened at t = 0. The current in the inductor of 2 H for $t \geq 0$, is



(A) $2.5e^{-4t}$ (B) $5e^{-4t}$ (C) $2.5e^{-0.25t}$ (D) $5e^{-0.25t}$

Key: (A)

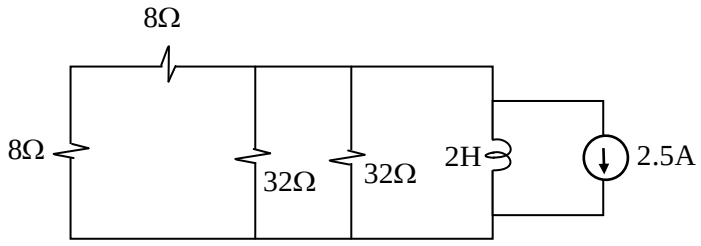
Exp: at $t = 0^-$



$$I = \frac{50}{6+4} = 5A$$

$$I_L(0^-) = \frac{5}{2} = 2.5A$$

For $t \geq 0$



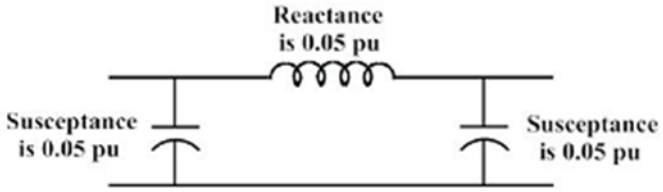
$$T = \frac{L}{Req} = \frac{2}{8} = \frac{1}{4}$$

$$I_L(\infty) = 0 \left(bc_3 \text{ it is a source free ckt}\right)$$

$$i_L(t) = I_L(\infty) + \left[I_L(0) - I_L(\infty)\right] e^{-t/T} = 2.5e^{-4t}$$

39. The bus admittance matrix for a power system network is $\begin{bmatrix} -j39.9 & j20 & j20 \\ j20 & -j39.9 & j20 \\ j20 & j20 & -j39.9 \end{bmatrix}$ pu

There is a transmission line, connected between buses 1 and 3, which is represented by the circuit shown in figure.



If this transmission line is removed from service, What is the modified bus admittance matrix?

(A) $\begin{bmatrix} -j19.9 & j20 & 0 \\ j20 & -j39.9 & j20 \\ 0 & j20 & -j19.9 \end{bmatrix}$ pu

(B) $\begin{bmatrix} -j39.95 & j20 & 0 \\ j20 & -j39.9 & j20 \\ 0 & j20 & -j39.95 \end{bmatrix}$ pu

(C) $\begin{bmatrix} -j19.95 & j20 & 0 \\ j20 & -j39.9 & j20 \\ 0 & j20 & -j19.95 \end{bmatrix}$ pu

(D) $\begin{bmatrix} -j19.95 & j20 & j20 \\ j20 & -j39.9 & j20 \\ j20 & j20 & -j19.95 \end{bmatrix}$ pu

Key: (C)

Exp: When the line 1-3 is removed

$$z_{13} = 0.05 = z_{31}$$

$$y_{13} = \frac{1}{0.05} = -j20, \qquad y_{13} = y_{31} = 0$$

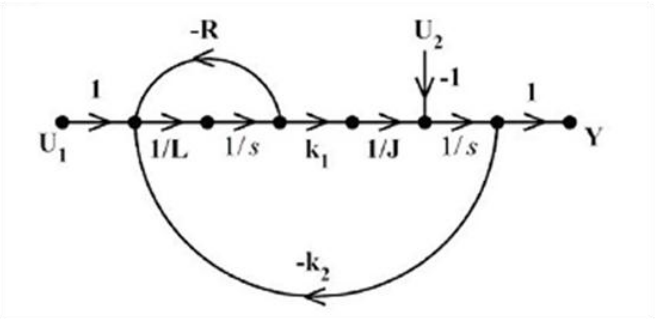
$\frac{y'_{13}}{2}$ – Half line shunt susceptance = j0.05

$$y_{11}(new) = y_{11}(old) - y_{13} - \frac{y'_{13}}{2} = -j39.9 - (-j20) - j0.05 = -j19.95$$

$$y_{33}(new) = y_{33}(old) - y_{13} - \frac{y'_{13}}{2} = -j39.9 - (-j20) - j0.05 = -j19.95$$

Modified Bus admittance matrix: $y_{Bus(new)} = \begin{bmatrix} -j19.95 & j20 & 0 \\ j20 & -j39.9 & j20 \\ 0 & j20 & -j19.95 \end{bmatrix}_{pu}$

40. In the system whose signal flow graph is shown in the figure, $U_1(s)$ and $U_2(s)$ are inputs. The transfer function $\frac{Y(s)}{U_1(s)}$ is



(A) $\frac{k_1}{JLs^2+JRs+k_1k_2}$

(B) $\frac{k_1}{JLs^2-JRs-k_1k_2}$

(C) $\frac{k_1-U_2(R+sL)}{JLs^2+(JR-U_2L)s+k_1k_2-U_2R}$

(D) $\frac{k_1-U_2(sL-R)}{JLs^2-(JR+U_2L)s-k_1k_2+U_2R}$

Key: (A)

