K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

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

(Accredited by NBA, New Delhi)

B.E. – EEE – VI – Semester - Students Hand book – EVEN Semester of 2016 – 2017

This book contains the following:

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

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION AND MISSION OF THE COLLEGE

VISION:

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

MISSION:

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

VISION AND MISSION OF THE DEPARTMENT

VISION:

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

MISSION:

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

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

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

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

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

PEO3: to work in international and multi-disciplinary Environments

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

Electrical and Electronics Engineering Graduates will be able to:

PSO1:

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

PSO2:

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

PSO3:

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

PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

OUTCOME BASED EDUCATION (OBE)

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

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

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

BENEFITS AND SIGNIFICANCE OF ACCREDITATION

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

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

Accreditation signifies different things to different stakeholders. These are:

Benefits to Institutions

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

Benefits to Students

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

Benefits to Employers

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

Benefits to the Public

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

Catalyst for International Accreditations

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

Benefits to Industry and Infrastructure Providers
It signifies identification of quality of Institutional capabilities, skills and knowledge.
Benefits to Parents
It signifies that their ward goes through a teaching-learning environment as per accepted good practices.
Benefits to Alumni
It reassures alumni that alumni are products of an institute with a higher standing in terms of learning.
Benefits to Country
Accreditation helps in gaining confidence of stakeholders and in giving a strong message that as a country, our technical manpower is of international standards and can be very useful in enhancing the global mobility for our technical manpower.

ENGINEERING ETHICS

Engineering Ethics is the set of rules and guidelines that engineers adhere to as a moral obligation to their profession and to the world. Engineering is a professional career that impact lives. When ethics is not followed, disaster often occurs; these disasters not only include huge monetary costs and environmental impacts, but also often result in the loss of human life. Engineering Ethics applies to every engineer and is very important.
The National Society of Professional Engineers (NSPE) decides the overall standards and codes of ethics for all the engineering professions. The Preamble of the NSPE *Code of Conduct for Engineers* (2007) states:
"*Engineers shall at all times recognize that their primary obligation is to protect the safety, health, property, and welfare of the public. If their professional judgment is overruled under circumstances where the safety, health, property, or welfare of the public are endangered, they shall notify their employer or client and such other authority as may be appropriate.*"

Electrical Engineering Ethics
Electrical Engineering is a type of engineering profession that deals with the creation of better electronics. Since our society is heading towards an era of technology, where all members of society will be affected, it is especially important for electrical engineers to follow a code of engineering ethics. For electrical engineers, an important set of guidelines is the *Electrical Engineering Code of Ethics*, published by IEEE.
IEEE code of ethics
We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

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

Engineering Ethics in College/Education

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

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

Engineering Ethics in the Professional World

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

Engineering Ethics in Companies

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

BLOOM'S TAXONOMY

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

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

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

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

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

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

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

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 POST - 630 612
ACADEMIC CALENDAR - Even Semester of 2016-2017 – Summary (Proposed)
IV, VI & VIII SEMESTER UG & II, IV&VI SEMESTER PG DEGREE COURSES

S.No.	Date (Day)	Programme / Events	*Day*
		DECEMBER 2016	
1	28.12.2016 (Wednesday)	Re-opening Day- B.E / B.Tech-IV&VI Semester	*01*
		JANUARY 2017	
2	01.01.2017(Sunday)	NEW YEAR – HOLIDAY- FOUNDERS DAY	-
	02.01.2017(Monday)	Re-opening day- II &VIII -B.E./B. Tech (except ECE AUE- VIII sem)	05
3	03.01.2017(Tuesday)	Re-opening day - VIII -B.E./B. Tech - ECE &AUE	06
4	14.01.2017 (Saturday)	PONGAL - HOLIDAY	-
5	15.01.2017(Sunday)	THIRUVALLUVAR THINAM- HOLIDAY	-
6	16.01.2017(Monday)	ULAVAR THIRUNAAL - HOLIDAY	-
7	19.01.2017 (Thursday)	CIT –I (IV, VI & VIII semester B.E/ B.Tech)	17
8	23.01.2017(Monday)	Commencement of classes – II, IV & VI semester PG courses	19
9	26.01.2017(Thursday)	REPUBLIC DAY - HOLIDAY	-
		FEBRUARY 2017	
10	08.02.2017(Wednesday)	CIT –II (IV, VI & VIII semester B.E/ B.Tech)	31
11	25.02.2017(Saturday)	Parents –Teachers Meeting	45
12	27.02.2017(Monday)	CIT –III (IV, VI & VIII semester B.E/ B.Tech)	46
		MARCH 2017	
13	03.03.2017(Friday)	Annual Sports day	50
14	07.03.2017 (Tuesday)	Technical Symposium – Mechanical - Tentative	52
15	09.03.2017(Thursday)	Technical Symposium – EEE - Tentative	54
16	11.03.2017 (Saturday)	19th Graduation day- Tentative	56
17	14.03.2017 (Tuesday)	Technical Symposium –ECE - Tentative	58
18	16.03.2017(Thursday)	CIT –IV (IV, VI & VIII semester B.E/ B.Tech)	60
19	17.03.2017(Friday)	Technical Symposium –MBA - Tentative	61
20	25.03.2017(Friday)	Technical Symposium –CSE - Tentative	67
21	28.03.2017(Tuesday)	Technical Symposium –IT - Tentative	69
22	29.03.2017(Wednesday)	TELUGU NEW YEAR - HOLIDAY	-
23	30.03.2017(Thursday)	Technical Symposium –AUE - Tentative	70
24	31.03.2017(Friday)	Technical Symposium –EIE- Tentative	71
		APRIL 2017	
25	03.04.2017(Monday)	CIT –V (VIII semester B.E/ B.Tech)	72
26	05.04.2017(Wednesday)	AU Practical – Slot –I (VIII semester B.E / B.Tech) - Tentative	74
27	07.04.2017(Friday)	CIT –V (IV, VI semester B.E/ B.Tech)	76
28	08.04.2017(Saturday)	23rd College Annual Day – Tentative	77
29	09.04.2017(Sunday)	MAHAVIR JEYANTHI - HOLIDAY	-
30	10.04.2017(Monday)	AU Practical – Slot –I (II, IV, VI semester B.E / B.Tech)– Tentative AU Practical – Slot –II (VIII semester B.E / B.Tech) - Tentative	78
31	13.04.2017(Thursday)	Last working Day- VIII- Semester – B.E / B.Tech	81
32	14.04.2017(Friday)	TAMIL NEW YEAR / GOOD FRIDAY/ Dr. AMBEDKAR'S BIRTHDAY - HOLIDY	-
33	17.04.2017(Monday)	AU Practical – Slot –II(II, IV, VI semester B.E / B.Tech) - Tentative Commencement of Anna University – Theory Examinations- VIII semester –B.E / B.Tech	82
34	24.04.2017(Monday)	Last working Day- II, IV & VI- Semester – B.E / B.Tech	88
35	27.04.2017(Thursday)	Commencement of Anna University – Theory Examinations- II, IV & VI semester –B.E / B.Tech	91
		MAY 2017	
36	01.05.2017(Monday)	MAY DAY – HOLIDAY	-
37	05.05.2017(Friday)	Last Working day (II, IV & VI semester PG courses)	96
38	10.05.2017(Wednesday)	Commencement of Anna University – Theory Examinations – PG courses	-

Re-opening Day: III, V, VII Semester – B.E./B.Tech., : 26th June 2017(Monday)

Re-opening Day: III, V Semester – M.E ., M.B.A & M.C.A : 3rd July 2017(Monday)

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

Department of Electrical and Electronics Engineering

CLASS WISE TIME TABLE -2016-2017 (EVEN)

Year/Sem/Sec : III / VI/ A **Faculty In-charge : A. Marimuthu**

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- 05.00
PERIOD→	I	II	III	IV		V	VI	VII	VIII
MON	**PST** AM	**CE** TG	**SSD** RJPP	**PSOC** JM	*L U N C H*	**DEM** JS	**ES** SM	**LIB/CE** TG	-
TUE	**PSOC** JM	**SSD** RJPP	**ES** SM	**DEM(T)** JS,CVR		**PSOC** JM	**PED LAB / MPMC LAB** AM, MJM / TG, RJR		
WED	**ES** SM	**DEM** JS	**PSOC** JM	**CE** TG		**PST** AM	**SSD** RJPP	**DEM(T)** JS	**ES** SM
THU	**CE** TG	**PED LAB / MPMC LAB** AM, MBL / TG, EJ				**SSD** RJPP	**PST** AM	**PST** AM	**CE** TG
FRI	**DEM** JS	**ES** SM	**CE** TG	**PSOC** JM		**PSTS** JS, CVR, APSR			-

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

TIME→ DAY↓	09.00 – 09.50	09.50 – 10.40	10.55- 11.45	11.45- 12.35		01.15- 02.05	02.05- 02.55	02.55- 03.45	04.00- 05.00
PERIOD→	I	II	III	IV		V	VI	VII	VIII
MON	**ES** RSD	**PSOC** KG	**PST** AM	**SSD** MJM	*L U N C H*	**PED LAB / MPMC LAB** MJM, MGK / EJ, RJR			-
TUE	**SSD** MJM	**CE** EJ	**DEM** SMK	**DEM** SMK		**ES** RSD	**PSOC** KG	**ES** RSD	**PSOC** KG
WED	**PST** AM	**SSD** MJM	**CE** EJ	**PSOC** KG		**ES** RSD	**PED LAB / MPMC LAB** MJM, MGK / EJ, TG		
THU	**CE** EJ	**ES** RSD	**DEM** SMK	**DEM(T)** SMK,JS		**SSD** MJM	**PSTS** RSD, APSR, MML		
FRI	**PSOC** KG	**PST** AM	**LIB/CE** EJ	**SSD** MJM		**DEM** SMK	**PST** AM	**CE** EJ	-

Year/Sem/Sec : III / VI / C **Faculty In-charge: M. Mahalakshmi**

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- 05.00
PERIOD→	I	II	III	IV		V	VI	VII	VIII
MON	**ES** RJR	**CE** EJ	**DEM** SMK	**DEM** SMK	*L U N C H*	**PST** MM	**PSOC** KG	**PST** MM	-
TUE	**PSOC** KG	**PED LAB / MPMC LAB** MGK, AM / RJR, TG				**CE** EJ	**SSD** MGK	**CE** EJ	**SSD** MGK
WED	**CE** EJ	**ES** RJR	**DEM** SMK	**DEM(T)** SMK,JS		**CE** EJ	**PSTS** MM, CVR, APSR		
THU	**SSD** MGK	**PSOC** KG	**SSD** MGK	**PST** MM		**ES** RJR	**PED LAB / MPMC LAB** MGK, MJM / RJR, EJ		
FRI	**PST** MM	**ES** RJR	**PSOC** KG	**DEM** SMK		**LIB/CE** EJ	**PSOC** KG	**ES** RJR	-

SUB CODE	SUBJECT NAME		STAFF NAME		
			Section - A	Section - B	Section - C
EC6651	Communication Engineering	CE	T.Gopu	E.Jeyasri	E.Jeyasri
EE6601	Solid State Drives	SSD	R.Jeyapandi Prathap	M.Jeyamurugan	M. Ganesh Kumari
EE6602	Embedded Systems	ES	S. Manoharan	R. Sridevi	R. Jeyarohini
EE6603	Power System Operation and Control	PSOC	J.Merlin	Dr.K.Gnanambal	Dr.K.Gnanambal
EE6604	Design of Electrical Machines (T)	DEM	J.Sangeetha	Dr.S.M.Kannan	Dr.S.M.Kannan
EE6002	Power System Transients (Elective I)	PST	A. Marimuthu	A. Marimuthu	M.Mahalakshmi.
EE6611	Power Electronics and Drives Laboratory	PED LAB	A. Marimuthu	M.Jeyamurugan	M. Ganesh Kumari
EE6612	Microprocessors and Micro controllers Laboratory	MPMC LAB	T.Gopu	E.Jeyasri	R. Jeyarohini
EE6613	Presentation Skills and Technical Seminar	PSTS	J.Sangeetha	R. Sridevi	M.Mahalakshmi.

Syllabus

S.NO.	COURSE CODE	COURSE TITLE	L	T	P	C
		THEORY				
1.	EC6651	Communication Engineering	3	0	0	3
2.	EE6601	Solid State Drives	3	0	0	3
3.	EE6602	Embedded Systems	3	0	0	3
4.	EE6603	Power System Operation and Control	3	0	0	3
5.	EE6604	Design of Electrical Machines	3	1	0	4
6.	EE6002	Power System Transients	3	0	0	3
		PRACTICAL				
7.	EE6611	Power Electronics and Drives Laboratory	0	0	3	2
8.	EE6612	Microprocessors and Microcontrollers Laboratory	0	0	3	2
9.	EE6613	Presentation Skills and Technical Seminar	0	0	2	1
	TOTAL		18	1	8	24

EC6651 COMMUNICATION ENGINEERING LT P C 3 0 0 3

OBJECTIVES:

- To introduce different methods of analog communication and their significance
- To introduce Digital Communication methods for high bit rate transmission
- To introduce the concepts of source and line coding techniques for enhancing rating of transmission of minimizing the errors in transmission.
- To introduce MAC used in communication systems for enhancing the number of users.
- To introduce various media for digital communication

UNIT I ANALOG COMMUNICATION 9

AM – Frequency spectrum – vector representation – power relations – generation of AM – DSB, DSB/SC, SSB, VSB AM Transmitter & Receiver; FM and PM – frequency spectrum – power relations : NBFM & WBFM, Generation of FM and DM, Amstrong method & Reactance modulations : FM & PM frequency.

UNIT II DIGITAL COMMUNICATION 9

Pulse modulations – concepts of sampling and sampling theorems, PAM, PWM, PPM, PTM, quantization and coding : DCM, DM, slope overload error. ADM, DPCM, OOK systems – ASK, FSK, PSK, BSK, QPSK, QAM, MSK, GMSK, applications of Data communication.

UNIT III SOURCE CODES, LINE CODES & ERROR CONTROL (Qualitative only) 9

Primary communication – entropy, properties, BSC, BEC, source coding:Shaum, Fao, Huffman coding: noiseless coding theorem, BW – SNR trade off codes: NRZ, RZ, AMI, HDBP, ABQ, MBnBcodes : Efficiency of transmissions, error control codes and applications: convolutions & block codes.

UNIT IV MULTIPLE ACCESS TECHNIQUES 9

SS&MA techniques: FDMA, TDMA, CDMA, SDMA application in wire and wireless communication: Advantages (merits) :

UNIT V SATELLITE, OPTICAL FIBER – POWERLINE, SCADA 9

Orbits: types of satellites : frequency used link establishment, MA techniques used in satellite communication, earth station; aperture actuators used in satellite – Intelsat and Insat: fibers – types: sources, detectors used, digital filters, optical link: power line carrier communications: SCADA

TOTAL : 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1. Taub&Schiling —Principles of Communication Systems, Tata McGraw Hill 2007.
2. J.Das —Principles of Digital Communication New Age International, 1986.

REFERENCES:

1. Kennedy and Davis —Electronic Communication Systems, Tata McGraw hill, 4th Edition, 1993.
2. Sklar —Digital Communication Fundamentals and Applications— Pearson Education, 2001.
3. Bary le, Memuschmidt, Digital Communication, Kluwer Publication, 2004.
4. B.P.Lathi —Modern Digital and Analog Communication Systems, Oxford University Press, 1998.

EE6601 SOLID STATE DRIVES L T P C 3 0 0 3

OBJECTIVES:

- To understand steady state operation and transient dynamics of a motor load system.
- To study and analyze the operation of the converter/chopper fed dc drive, both qualitatively and quantitatively.
- To study and understand the operation and performance of AC motor drives.
- To analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

UNIT I DRIVE CHARACTERISTICS 9

Electric drive – Equations governing motor load dynamics – steady state stability – multi quadrant Dynamics: acceleration, deceleration, starting & stopping – typical load torque characteristics – Selection of motor.

UNIT II CONVERTER / CHOPPER FED DC MOTOR DRIVE 9

Steady state analysis of the single and three phase converter fed separately excited DC motor drive– continuous and discontinuous conduction– Time ratio and current limit control – 4 quadrant operation of converter / chopper fed drive.

UNIT III INDUCTION MOTOR DRIVES 9

Stator voltage control–energy efficient drive–v/f control–constant airgap flux–field weakening mode – voltage / current fed inverter – closed loop control.

UNIT IV SYNCHRONOUS MOTOR DRIVES 9

V/f control and self control of synchronous motor: Margin angle control and power factor control – permanent magnet synchronous motor.

UNIT V DESIGN OF CONTROLLERS FOR DRIVES 9

Transfer function for DC motor / load and converter – closed loop control with Current and speed feedback– armature voltage control and field weakening mode – Design of controllers; current controller and speed controller- converter selection and characteristics.

TOTAL: 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1. Gopal K.Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, 1992.
2. Bimal K.Bose. Modern Power Electronics and AC Drives, Pearson Education, 2002.
3. R.Krishnan, Electric Motor & Drives: Modeling, Analysis and Control, Prentice Hall of India, 2001.