Exp: $\left.\frac{Y(s)}{U_1(s)}\right|_{U_2(s)=0}$

By Masons gain formula

$$\frac{Y(s)}{U_1(s)}=\frac{P_1\Delta_1}{1-[L_1+L_2]}$$

$$\text{Here } P_1=\frac{1}{k^2}.\frac{k_1}{LJ}$$

$$\Delta_1=1$$

$$L_1=-\frac{R}{L}\frac{1}{s}$$

$$L_2=\frac{1}{LJ}.\frac{1}{s^2}(k_2)k_1$$

$$\frac{Y(s)}{U_1(s)}=\frac{\frac{1}{s^2}.\frac{k_1}{LJ}}{1+\frac{R}{L}.\frac{1}{s}+\frac{1}{LJ}.\frac{1}{s^2}k_2k_1}$$

$$T/F=\frac{k_1}{s^2LJ+sRJ+k_1k_2}$$

41. For a system having transfer function $G(s)=\frac{-s+1}{s+1}$, a unit step input is applied at time t=0. The value of the response of the system at t=1.5 sec is _____.

Key: 0.550 to 0.556

Exp: $\frac{Y(s)}{R(s)}=\frac{-s+1}{s+1}$

$$Y(s)=\frac{1-s}{s+1}.\frac{1}{s}$$

$$Y(s)=\frac{1}{s}-\frac{2}{s+1}$$

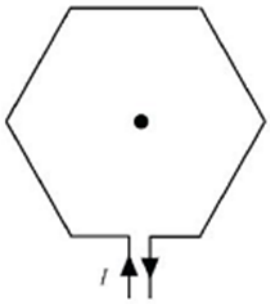
Apply Inverse L.T

$$y(t)=u(t)-2e^{-t}u(t)$$

$$y(1.5)=1-2e^{-1.5}=1-0.44626$$

$$y(1.5)=0.5537$$

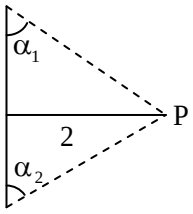
42. The magnitude of magnetic flux density (B) in micro Teslas (μT) at the center of a loop of wire wound as a regular hexagon of side length 1m carrying a current (I=1A), and placed in vacuum as shown in the figure is _____.



Key: 0.65 to 0.75

Exp: For a finite length conductor B at a point P

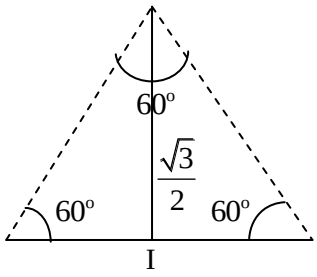
$$B=\frac{\mu_o I}{4\pi r}(\cos\alpha_1+\cos\alpha_2)$$



For a given hexagon 4 for a side

$$r=\frac{\sqrt{3}}{2}$$

$$\alpha_1=\alpha_2=60^o$$



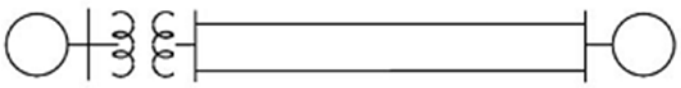
Total flux density $B=6\times\frac{\mu_o I}{4\pi r}(\cos\alpha_1+\cos\alpha_2)$

$$=6\times\frac{4\pi\times10^{-7}\times1}{4\pi\times\sqrt{3}/2}(\cos60^o+\cos60^o)$$

$$=6.9\times10^{-7}$$

$$=0.69\times10^{-7}\text{ Tesla}$$

43. The figure shows the single line diagram of a power system with a double circuit transmission line. The expression for electrical power is $1.5\sin\delta$, where δ is the rotor angle. The system is operating at the stable equilibrium point with mechanical power equal to 1 pu. If one of the transmission line circuits is removed, the maximum value of δ as the rotor swings, is 1.221 radian. If the expression for electrical power with one transmission line circuit removed is $P_{max}\sin\delta$, the value of $P_{max,}$ in pu is _____.

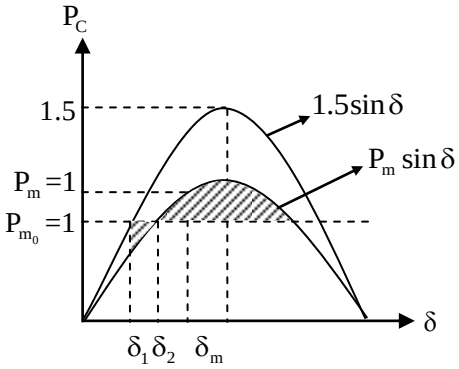


Key: 1.21 to 1.23

Exp: Given $\delta_m = 1.22\text{rad} = 69.958°$

$$\delta_1 = \sin^{-1}\left(\frac{P_m}{1.5}\right)$$

$$= \sin^{-1}\left(\frac{1}{1.5}\right) = 41.81° = 0.729\,\text{rad}$$



Using equal area criterion

$A_1 = A_2$

$$\int_{\delta_1}^{\delta_2}\left(P_{m_0} - P_{m_1}\sin\delta\right)d\delta = \int_{\delta_2}^{\delta_m}\left(P_{max1}\sin\delta - P_{m_0}\right)d\delta$$

By solving above integration

$$P_{max1} = \frac{P_{m_0}\left(\delta_m - \delta_1\right)}{\cos\delta_1 - \cos\delta_m} = \frac{1(1.221 - 0.7297)}{\cos(41.81) - \cos(69.95)} = 1.22\text{pu}$$

44. A 375W, 230 V, 50 Hz capacitor start single-phase induction motor has the following constants for the main and auxiliary windings (at starting): $Z_m = (12.50 + j15.75)\Omega$ (main winding), $Z_a = (24.50 + j12.75)\Omega$ (auxiliary winding). Neglecting the magnetizing branch the value of the capacitance (in μF) to be added in series with the auxiliary winding to obtain maximum torque at starting is _____.