REFERENCES:

1. John Hindmarsh and Alasdain Renfrew —Electrical Machines and Drives System, Elsevier 2012.
2. ShaahinFelizadeh, —Electric Machines and Drives, CRC Press (Taylor and Francis Group), 2013.
3. S.K.Pillai, A First course on Electrical Drives, Wiley Eastern Limited, 1993.
4. S. Sivanagaraju, M. Balasubba Reddy, A. Mallikarjuna Prasad —Power semiconductor drives, PHI, 5th printing, 2013.
5. N.K.De., P.K.SEN,Electric drives, PHI, 2012.
6. Vedam Subramanyam,Thyristor Control of Electric Drives, Tata McGraw Hill, 2007.

EE6602 EMBEDDED SYSTEMS LT P C 3 0 0 3

OBJECTIVES:

- To introduce the Building Blocks of Embedded System
- To Educate in Various Embedded Development Strategies
- To Introduce Bus Communication in processors, Input/output interfacing.
- To impart knowledge in various processor scheduling algorithms.
- To introduce Basics of Real time operating system and example tutorials to discuss on one real-time operating system tool

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Introduction to Embedded Systems – The build process for embedded systems- Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

UNIT II EMBEDDED NETWORKING 9

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols -RS232 standard – RS422 – RS485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) –need for device drivers.

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT 9

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN 9

Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication-shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance, comparison of Real time Operating systems: Vx Works, ЧC/OS-II, RT Linux.

UNIT V EMBEDDED SYSTEM APPLICATION DEVELOPMENT 9

Case Study of Washing Machine- Automotive Application- Smart card System Application,.

TOTAL: 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1. Rajkamal, Embedded System-Architecture, Programming, Design‘, Mc Graw Hill, 2013.
2. Peckol, Embedded system Design, John Wiley & Sons,2010
3. Lyla B Das, Embedded Systems-An Integrated Approach, Pearson, 2013

REFERENCES:

1. Shibu. K.V, —Introduction to Embedded Systems, Tata Mcgraw Hill,2009.
2. Elicia White, Making Embedded Systems, O‘ Reilly Series,SPD,2011.
3. Tammy Noergaard, —Embedded Systems Architecture, Elsevier, 2006.
4. Han-Way Huang, Embedded system Design Using C8051, Cengage Learning,2009.
5. Rajib Mall —Real-Time systems Theory and Practice Pearson Education, 2007. 70

EE6603 POWER SYSTEM OPERATION AND CONTROL L T P C 3 0 0 3

OBJECTIVES:

- To have an overview of power system operation and control.
- To model power-frequency dynamics and to design power-frequency controller.
- To model reactive power-voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.
- To study the economic operation of power system.
- To teach about SCADA and its application for real time operation and control of power systems.

UNIT I INTRODUCTION 9

An overview of power system operation and control - system load variation - load characteristics - load curves and load-duration curve - load factor - diversity factor - Importance of load forecasting and quadratic and exponential curve fitting techniques of forecasting – plant level and system level controls .

UNIT II REAL POWER - FREQUENCY CONTROL 9

Basics of speed governing mechanism and modeling - speed-load characteristics – load sharing between two synchronous machines in parallel - control area concept - LFC control of a single-area system - static and dynamic analysis of uncontrolled and controlled cases - two-area system – modeling - static analysis of uncontrolled case - tie line with frequency bias control - state variable model - integration of economic dispatch control with LFC.

UNIT III REACTIVE POWER–VOLTAGE CONTROL 9

Generation and absorption of reactive power - basics of reactive power control - excitation systems – modeling - static and dynamic analysis - stability compensation - methods of voltage control: tap-changing transformer, SVC (TCR + TSC) and STATCOM – secondary voltage control.

UNIT IV UNIT COMMITMENT AND ECONOMIC DISPATCH 9

Formulation of economic dispatch problem – I/O cost characterization – incremental cost curve - co-ordination equations without and with loss (No derivation of loss coefficients) - solution by direct method and λ-iteration method - statement of unit commitment problem – priority-list method - forward dynamic programming.

UNIT V COMPUTER CONTROL OF POWER SYSTEMS 9

Need for computer control of power systems - concept of energy control centre - functions - system monitoring - data acquisition and control - system hardware configuration – SCADA and EMS functions - network topology - state estimation – WLSE - Contingency Analysis - state transition diagram showing various state transitions and control strategies.

TOTAL: 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1. Olle.I.Elgerd, Electric Energy Systems theory - An introduction‘, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010.

2. Allen. J. Wood and Bruce F. Wollenberg,Power Generation, Operation and Control‘, John Wiley & Sons, Inc., 2003.

3. Abhijit Chakrabarti, Sunita Halder, Power System Analysis Operation and Control‘, PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010.

REFERENCES:

1. Nagrath I.J. and Kothari D.P., Modern Power System Analysis‘, Tata McGraw-Hill, Fourth Edition, 2011.

2. Kundur P., Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

3. Hadi Saadat, Power System Analysis‘, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.

4. N.V.Ramana, —Power System Operation and Control, Pearson, 2011.

5. C.A.Gross, —Power System Analysis, Wiley India, 2011.

EE6604 DESIGN OF ELECTRICAL MACHINES LT P C 3 1 0 4

OBJECTIVES:

- To study mmf calculation and thermal rating of various types of electrical machines.
- To design armature and field systems for D.C. machines.
- To design core, yoke, windings and cooling systems of transformers.
- To design stator and rotor of induction machines.
- To design stator and rotor of synchronous machines and study their thermal behaviour.

UNIT I INTRODUCTION 9

Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings - Thermal considerations - Heat flow – Temperature rise and Insulating Materials - Rating of machines – Standard specifications.

UNIT II DC MACHINES 9

Output Equations – Main Dimensions – Choice of Specific Electric and Magnetic Loading - Magnetic Circuits Calculations - Carter's Coefficient - Net length of Iron –Real & Apparent flux densities – Selection of number of poles – Design of Armature – Design of commutator and brushes – performance prediction using design values.

UNIT III TRANSFORMERS 9

Output Equations – Main Dimensions - kVA output for single and three phase transformers – Window space factor – Design of core and winding – Overall dimensions – Operating characteristics – No load current – Temperature rise in Transformers – Design of Tank - Methods of cooling of Transformers.

UNIT IV INDUCTION MOTORS 9

Output equation of Induction motor – Main dimensions – Choice of Average flux density – Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor – Magnetic leakage calculations – Leakage reactance of polyphase machines- Magnetizing current - Short circuit current – Operating characteristics- Losses and Efficiency.

UNIT V SYNCHRONOUS MACHINES 9

Output equations – choice of Electrical and Magnetic Loading – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

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

OUTCOMES:

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

TEXT BOOKS:

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai & Sons, New Delhi, 1984.
2. M.V.Deshpande —Design and Testing of Electrical Machine Design Wheeler Publications, 2010.

REFERENCES:

1. A.ShanmugaSundaram, G.Gangadharan, R.Palani 'Electrical Machine Design Data Book', New Age International Pvt. Ltd., Reprint, 2007.
2. R.K.Agarwal — Principles of Electrical Machine Design, Esskay Publications, Delhi, 2002.
3. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxfordand IBH Publishing Co. Pvt. Ltd., New Delhi, 1987.

EE6002 POWER SYSTEM TRANSIENTS LT P C 3 0 0 3

OBJECTIVES:

- To study the generation of switching transients and their control using circuit – theoretical concept.
- To study the mechanism of lighting strokes and the production of lighting surges.
- To study the propagation, reflection and refraction of travelling waves.
- To study the impact of voltage transients caused by faults, circuit breaker action, load rejection on integrated power system.

UNIT I INTRODUCTION AND SURVEY 9

Review and importance of the study of transients - causes for transients. RL circuit transient with sine wave excitation - double frequency transients - basic transforms of the RLC circuit transients. Different types of power system transients - effect of transients on power systems – role of the study of transients in system planning.

UNIT II SWITCHING TRANSIENTS 9

Over voltages due to switching transients - resistance switching and the equivalent circuit for interrupting the resistor current - load switching and equivalent circuit - waveforms for transient voltage across the load and the switch - normal and abnormal switching transients. Current suppression - current chopping - effective equivalent circuit. Capacitance switching - effect of source regulation - capacitance switching with a restrike, with multiple restrikes. Illustration for multiple restriking transients - ferro resonance.

UNIT III LIGHTNING TRANSIENTS 9

Review of the theories in the formation of clouds and charge formation - rate of charging of thunder clouds – mechanism of lightning discharges and characteristics of lightning strokes – model for lightning stroke - factors contributing to good line design - protection using ground wires - tower footing resistance - Interaction between lightning and power system.

UNIT IV TRAVELING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS 9

Computation of transients - transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept - step response - Bewely‘s lattice diagram - standing waves and natural frequencies - reflection and refraction of travelling waves.

UNIT V TRANSIENTS IN INTEGRATED POWER SYSTEM 9

The short line and kilometric fault - distribution of voltages in a power system - Line dropping and load rejection - voltage transients on closing and reclosing lines - over voltage induced by faults -switching surges on integrated system Qualitative application of EMTP for transient computation.

TOTAL : 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1. Allan Greenwood, Electrical Transients in Power Systems‘, Wiley Inter Science, New York, 2nd Edition, 1991.

2. Pritindra Chowdhari, —Electromagnetic transients in Power System, John Wiley and Sons Inc., Second Edition, 2009.

3. C.S. Indulkar, D.P.Kothari, K. Ramalingam, ‘Power System Transients – A statistical approach‘, PHI Learning Private Limited, Second Edition, 2010.

REFERENCES:

1. M.S.Naidu and V.Kamaraju, High Voltage Engineering‘, Tata McGraw Hill, Fifth Edition, 2013.

2. R.D. Begamudre, Extra High Voltage AC Transmission Engineering‘, Wiley Eastern Limited, 1986.

3. Y.Hase, Handbook of Power System Engineering, Wiley India, 2012.

4. J.L.Kirtley, —Electric Power Principles, Sources, Conversion, Distribution and use, Wiley, 2012.

EE6611 POWER ELECTRONICS AND DRIVES LABORATORY LT P C 0 0 3 2

OBJECTIVES:

To provide hands on experience with power electronic converter design and testing

LIST OF EXPERIMENTS:

1. Gate Pulse Generation using R,RC and UJT.
2. Characteristics of SCR and Triac
3. Characteristics of MOSFET and IGBT
4. AC to DC half controlled converter
5. AC to DC fully controlled Converter
6. Step down and step up MOSFET based choppers
7. IGBT based single phase PWM inverter
8. IGBT based three phase PWM inverter
9. AC Voltage controller
10. Switched mode power converter.
11. SimulationofPEcircuits (1Φ&3Φsemiconverter, 1Φ&3Φfullconverter, dc-dcconverters,acvoltage controllers).

TOTAL: 45 PERIODS

OUTCOMES:

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

EE6612 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY LT P C 0 0 3 2

OBJECTIVES:

To provide training on programming of microprocessors and microcontrollers and understand the interface requirements.

LIST OF EXPERIMENTS:

1. Simple arithmetic operations: addition / subtraction / multiplication / division.
2. Programming with control instructions:
   (i) Ascending / Descending order, Maximum / Minimum of numbers
   (ii) Programs using Rotate instructions
   (iii) Hex / ASCII / BCD code conversions.
3. Interface Experiments: with 8085
   (i) A/D Interfacing. & D/A Interfacing.
4. Traffic light controller.
5. I/O Port / Serial communication
6. Programming Practices with Simulators/Emulators/open source
7. Read a key, interface display
8. Demonstration of basic instructions with 8051 Micro controller execution, including:
   (i) Conditional jumps, looping (ii) Calling subroutines.
9.. Programming I/O Port 8051
   (i) study on interface with A/D & D/A
   (ii) Study on interface with DC & AC motor.
10. Mini project development with processors.

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to understand and analyse, linear and digital electronic circuits.
- To understand and apply computing platform and software for engineering problems.

EE6613 PRESENTATION SKILLS AND TECHNICAL SEMINAR LT P C 0 0 2 1

OBJECTIVES:

- To encourage the students to study advanced engineering developments
- To prepare and present technical reports.
- To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative models.

METHOD OF EVALUATION :

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. Each student is expected to present atleast twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report. A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Evaluation is 100% internal.

TOTAL : 30 PERIODS

OUTCOMES:

- Ability to review, prepare and present technological developments
- Ability to face the placement interviews

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

LECTURE SCHEDULE

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

Degree/Program : **B.E./EEE** Course Name : **COMMUNICATION ENGINEERING** Duration : **January '17 to April'17** Course Code :**EC6651** Semester : **VI**

Section : **A,B&C** Regulation : **2013 / AUC** Staff : **T. Gopu&E.Jeyasri**

AIM :

To introduce the concepts of communication systems engineering using wire and wireless medium

OBJECTIVES:

- To introduce different methods of analog communication and their significance
- To introduce Digital Communication methods for high bit rate transmission
- To introduce the concepts of source and line coding techniques for enhancing rating of transmission of minimizing the errors in transmission.
- To introduce MAC used in communication systems for enhancing the number of users.
- To introduce various media for digital communication

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

CO	Course Outcomes	POs	PSOs
C310.1	Explain the operation of Amplitude Modulation , draw the frequency spectrum and vector representation of AM	1,2,3,4,5,7,11	1,2,3
C310.2	Compare the different methods of QPSK, BFSK and GMSK	1,2,3,4,5,6	1,3
C310.3	Analyze how information is transmitted to receiver using the Huffman coding	1,2,3,6,7	1,3
C310.4	Discuss about the various types of multiple access techniques	1,3,4,5,	1,2
C310.5	Distinguish between INTELSAT and INSAT	1,2,3,5,11	1,2

S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I: ANALOG COMMUNICATION				Target Periods : 10
1			AM – Frequency spectrum	R6(2.1)
2			Vector representation - power relations	R6(2.5),(2.10)
3			Generation of AM –DSB	R6(3.1),(4.1)
4			DSB/SC, SSB	R6(4.2),(4.11)
5			VSB AM Transmitter & Receiver	R6(4.21),(5.1),(5.3)
6			FM and PM – frequency spectrum	R6(6.1)
7			Power relations : NBFM & WBFM	R6(6.13),(6.14)
8			Generation of FM and DM	R6(7.1),(3.7)
9			Armstrong method & Reactance Modulations: FM & PM frequency.	R6(7,5),(7.2)
10				
11			NPTEL Video – Unit-I	
12			Anna University important Part-A & Part-B Questions Discussion – Unit-1	
Total Periods:		12	Assignment - 1	
UNIT II: DIGITAL COMMUNICATION				Target Periods : 10
13			Pulse modulations ,concepts of sampling and sampling	R6(1.1),(1.2)

			theormes	
14			PAM, PWM	R6((1.7),(1.14)
15			PPM, PTM	R6(1.18),(1.14)
16			Quantization and Coding – DCM	R6(2.4),(2.16),(2.1)
17			DM, slope overload error	R6(3.4),(3.7)
18			ADM, DPCM, OOK systems	R6(3.9),(3.1)
19			ASK, FSK, PSK	R6(4.5),(4.8),(4.13)
20				
21			BSK, QPSK, QAM	R6(4.14),(4.19) (4.26)
22			MSK, GMSK, applications of Data communication	R6(4.29),(4.34)
23			NPTEL Video – Unit-II	
24			Anna University important Part-A & Part-B Questions Discussion – Unit-2	
Total Periods:		12	CIT-1 Test Portion:Unit-1&2	
UNIT III: SOURCE CODES, LINE CODES & ERROR CONTROL (Qualitative only) Target Periods : 11				
25			Primary communication – entropy, properties	R6(1.1),(1.3),(1.5)
26			BSC, BEC,	R6(1.20),(1.21)
27			source coding :Shaum, Fao,	R6(2.1),(2.3)
28				
29			Huffman coding : noiseless coding theorem	R6(2.7),(2.12)
30			BW – SNR trade off codes: NRZ	R6(3.1),(3.5)
31			RZ, AMI	R6(3.7)(3.10)
32			HDBP, ABQ	R6((3.12)
33			MBnBcodes : Efficiency of transmissions	R6(3.12)(3.17)
34			Error control codes and applications: convolutions & block codes	R6(4.1),(4.2),(4.6)
35			Unit-3 Revision & Anna University important Part-A & Part-B Questions Discussion – Unit-3	
Total Periods:		11	Assignment -2 Class Test- 2 Test Portion:Unit-3	
UNIT IV: MULTIPLE ACCESS TECHNIQUES Target Periods : 9				
36			SS&MA techniques	R6(1.1),(2.1) R6(2.6)
37			FDMA	R6(2.9)
38			TDMA	R6(2.14)
39				
40			CDMA	R6(1.1),(2.1) R6(2.6)
41				
42			SDMA	R6(2.9)
43			Application in wire and wireless communication: Advantages (merits)	Material
44			Unit-4 Revision & Anna University important Part-A & Part-B Questions Discussion – Unit-4	
Total Periods:		09	CIT-II Test Portion:Unit-3 &4	
UNIT V: SATELLITE, OPTICAL FIBER – POWERLINE, SCADA Target Periods : 9				
45			Orbits: types of satellites	R6(1.2),(1.4)
46				
47			Frequency used link establishment	R6(1.7)

48			MA techniques used in satellite communication	R6(1.9)
49			Earth station ,Aperture actuators used in satellite	R6(1.25)
50			Intelsat and Insat	R6(1.29),(1.34)
51			Fibers –types: sources, detectors used digital filters	R6(2.1),(2.6),(2.12) (2.16)&(2.24)
52				
53			Optical link: power line carrier communications: SCADA	R6(2.32)
54			Unit-5 Revision & Anna University important Part-A & Part-B Questions Discussion – Unit-5	
Total Periods:		10	Assignment -3 Class Test-3 Test Portion:Unit-5	
CONTENT BEYOND THE SYLLABUS Target Periods: 02				
55			Commercial applications of Bluetooth	Material
56				
QUIZZES Target Periods: 02				
57			Quizzes –I – Unit-1	
58			Quizzes –II – Unit-2	

Text Book / Reference

S. No		Title of the Book	Author	Publisher	Year
1	**T1**	Principles of communication systems	Taub&Schiling	Tata McGraw hill	2007
2	**T2**	Principles of Digital communication	Das J	New Age International	1986
3	**R1**	Electronic communication systems	Kennedy and Davis	Tata McGraw hill, 4th edition	1993
4	**R2**	Digital communication fundamentals and applications	Sklar	Pearson Education	2001
5	**R3**	Digital Communication	Baryle, Memuschmidt	Kluwer Publication	2004
6	**R4**	Electronic communication systems	Wayne Tomasi	Pearson Education	2009
7	**R5**	Modern digital and analog communication systems	Lathi B.P	Oxford University Press	1998
8	**R6**	Communication Engineering	K.Muralibabu	Lakshmi Publications	2013

Website Reference

- http://nptel.ac.in/courses/117102059/8
- https://www.youtube.com/watch?v=ZW1glqkIgcw

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

Department of Electrical and Electronics Engineering

LectureSchedule

Degree/Programme : **B.E/EEE** Semester:**VI** Section: **A, B &C**

Course code & Name: **EE6601 & SOLIDSTATEDRIVES**Duration: **Jan-Apr2017.**

Regulation: **2013/AUC** Staff: **M.GANESH KUMARI, M.JEYAMURUGAN & R. JEYAPANDIPRATHAP**

AIM: To study and understand the operation of electric drives controlled from a power electronic converter and to introduce the design concepts of controllers.

OBJECTIVES:

- To understand steady state operation and transient dynamics of a motor loadsystem.
- Tostudyandanalyzetheoperationoftheconverter/chopperfeddcdrive,bothqualitativelyandquantitatively.
- To study and understand the operation and performance of AC motordrives.
- ToanalyzeanddesignthecurrentandspeedcontrollersforaclosedloopsolidstateDCmotordrive.

Prerequisites: Electronic Devices and Circuits, Electrical machines, Power Electronics

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

COs	Cours	POs	PS
C311.1	Classify the various types of drives and load torque characteristics and Apply the multi quadrant dynamics in hoist load system.	1	1
C311.2	Analyze the operation of steady state analysis of single phase and three phase fully controlled converter and Chopper fed separately excited dc motor drives and discuss the various control strategies of converter.	1,2,3,4	1
C311.3	Explain the operation and characteristics of various methods of solid state speed control of inductionmotor.	1,2	1
C311.4	Describe the operation of various modes of V/f control of synchronous motor drives and different types of permanent magnet synchronous motor drives.	1	1
C311.5	Design a current and speed controller and develop the transfer function for DC motor, load and converter, closed loop control with current and speed	1,2,3,4	1

Total : 45 Periods

S. No	Date	Period Number	Topics to be Covered	Book No [Page	
UNIT - I:DRIVECHARACTERISTICSTarget Periods :9					
1			Electrical Drives - Introduction	T1[1]	R7[1.1]
2			General Electric Drive System	T1[3]	R7[1.4]
3			Equations governing motor load dynamics	T1[11]	R7[1.8]
4			Steady state stability	T1[23]	R7[1.19]
5			Multi quadrant dynamics	T1[12]	R7[1.13]
6			Acceleration including starting,	T1[32]	R7[1.21]
7			Deceleration including stopping		R7[1.23]
8			Typical Load Torque Characteristics	T1[18]	R7[1.24]
9			Selection of motor, Revision	T1[44]	R7[1.4]
Total		**9**	***Assignment - I****Date of Submission:*		

			Test – I: Class Test-I	***Portion :****Unit –*	
UNIT – II: CONVERTER/CHOPPER FED DCMOTORDRIVE					
10			Controlled rectifier fed DC Motor drive	T1[97]	R7[2.1]
11			Steady state analysis of the single phase half controlled converter fed separately excited DC motor drive-Continuous conduction mode	T1[109]	R7[2.32]
12			Steady state analysis of the single phase half controlled converter fed separately excited DC motor drive-Discontinuous conduction mode	T1[107]	R7[2.36]
13			Steady state analysis of the single phase full controlled converter fed separately excited DC motor drive-Continuous conduction mode	T1[100]	R7[2.47]
14			Steady state analysis of the single phase full controlled converter fed separately excited DC motor drive-	T1[98]	R7[2.45]
15			Steady state analysis of the three phase half & fully controlled converter fed separately excited D.C motor drive	T1[111]	R7[2.80,A3]
16			Chopper fed D.C motor drive -Time ratio and current limit	T1[121]	R7[3.1]
17			Four quadrant operation of converter fed drive	T1[11	R7[2.91]
18			Four quadrant operation of chopper fed drive, Revision	T1[12	R7[3.37]
Total Periods:		**9**	***Assignment-II****Date of Submission:*		
		1,2	***Test – II: CIT-I***	***Portion :****Unit –*	
UNIT – III: INDUCTIONMOTORDRIVES					
19			Stator voltage control	T1[183]	R7[5.23]
20			Energy efficient drive	T1[218]	R7[A.11]
21			Static Kramer Drive-Static Scherbius Drive	T1[221]	R7[5.159]
22			V/f control	T1[186]	R7[5.63]
23			Constant air-gap flux control	-	R7[5.75]
24			Field weakening mode	-	R7[5.78]
25			VSI fed Induction motor drive	T1[191]	R7[5.79]
26			CSI fed Induction motor drive	T1[206]	R7[5.86]
27			Closed loop control, Revision	T1[198, 208]	R7[5.88]
28			Seminar-I	-	-
29			Quiz-I	-	-
Total		**9**	***Test – III : Class Test-II***	***Portion :****Unit – III*	
UNIT – IV: SYNCHRONOUSMOTOR DRIVES					
30			Introduction-Synchronous Motor	T1[24	R7[6.1]
31			Synchronous motor Variable Speed Drives	T1[25	R7[6.8]
32			V/f control of synchronous motor	T1[25	R7[6.8]
33			Self-control of synchronous motor drive a load commutated thyristor inverter	T1[260]	R7[6.9]
34			Self-controlled synchronous motor drive employing a	T1[26	R7[6.20]
35			Marginal angle control	T1[26	R7[6.13]
36			Power factor control	-	R7[6.22]
37			Permanent magnet synchronous motor& Revision	T1[267]	R7[6.22]
38					
39			Seminar-II	-	-
40			Quiz-II	-	-
Total		**9**	***Assignment-III***	*Date of*	
			Test – IV: CIT-II	***Portion :****Unit –*	
UNIT – V: DESIGN OF CONTROLLERSFORDRIVES					
41			Transfer function for DC motor / load	-	R7[4.5]
42			Transfer function for DC motor / converter	-	R7[4.12]

43			Closed loop control with current feedback	T1[35]	R7[4.2]
44			Closed loop control with speed feedback	T1[36]	R7[4.3]
45			Closed loop control with armature voltage control and field weakening mode	-	R7[4.4]
46			Design of controllers: Current controller	-	R7[4.19]
47			Design of controllers: speed controller	-	R7[4.15]
48			Converter selection and characteristics	-	R7[4.28]
49			Revision	-	-
Total		**9**	***Test – V: Class Test-III***	***Portion :****Unit – V*	
50			**Content beyond Syllabus**	-	-
51			**NPTEL**	-	-

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

S. No		Title of the Book	Author	Publisher	Year
1	T1	Fundamentals of Electrical Drives	Gopal K.Dubey	Narosa Publishing	1992
2	T2	Modern Power Electronics and AC Drives	BimalK.Bose	Pearson Education	2002
3	T3	Electric Motor & Drives: Modeling, Analysis	R.Krishnan	Prentice Hall of India	2001
4	R1	Electrical Machines and Drives System	John Hindmarsh and Alasdain Renfrew	Elsevier	2012
5	R2	Electric Machines and Drives	ShaahinFelizadeh	CRC Press(Taylor and	2013
6	R3	A First course on Electrical Drives	S.K.Pillai	Wiley Eastern Limited	1993
7	R4	Power semiconductor drives	S. Sivanagaraju, M. Balasubba Reddy, A. Mallikarjuna Prasad	PHI, 5th printing	2013
8	R5	Electric drives	N.K.De., P.K.SEN	PHI	2012
9	R6	Thyristor Control of Electric Drives	VedamSubramanyam	Tata McGraw Hill	2007
10	R7	Solid State Drives	J. Gnanavadivel	Anuradha	2015

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C311.1	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
C311.2	3	2	1	3	-	-	-	-	-	-	-	-	3	-	-
C311.3	3	1	-	-	-	-	-	-	-	-	-	-	1	-	-
C311.4	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
C311.5	3	2	1	2	-	-	-	-	-	-	-	-	2	-	-
C311	**3**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**

Content beyond syllabus added	POs strengthened/Vacant	CO/Unit
VariableFrequencyDrives-Powerelectronicsimulation software based, designed specifically for use in power electronics and motor drivesimulations.	PO5(2),PO7(2),PSO2(1)vacant filled	C311.5/V

K.L.N. College of Engineering, Pottapalayam- 630 612

Department of Electrical and Electronics Engineering

Lecture Schedule

Course/Branch: B.E/EEE **Subject :** Embedded Systems

Duration : Dec 2016 to April 2017 **Subject Code :** EE 6602

Staff Handling :S.Manoharan,R.Jeyarohini,R.Sridevi**Semester :** VI **Section:** A,B,C

Régulation : 2013 **AUC/AUT/AUM:** AU-Chennai

OBJECTIVES

- To introduce the Building Blocks of Embedded System
- To Educate in Various Embedded Development Strategies
- To Introduce Bus Communication in processors, Input/output interfacing.
- To impart knowledge in Various processor scheduling algorithms.
- To introduce Basics of Real time operating system and example tutorials to discuss on one real time operating system tool

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

CO	Course Outcomes	Pos
C312.1	Analyze the basic build process of embedded systems, structural units in embedded processor and selection of processor and memory devices depending upon the applications.	1,2,4,5
C312.2	Classify the types of I/O device ports and buses and different interfaces for data transfer.	1,2,3,5
C312.3	Modeling of the Embedded Product Development Life Cycle (EDLC) by using different techniques like state machine model, sequential program model and concurrent model	1,2,3,4,5,6
C312.4	Analyze about the basic concept of Real Time Operating Systems and plan to scheduling of different task and compare the features of different types of Real Time Operating Systems	1,2,3,5,6
C312.5	Apply the knowledge of programming concepts of Embedded Systems for various applications like Washing Machine automotive and Smart Card System applications	1,2,3,5,6,7

S.No	Date	Period No.	Topics to be covered	Book No [Page No]
Unit-I INTRODUCTION TO EMBEDDED SYSTEMS				**Target Period:9**
1.			Introduction to Embedded Systems	T1[1-7]
2.			The build process for embedded systems	Material
3.			Structural units in Embedded processor	T1[8]
4.			Selection of processor & memory devices	T1[113-118]
5.			DMA	T[218]
6.			Memory management methods	Material
7.			Timer and Counting devices	T1[152]
8.			Watchdog Timer, Real Time Clock	T1[157-158]
9.			In circuit emulator, Target Hardware Debugging	T1[656]
				Total Periods : 9
Unit-II			**EMBEDDED NETWORKING**	**Target Period:9**
10			Embedded Networking: Introduction	Material

11			I/O Device	T1[130-131]
12			Ports & Buses	T1[131-136]
13			Serial Bus communication protocols -RS232 standard	T1[137]
14			RS422 – RS485	Material, T1[138]
15			CAN Bus	T1[161-163]
16			Serial Peripheral Interface (SPI)	T1[139-140]
17			Inter Integrated Circuits (I^2C)	T1[161]
18			Need for device drivers	T1[188]
Assignment 1			**Date of Submission :**	
Test-II-CIT-I-[ ]			**Total Periods : 9**	
Unit-III		**EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT**		**Target Period:9**
19			Embedded Product Development Life Cycle- objectives	R1[622-625]
20			Different phases of EDLC	R1[625-636]
21			Modeling of EDLC	R1[636-641]
22			Issues in Hardware-software Co-design	R1[205-206]
23			Data Flow Graph	R1[207-208]
24			State machine model	R1[208-211]
25			Sequential Program Model	R1[211]
26			Concurrent Model	R1[212-213]
27			Object oriented Model	R1[213-214]
Assignment - 2			**Date of Submission :**	**Total Periods : 9**
Unit-IV		**RTOS BASED EMBEDDED SYSTEM DESIGN**		**Target Period:9**
28			Introduction to basic concepts of RTOS	T1[351-354]
29			Task, process & threads, Multiprocessing and Multitasking	T1 [305-308]
30			Interrupt routines in RTOS	T1 [366-370]
31			Preemptive and non-preemptive scheduling	T1 [392-397]
32			Task communication shared memory, message passing	T1 [326-330,335]
33			Inter process Communication – synchronization between processes	T1 [330-332]
34			Semaphores, Mailbox, pipes	T1 [334-341]
35			Priority inversion, priority inheritance	T1 [329-330]
36			Comparison of Real time Operating systems: VxWorks, ЧC/OS-II, RT Linux	T1 [453,496]
Assignment - 3			**Date of Submission :**	
Test – III – Class Test – II [ ]			**Total Periods :9**	
Unit-V		**EMBEDDED SYSTEM APPLICATION DEVELOPMENT**		**Target Period:9**
37			Introduction to washing machine and block diagram	R1[83-85]
38			Design specification & schematic diagram	R1[83-85]
39			Software design of washing machine	R1[83-85]
40			Introduction to Automotive application	R1[85-89]
41			Classification of automotive embedded systems	R1[85-89]

42			Advance control of automotive system & car navigation systems	R1[85-89]
43			Introduction to smart card systems & block diagram	T1[593-604]
44			ASIC for smart card systems	T1[593-604]
45			Embedded software for smart card systems	T1[593-604]
46			Proteus tool(CBS)	Material
Test – IV – CIT – II – [ ]			**Total Periods :9**	
Test – V – Model Examination – Theory [ ]				

Book Reference

S.no	Title of the Book	Author	Publisher	Year
T1	Embedded System-Architecture, Programming, Design	Rajkamal	Mc Graw Hill	2013
R1	Introduction to Embedded Systems	Shibu. K.V	Tata Mcgraw Hill	2009
T2	Embedded system Design	Peckol	John Wiley & Sons	2010
T3	Embedded Systems-An Integrated Approach	Lyla B Das	Pearson	2013
R2	Making Embedded Systems	Elicia White	O' Reilly Series SPD	2011
R3	Embedded Systems Architecture	Tammy Noergaard,	Elsevier	2006
R4	Embedded system Design Using C8051	Han-Way Huang,	Cengage Learning	2009
R5	Real-Time systems Theory and Practice	Rajib Mall	Pearson Education	2007

Website reference:

http://nptel.ac.in/courses/108105057/
http://nptel.ac.in/courses/108102045/
https://docs.google.com/file/d/0B7tBh7YQV0DGTHVMa0ZRVzh0XzQ/edit

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Proteus simulation tool	PO5(3) (strengthened)	C312.5 / V

SELF STUDY TOPICS:

S.no	UNIT/ TOPIC	Text / Ref book
1	Architecture of a cirrus audio processor for CD/MP3 players	Embedded system Design Using C8051, Han-Way Huang, Cengage Learning,2009

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

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

Lecture Schedule

Courses/Branch : BE / EEE **Subject : Power System Operation and Control**
Duration : Jan – April 2017 **Subject Code: EE6603**
Semester : VI **Section: A,B,C** **Staff Handling : Dr.K.Gnanambal, J.Merlin**
Regulation: 2013

AIM

To understand the day to day operation of power system and the control actions to be implemented on the system to meet the minute-to-minute variation of system load demand.