Key: 95 to 100

Exp: $$\tan^{-1}\left(\frac{X_m}{R_m}\right) - \tan^{-1}\left(\frac{x_a - x_e}{R_a}\right) = 90°$$

$$\tan^{-1}\left(\frac{15.75}{12.5}\right) - \tan^{-1}\left(\frac{12.75 - X_c}{24.5}\right) = 90°$$

$$51.562° - \tan^{-1}\left(\frac{12.75 - X_c}{24.5}\right) = 90° \Rightarrow -\tan^{-1}\left(\frac{12.75 - X_c}{24.5}\right) = 38.43°$$

$$\frac{12.75 - X_c}{24.5} = -0.793 \Rightarrow -X_c = 32.194\Omega$$

$$X_c = \frac{1}{2\pi \times 50 \times 32.194} = 98.87\mu F$$

45. A function f(x) is defined as $f(x)=\begin{cases} e^x, & x<1 \\ 1nx+ax^2+bx, & x\geq 1 \end{cases}$ where $x\in\mathbb{R}$. Which one of the following statements is TRUE?

(A) f(x) is **NOT** differentiable at x=1 for any values of a and b.

(B) f(x) is differentiable at x = 1 for the unique values of a and b

(C) f(x) is differentiable at x = 1 for all values of a and b such that a + b = e

(D) f(x) is differentiable at x = 1 for all values of a and b.

Key: (A) Not matching with IIT key

Exp: $Lf^1(1)=\underset{\substack{x\to 1\\ x<1}}{Lt}\frac{f(x)-f(1)}{x-1}=\underset{x\to 1}{Lt}\frac{e^x-(a+b)}{x-1}$ does not exists, for any values of a and b

$\therefore f(x)$ is not differentiable at $x=1$, for any values of a and b.

46. Consider a causal and stable LTI system with rational transfer function H(z). Whose corresponding impulse response begins at n = 0. Furthermore, $H(1)=\frac{5}{4}$. The poles of H(z) are $P_k=\frac{1}{\sqrt{2}}\exp\left(j\frac{(2k-1)\pi}{4}\right)$ for k = 1,2,3,4. The zeros of H(z) are all at z = 0. Let $g[n]=j^n h[n]$.

The value of g[8] equals _____.

Key: 0.06 to 0.065

47. Only one of the real roots of $f(x)=x^6-x-1$ lies in the interval $1\leq x\leq 2$ and bisection method is used to find its value. For achieving an accuracy of 0.001, the required minimum number of iterations is _____.

Key: 10 to 10

Exp: $a=1, b=2$ and $\frac{b-a}{2^n}<0.001$ using bisection method

$\Rightarrow 2^n>1000\Rightarrow n=10$ is the minimum number of iterations

48. Two parallel connected, three-phase, 50Hz, 11kV, star-connected synchronous machines A and B, are operating as synchronous condensers. They together supply 50 MVAR to a 11 kV grid. Current supplied by both the machines are equal. Synchronous reactances of machine A and machine B are 1Ω and 3Ω respectively. Assuming the magnetic circuit to be linear, the ratio of excitation current of machine A to that of machine B is _____.

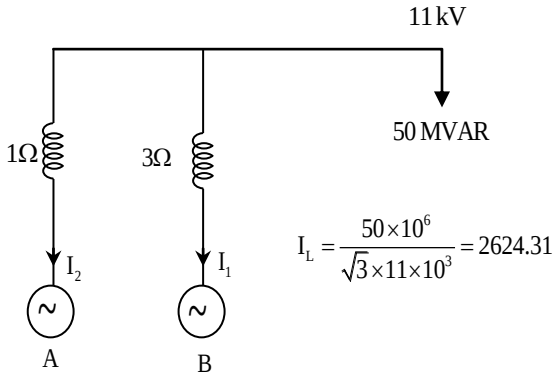
Key: 2.05 to 2.13

Exp: → syn. Condencors

→ current's supplied both the machines are same

$\therefore\ I_1=I_2=\frac{2624.31}{2}=1312.159$ Amps

As the two motors, supplying reactive power only, the phasor diagaram will be



$E + jI_aX_s = V_t$

$E = V - jI_aX_s$

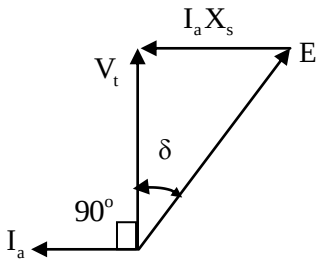
Consider magnitudes $\Rightarrow E^2 = (V - I_aX_s)^2$

$E = \sqrt{(V - I_aX_S)^2}$

$E_A = \sqrt{(6350.85 - 1312.159 \times 1)^2} = 5038.7 \text{ volts}$

$E_B = \sqrt{(6350.85 - 1312.159 \times 3)^2} = 2414.14 \text{ Volts}$

$\frac{I_{fA}}{I_{fB}} = \frac{E_A}{E_B} = \frac{5038.7}{2414.14} = 2.086$



49. The positive, negative and zero sequence reactances of a wye-connected synchronous generator are 0.2 pu, 0.2 pu, and 0.1 pu, respectively. The generator is on open circuit with a terminal voltage of 1 pu. The minimum value of the inductive reactance, in pu, required to be connected between neutral and ground so that the fault current does not exceed 3.75 pu if a single line to ground fault occurs at the terminals is _____ (assume fault impedance to be zero).