OBJECTIVES

1. To have an overview of power system operation and control
2. To model power-frequency dynamics and to design power frequency controller
3. To model reactive power voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.
4. To study the economic operation of power system
5. To teach about SCADA and its application for real – time operation and control of power systems

PREREQUISITES: Transmission and Distribution, Power system analysis

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

CO	Course Outcome	POs	PSOs
C313.1	Analyze the various load characteristics with load curve and load duration curve by applying the Engineering knowledge	1,2	1
C313.2	Develop the static and dynamic modeling of simple single area and two area power systems for frequency control	1,2,3	1
C313.3	Develop the static and dynamic modeling of simple single area and two area power systems for voltage control	1,2,3	1
C313.4	Solve economic dispatch problems and unit commitments problems in power systems	1,2,3,5	1
C313.5	Explain the need of computer controls to energy management using SCADA	1,2,5	1

UNIT I- INTRODUCTION Target Period:9				
S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
1.			An overview of power system operation	R3 [1.36-1.38]
2.			An overview of power system control	R3 [1.33-1.36]
3.			System load – variation	R3 [1.4-1.5]
4.			System - load characteristics	R3 [1.5-1.15]
5.			Load curves and load-duration curve (daily, weekly and	R3 [1.16-1.17]

			annual)	
6.			load factor - diversity factor	R3 [1.18-1.27]
7.			Importance of load forecasting and quadratic and exponential curve fitting techniques of forecasting.	R3 [1.36-1.37] R1[575- 577]
8.			Plant level and system level controls	
9.			Tutorial	
Assignment-I			*Class Test-I*	
UNIT II - REAL POWER - FREQUENCY CONTROL Target Period:9				
10.			Basics of speed governing mechanism and modeling	R3 [2.2-2.12]
11.			speed load characteristics – load sharing between two synchronous machines in parallel.	R3 [2.12-2.27]
12.			Control area concept - LFC control of a single-area system. Static analysis of Controlled and uncontrolled cases	R3 [2.27-2.41]
13.			Dynamic analysis of uncontrolled and controlled cases.	R3 [2.41-2.55]
14.			Two area system modeling- static analysis of uncontrolled case	T2[727-732]
15.			Tie line with frequency bias control	R3[2.71-2.75]
16.			State variable model	R3[2.75-2.77]
17.			Integration of economic dispatch control with LFC.	R3 [2.55-2.57]
18.			Tutorial	
Assignment II			*CIT – I*	
UNIT III REACTIVE POWER–VOLTAGE CONTROL Target Period:9				
19.			Generation and absorption of reactive power *[NPTEL]*	R3[4.6-4.17]
20.			Basics of reactive power control – Types of Excitation systems	R3[3.1-3.4]
21.			Excitation systems – modeling	R3[3.4-3.9]
22.			Static and dynamic analysis	R3[3.9-3.12]
23.			Stability compensation	R3[3.15-3.17]
24.			Methods of voltage control	R3[4.19-4.30]
25.			Tap changing transformer.	R3[4.34-4.4.39]
26.			SVC(TCR+TSC), STATCOM	R3[4.42-4.49] R5[3.73-3.77]
27.			Secondary voltage control	R5[3.77]
28.			Quiz	
Class Test-II				
UNIT IV COMMITMENT AND ECONOMIC DISPATCH Target Period:9				
29.			Formulation of economic dispatch problem	R3[6.1-6.3]
30.			I/O cost characterization , Incremental cost curve	R3[6.3-6.11]
31.			Coordination equations without loss and with loss	R3[6.11-6.15]
32.			Solution by direct method and λ- iteration method. (No derivation of loss coefficients).	R3[6.16-6.40]
33.			Statement of Unit Commitment problem	R3[5.1-5.5]
34.			Solution methods – Priority list methods	R3[5.5-5.13]
35.			Forward dynamic programming approach.	R3[5.13-5.15]
36.			*Content Beyond the Syllabus* Solution of Economic Dispatch problem using Optimization Techniques (EA)	Journal Paper
37.			Tutorial	

Assignment III			*CIT – II*	
UNIT V COMPUTER CONTROL OF POWER SYSTEMS Target Period:9				
38.			Need for computer control of power systems.	R3[7.1]
39.			Concept of energy control centre - functions -	R3[7.3-7.5]
40.			System monitoring and data acquisition and control.	R3[7.5-7.7]
41.			System hardware configuration – SCADA and EMS functions.	R3[7.7-7.14] R3[7.1-7.3]
42.			Network topology	R3[7.2-7.28]
43.			State estimation , WLSE	R3[7.28-7.45]
44.			Contingency analysis	R5[5.44-5.46]
45.			State transition diagram showing various state transitions and control strategies	R3[7.45-7.50]
46.			Seminar	
Class Test-III(21.4.16-23.4.16)				

Text Books:

S.No	Title of the Book	Author	Publisher	Year
1	Electric Energy System Theory: An Introduction	Elgerd, O.I	Tata McGraw Hill Edition	1983
2	Power Generation, Operation and Control	Allen. J. Wood and Bruce F. Wollenberg	John Wiley & Sons, Inc.,	2003
3	Power System Analysis Operation and Control	Abhijit Chakrabarti, Sunita Halder	2nd Edition,Prentice Hall of India	2008

Reference Books:

S.No	Title of the Book	Author	Publisher	Year
1.	Power System Analysis	Hadi Saadat	Tata McGraw Hill Publishing company, New Delhi	2002
2.	Power System Operation and Control	M.Jeraldin Ahela	A.R.S. Publiations Chennai	2011
3.	Modern Power Sytem Analysis Third Edition	I.J.Nagrath and D.P.Kothari	Tata McGraw Hill Publishing company, New Delhi	2003
4.	Power System Operation and Control	V.Ramanathan, P.S.Manoharan	Charulatha Publications	2008
5.	Power System Operation and Control	S. Ramar P.Selvam	Scitech Publications	2012
6.	Power System Stability and Control	P.Kundur	Tata McGraw Hill Publishing company, New Delhi	2007

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C313.1	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
C313.2	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
C313.3	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
C313.4	3	2	1	-	1	-	-	-	-	-	-	-	2	-	-
C313.5	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
C313	3	2	1	-	1	-	-	-	-	-	-	-	2	-	-

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Solution of Economic Dispatch problem using Optimization Techniques (EA)	PO5 (3)	C313.4 / IV

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

Lecture Schedule

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

Course code &Name: **EE 6604 DESIGN OF ELECTRICAL MACHINES** Duration: **Jan -Apr 2017**

Semester: **VI** Section: **A,B,C.**Staff :**Dr.S.M.KANNAN** Regulation : **2013/AUC**

AIM: To expose the students to the concept of design of various types of Electrical Machines.

OBJECTIVES

- To study mmf calculation and thermal rating of various types of electrical machines.
- To design armature and field systems for D.C. machines.
- To design core, yoke, windings and cooling systems of transformers.
- To design stator and rotor of induction machines.
- To design stator and rotor of synchronous machines and study their thermal behavior.

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

CO	Course Outcomes	POs	PSOs
C314.1	Compare Electrical Engineering materials, determine heat dissipation due Conduction, convection and radiation**.**	1,2,3,5	**2,1**
C314.2	Calculate mmf for slots and teeths, apparent flux density, main dimensions and winding details of DC machines.	1,2,3,5	**2,1**
C314.3	Design core, yoke , winding and cooling system of transformers.	1,2,3,5	**2,1**
C314.4	Develop output equation of AC machines, design stator and rotor of induction machines.	1,2,3,5	**2,1**
C314.5	Design stator and rotor of synchronous machines analyze their thermal behavior, design field systems for turbo alternators.	1,2,3,5	**2,1**

S.No	Date	Period No	Topics to be Covered	Book No [Page No]
			UNIT I: INTRODUCTION **Target Periods : 9+3**	
1			Design of machines-major considerations-design factors-limitations in design.	1(1.1-1.4) 2(20-21)
2			Electrical engineering materials- Electrical Conducting materials-requirements — characteristics-copper&aluminium-iron and steel-alloys of copper-materials of high resistivity	1(2.1-2.10) 3(11-15)
3			Magnetic materials-soft & hard-hysteresis loop-ageing-dynamo grade steel-transformer grade steel-high resistance steel-c.r.o.s-	1(2.10-16) 3(15-36)
4			Insulating materials-electrical properties-classification of Insulating materials-application of insulating materials	1(2.16-2.24)
5			Total loadings-specific electric and magnetic loadings-choice of specific magnetic &electric loadings	1(6.1-6.14) 2(17-18)
6			Rating of machines-standard specifications	1(4.29),2(5-6)
7			Thermal considerations-modes of heat dissipation-conduction-radiation-convection-calculation of internal temperature-temperature gradient in cores-Tutorial-I-	1(4.1-4.11)

8			Heat flow in two dimensions	1(4.11-4.13)
9			Thermal resistivity of winding-space factor-Tutorial-II-	1(4.13-4.14)
10			Thermal state in Electrical machines-heating &cooling time constant-temperature rise-Tutorial-III-	1(4.18-4.29)
Total Periods:		**12**	***Assignment-I-DOS:*** ***Test-I :***	
UNIT II:DC MACHINES Target Periods : 10+3				
11			Magnetic circuit Calculations-Calculation of mmf-airgap-smooth and slotted armature-fringing-Carter's gap coefficient-	1(3.1-3.17) 2(49-64) 3(101-1123)
12			Gap contraction factor for slots and ducts-effect of saliency-field form factor-net length of Iron-mmf for teeth-	1(3.1-3.17)
13			Real and apparent flux densities	1(3.17-27)
14			Tutorial - I	
15			Constructional details-relation between rating and dimensions of rotating machines-Main dimensions-Output equation of D.C. machines-output co-efficient.	1(6.1-6.4) 2(110-112) 3(451-452)
16			Selection of Number of Poles-guiding factor for choice of number of poles-core length-pole proportions-pole face profile-Separation of D and L for D.C. Machines-	1(9.18-25) 2(114) 3(456-461)
17			Tutorial - II	
18			Factors affecting size of Electric Machines- Choice of specific Magnetic Loading-Choice of Specific electric loadings-	1(6.4-6.18) 2(16,113-114)
19			Armature design-Choice of armature winding-No.of armature conductors-armature coils-guiding factors for choice of No.of armature slots-slot dimensions-	1(9.40-58) 2(116-119) 3(461-466)
20			Tutorial - III	
21			Design of Commutator No.of segments-Commutator diameter-	1(9.88-95) 2(151-153) 3(471-473)
22			Design of brushes-dimensions of brushes-	1(9.88-95) 2(151-153) 3(471-473)
23			Variation of output and losses with linear dimensions-	1(6.4-6.18)
Total Periods:		**13**	***Assignment –II-DOS:*** ***CIT-I-***	
UNIT-III-TRANSFORMERSTarget Periods : 9+3=12				
24			Constructional details-emf equation-core/Shell type-single/ three phase-distribution/power transformer—	1(5.1-5.47) 2(215-216) 3(192-210)
25			Tappings and tap changing-bushings-transformer oil-conservator and breather-Bucholz relay	1(5.1-5.47)
26			Design-output equation-single phase-three phase-volt per turn-optimum designs-variation of output and losses of transformer with linear dimensions	1(5.49-54) 2(217-222) 3(210-215)
27			Design of core-rectangular –square core-stepped core-core area-window space factor-window dimensions-Overall	1(5.54-84) 2(222-227)

			dimensions-Amorphous cores-	3(215-231)
28			Overall dimensions-Single phase and three phase, core and shell type transformer-winding design	1(5.54-84)
29			Tutorial - I	
30			Design of shell type Transformer-Problems	1(5.73) 2(227-241) 3(253-260)
31			No load current-magnetizing Volt-ampere-	1(5.90-5.92) 1(5.98-102)
32			Tutorial - II	
33			Temperature rise of transformer-Design of tank with tubes-cooling of transformer	1(5.104-109)
34			Tutorial - III	
Total Periods:		**12**	***Assignment-III-[DOS: -Test-3:***	
UNIT-IV- INDUCTION MOTORSTarget Periods : 9+3=12				
35			Three phase induction motors-review-comparison of SR & SC Induction motor-Output equation-choice of average flux density and ampere conductors-efficiency and p.f.-Main dimensions-turns per phase-Number of stator slots-area of stator slots-lmt	1(10.1-19) 2(273-280) 3(291-313)
36			efficiency and p.f.-Main dimensions-turns per phase-Number of stator slots-area of stator slots-lmt	
37			Rotor design-length of air gap-relations for calculation of length of airgap	1(10.19-21) 2(281-283) 3(313-320)
38			Tutorial - I	
39			Design of squirrel cage rotor-number of slots-crawling-cogging-rule for selecting rotor slots-problems	1(10.21-28) 2(283)1
40			Design of rotor bars and slots-rotor bar current-area of rotor bars-shape and size of rotor slots-design of end rings-end ring current-area of end ring-problems.	1(10.28-34) 2(284-286) 3(322-330)
41			Design of wound rotors-number of rotor slots-number of rotor turns-area of rotor conductors-problems.	1(10.34-41) 2(287-289) 3(336-339)
42			Tutorial - II	
43			No load current-problems-short circuit current-problem-	1(10.41-61) 2(289)
44			Dispersion co-efficient and its effects-Short Circuit Ratio-D and L for best power factor-problems.	1(10.41-61) 2(289)
45			Tutorial-III-	
46			leakage reactance-various leakage fluxes-UMP	1(3.36-42) 3.72
47	Seminar-I		Leakage reactance calculation for induction &synchronous machines-/Seminar-I	1(3.42-45)
Total Periods:		**12**	***CIT-II :***	

			UNIT V: SYNCHRONOUS MACHINES Target Periods : 9+3=12	
48			Type of construction-revolving field-advantages-salient pole, cylindrical rotor-types of synchronous machines-	1(11.1-15) 2(290-293) 3(399-407)
49			prime movers for synchronous generators-run away speed-damper winding-Construction of Turbo alternators	
50			Design-output equation-choice of specific magnetic, electric loading-design of salient pole machines-main dimensions-	1(11.15-18)
51			Tutorial-I-	
52			Short circuit ratio-effect of SCR on machine performance-length of air gap-shape of pole face-Number of armature slots-coil span-turns per phase-conductor section	1(11.18-26) 2(293-295) 3(408-411)
53			shape of pole face-Number of armature slots-coil span-turns per phase-conductor section	
54			Slot dimensions-length of mean turn-elimination of harmonics-problem.	1(11.26-41)
55			Design of damper winding-problem-height of pole-determination of full load field mmf-design of field winding-	1(11.41-51) 3(426-435)
56			Estimation of Airgap length	1(11.35-37)
57			Design of turbo alternators-main dimensions-length of air gap-problem-rotor design.	1(11.56-60) 2(297-298) 3(436-442)
58			Tutorial - II,III	
59			Beyond subject content: Computer aided design-analysis method-synthesis method-program to design main dimensions of Alternator.	1(22.1-7) 3(553-584)
60			Seminar-II/Quiz	
Total Periods:		**12**	***CIT-III :***	

Books: Text/Reference:

S. No		Title of the Book	Author	Publisher	Year
1	**T1(1)**	"A Course in Electrical Machine Design"	Sawhney A.K.	Dhanpat Rai & Sons, New Delhi, 1984.	2010
2	**T2**	"Principles of Electrical Machine Designs with Computer Programmes"	Sen, S.K.	Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi	1987
3	**R1**	"Electrical Machine Design Data Book"	Shanmuga sundaram.A, Gangadharan. G, Palani.R	New Age Intenational Pvt. Ltd.	2007
4	**R2**	"Electrical Machine Design"	Balbir Singh,	Brite Publications,Pune	-
5	**R3(2)**	A Simplified text in Electrical Machine Design	A.NagoorKani	RBA,Chennai,	2010
6	**R4(3)**	Principles of Electrical Machine Design	A.K.Agarwal	Kataria&Sons,	2010

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

Lecture Schedule

Degree/ Program	:	**B.E/ Electrical and Electronics Engineering**	Course code & Name	:	**EE6002- POWER SYSTEM TRANSIENTS (C315E3)**
Duration	:	**Jan 2017 - Apr 2017**	Semester	:	**VI** ; Section : **A, B & C**
Regulation	:	**2013/AUC**	Staff handling	:	**A. Marimuthu, M. Mahalakshmi**

AIM

To review the over voltages (or) surges due to the phenomena of switching operations and lighting discharge. Also to study propagation, reflection and refraction of these surges on the equipment's their impact on the power system grid

OBJECTIVE

1. To understand the importance of the study of transients.
2. To study the generation of switching transients and their control using circuit – theoretical concept.
3. To study the mechanism of lighting strokes and the production of lighting surges.
4. To study the propagation, reflection and refraction of travelling waves.
5. To study the impact of voltage transients caused by faults, circuit breaker action, load rejection on integrated power system.

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

Course	Course Outcomes	POs	PSOs
C315E3.1	Explain the concept of transients and Compute the solution of transient current equation for RL and RLC system.	1,2	2
C315E3.2	Illustrate the importance of switching transients; Explain the concept of resistance switching, load switching and capacitance switching.	1,2,7	2,1
C315E3.3	Explain the concept of lightning mechanism, Describe the interaction between lightning and power system	1,2,6,7,8	1,1
C315E3.4	Apply the concept of reflection and refraction, Draw the Bewley Lattice diagram for different systems.	1,2,5	1,1
C315E3.5	Explain the concept of transients and Compute the solution of transient current equation for RL and RLC system.	1,2,5	1,1

S.No	Date	Period No	Topics to be Covered	Book No [Page No]
UNIT I -INTRODUCTION AND SURVEY				**Target periods : 09**
1			Review and importance of the study of transients	R2[1.1]
2			Causes for transients.	R2[1.1-1.8]
3			RL circuit transient with sine wave excitation	R2[2.1-2.4]
4			Double frequency transients	R2[2.4-2.8]
5			Basic transforms of the RLC circuit transients	R2[2.4-2.13]
6			Different types of power system transients	R2[1.8-1.11]
7			Effect of transients on power systems	R2[1.11]
8			Role of the study of transients in system planning	R2[1.11-1.12]
Total periods:		**9**	**Assignment-I-[DOS:]** **CT-I :**	
UNIT II -SWITCHING TRANSIENTS				**Target periods: 09**

9			Over voltages due to switching transients	R2[3.1-3.3]
10			Resistance switching and the equivalent circuit for interrupting the resistor current	R2[2.13-2.18]
11			Load switching and equivalent circuit, waveforms for transient voltage across the load and the switch	R2[2.18-2.22]
12			Normal and abnormal switching transients	R2[2.22]
13			Current suppression, current chopping effective equivalent circuit.	R2[2.22-2.25]
14			Capacitance switching ,effect of source regulation	R2[2.25-2.27]
15			Capacitance switching with a restrike, with multiple restrikes.	R2[2.27-2.29]
16			Illustration for multiple restriking transients ferro resonance	R2[2.29-2.33]
Total Periods:		**9**	**Assignment –II-[DOS:]** **CIT-I:**	
UNIT III -LIGHTNING TRANSIENTS				**Target periods :09**
17			Review of the theories in the formation of clouds and charge formation	R2[3.3-3.6]
18			Rate of charging of thunder clouds	R2[3.6-3.8]
19			Mechanism of lightning discharges	R2[3.8-3.12]
20			Characteristics of lightning strokes, factors contributing to good line design	R2[3.13-3.16]
21			Protection using ground wires	R2[3.16-3.20]
22			Tower footing resistance	R2[3.20-3.24]
23			Interaction between lightning and power system	R2[3.24-3.27]
24			Model for lightning stroke	R2[3.27-3.29]
Total Periods:		**9**	**Assignment-III-[DOS:]** **CT-II:**	
UNIT IV - TRAVELING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS Target periods:09				
25			Computation of transients, transient response of systems with series and shunt distributed lines	R2[4.1-4.10]
26			Transient response of systems with series and shunt lumped parameters and distributed lines	R2[4.10-4.15]
27			Traveling wave concept, step response,	R2[4.15-4.24]
28			Reflection and refraction of travelling waves	R2[4.24-4.37]
29			Bewely's lattice diagram	R2[4.37-4.42]
30			Standing waves and natural frequencies	R2[4.42-4.56]
31			**Seminar-I/Quiz-I:**	
Total Periods:		**10**	**CIT-II :**	
UNIT V - TRANSIENTS IN INTEGRATED POWER SYSTEM				**Target periods :09**
32			The short line and kilometric fault, distribution of voltages in a power system	R2[5.1-5.7]
33			Line dropping and load rejection	R2[5.7-5.8]

34			Voltage transients on closing and reclosing lines	R2[5.8-5.9]
35			Over voltage induced by faults	R2[5.9-5.10]
36			Switching surges on integrated system.	R2[5.10-5.16]
37			Qualitative application of EMTP for transient computation	R2[5.16-5.22]
38			*Content Beyond the Syllabus:* Transient analysis using PSCAD	
39			**Seminar-II/Quiz-II:**	
40				
Total Periods:		**12**	**CT-III :**	

TEXT BOOKS

	Title of the Book	**Author**	**Publisher**	**Year**
T1	Electrical Transients in Power Systems	Allan Greenwood,	Wiley Interscience, 2nd edition	1991.
T2	Extra High Voltage AC Transmission Engineering	Begamudre.R.D,	Wiley Eastern Limited,	1986.
R1	High Voltage Engineering	Naidu.M.S and Kamaraju.V,	Tata McGraw Hill, 2nd edition	
R2	Power System Transients	Sivasangari. R, Nagalakshmi.S, Rampriya.S	Anuradha Publications	2011

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

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C315E3.1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
C315E3.2	3	3	-	-	-	-	2	-	-	-	-	-	2	-	1
C315E3.3	3	1	-	-	-	1	2	1	-	-	-	-	1	-	1
C315E3.4	3	1	-	-	2	-	-	-	-	-	-	-	1	1	-
C315E3.5	3	1	-	-	2	-	-	-	-	-	-	-	1	1	-
C315E3	3	2	-	-	1	-	1	-	-	-	-	-	1	-	-

Content beyond the syllabus:

Content Beyond Syllabus Added(CBS)	**POs strengthened / vacant filled**	**CO / Unit**
Transient analysis using PSCAD	PO5(3) strengthened	C315E3.5/V

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

EC6651 - COMMUNICATION ENGINEERING[C310]

Important Questions/Assignments/Self study /Seminar topics.

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

CO	Course Outcomes	POs	PSOs
C310.1	Explain the operation of Amplitude Modulation , draw the frequency spectrum and vector representation of AM	1,2,3,4,5,7,11	1,2,3
C310.2	Compare the different methods of QPSK, BFSK and GMSK	1,2,3,4,5,6	1,3
C310.3	Analyze how information is transmitted to receiver using the Huffman coding	1,2,3,6,7	1,3
C310.4	Discuss about the various types of multiple access techniques	1,3,4,5,	1,2
C310.5	Distinguish between INTELSAT and INSAT	1,2,3,5,11	1,2

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C310.1	2	3	1	2	3	-	1	-	-	-	2	-	2	1	1
C310.2	3	2	1	3	1	3	-	-	-	-	-	-	2	-	1
C310.3	3	3	1	-	-	2	3	-	-	-	-	-	2	-	1
C310.4	3	-	1	1	3	-	-	-	-	-	-	-	1	1	-
C310.5	3	1	1	-	3	-	-	-	-	-	**1**	-	1	1	-
C310	3	2	1	1	2	1	1	-	-	-	1	-	2	1	1

S.No.	4. Important Questions.	COs	POs
Q.1.1.	Name the methods used for the suppression of unwanted side band in AM transmission?	C310.1	3
Q.1.2.	Compare the features of FM with AM and also writes its merits and demerits.	C310.1	1,3
Q.1.3.	Explain the operation of SSB transmitter and Receiver.	C310.1	1,2,3
Q.1.4.	How will you generate the FM signal using direct and indirect method?	C310.1	1,3
Q.1.5.	How will you generate the FM signal using Amstrong method?	C310.1	1,3
Q.2.1.	Discuss the process of commanding and its characteristics.	C310.2	1
Q.2.2.	How does the Flat top sampling differs from the natural sampling? also discuss the filtered output.	C310.2	1,2
Q.2.3.	Explain the QPSK with block diagram and spectrum also discuss the phasor diagram of sinusoids	C310.2	1,3
Q.2.4.	Explain the operation of QPSK receiver and derive the expression for bit error.	C310.2	1,2,3
Q.2.5.	Explain the working of Delta modulation scheme.	C310.2	1,3
Q.3.1.	Derive the expression for Quantization noise in PCM & DM systems.	C310.3	1,2,3
Q.3.2.	Discuss the Bandwidth Trade off of communication systems.	C310.3	1,2
Q.3.3.	Apply the following coding techniques to obtain the output waveform of	C310.3	1,2,3

	bit stream 10011100 by NRZ, RZ, AMI, HDBP, ABQ, MBnB.		
Q.3.4.	Design a convolution coder of constraint length 6 and rate efficiency ½.	C310.3	1,2,3
Q.3.5.	State and prove Shanon noiseless coding theorem.	C310.3	1,2,3,4
Q.3.6.	Discuss the viter bi algorithm by showing the possible paths through the trellis of a coder. Assume the state diagram of any coder.	C310.3	1,2
Q.4.1.	500 users employ FDMA to transmit 1000-bit packets of data. The channel bandwidth is 100MHZ and QPSK is used at each of the 500 carrier frequencies employed. What is the maximum bandwidth allocated to each user. What is the bit rate employed by each user? How long does it take to transmit a packet?	C310.4	1,2
Q.4.2.	Explain TDMA and FDMA systems.	C310.4	1,3
Q.4.3.	Compare wire and wireless communication systems.	C310.4	1
Q.4.4.	Draw a typical TDMA system and explain the operation with its time pattern.	C310.4	1,3
Q.5.1.	Discuss broadly on the multiple access techniques used in satellite communications.	C310.5	1,3

S.No.	**4. Important Questions.**	COs	POs
Q.5.2.	Describe the following (i) Optical Detectors and their types. (ii) Satellite types (iii) Digital filters used in Satellite systems (iv) Optical Link	C310.5	1
Q.5.3.	An band transponder of a geo synchronous satellite at height of 35,760 km from the surface of earth and operating at 7.6 GHz has its antenna oriented towards earth station antenna. The input power and directive gain of the transponder antenna are 18 watts and 36dB respectively. Assuming no losses occurs in the down link determine (i) Power received by earth station antenna of aperture diameter and efficiency given as 3m and 62% respectively. (ii) EIRP of the transponder antenna.	C310.5	1,2,3
Q.5.4.	Write notes on SCADA and Intelsat.	C310.5	1
Q.5.5.	What are the modes of operation suggested in optical fibers and how are the classified according to this?	C310.5	1
	5.Assignments		
A.1.1.	Determine the modulation index (μ), by Considering sinusoidal modulation in an AM systems. Assuming no over modulation , when the maximum and minimum values of the envelope, respectively, are 3V and 1V [GATE 2014]	C310.1	1,2,3
A.1.2	In a double side-band (DSB) full carrier AM transmission system, if the modulation index is doubled, then the ratio of total sideband power to the carrier power increases by a factor of _____ [GATE 2014]	C310.1	1,2,3
A.1.3	A 1 MHz sinusoidal carrier is amplitude modulated by a symmetrical square wave of period 100 μsec. Which of frequency will not be present in the	C310.1	1,2,3

<table>
<tr><td></td><td>modulated signal? [GATE 2002]</td><td></td><td></td></tr>
<tr><td>A.1.4</td><td>A 4 GHz carrier is DSB - SC modulated by a low - pass message signal with maximum frequency of 2 MHz. The resultant signal is to be ideally sampled. The minimum frequency of the sampling impulse train should be _____</td><td>C310.1</td><td>1,2,3</td></tr>
<tr><td>A.2.1.</td><td>Apply the Shannon – Fanno coding procedure for the following message ensemble and also find the efficiency of the coding. (Ans. Efficiency=96.03%)
<table>
<tr><td>Symbols</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr>
<tr><td>Probabilities</td><td>0.4</td><td>0.2</td><td>0.12</td><td>0.08</td><td>0.08</td><td>0.08</td></tr>
</table></td><td>C310.3</td><td>1,2,3</td></tr>
<tr><td>A.2.2.</td><td>Apply the Haffman coding procedure for the following message ensemble and also find the efficiency of the coding. (Ans. Efficiency=97%)
<table>
<tr><td>Symbols</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr>
<tr><td>Probabilities</td><td>0.2</td><td>0.2</td><td>0.2</td><td>0.2</td><td>0.2</td></tr>
</table></td><td>C310.3</td><td>1,2,3</td></tr>
<tr><td>A.2.3</td><td>Draw the various types of Line coding techniques for the data 1001110011.</td><td>C310.3</td><td>1,2</td></tr>
<tr><td>A.2.4.</td><td>How would you compare the various types of Line coding techniques based on their characteristics?</td><td>C310.3</td><td>1,2</td></tr>
</table>

S.No.	**5.Assignments**	COs	POs
A.3.1.	A digital satellite communication link is to be designed to transmit data at a 1MBps, with overall Eb/No of 14dB. If Eb/No of satellite downlink is 17dB, determine the EIRP required, assuming following parameters for uplink design. (i) uplink path loss = 214dB; (ii) total uplink path loss excluding path loss = 2.5dB; (iii) satellite receiver gain = 45dB; (iv) satellite receiver noise density = -169 dBM/Hz. Assuming uplink frequency of 30GHz, HPA power of 0.5W, determine the earth station antenna size, considering antenna efficiency of 60% also assume negligible losses between HPA to antenna input. **(Ans. EIRP = 49.5dB, the diameter of the earth station antenna =1.733m)**	C310.5	1,2,3
A.3.2.	Determine the optical power received in dBm and Watts for a 20km optical fiber link with the following parameter: (i) LED output power of 30mW; (ii) four 5km sections of optical cable each a loss of 0.5dB/km; (iii) Three cable to cable connectors with a loss of 2dB each; (iv) no cable splices; (v) light source to fiber interface loss of 1.9 dB; (vi) fiber to light defector loss of 2.1dB; (vii) no loss due to cable bends. **(Ans. Transmitted power Pt = 14.77dBm; Total loss = 20dB; Received optical power = 0.3mW)**	C310.5	1,2
	6. Seminar topics		
S.1.1.	**Global System for Mobile communication (GSM)**	C310.4	1,2,3, 4,5, 6,7
S.1.2.	**Near field communication (NFC)**	C310.4	1,2,3, 4,5, 6,7
S.1.3.	**Introduction to Spread Spectrum Modulation**	C310.4	1,2,3, 4,5, 6,7

S.1.4.	**Code Acquisition and Tracking**	C310.4	1,2,3, 4,5, 6,7
S.1.5	**Spread Spectrum as Multiple Access Technique**	C310.4	1,2,3, 4,5, 6,7
S.1.6	**Application of CDMA**	C310.4	1,2,3, 4,5, 6,7
S.2.1.	**Wireless Fidelity (Wi-Fi)**	C310.5	1,2,3, 4,5, 6,7
S.2.2.	**MATLAB applications to Communication systems**	C310.5	1,2,3, 4,5,6, 7
S.2.3.	**Principle of Photo Detection**	C310.5	1,2,3, 4,5,6, 7
S.2.4.	**Photo Diodes**	C310.5	1,2,3, 4,5,6, 7
S.2.5.	**Receiver Noise and Bit Error Ratio**	C310.5	1,2,3, 4,5,6, 7
S.2.6.	**Light Emitting Diodes**	C310.5	1,2,3, 4,5,6, 7
S.2.7.	**Measurements on Fiber Optic Systems**	C310.5	1,2,3, 4,5,6, 7
S.2.8.	**Non linear Fiber Optics**	C310.5	1,2,3, 4,5,6, 7
S.2.9.	**Different Types of Fibers**	C310.5	1,2,3, 4,5,6, 7
S.2.10.	**Signal Distortion on Optical Fibers**	C310.5	1,2,3, 4,5,6, 7
S.2.11	**Modal Propagation inside an Optical Fiber**	C310.5	1,2,3, 4,5,6, 7

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE 6601 - SOLID STATE DRIVES [C311]

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

1.Course outcomes

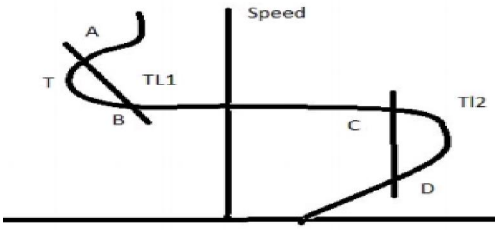
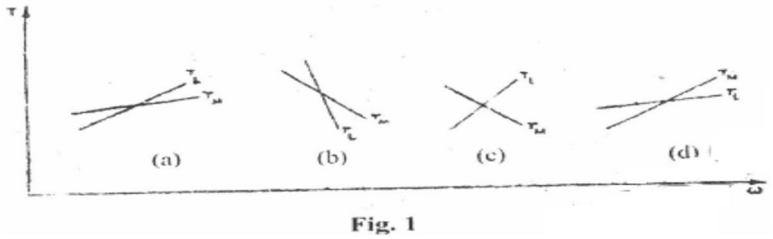
COs	Cours	POs	PS
C311.1	Classify the various types of drives and load torque characteristics and Apply the multi quadrant dynamics in hoist load system.	1	1
C311.2	Analyze the operation of steady state analysis of single phase and three phase fully controlled converter and Chopper fed separately excited dc motor drives and discuss the various control strategies of converter.	1,2,3,4	1
C311.3	Explain the operation and characteristics of various methods of solid state speed control of inductionmotor.	1,2	1
C311.4	Describe the operation of various modes of V/f control of synchronous motor drives and different types of permanent magnet synchronous motor drives.	1	1
C311.5	Design a current and speed controller and develop the transfer function for DC motor, load and converter, closed loop control with current and speed	1,2,3,4	1

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C311.1	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
C311.2	3	2	1	3	-	-	-	-	-	-	-	-	3	-	-
C311.3	3	1	-	-	-	-	-	-	-	-	-	-	1	-	-
C311.4	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
C311.5	3	2	1	2	-	-	-	-	-	-	-	-	2	-	-
C311	**3**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**

S.No.	**4. Important Questions.**	COs	P
Q.1.1.	State the essential parts of electric drive and classify it.Explain its function	C311.1	1
Q.1.2.	Derive the mathematical condition for steady state stability of equilibrium point.	C311.1	1,2
Q.1.3.	Explain in detail the multi quadrant dynamics in the speed-torque plane.	C311.1	1,2
Q.1.4.	Explain the different modes of operation of an electrical drive.	C311.1	1
Q.1.5.	A motor having a suitable control circuit develops a torque given by the relation Tm= pω + q where p and q are positive constants. The motor is used to drive a load whose torque is expressed as TL = $r\omega^2$ + s where r and s are positive constants. The total inertia of the rotating masses is J. i) Determine the relation among p, q, r and s in order that the motor can start together with the load and has an equilibrium operating speed. ii) Calculate the equilibrium operating speed.	C311.1	1,2,3