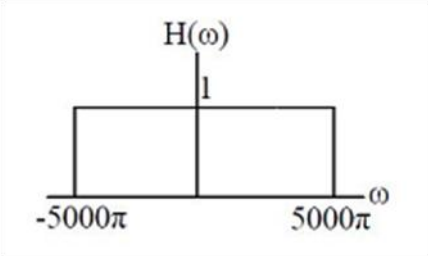
Key: 0.1 to 0.1

Exp: $I_f = \frac{3E_f}{Z_0 + Z_1 + Z_2 + 3Z_n}$

$3.75 = \frac{3 \times 1}{0.1 + 0.2 + 0.2 + 3Zn}$

$Zn = 0.1 P.U$

50. Let the signal $x(t) = \sum_{k=-\infty}^{+\infty} (-1)^k \delta\left(t - \frac{k}{2000}\right)$ be passed through an LTI system with frequency response $H(\omega)$, as given in the figure below



The Fourier series representation of the output is given as

(A) $4000 + 4000\cos(2000\pi t) + 4000\cos(4000\pi t)$

(B) $2000 + 2000\cos(2000\pi t) + 2000\cos(4000\pi t)$

(C) $4000\cos(2000\pi t)$

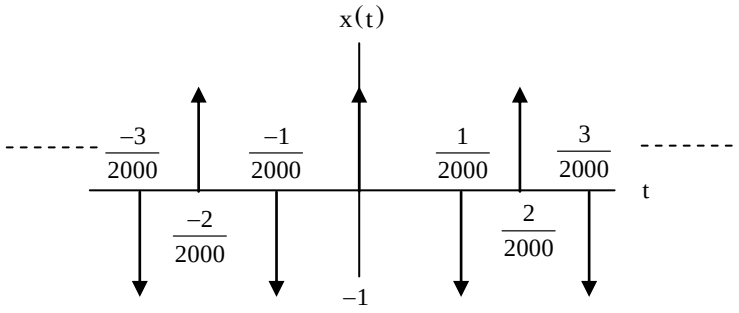
(D) $2000\cos(2000\pi t)$

Key: (C)

Exp: Given $x(t)$ is a periodic signal for which Fourier transform $x(\omega)$ is to be calculated

$$x(\omega) = 2\pi \sum_{n=-\infty}^{\infty} D_n \delta(\omega - n\omega)$$

D_n is exponential Fourier series coefficient for x(t)



Define $x(t)$ over one period $\quad x(t) = \delta(t) - \delta\left(t - \frac{1}{2000}\right)$

Where as $T_o = \frac{1}{1000}$ sec; $\omega_o = 2000\pi$ rad/sec

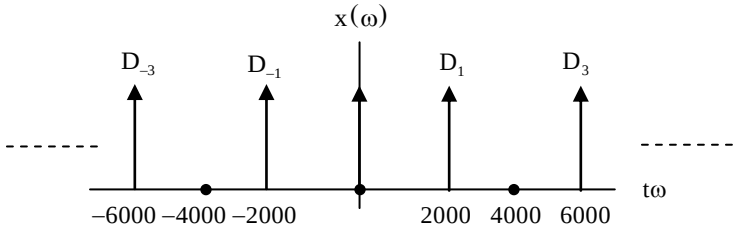
$$\therefore D_n = \frac{1}{T_o}\left[1 - e^{-jn\omega_o t_o}\right];\ t_o = \frac{1}{2000}$$

$$D_n = 1000\left[1 - e_{-j\pi n}\right] \Rightarrow D_n = \left[1 - (-1)^n\right]1000$$

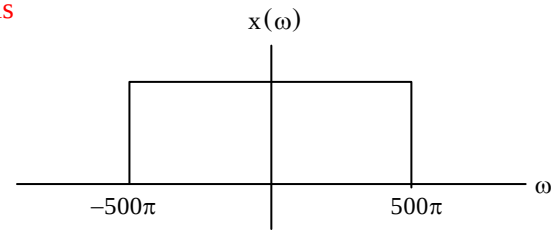
At $n = 0, 2, 4, \ldots\ldots\ldots\ldots D_n = 0$

i.e., $D_n = \begin{cases} 0 & \text{for even values of } n \\ 2000 & \text{for odd values of } n \end{cases}$

$$\therefore x(\omega) = 2\pi\left[D_0 + D_1\right]\delta(\omega - 2000\pi) + D_{-1}\delta(\omega + 2000\pi) + D_2\delta(\omega - 4000\pi) + D_{-2}\delta(\omega + 4000\pi) + \ldots\ldots\ldots\ldots\ldots\ldots\ldots]$$