Q.1.6.	Derive the expressions to find the equivalent load torque and equivalent inertia of loads in Translational and Rotational motion.	C311.1	1
Q.1.7.	Draw and describe the load torque characteristics of various drives.	C311.1	1
Q.2.1.	Describe in detail about the braking of DC and AC drives.	C311.2	1
Q2.2.	Explain in detail the operation and steady state analysis of single phase fully controlled converter fed dc drive with neat waveforms in continuous and discontinuous modes.	C311.2	1,2
Q.2.3.	Explain the discontinuous modes of operation fully controlled converter fed separately excited dc motor in detail with necessary waveforms and equations.	C311.2	1,2
Q2.4.	A 250V separately excited dc motor has an armature resistance of 2.5Ω when driving a load at 600 r.p.m. with constant torque, the armature takes 20 A. This motor is controlled by a chopper circuit with a frequency of 400 Hz and an input voltage of 250 V. (i) What should be the value of the duty ratio if one desires to reduce the speed from 600 to 540 r.p.m. with the load torque maintained constant. (ii) Find out the value of duty ratio for which the per unit ripple current will be maximum	C311.2	1,2
Q.2.5.	A 200 V, 875 rpm, 150 A separately excited dc motor has an armature resistance of 0.06 Ω. It is fed from a single phase fully controlled rectifier with an ac source of 220 V, 50 Hz. Assuming continuous conduction, calculate the firing angle for rated motor torque and 750 rpm.	C311.2	1,2
Q.2.6.	Explain with the circuit diagrams and waveform the operation of a three phase fully controlled converter fed separately excited dc motor	C311.2	1,2
Q.3.1.	Explain the stator voltage control of induction motor.	C311.3	1
Q.3.2.	Explain in detail with suitable diagrams and waveforms the v/f control applied to induction motor drives	C311.3	1,2
Q.3.3.	Explain with a neat diagram the field weakening mode control of induction motor drives	C311.3	1
Q.3.4.	Explain the closed loop control of CSI fed induction motor drives	C311.3	1,2
Q.3.5.	Describe with a neat diagram the working of a current fed inverter for an induction motor	C311.3	1,2
Q.3.6.	Draw and explain the speed torque characteristics of induction motor.	C311.3	1
Q.4.1.	Explain the open loop v/f control of synchronous motor in detail	C311.4	1,2
Q.4.2.	Write short notes on permanent magnet synchronous motor	C311.4	1,2,3
Q.4.3.	Explain the self controlled mode of operation of synchronous motor	C311.4	1,2
Q.4.4.	Explain power factor control of synchronous motor with relevant vector diagram	C311.4	1
Q.4.5.	Describe the constant margin angle control and power factor control of synchronous motor drives.	C311.4	1
Q.4.6.	A 3 phase, 400V, 50Hz,6 pole star connected round rotor synchronous motor has Zs=0+j2Ω Load torque proportional to speed squared is 340Nm at rated synchronous speed. The speed of the motor is lowered by keeping v/f constant and maintaining unity pf by field control of the motor. For the motor operation at 600rpm, calculate a) supply voltage) armature current c) excitation angle d) load angle e) pull out torque.	C311.4	1,2

	Neglect rotational losses.		
Q.5.1.	Derive the closed loop transfer function of converter fed separately excited DC motor.	C311.5	1,2
Q.5.2.	Derive the transfer function of armature controlled DC motor	C311.5	1,2,3
Q.5.3.	Explain the closed loop operation of armature voltage control method with field weakening mode control in detail	C311.5	1,2,3
Q.5.4.	Explain the design procedure of current controller in detail	C311.5	1,2
Q.5.5.	Describe the design of speed controller with necessary diagrams	C311.5	1,2
Q.5.6.	Describe the various closed loop configurations applied in electrical drives	C311.5	1,2
Q.5.7.	Design the following controllers i)Current controller ii)Speed controller	C311.	1,2,3
Q.5.8.	Explain in detail about converter selection and characteristics	C311.5	1
Q.5.9.	A 50 KW, 240V,1700 rpm separately excited DC motor is controlled by a converter. The field current is maintained at If=1.4A and the machine back EMF constant is Kv=.91 VA rad/sec. The armature resistance is Rm=0.1Ω and the viscous friction constant is B=0.3Nm/rad/sec. The amplification of the speed sensor is K1=95 mV/rad/sec and the gain of the power controller is K2=100 i)Determine the reference voltage Vr to drive the motor at the rated speed ii)If the reference voltage is kept unchanged, determine the speed at which the motor develops rated torque.	C311.5	1,2,3
	5. Assignments		
A.1.1.	The fig shows plots of speed Vs motor and load torques. Comment on the stability of the operating points A, B, C, D. 	C311.1	1
A.1.2.	Based on the mathematical condition. Examine the stability of equilibrium points as shown in fig below 1  Fig. 1	C311.1	1
A.1.3.	The motor is coupled to a load having the following characteristics : Motor and load: $Tm = 15 - 0.5\omega_m$ and $T_l = 0.5\omega_m 2$ .To find out the stable operating point for this condition.	C311.1	1
A.1.4.	Explain the methods of plugging and rheostatic braking as applied to dc motors and induction motors	C311.1	1

A.1.5.	Explain how an induction motor is brought to stop by (1) plugging and (2) dynamic braking	C311.1	1,2
A.2.1.	A 220V, 1500 rpm, 10A separately excited dc motor is fed from a single-phase fully-controlled rectifier with an ac source voltage of 230V, 50Hz. R_a=2Ω. Conduction can be assumed to be continuous. Calculate firing angles for, (a.)Half the rated motor torque and 500rom. (b) Rated motor torque and (-1000) rpm.	C311.2	1,2,3
A.2.2.	A 220V, 1200rpm, 15A separately excited motor has armature resistance and inductance of 1.8Ω 32mH respectively. This motor is controlled by a single-phase fully- controlled rectifier with an ac source voltage 0f 230V, 50Hz. Identify the modes and calculate developed torques For: (a) $\alpha=60^o$ and speed = 450 rpm (b) $\alpha=60^o$ and speed = 1500 rpm	C311.2	1,2,3,4
A.2.3.	A 220V, 750 rpm, 200A separately excited motor has an armature resistance of 0.05 Ω. armature is fed from a three-phase non-circulating current dual converter consisting of fully- controlled rectifiers A and B. Rectifier A provides motoring operation in the forward direction and rectifier B in reverse direction. Line voltage of ac source is 400V. Calculate firing angles of rectifiers for the following assuming continuous conduction. (a) Motoring operation at rated torque and 600 rpm. (b)Regenerative braking operation at rated torque and 600 rpm	C311.2	1,2,3,4
A.2.4.	A 220V, 24A, 100 rpm, separately excited dc motor has an armature resistance of 2Ω. Motor is controlled by a chopper with frequently of 500Hz and source voltage of 230V. Calculate the Duty ratio for 1.2 times rated torque and 500 rpm	C311.2	1,2,3
A.2.5.	A 230V separately excited dc motor takes 50A at a speed of 800 rpm. It has armature resistance of 0.4Ω. This motor is controlled by a chopper with an input voltage of 230V and frequency of 500Hz. Assuming continuous conduction throughout, calculate the plot speed-torque characteristics for: (a)Motoring operation at duty ratios of 0.3 and 0.6. (b)Regenerative braking operation at duty ratios of 0.7 and 0.4	C311.2	1,2,3,4
A.3.1.	Describe the principle and operation of constant air gap flux control in detail	C311.3	1,2
A.3.2.	Draw and explain the various modes(variation of torque , power Limitations and high speed modes) of operation of induction motor	C311.3	1,2
A.3.3.	Describe in detail closed loop speed control of VSI drive and CSI drive	C311.3	1
A.3.4.	Compare VSI and CSI drives	C311.3	1
A.3.5.	A 3 phase star connected,60HZ,4 pole induction motor has the following parameter for the per phase equivalent circuits $R_a=R'_r=0.024\Omega$ and $X_a=X'_r=0.12\Omega$.The motor is controlled by the variable frequency with a constant (v/f) ratio. For an operating frequency $12H_Z$, Calculate the breakdown torque as a ratio of this value at the frequency for both motoring &braking	C311.3	1
A.4.1.	Describe using a diagram the construction of a trapezoidal surface mounted permanent magnet synchronous motor, draw and explain the	C311.4	1

	stator voltage & current waveform		
	6.Seminar		
1.	Current status of AC and DC drives	C311.1	1
2.	DC motors and their performance	C311.1	1
3.	Eddy current drives	C311.1	1
4.	Traction drives	C311.1	1
5.	Energy conservation in electricaldrives	C311.1	1
6.	Electrical drive systems andcomponents	C311.1	1
7.	Semiconductor converter controlled drives	C311.2	1
8.	Linear induction motors and its control	C311.3	1
9.	Induction motor analysis and performance	C311.3	1
10.	Control of fractional hpmotor	C311.3	1
11.	Polechanging	C311.3	1
12.	Poly-phase AC motors for traction drives	C311.3	1
13.	Brushless DC motordrive	C311.4	1
14.	Stepper motordrives	C311.4	1
15.	Switched reluctance motordrives	C311.4	1
16.	Cyclo-convertercontrol	C311.4	1
17.	Solar powereddrives	C311.4	1,2
18.	Closed loop speed control of multi motor drive	C311.5	1,2
19.	PLL control of electric drives	C311.5	1,2
20.	Closed loop position control	C311.5	1,2
21.	Battery poweredvehicles	General	1,2
22.	Diesel electrictraction	General	1,2
	7. Self study topics.		
1.	An Improved Circulating Current Injection Method for Modular Multilevel Converters in Variable-Speed Drives **[IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, VOL. 63, NO. 11, NOVEMBER 2016]**	General	1,2

NPTEL References

1. **http://nptel.ac.in/courses/117106091/**
2. **http://nptel.ac.in/courses/108108077/**
3. **http://nptel.ac.in/syllabus/108108077/**
4. **http://textofvideo.nptel.iitm.ac.in/video.php?courseId=108108077**
5. **http://textofvideo.nptel.iitm.ac.in/108108077/lec1.pdf**

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6602-EMBEDDED SYSTEMS [C312]

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

1.Course outcomes

Course	Course outcomes	Pos
C312.1	Analyze the basic build process of embedded systems, structural units in embedded processor and selection of processor and memory devices depending upon the applications.	1,2,4,5
C312.2	Classify the types of I/O device ports and buses and different interfaces for data transfer.	1,2,3,5
C312.3	Modeling of the Embedded Product Development Life Cycle (EDLC) by using different techniques like state machine model, sequential program model and concurrent model	1,2,3,4, 5,6
C312.4	Analyze about the basic concept of Real Time Operating Systems and plan to scheduling of different task and compare the features of different types of Real Time Operating Systems	1,2,3,5, 6
C312.5	Apply the knowledge of programming concepts of Embedded Systems for various applications like Washing Machine automotive and Smart Card System applications	1,2,3,5, 6,7

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C312.1	2	1	-	1	1	-	-	-	-	-	-	-	1	-	-
C312.2	2	1	-	2	1	-	-	-	-	-	-	-	1	-	-
C312.3	2	1	2	2	1	1	-	-	-	-	-	-	2	-	-
C312.4	2	1	1	-	1	1	-	-	-	--	-	-	1	-	-
C312.5	2	1	2	-	1	1	1	-	-	-	-	-	1	-	-
C312	2	1	1	1	1	-	-	-	-	-	-	-	1	-	-

S.No.	**4. Important Questions.**	Cos	Pos
Q.1.1.	List the Hardware units that must be present in the embedded systems.	C312.1	1,3
Q.1.2.	Describe briefly on the memory management and mapping techniques that enhance the efficiency of the processor.	C312.1	1,2,3
Q.1.3.	Define timer. Analyze a counter related with : (a) timer function (b) prefixed time initiated events generation (c) Time capture function.	C312.1	2
Q.1.4.	Analyze the performance of DMA controller and explain the mode of data transfer.	C312.1	1,2
Q.1.5.	Why should a program be divided into functions and each placed in different memory blocks or segments?	C312.1	3
Q.1.6.	Give the building blocks for an embedded system and explain how memory management schemes can improve high speed process.	C312.1	2
Q.1.7.	Explain with neat diagrams on how DMA based processor can remove delay for high speed processor.	C312.1	2
Q.1.8.	Brief on the need of a watchdog timer with reset functionality after the watched time.	C312.1	1,3
Q.2.1.	Justify the need for various bus communication standards. Describe one type	C312.2	1,3

	of serial communication bus with its communication protocol.		
Q2.2.	Explain the classification of I/O devices and use of each control bit of I2C bus protocol	C312.2	1,2
Q.2.3.	Compare advantages and disadvantages of data transfer using serial and parallel ports or devices.	C312.2	1,2
Q2.4.	Briefly explain about the standard serial port used in embedded networking. Draw the diagram and explain about controller area network protocol.	C312.2	1,3,5
Q.2.5.	State a cause for interrupt latency and discuss a solution to avoid it. Mention any one design technique that multiple interrupt handling in embedded processor.	C312.2	1,3,4
Q.2.6	Describe a type of bus supporting of Master-Slave configuration in Bus topology.	C312.2	1,2
Q.3.1.	Discuss about the modeling of EDLC. Why EDLC is essential in embedded production development?	C312.3	1,2
Q.3.2.	Explain the different life cycle model adopted in embedded product development.	C312.3	1,2,5
Q.3.3.	Explain the following : (i)Data flow graph (ii)Control Data flow graph (ii)State machine model (iv)Sequential program model	C312.3	1,2
Q.3.4.	How the performance tool helps in analyzing the performance of the system.	C312.3	1,2
Q.3.5.	List out the fundamental issues in hardware software co-design. Discuss about the objectives of EDLC.	C312.3	1,3
Q.4.1.	Write briefly about: (i)Semaphores for inter-task communication (ii)Mailbox & Message for inter process communications (iii) Pipe &Queue for multitasking	C312.4	1,5
Q.4.2	Explain briefly on multitasking RTOS which has priority level switching and co-operative scheduling mechanism.	C312.4	1,2
Q.4.3	Explain in detail about task, process and threads in RTOS based embedded system design.	C312.4	1,2
Q.4.4	Explain briefly on how special embedded processor has improved efficiency with use of multitasking RTOS with scheduling mechanism.	C312.4	1,2,3
Q.4.5	How do you initiate preemptive scheduling and assign priorities to the tasks for scheduling? Write the need for preemptive scheduling with examples.	C312.4	3
Q.5.1	Briefly explain the various embedded system based application developments in real time.	C312.5	1,6,7
Q.5.2	Draw a neat diagram and explain the application of smart card in embedded system.	C312.5	1,2,3
Q.5.3	With neat sketch explain the mechanism involved in washing machine control.	C312.5	1,2,3
Q.5.4	How the embedded systems are used in automotive application? Give an example.	C312.5	1,2,3
Q.5.5	Discuss the list of task function and IPCS in automotive applications.	C312.5	1,2
	5. Tutorials/ Assignments / Seminar / Self study topics		
A.1.1.	1.Explain how suitable processor and memory devices are selected for an embedded system design. 2. How an embedded microcomputer and supporting hardware elements are	C312.1	1,2,3, 4

	interconnected? 3. How to select microcontrollers and memories for your own design applications Write with example. 4. Identify and briefly describe the major functional blocks that comprise the computing core.		
A.2.1.	1.Describe the requirements and approaches used for serial, parallel communication in embedded networking . 2.Write the complete interface detail for microcontroller and CAN with a typical example. 3.Explain interfacing sensors by using SPI with any one example. 4.Explain how serial data transfer is performed in I^2C bus . How to transfer a byte usingI^2C?	C312.2	1,2,3, 5
A.3.1.	1.Discuss about the issues in hardware and software co-design with any one example. 2.Explain about the advantages of Object Oriented Model for embedded development environment. 3.Analyze how will you describe a system as a state machine model?	C312.3	1,2,3
S.3.1	1. RTOS Programming 2. Self host systems 3. System level function 4. IPC for semaphore release 5. Programming with RT Linux 6. Real time FIFO functions 7. Real time thread functions 8. Specification modeling using UML 9. Advanced Graphics Port(AGP) 10. Extended ISA	C312.3	1,2,3, 5
S5.1	1. Micro channel architecture 2. Small computer interface 3. Watch dog timers for task execution monitoring 4. Mutual exclusion and task synchronization 5. Automotive communication buses 6. Software modem 7. Component design and testing 8. Digital still camera 9. Video accelerator 10. High speed electronic control units	C312.5	1,2,3
S.5.2	1. Remote procedure call 2. Microsoft IDL 3. Media oriented system transport Bus 4. Microsoft project tool 5. Software engineering tool	C312.5	1,2,3

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE 6603 - POWER SYSTEM OPERATION AND CONTROL [C313]

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

1. Course outcomes*

Course	Course outcomes	POs
C313.1	Analyze the various load characteristics with load curve and load duration curve by applying the Engineering knowledge	1,2
C313.2	Develop the static and dynamic modeling of simple single area and two area power systems for frequency control	1,2,3
C313.3	Develop the static and dynamic modeling of simple single area and two area power systems for voltage control	1,2,3
C313.4	Solve economic dispatch problems and unit commitments problems in power systems	1,2,3,5
C313.5	Explain the need of computer controls to energy management using SCADA	1,2,5

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C313.1	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
C313.2	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
C313.3	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
C313.4	3	2	1	-	1	-	-	-	-	-	-	-	2	-	-
C313.5	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
C313	3	2	1	-	1	-	-	-	-	-	-	-	2	-	-

S.No.	**4. Important Questions.**	COs	POs
Q.1.1.	(i) Analyze the need for voltage and frequency regulation in power system (ii) A generating station has maximum demand of 400 MW. The annual load factor is65% and capacity factor is 50% analyze the reserve capacity of the plant.	C313.1	1,2
Q.1.2.	(i) Discuss about the recent trends in real time control of power systems. (ii) Write short notes on load forecasting.	C313.1	1,2
Q.1.3.	Explain the term Installed reserve, Hot reserve and cold reserve.	C313.1	1,2
Q.1.4.	Explain the need for voltage and frequency regulation in power system	C313.1	1,2
Q.1.5.	Define(i)Load Curve (ii)Daily Load Curve (iii)Monthly Load curve (iv)Annual Load Curve (v)Load Duration Curve, Write the formula of (i)Demand Factor (ii)Load Factor (iii)Diversity Factor (iv)Plant use Factor	C313.1	1,2
Q.1.6.	i) Classify load curve and load duration curve elaborately? ii) Describe the importance of load forecasting and explain the method of least square fit forecasting the base load.	C313.1	1,2
Q.1.7	(i) Quote the objectives of modern trend in real time control of power system? Explain the significant features of computer control in power system. (ii) Describe on load forecasting.	C313.1	1,2
Q.1.8	Summarize objectives of modern trend in real time control of power system?	C313.1	1,2