Given $x(\omega)$ is



Thus the filtered output is

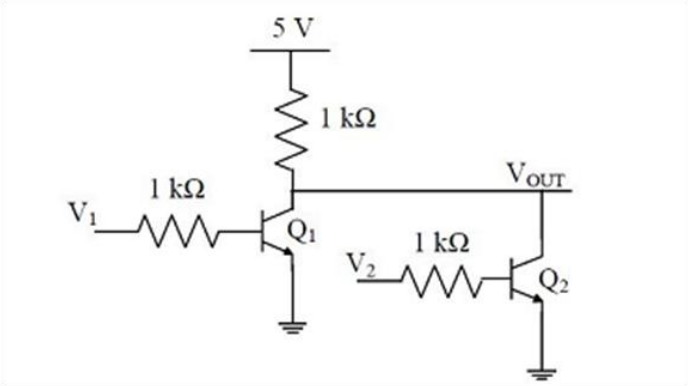
$$y(\omega) = 2\pi\left[D_1\delta(\omega - 2000\pi)\right] + D_{-1}\delta(\omega + 2000\pi)$$

$$\because D_1 = D_{-1} = 2000$$

$$y(\omega) = 4000\left[\pi\left(\delta(\omega - 2000\pi) + \delta(\omega + 2000\pi)\right)\right]$$

$$\therefore y(t) = 4000\cos(2000\pi t)$$

51. The logical gate implemented using the circuit shown below where. V_1 and V_2 are inputs (with 0 V as digital 0 and 5 V as digital 1) and V_{OUT} is the output is



(A) NOT (B) NOR (C) NAND (D) XOR

Key: (B)

Exp:

V_1	V_2	Q_1	Q_2	V_{out}	Logic Level
0	0	OFF	OFF	5V	1
0	1	OFF	ON	0V	0
1	0	ON	OFF	0V	0
1	1	ON	ON	0V	0

So, this logic level o/p is showing the functionality of NOR-gate.

52. A load is supplied by a 230 V, 50 Hz source. The active power P and the reactive power Q consumed by the load are such that 1 kW ≤ P ≤ 2kW and 1kVAR ≤ Q ≤ kVAR . A capacitor connected across the load for power factor correction generates 1 kVAR reactive power. The worst case power factor after power factor correction is

(A) 0.447 lag (B) 0.707 lag (C) 0.894 lag (D) 1

Key: (B)

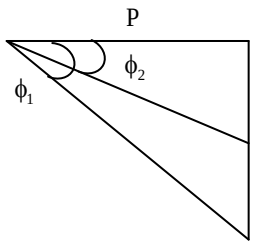
Exp: Under worst case,

$P_{max} = 2kW$

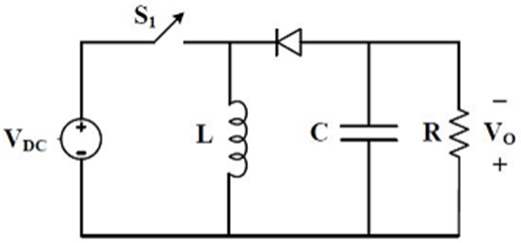
$Q_{max} = 2kVAR$

$\phi_1 = \tan^{-1}\frac{Q}{P} = 45^o$

$\cos 45 = 0.707 lag$



53. The input voltage V_{DC} of the buck-boost converter shown below varies from 32 V to 72 V. Assume that all components are ideal, inductor current is continuous, and output voltage is ripple free. The range of duty ratio D of the converter for which the magnitude of the steady state output voltage remains constant at 48 V is



(A) $\frac{2}{5} \le D \le \frac{3}{5}$ (B) $\frac{2}{3} \le D \le \frac{3}{4}$ (C) $0 \le D \le 1$ (D) $\frac{1}{3} \le D \le \frac{2}{3}$

Key: (A)

Exp:

$V_{dc} = 32V$ | $V_{dc} = 72V$

$V_o = 48V$ | $V_o = 48V$

$\frac{V_o}{V_{dc}} = \frac{D}{1-D}$ | $\frac{V_o}{V_{dc}} = \frac{D}{1-D}$

$\frac{48}{32} = \frac{D}{1-D}$ | $\frac{2}{3} = \frac{D}{1-D}$

$\frac{3}{2} = \frac{D}{1-D}$ | $3D = 2-2D$

$3-3D = 2D$ | $5D = 2$

$3 = 5D \Rightarrow D = \frac{3}{5}$ | $D = \frac{2}{5}$

$\frac{2}{5} \le D \le \frac{3}{5}$

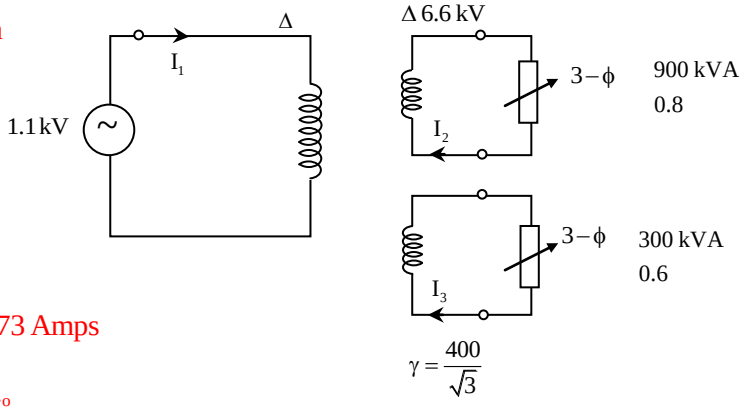
54. A three-phase, three winding $\Delta/\Delta/Y$ (1.1kV/6.6kV/400 V) transformer is energized from AC mains at the 1.1 kV side. It supplies 900 kVA load at 0.8 power factor lag from the 6.6 kV winding and 300 kVA load at 0.6 power factor lag from the 400 V winding. The RMS line current in ampere drawn by the 1.1 kV winding from the mains is _____.