	Explain the significant features of computer control in power system.		
Q.1.9	Explain the important objectives of power system and various control strategies during its operation.	C313.1	1,2
Q.2.1.	Derive the expression of Speed-Load characteristics sharing of load between two synchronous machine.	C313.2	1,2
Q2.2.	Derive and explain the concept of two area load frequency control system modeling with necessary diagram.	C313.2	1,2
Q.2.3.	Draw and explain the concept of fundamentals of speed governing mechanism and derive the following(i)Model of Speed Governor (ii)Turbine Model (iii)Generator Load Model (iv)Model of Load frequency control of a single area system	C313.2	1,2
Q2.4.	Draw the necessary block diagram and derive the expression of dynamic analysis of uncontrolled case.	C313.2	1,2,3
Q.2.5.	Explain integral control of single area system for uncontrolled case (i)Static analysis (ii)dynamic analysis	C313.2	1,2
Q.2.6.	Develop the state variable model of a two area system and state the advantages of the model.	C313.2	1,2
Q.2.7	Examine and derive the transfer function model and draw the block diagram for single control area provided with governor system. From the transfer function derive the expression for steady state frequency error for a step load change	C313.2	1,2
Q.2.8	Deduce the expression for steady state frequency change for single area system with the following cases. (i)Changes in load with fixed speed (ii)changes in speed with fixed demand	C313.2	1,2
Q.2.9	Estimate the primary ALFC loop parameters for a control area having the following data. Total rated area capacity Pr=2000MW. Normal operating load Pd=1000MW. Inertia constant H=5.0 Regulation R=2.40 Hz/pu MW (all area generators) We shall assume that the load frequency dependency as linear meaning that the old loadwould increase 1% for 1% frequency increase.	C313.2	1,2,3
Q.2.10	Explain the tie-line bias control of two area system.	C313.2	1,2
Q.3.1.	Explain the functions of Excitation system and also explain any two types of excitation system with neat block diagram.	C313.3	1,2
Q.3.2.	Explain typical excitation system or Typical brushless Automatic Voltage Regulator.	C313.3	1,2
Q.3.3.	Explain the Voltage control with suitable example and mention its advantages	C313.3	1,2
Q.3.4.	Derive and justify the static and dynamic analysis of Automatic Voltage Regulator loop.	C313.3	1,2.,3
Q.3.5.	Explain the concept of tap chancing transformer with its type.	C313.3	1
Q.3.6.	i)Discuss in brief about generation and absorption of reactive power. (ii) Derive the relations between voltage, power and reactive power at a node for applications in power system control.	C313.3	1,2,3
Q.3.7	Explain Static VAR compensator? Explain its operation. Also state the merits of static VAR compensator over the other methods of voltage control.		
Q.3.8	Analyze various methods of reactive power control and explain any two in detail.		
Q.3.9	Examine the circuit for a typical excitation system and derive the transfer functionmodel and draw the block diagram.		

Q.3.10	Discuss the effect of compensation on the maximum power transfer in a transmission line		
Q.4.1.	State Unit Commitment problem – Define spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints.	C313.4	1,2
Q.4.2.	Derive coordination equation for with loss and without loss in Economic dispatch method.	C313.4	1,2,3.
Q.4.3.	Explain the concept of dynamic programming method with flow chart and also explain its type.	C313.4	1,2
Q.4.4.	Draw the flow chart for λ-iteration method.	C313.4	1,2,3.
Q.4.5.	(i) Explain the unit commitment problem using priority ordering load dispatch. (ii) Explain the term 'Incremental Operating Cost' of power system related with economic dispatch	C313.4	1,2
Q.4.6.	The input output curve characteristics of three units are $F1=940+5.46PG1+0.0016PG1^2$ $F2=820+5.35PG2+0.0019PG2^2$ $F3=99+5.65PG3+0.0032PG3^2$. Total load 600MW. Use the participating factor method to calculate dispatch for a load is reduced to 550MW	C313.4	1,2,3.
Q.4.7	Give out the priority list of unit commitment using full load average production cost for the given data: Heat rate of unit1 H1= $510+7.2PG1+0.00142\ PG1^2$MW\hr Heat rate of unit2 H2= $310+7.85PG2+0.00194PG2^2$MW\hr Heat rate of unit3 H3= $78+7.97PG3+0.00482PG3^2$MW\hr. PD=500MW Unit Min(MW) Max(MW) Fuel Cost (K) 1 150 600 1.1 2 100 400 1.0 3 50 200 1.2	C313.4	1,2,3.
Q.4.8.	Formulate the economic dispatch problem and derive the exact coordination equation	C313.4	1,2
Q.4.9	The fuel-cost functions for three thermal plants are given by $F1=0.004Pg1^2+5.3Pg1+500$ $/hr $F2=0.006Pg2^2+5.5Pg2+400$ $/hr $F3=0.009Pg3^2+5.8Pg3+200$$/hr Where Pg1,Pg2and Pg3 are in MW. Estimate the optimum scheduling and the total cost per hour for a total load of 975 MW with the following generator limits. $100MW \le Pg1 \le 450MW$ $100MW \le Pg2 \le 350MW$ $100MW \le Pg3 \le 225MW$	C313.4	1,2
Q.4.10	Analyze participation factor and Interpret participation factor with respect to economic load dispatch	C313.4	1,2
Q.5.1.	Explain the hardware components and fundamentals of SCADA using a fundamental block diagram.	C313.5	1,2
Q5.2.	Explain the Energy Control Centre function using SCADA.	C313.5	1,2
Q.5.3.	Define State Estimation and explain the classifications of state estimation	C313.5	1,2
Q.5.4.	List the various contingencies that are generally considered for steady sate security analysis. Explain the major functions of system security control	C313.5	1,2
Q.5.5.	Explain various state transitions and control strategies using state transition diagram.	C313.5	1,2

<table>
<tr><td>Q.5.6</td><td>Discuss the various functions, system monitoring and control of load dispatch center.</td><td>C313.5</td><td>1,2</td></tr>
<tr><td>Q.5.7</td><td>(i) Explain what is EMS? What are its major functions in power system operation and control?
(ii) Design the block diagram to show the hardware configuration of a SCADA system for a power system and explain the application of SCADA in monitoring and control of power system</td><td>C313.5</td><td>1,2</td></tr>
<tr><td>Q.5.8</td><td>(i)Prepare need of computer control of power system.
(ii) Evaluate the major functions of system security control.</td><td>C313.5</td><td>1,2</td></tr>
<tr><td>Q.5.9</td><td>Explain briefly the method of maximum likelihood weighted least square estimation.</td><td>C313.5</td><td>1,2</td></tr>
<tr><td colspan="4">5. Tutorial Questions.</td></tr>
<tr><td>T.1.1.</td><td>i)Explain about the over view of power system operation.
ii) A generating station has the following daily load cycle
<table>
<tr><td>Time(hr)</td><td>0-6</td><td>6-10</td><td>10-12</td><td>12-16</td><td>16-20</td></tr>
<tr><td>Load(MW)</td><td>20</td><td>25</td><td>30</td><td>25</td><td>35</td></tr>
</table>
a)Draw the Load duration curve
b)Maximum demand(ans-35KW)
c)Units generated per day(ans 600x3kwhr)
d)Average load(ans 25000KW)
e)Load factor(ans 71.43%)</td><td>C313.1</td><td>1,2,3</td></tr>
<tr><td>T.1.2.</td><td>A Power station has to meet the following demand
Group A:200KW between 8A.M to 6P.M
Group B:100KW between 6A.M to 10 A.M
Group C:50 KW between 6A.M to10A.M
Group D:100KW between 10A.M to 6P.M and 6P.M to 6A.M
Plot the daily load curve and determine:
i)diversity factor(ans 1.286) ii)units generated per day(ans 4600kwhr)
iii)load factor(ans 54.76%)</td><td>C313.1</td><td>1,2,3</td></tr>
<tr><td>T.1.3.</td><td>A generating station has a maximum demand of 20MW, a load factor of 60%,a plant capacity factor of 48% and a plant use factor of 80%.calculate
(i)the daily energy produced(ans-25000KW)
(ii)the reserve capacity of the plant(ans-5000KW)
(iii)the maximum energy that could be produced daily if the plant was running all the time(ans-480000KWhr)
(iv)the maximum energy that could be produced daily if the plant was running fully loaded and operating as per schedule.(600000KWhr)</td><td>C313.1</td><td>1,2,3</td></tr>
<tr><td>T.1.4.</td><td>Explain the method of constructing a load duration curve using a load curve. The following data were collected from the daily load curves of a power system during a year
<table>
<tr><td>Load in KW</td><td>Duration hours</td></tr>
<tr><td>15000</td><td>87</td></tr>
<tr><td>12000 and over</td><td>876</td></tr>
<tr><td>10000 and over</td><td>1752</td></tr>
<tr><td>8000 and over</td><td>2658</td></tr>
<tr><td>6000 and over</td><td>4380</td></tr>
<tr><td>4000 and over</td><td>7000</td></tr>
<tr><td>2000 and over</td><td>8760</td></tr>
</table>
Construct the annual load duration curve and find the load factor of the system.(ans-6.8)</td><td>C313.1</td><td>1,2,3</td></tr>
</table>

<table>
<tr><td>T.2.1.</td><td>Considering the two area system, find the new steady-state frequency and change in tie-line flow for a load change of area 2 by 100MW, Assume following data for the system.
Capacity of area 1 Pr1 =1000MW Capacity of Area 2 Pr2 =2000MW
Nominal load of area 1,P_{D1} =500MW Nominal load of area 2,P_{D2} =1500 MW
Regulation of area 1, R_1 =5% Regulation of area 2, R_2 =4%
Nominal Frequency F^0 =50 Hz
For both areas each percent change in frequency causes 1% change in load. Find also the amount of additional frequency drop if the interconnection is lost due to certain reasons.
(ans-steady state value reduced to a value of 49.9029Hz and additional frequency drop is 0.0271Hz)</td><td>C313.2</td><td>1,2,3</td></tr>
<tr><td>T.2.2.</td><td>Consider two interconnected areas the incremental regulation of each area on its own base is equal to 0.1pu. The damping torque coefficient D for each on its own base is equal to 1 p.u. Assume that the system in initially at 60 Hz. Find the steady state change in system frequency and the steady state flow over the tie-line for the following situations.
<table><tr><th>Load Change of 20MW in area</th><th>Total Capacity of area1</th><th>Total Capacity of area2</th></tr><tr><td>1</td><td>1000MW</td><td>1000MW</td></tr><tr><td>1</td><td>1500MW</td><td>500MW</td></tr><tr><td>2</td><td>1500MW</td><td>500MW</td></tr></table>(case I ΔPtie1=-10MW,caseII ΔPtie1=-4.875MW,case III ΔPtie1=-5MW)</td><td>C313.2</td><td>1,2,3</td></tr>
<tr><td>T.2.3.</td><td>Two power systems A and B are interconnected by a tie-line and have power-frequency constants Ka and Kb MW/Hz. An increase in load of 500MW on system A calls a power transfer of 300MW from B to A,when the line is opened frequency of system A is 49Hz and system B is 50Hz.Determine the value of Ka and Kb.
(ans –Ka=500Mw/Hz, Kb=750MW/Hz)</td><td>C313.2</td><td>1,2,3</td></tr>
<tr><td>T.2.4.</td><td>Two 750KW alternators operates in parallel. The speed regulation of 1 set 100% to 103% from full load to no load and that of other is 100% to 104%.How will the two alternators share a load of 1000KW and at what load will one machine cease to supply any portion of the load.
(ans PG1=464.28KW,PG2=535.7KW,cease supply 187.5KW)</td><td>C313.2</td><td>1,2,3</td></tr>
<tr><td>T.3.1.</td><td>If a load is with power factor of 0.8, find the power factor upto which improvement may be carried out economically. It is given that tariff for the consumer is Rs.80 per KVA+Rs.0.10 per KWH, cost of installing compensating equipment is Rs.350 per KVAR, rate of interest and depreciation on installation of compensating equipment is 10%. (ans-Improvement in power factor=0.899)</td><td>C313.3</td><td>1,2,3</td></tr>
<tr><td>T.3.2.</td><td>The load at the receiving end of a three-phase, overhead line is 25MW, power factor 0.8 lagging, at a line voltage of 33KV.A synchronous compensator is situated at the receiving end and the voltage at the both ends of the line is maintained at 33KV. Calculate the MVAR of the compensator. The line has resistance 5ohm per phase and inductive reactance (line to neutral) 20 ohm per phase.
(Q rating of the compensator=33.09MVAR)</td><td>C313.3</td><td>1,2,3</td></tr>
<tr><td>T.3.3.</td><td>A three phase induction motor delivers 500 HP at an efficiency of 0.91, the operating power factor being 0.76 lagging. A loaded synchronous motor with</td><td>C313.3</td><td>1,2,3</td></tr>
</table>

	a power consumption of 100KW is connected in parallel with the induction motor. Calculate the necessary KVA and the operating power factor of the synchronous motor if the overall power factor is to be utility. (ans-Reactive power-350.53KVAR,KVA of synchronous motor-364.5KVA)		
T.3.4.	Three supply points A, B and C are connected to a common busbar M. Supply point A is maintain at a nominal 275KV and is connected to M through a 275/132 KV transformer (0.1 p.u reactance) and a 132 KV line of reactance 50ohm .Supply point B is nominally at 132KV line of 50 ohm reactance. Supply point C is nominally at 275 KV and is connected to M by a275/132 KV transformers (0.1 p.u. reactance) and a 132KV line of 50ohm reactance. (ans-Natural voltage drop at M=5KV,reactive power injected to offset drop=38MVAR)	C313.3	1,2,3
T.3.5.	At a particular node of the power system network if the voltage falls from its nominal value by 2KV, estimate the amount of MVAR to be injected at the node. It is given that three-phase short circuit current at that node is about 5KA. (ans-MVAR to be injected to maintain the voltage=10MVAR)	C313.3	1,2,3
T.4.1.	The incremental cost characteristics of the plants are IC1=0.02P1+22 Rs/Mwhr IC2=0.04P2+20 Rs/Mwhr The system load is entirely concentrate at plant 2.For transfer of 80MW from plant 1 to plant 2 the transmission loss is found to be 14MW.for this system compute optimum scheduling for a total received power of 150MW. (ans λ-25.75,P1=38.56MW,P2-143.75MW,P3=2.23MW)	C313.4	1,2,3
T.4.2.	The input output curve characteristics of three units are F1:750+6.49P_{G1}+0.0035P_{G1}^2 F2: 870+5.75P_{G1}+0.0015P_{G1}^2 F3: 620+8.56P_{G1}+0.001P_{G1}^2 The fuel cost of unit 1 is 1Rs/MBtu for unit 2 and 1Rs/MBtu for unit3.Total load is 800MW.Use the participation factor method to calculate the dispatch of load is increased to 880MW. (ans-$P_{new,1}$ =394.17MW, $P_{new,2}$=331.04MW, $P_{new,3}$=154.076MW)	C313.4	1,2,3
T.4.3.	A power plant has three units with the following cost equations $C_1 = 0.02P_1^2 + 1.95\ P_1 + 100$ Rs/hr $C_2 = 0.015\ P_2^2 + 2.10\ P_2 + 120$ Rs/hr $C_3 = 0.005\ P_3^2 + 2.20\ P_3 + 130$ Rs/hr Find the optimum scheduling for a total load of 300 MW. (ans- P1=52.126MW,P2-64.36MW,P3-183.506MW)	C313.4	1,2,3
T.4.4.	A constant load of 300MW is supplied by 2 generators having a capacity of 200MW each. The respective incremental fuel costs are. $dC_1/dP_{G1} = 0.1\ P_{G1} + 20$ Rs/MWhr $dC_2/dP_{G2} = 0.12\ P_{G2} + 15$ Rs/MWhr Compute the most economical division of load between the generators using lambda iteration method.	C313.4	1,2,3
T.4.5.	A Power plant has 3 units with the following characteristics $F_1 = 0.05P_1^2 + 21.5\ P_1 + 800$ Rs/hr $F_2 = 0.10\ P_2^2 + 27\ P_2 + 500$ Rs/hr $F_3 = 0.07\ P_3^2 + 16\ P_3 + 900$ Rs/hr Pmax=120MW,Pmin=39MW. (ans-P1=71MW,P2=39MW,P3=90MW)	C313.4	1,2,3
6. Assignments			
A.1.1.	Determine the diversity factor and the annual load factor of a generating	C313.1	1,2