Key: 623 to 627

Exp: $3-\phi, 3-$ winding T/F

$\Delta/\Delta/Y$

per phase representation



$I_2 = \frac{900\times10^3}{\sqrt{3}\times6.6\times10^3} = 78.73 \text{ Amps}$

$I_{ph} = \frac{I_2}{\sqrt{3}} = 45.45\angle -36.87^o$

$I_2' = KI_2 = \frac{6.6\times10^3}{1.1\times10^3}\times 45.45 \Rightarrow I_2' = 272.7\angle -36-.87^o$

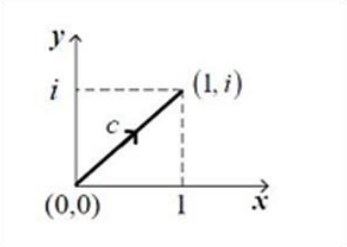
$I_3 = \frac{300\times10^3}{\sqrt{3}\times400} = 433.01 \text{ Amp}$

$I_{ph} = I_L = I_3 = 433.01\angle -53.13$

$I_3' = \frac{400/\sqrt{3}}{1.1\times10^3}\times 433.01 \Rightarrow I_3'' = 90.91\angle -53.13^o$

$I_1 = I_2' + I_3' \Rightarrow I_1 = 360.87\angle -40.91 \Rightarrow I_1 = \sqrt{3}\, I_1 = 625.05\angle 40.91$

55. Consider the line integral $I=\int_C\left(x^2+iy^2\right)dz$ where z = x + iy. The line C is shown in the figure below.



The value of I is

(A) $\frac{1}{2}i$ (B) $\frac{2}{3}i$ (C) $\frac{3}{4}i$ (D) $\frac{4}{5}i$

Key: (B)

Exp: curve 'C' is $y=x\Rightarrow dy=dx$

$$\therefore I=\int_0^1\left(x^2+i(x)^2\right)(dx+idx)=(1+i)^2\int_0^1x^2dx=(2i)\left(\frac{x^3}{3}\right)_0^1=\frac{2}{3}i$$

General Aptitude

Q. No. 1 – 5 Carry One Mark Each

1. Research in the workplace reveals that people work for many reasons_____.

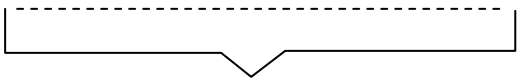
(A) money beside (B) beside money (C) money besides (D) besides money

Key: (D)

2. The probability that a k-digit number does NOT contain the digits 0.5, or 9 is

(A) 0.3^k (B) 0.6^k (C) 0.7^k (D) 0.9^k

Key: (C)



k digits

Each digit can be filled in 7 ways as 0, 5 and 9 is not allowed, so each of these places can be filled by 1, 2, 3, 4, 6, 7, 8.

So required probability is $\left(\frac{7}{10}\right)^k$ or 0.7^k.

3. Find the smallest number y such that $y\times 162$ is a perfect cube.

(A) 24 (B) 27 (C) 32 (D) 36

Key: (D)

Exp: Factorization of 162 is $2\times3\times3\times3\times3$

$y\times162$ is a perfect cube

$y\times2\times3\times3\times3\times3=$ Perfect cube

For perfect cube 2's & 3's are two more required each.

4. After Rajendra Chola returned from his voyage to Indoneisa, he _____ to visit the temple in Thanjavur.

(A) was wishing (B) is wishing (C) wished (D) had wished

Key: (C)

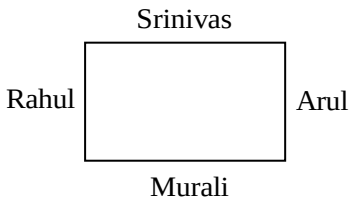
5. Rahul, Murali, Srinivas and Arul are seated around a square table. Rahul is sitting to the left of Murali. Srinivas is sitting to the right of Arul. Which of the following pairs are seated opposite each other?

(A) Rahul and Murali (B) Srinivas and Anil

(C) Srinivas and Murali (D) Srinivas and Rahul

Key: (C)

Exp:



Q. No. 6 – 10 Carry Two Marks Each

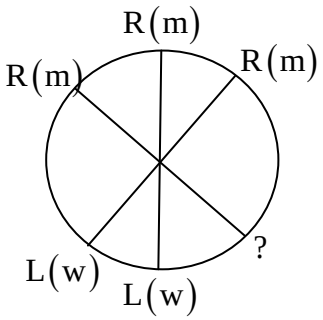
6. Six people are seated around a circular table. There are at least two men and two women. There are at least three right-handed persons. Every woman has a left-handed person to her immediate right. None of the women are right-handed. The number of women at the table is

(A) 2 (B) 3

(C) 4 (D) Cannot be determined

Key: (A)

Exp: Out of six people, 3 place definitely occupied by right handed people as atleast 2 women are there so these two will sit adjacently. Now as only one seat is left it will be occupied by a left handed man because on right side of this seat is sitting an right handed man.



Therefore, answer should be 2 women.

7. The expression $\frac{(x+y)-|x-y|}{2}$ is equal to

(A) the maximum of x and y (B) the minimum of x and y

(C) 1 (D) none of the above

Key: (B)

Exp: If $x > y$

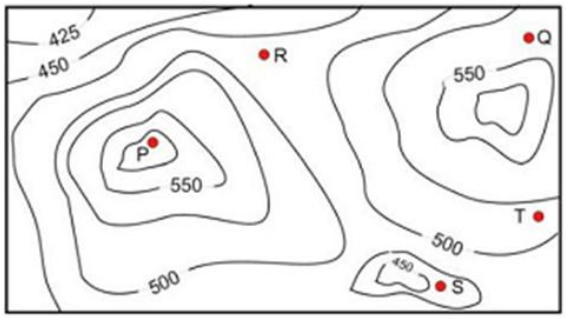
$$\text{Exp} = \frac{x + y - (x - y)}{2} = y_{min}$$

If $x < y$

$$\text{Exp} = \frac{x + y - (y - x)}{2} = x_{min}$$

$\therefore$ The expression $\frac{(x+y)-|x-y|}{2}$ is equal to minimum of x & y

8. A contour line joins locations having the same height above the mean sea level. The following is a contour plot of a geographical region. Contour lines are shown at 25m intervals in this plot. If in a flood, the water level rises to 525m. Which of the villages P,Q,R,S,T get submerged?



(A) P, Q (B) P,Q,T
(C) R,S,T (D) Q,R,S

Key: (C)

Exp: The given contour is a hill station, the peak point of this hill station is P, it is under a contour of 550. At floods, the water level is 525m. So the village of R, S and T are under a contour of 500. Therefore these villages are submerged.

9. Arun, Gulab, Neel and Shweta must choose one shirt each from a pile of four shirts coloured red, pink, blue and white respectively. Arun dislikes the colour red and Shweta dislikes the colour white, Gulab and Neel like all the colours. In how many different ways can they choose the shirts so that no one has a shirt with a colour he or she dislikes?

(A) 21 (B) 18 (C) 16 (D) 14

Key: (D)

Exp: As there are 4 people A,G,N,S and 4 colours so without any restriction total ways have to be $4 \times 4 = 16$

Now, Arun $\rightarrow$ dislikes Red and

Shweta $\rightarrow$ dislikes white

So 16-2=14 ways

10. "The hold of the nationalist imagination on our colonial past is such that anything inadequately or improperly nationalist is just not history."

Which of the following statements best reflects the author's opinion?

(A) Nationalists are highly imaginative.
(B) History is viewed through the filter of nationalism.
(C) Our colonial past never happened
(D) Nationalism has to be both adequately and properly imagined.

Key: (B)

ANNA UNIVERSITY

CENTRE FOR UNIVERSITY INDUSTRY COLLABORATION (CUIC)

A READY RECKONER FOR ENHANCING PLACEMENT ACTIVITIES

Dr. T .Thyagarajan, Director- CUIC

ROLES AND RESPONSIBILITIES OF PLACEMENT REPRESENTATIVES

- Collect list of HR contact details through your friends / relatives / Newspaper / Faculty members / Seniors / Alumni
- Pass on the HR Contact details to Placement Officer for sending official invitations
- Ensure Placement Officer contact details in all the Department Brochures, to have single point contact
- Keep the hard and soft copies of Curriculum and Syllabus
- Keep the contact details (Email, Landline No. & Mobile No.) of all your classmates
- Keep the complete details about each student (SSLC, HSC, Semester wise GPA, CGPA, DOB, Community, History & Current Arrears)
- Keep the contact details of other Placement Representatives
- Generate comprehensive Question Bank (Both Technical and Non-Technical)
- Collect Aptitude Questions / GD Topics / Interview Questions to create Question Bank
- Give training to the needy students
- Avoid spreading Rumors / False / Assumed information (This will lead to black listing)
- Avoid accepting false information / Track records from students (This will lead to rejection of offer)
- Avoid arguing with company HRs about previous year's branch preferences

TIPS TO FACE INTERVIEWS

- Maintain Professional Ethics and Moral Standards
- Read Frequently Asked Questions by interviewers and prepare the answers and practice them
- Prepare a Comprehensive Resume
- Practice with Mock Aptitude Test / Mock GD / Mock Interview etc.,
- Prepare well in fundamental & core subjects of respective branches
- Update database after declaration of revaluation / Aarrear result
- View the placement Notice Board regularly
- As for as possible change of contact details should be avoided
- Visit the company's website before attending the Pre Placement Talk (PPT) to get clear idea
- Avoid Wearing Jeans / T-shirts/ Cheppal / Half sleeves
- Be punctual for PPT as well as for Test / Interview
- Avoid standing outside or near the PPT hall
- Occupy first benches also, during the PPT
- Maintain Gender separation during the PPT
- Maintain discipline during PPT
- Avoid coming late to the PPT/test/interview
- Ask only relevant / valid questions during the PPT
- Carry Pen, Pencil, Eraser, Passport Size Photograph etc., for the test
- Avoid contacting the HR directly. It should be through CUIC only.
- Carry Resume / Copy of Mark Sheets / Community / Co-curricular / Extra-curricular Certificate etc for the interview
- Bring OBC Certificate for PSU interview
- Bring doctor certificate for differently abled physique
- Inform at the beginning itself about colour blindness, hearing disorder to avoid disqualification at the end.
- Attend the interview with clean dress (tucked-in) and neatly shaved to maintain dignity and decorum
- Wish the interviewer while entering the room. Thank the interviewer before leaving the room
- During the interview, relax and avoid showing your nervousness obvious
- Speak loudly, clearly; sit up straight; try to look at the interviewer's eyes when you speak to him/her
- Be honest in your approach
- Keep your answers brief and to the point.
- Do not give 'YES' or 'NO' replies.
- Don't discuss your personal difficulties
- Show your enthusiasm and willingness
- Exhibit your skills and abilities.

- Avoid passing bad comments /Remarks about the College/ University/ Staff during the interview
- Prepare in advance, the questions you want to ask about the job and company
- Be available till the announcement of results
- Maintain silence during announcements of results
- Do not exhibit bad mannerism during the placement activity

FREQUENTLY ASKED QUESTIONS (FAQ)

- Tell me about yourself
- What are your long range goals, ambitions, future plans?
- What do you want to be doing 5 or 10 years from now?
- How do you feel that you can contribute to this job?
- What are your hobbies?
- What are your strengths? Your weaknesses?
- What are your big accomplishments?
- What are your special abilities?
- Why you think that you are suitable for this kind of job?
- What is your career goal?
- What do you know about our company?
- Why are you applying for a job with us?
- What salary do you expect?
- Do you have any plans to go back to school?
- What kind of job profile you enjoy the most, the least and why?
- I have interviewed others for this job, why should I give you the job?
- Would you be willing to take an aptitude test?
- Can you tell me anything about yourself that you think I might want to know?
- What is the lowest salary you would accept?
- Can you handle criticism? How do you deal with it?
- Do you have any questions?

H.R. EXPECTATIONS

- Sincerity and honesty in the answers
- Attentiveness in listening to the questions
- Body language: gesture, posture, eye contact and confidence level
- Stress handling capability
- Positive approach in answering the questions
- Exhibition of skills, accomplishments and talents
- Enthusiasm and motivation level
- Command over communication skills
- Willingness and positive approach
- Exhibition of talents and accomplishments

POINTS DECIDED BY THE ORGANISATION

- Interview time and venue
- Decision on allowing identical branches
- Execution of Bond
- Change in eligibility criteria
- Place of work
- Percentage cut-off/ history of arrears / standing arrears
- Postponement of dates/ cancellation
- The number of recruits, on-board date

USEFUL WEBSITES FOR APTITUDE, GD, TECHNICAL & HR INTERVIEW

http://www.indiabix.com
http://www.freshersworld.com
http://www.placementpapers.net
http://www.allinterview.com
http://www.geekinterview.com
http://www.careersvalley.com
http://www.sampleplacementpapers.com
http://www.chetanasinterview.com
http://www.ittestpapers.com
http://www.indianfresher.com
http://www.freeplacementpapers.com
http://www.educationindiaworld.com
http://www.jobsnresults.com
http://www.psychometric-success.com
http://testfunda.com http:/www.test4free.com
http://www.placementexpress.com

TECHNICAL

http://www. mechanicalengineeringblog.com
http://www.indiabix.com

USEFUL WEBSITES FOR ENGLISH COMMUNICATION

http://www.nonstopenglish.com http://www.talkenglish.com
http://www.freeenglishnow.com http://www.ego4u.com
http://www.focusenglish.com
http://www.bbc.co.uk/worldservice/learningenglish
http:/www.englishclub.com http://www.easyenglish.com
http://learnenglish.britishcouncil.org englishbee.net
http://www.english4today.com/free_content.cfm
http://www.english-the-international-language.com
http://www.teachingengtish.org.uk http://esl.about.com
http://www.learnenglish.de
http://www.busuu.com http://free-
esl.com

'FACTS' TO PERFORM WELL IN THE PLACEMENTS

F - Clear the subjects in **F**irst attempt

- Learn **F**oreign Language (German, Japanese, French, Chinese)

A - Have right **A**ttitude

C - Have good **C**ommunication Skills

Maintain a **C**GPA above 7.5

T - **T**hink Positive

Develop creative **T**hinking

S - Be **S**agacious. Express your wisdom and Exhibit your Talents

K.L.N. COLLEGE OF ENGINEERING
POTTAPALAYAM - 630 612 (11KM from Madurai City)
SIVAGANGAI DISTRICT, TAMILNADU, INDIA
(Sponsored by K.L.N. Sourashtra College of Engineering Council)
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Approved Research Centres for Mechanical, EEE, ECE, CSE and MBA by Anna University
Accredited by NBA up to 30.06.2019, New Delhi for B.E. – Mechanical, EEE, CSE, B.Tech – IT & MCA
An ISO 9001:2015 Certified Institution, Sourashtra Linguistic Minority Institution
Ph: 0452 – 6562171 & 2, 0452 – 2090971 & 2, Fax: 0452 – 2090070, Email – info@klnce.edu

COURSES OFFERED

UG COURSES - B.E. / B.TECH

1. Mechanical Engineering (Accredited by NBA)
2. Electrical & Electronics Engineering (Accredited by NBA)
3. Electronics & Communication Engineering
4. Computer Science & Engineering (Accredited by NBA)
5. Information Technology (Accredited by NBA)
6. Automobile Engineering
7. Electronics & Instrumentation Engineering

PG COURSES

1. Master of Computer Applications (Accredited by NBA)
2. Master of Business Administration
3. M.E. – CAD / CAM
4. M.E. – Communication Systems
5. M.E. – Power Systems Engineering
6. M.E. – Computer Science & Engineering
7. M.E. – Computer Science & Engineering (with Specialization in Networks)