<table>
<tr><td></td><td>station, which supplies load to various customers as follows:
Industrial Consumer=2000KW
Commercial establishment=1000KW
Domestic Power=200KW
Domestic light=500KW
And assume that the maximum demand on the station is 3000KW and the number of units produced per year is $50x10^5$</td><td></td><td></td></tr>
<tr><td>A.1.2.</td><td>The maximum demand on a generating station is 20 MW, a load factor of 75%, a plant capacity factor of 50% and a plant use factor of 80%. Calculate the following:
(a) the daily energy generated,
(b) the reserve capacity of the plant
(c) the maximum energy that could be produced daily if the plant were use in all the time</td><td>C313.1</td><td>1,2</td></tr>
<tr><td>A.1.3.</td><td>Calculate the annual load factor of a 120 MW power station, which delivers 110 MW for 4 hours, 60 MW for 10 hours, and is shut down for the rest of each day. For general maintenance, it is shut down for 60 days per annum.</td><td>C313.1</td><td>1,2</td></tr>
<tr><td>A1.4</td><td>The daily load curve data for a system is as under
Week days:
<table>
<tr><td>Time (Hours)</td><td>12–5 am</td><td>5-8</td><td>8-12</td><td>12-1</td><td>1-5</td><td>5-9</td></tr>
<tr><td>Load (MW)</td><td>100</td><td>150</td><td>250</td><td>100</td><td>250</td><td>350</td></tr>
</table>
Saturday and Sunday:
<table>
<tr><td>Time (Hours)</td><td>12–5 am</td><td>5 am-5 pm</td><td>5-9</td><td>9-12</td></tr>
<tr><td>Load (MW)</td><td>100</td><td>150</td><td>200</td><td>150</td></tr>
</table>
Develop a load duration curve for the system for one week. Find the weekly load factor.</td><td>C313.1</td><td>1,2,3</td></tr>
<tr><td>A.2.1.</td><td>Two synchronous generators operating in parallel. Their capacities are 700MW and 600MW. The droop characteristics of their governor are 4% and 5% from no load to full load. Assuming that the governors are operating at 60 Hz at no load, how would be a load of 800MW shared between them. What will be the system frequency at this load? Assume free governor action.</td><td>C313.2</td><td>1,2,3</td></tr>
<tr><td>A.2.2.</td><td>For the uncontrolled two- area system estimate the oscillating frequency of the system response following a disturbance in either area in the form of a step change in electrical load. Parameters for the two identical areas are given as
Incremental Regulation R =2.50 Hz/p.u MW
Inertia Constant H =5 secs Damping Coefficients=1.0pu
Tie line operating power angle, $\delta_{10}-\delta_{20}=45^0$
Tie line capacity is 10% of area capacity.</td><td>C313.2</td><td>1,2,3</td></tr>
<tr><td>A.2.3.</td><td>Two identical synchronous machine of rating 100MW,50Hz operating in parallel have the following characteristics
Machine 1: speed droop is 4%, speed changer set to give 50% rated load at rated speed.
Machine 2: speed droop is 4%, speed changer set to give 75% rated load at rated speed.
(a) Determine the load taken by each machine for a total load of 150MW and the frequency of operation.
(b) Conclude about the adjustments to be made by the speed changers of the</td><td>C313.2</td><td>1,2,3</td></tr>
</table>

	machines to share the load as in(a)but with a frequency of 50Hz.		
A.2.4.	Two generators rated at 150MW and 250MW are operating in parallel. The governor settings on the machines are such that they have 4 percent and 3 percent drops. Determine (i) the load taken by each machine for a total load of 200MW (ii) The percentage no load and rated output of machine 1 to be made by the speeder motor if the machines are to share the load equally.(iii) Rated output of machine 1.	C313.2	1,2,3
A.4.1.	The input – output curve characteristics of three units are H_1=510+7.2 P_{G1}+0.0014 P_{G1}^2MBtu/hr H_2=310+7.85 P_{G2}+0.00194 P_{G2}^2 MBtu/hr H_3=78+7.97 P_{G3}+0.00482 P_{G3}^2 MBtu/hr The fuel cost of unit 1 is 1.1 Rs/MBtu, 1.0 Rs/MBtu for unit 2 and 1.0 Rs/MBtu for unit 3. Total load is 850 MW. Use the participation factor method to calculate the dispatch for a total load of 900MW. Also apply any of the modern appropriate optimization algorithm to verify the results	C313.4	1,2,3, 5
A.4.2.	Three power plants of a total capacity of 500 MW are scheduled for operation to supply a total system load of 350 MW. Find the optimum load scheduling if the plants have the following incremental cost characteristics and the generator constraints: dC_1/dP_{G1} = 0.25 P_{G1} +40 ; 30 ≤ P_{G1} ≤ 150 dC_2/dP_{G2} = 0.30 P_{G2} +50 ; 40 ≤ P_{G2} ≤ 125 dC_3/dP_{G3} = 0.20 P_{G1} +20; 50 ≤ P_{G3} ≤ 225 and verify the results with C program.	C313.4	1,2,3, 5
A.4.3.	There are 3 thermal generating units which can be committed to take the system load of 800 MW. The fuel cost data and generation operating limit data are given below. With the data provided, analyze the optimum unit committed using brute force enumeration technique. F_1 = 0.006P_1^2 + 7 P_1 + 600 100 ≤ P_1 ≤ 600 F_2 = 0.01 P_2^2 + 8 P_2+ 400 50 ≤ P_2 ≤ 300 F_3 = 0.008 P_3^2 + 6 P_3 + 500 150 ≤ P_3 ≤ 500	C313.4	1,2,3
7. Seminar/Self-study topics			
1. Conventional Grid Overview – Drawbacks 2. Examples of IEEE systems – Types of buses 3. Optimization in Power Systems – Tools available 4. Overview of Deregulation 5. Blackouts – Causes 6. Blackouts occurred 7. Necessity of Smart Grid 8. Overview of Smart Grid 9. Challenges in Smart Grid 10. Advanced Metering 11. Phasor Measurement Unit 12. Super Conducting Fault Current Limiter (SFCL) 13. Types of SFCL – Modeling of Resistive type SFCL		C313.5	1,2,3, 5

14. Smart Transmission system 15. Distributed Generation 16. Electric Vehicles 17. Automation in Smart Distribution Systems 18. Micro turbine 19. Problems in the addition of Renewable Sources 20. Power Quality Issues in Smart Grid 21. Wireless Communication in Smart Grid – Interference issues		

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE 6604 - DESIGN OF ELECTRICAL MACHINES [C314]

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

1.Course outcomes

Course	Course outcomes	POs
C314.1	Compare Electrical Engineering materials; determine heat dissipation due Conduction, convection and radiation**.**	1,2,3,5
C314.2	Calculate mmf for slots and teeths, apparent flux density, main dimensions and winding details of DC machines.	1,2,3,5
C314.3	Design core, yoke , winding and cooling system of transformers.	1,2,3,5
C314.4	Develop output equation of AC machines, design stator and rotor of induction machines.	1,2,3,5
C314.5	Design stator and rotor of synchronous machines analyze their thermal behavior, design field systems for turbo alternators.	1,2,3,5

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C314.1	3	3	3	-	2	-	-	-	-	-	-	-	2	1	-
C314.2	3	3	3	-	2	-	-	-	-	-	-	-	2	1	-
C314.3	3	3	3	-	2	-	-	-	-	-	-	-	2	1	-
C314.4	3	3	3	-	2	-	-	-	-	-	-	-	2	1	-
C314.5	3	3	3	-	2	-	-	-	-	-	-	-	2	1	-
C314	3	3	3	-	2	-	-	-	-	-	-	-	2	1	-

S.No.	**3. Important Questions.**	COs	POs
Q.1.1.	Define design.What are the factors those limit the design of a machine .Describe the major considerations to evolve a good design?	C314.1	2,3
Q.1.2.	Classify various electrical conducting materials, their properties ,requirements, and uses. Show that use of aluminium conduction in electrical machines instead of equivalent copper conduction results in reduction of rating by 22%.	C314.1	1,2
Q.1.3.	Describe the various types of magnetic materials, their properties ,requirements, and uses. What do you mean by "Ageing"? What are dynamo grade steel, CRGOs and transformer grade steel? Which magnetic materials are used in chokes and current Tr.?	C314.1	1
Q.1.4.	Explain the various types of insulating materials based on temperature rise, their properties ,requirements, and uses. Which insulating materials are used in modern EM.?	C314.1	1
Q.1.5.	Compare the various modes of heat dissipation. Develop an expression for heat dissipation by conduction, convection and radiation. Give real time examples.	C314.1	1
Q.1.6.	Develop an expression to find hotspot temperature. Develop an expression for heat produced in the coil of an electrical machine considering the flow in two dimensions. Find a relation between the effective thermal resistivity of winding, thermal resistivity of insulation and space factor in electrical machines. Define space factor.	C314.1	1
Q.1.7.	Derive the equation of temperature rise with time in electrical machines. What is heating time constant. Show that the cooling curve of electrical machines is exponential in nature. Define cooling time constant.	C314.1	1,2
Q.1.8.	Define "Rating" of an electrical machine. Classify the different duties and rating of	C314.1	1,2

	electrical machines with their respective temperature-time curves. Distinguish between continuous duty and short time duty with examples.		
Q.1.9.	Describe any two methods used for determination of motor rating for variable load drives with suitable diagram.	C314.1	1
Q.1.10.	Define specific Electric and magnetic loading. What are the choices of specific electric and magnetic loadings.	C314.1	1
Q.2.1.	Write Ohms law of magnetic circuit. Derive an expression for reluctance of series and parallel magnetic circuit. What are the similarities and differences between Electric and magnetic circuits?	C314.2	1
Q2.2.	Develop an expression for mmf of airgap of (a)smooth armature(b)slotted armature	C314.2	1
Q.2.3.	What are the problems associated with the calculation of mmf for teeth? Explain the methods of determination of mmf for teeth.	C314.2	1
Q2.4.	Distinguish between apparent and real flux density. Derive an expression for apparent flux density interms of real flux density. Define stacking factor.	C314.2	1
Q.2.5.	Develop an expression for the output equation of DC machines. How will you separate D,L for DC machines. What is meant by square pole criterion? Mention the guidelines for the selection of number of poles of DC machines.	C314.2	1
Q.2.6.	Describe the design details of the armature of a DC machines for lap and wave windings. Determine the diameter and length of the armature core for 55kW,110V,1000rpm,4pole, DC Shunt generator, assuming specific electric and magnetic loading of 26,000 Amp.Cond/m and 0.5Wb/m^2 respectively. The pole arc should be about 70% of pole pitch and length of core is about 1.1 times the pole arc. Allow 10A for field current and assume a voltage drop of 4V for armature circuit. Specify the winding used and also determine suitable values for the number of armature conductor and No,of slots. (D=0.36m, L=0.217m, S_a=38slots,C=38coils,Z=228Conductors,Cond/Slot=6,T_c =3T)	C314.2	1,2,3
Q2.7.	(a).Describe the procedure for the design of commutator and brushes for DC machines. What are the commutator losses? Name the materials of commutator and brushes. (b).Determine total commutator loss for 1000kW,500V,800rpm,10 pole generator,given that commutator diameter=1.0m,current density at brush contact =75X10^{-3}A/mm^2.Brush pressure is 14.7kN/m^2.Coefficient of friction =0.28, Brush contact drop=2.2Volt.(13.6KW) (c). Design a suitable Commutator for a 350kW,600rpm,440V,6pole,DC generator having an armature diameter of 0.75m,No.of coils is 288.Assume suitable values wherever necessary.	C314.2	1,2,3
Q.2.8.	Explain various steps involved in the design of shunt field winding of DC machine.	C314.2	1
Q.3.1.	Derive an expression for the output equation of a single-phase and three phase transformer interms of core and window area. Develop the equation of voltage per turn interms of rating of the transformer. Write the design details of winding of single and three phase transformer.	C314.3	1
Q.3.2.	Explain the design aspects of transformer core. Draw square core section, cruciform core and three stepped core. Give the relationships among the physical dimensions involved in the three cases. Draw and show the overall dimensions of single, three phase core type and shell type transformers.	C314.3	1,2
Q.3.3.	Calculate the core and window area for a 1000kVA,6600/400V,50Hz,1φ core type transformer. Assume a maximum flux density of 1.25Wb/m^2 and a current density of 2.5A/mm^2. Voltage/turn =30V Window space factor is 0.32.	C314.3	1,2.,3

Q.3.4.	Determine the dimensions of yoke, core for a 200kVA,50Hz,1φ core type transformer. A cruciform core is used with distance between adjacent limb is equal to 1.6times the width of core lamination. Assume emf/turn as 14Volts, maximum flux density is 1.1Wb/m^2,window space factor=0.32,current density =3A/mm^2.Stacking factor is 0.9.The net iron area is 0.56d^2 in a cruciform core where d is the diameter of the circumscribing circle. Also width of the largest stamping is 0.85d.	C314.3	1,2.,3
Q.3.5.	Explain the design procedure of cooling tubes for a transformer.	C314.3	1
Q.3.6.	How will you estimate no-load current in single phase and three phase transformers?	C314.3	1
Q.3.7.	A 1ϕ, 440V, 50HZ, Transformer is built from stampings having a relative permeability of 1000. The length of flux path is 2.5m; area of C.S of core = 2.5 X $10^{-3}m^2$; Primary winding has 800 turns. Estimate the maximum flux and no load current of Transformer. The iron loss at working flux density is 2.6 watts/Kg, iron weighs, 7.8 X 10^3 Kg / m^3, stacking factor = 0.9.(I_o =1.61A)	C314.3	1,2,3
Q.4.1.	Develop the Output equation for rotating AC machines. How will you separate D&L for the rotating AC machines?. Describe the design details of stator winding.	C314.4	1
Q.4.2.	Calculate specific electric and magnetic loading of a 100 HP,3000V,3φ,50Hz,8pole,star connected, flame proof induction motor having stator core length 0.5m,stator bore is 0.66m.Take turns/phase=286. Assume full load efficiency=0.938,power factor=0.86.	C314.4	1,2,3.
Q.4.3.	Describe the design details of rotor bars and end rings of squirrel cage &slip ring IM.	C314.4	1
Q.4.4.	Design a cage rotor for a 40HP,3φ,400V,50Hz,6pole,delta connected, induction motor. A full load efficiency of 87%,and a full load power factor of 0.85 may be assumed. Take D=33cm ,L=17cm, Stator slots=54,conductor/slot=14.	C314.4	1,2,3.
Q.4.5.	A 3φIM,has 54stator slots with 8conductor/slot and 72 rotor slots with 4 conductors/slot.Find the No.of stator and rotor turns.Find the voltage across the slip rings when the rotor is open circuited and at rest. Both stator and rotor are star connected and a voltage of 400V is applied across the stator	C314.4	1.
Q.4.6.	Discuss the points to be considered for estimating the length of air gap of an induction motor?	C314.4	1.
Q.5.1.	Develop an expression for the output equation of synchronous machine. How will you separate D&L for synchronous machines? What are the choice of B_{av} and ac for synchronous machine.	C314.5	1.
Q5.2.	The output co-efficient of a1250kVA,800rpm,synchronous generator is 200kVA/m^3-rps.(a).Find the values of main dimensions of the m/c, if L/D=0.2.(b).Also calculate the value of main dimension, if specific loading are decreased by 10%each,with speed remaining the same.(c).The speed is decreased to 150rpm with specific loading remaining the same as in (a).Assume same L/D. Comment on the result.	C314.5	1,2,3.
Q.5.3.	Describe the design details of rotor and field system of turbo alternator.(synchronous machines).	C314.5	1.
Q.5.4.	Describe computer aided design of electrical machines.	C314.5	1.
Q.5.5.	Describe the effect of dispersion co-efficient due to the following factors in an induction motor: (a).Over load capacity (b).air gap length (c).Number of poles (d) frequency.		
5. Tutorial Questions.			
T.1.1.	A copper bar 12 mm in diameter is insulated with micanite tube which fits tightly around the bar and into the rotor slots of an induction motor. The micanite tube is	C314.1	1,2,3

	1.5mm thick and its thermal resistivity is 8Ωm.Calculate the loss that will pass from copper bar to iron if a temperature difference of 25°C is maintained between them. The length of bar is 0.2m. (Diagram: Refer at the end) [19W]		
T.1.2.	A heat radiating body can be assumed to be spherical surface with co-efficient of emissivity =0.8.The temperature of the body is 60°C and that of the walls of the room, in which it is placed, is 20°C.Find the heat radiated from the body in W/m^2($224.6W/m^2$	C314.1	1,2,3
T.1.3.	A transformer core of plate width 0.5m and with a stacking factor of 0.94, has a uniformly distributed core loss of 3W/kg. The thermal conductivity of the steel is 150W/°C-m and the surface temperature is 40°C.Estimate the temperature of the hot spot if the heat flow is all to one end of the core.(ii).one half to the surface of each end. The heat flow is assumed to be along laminal. The density of steel plate is $7800kg/m^3$. (58.3°,44.6°)	C314.1	1,2,3
T.1.4.	A field coil has a cross section of $100X50mm^2$ and its length of mean turn is 1m.Estimate the hot spot temperature above that of outer surface of the coil, if the total loss in the coil is 120W.Assume stacking factor =0.56,resistivity=2Ω-m.(8.4°)	C314.1	1,2,3
T.1.5.	A field coil has a heat dissipating surface of $0.15m^2$ and a length of mean turn of 1m.It dissipates loss of 150W, the emissivity being $34W/m^2$-°C. Estimate the final steady temperature rise of the coil and its time constant, if the cross-section of the coil is $100X50mm^2$.Specific heat of copper is 390J/kg-°C. The space factor is 0.56.Copper weighs $8900kg/m^3$.	C314.1	1,2,3
T.1.6.	The temperature rise of transformer is 25°C after 1 hour and 37.5°C after 2 hours of energizing from cold conditions. Calculate its final steady temperature rise and the heating time constant. If this temperature falls from the final steady state value of 40°C in 1.5 hours when it is disconnected, calculate the cooling time constant. The ambient temperature is 30°C. (T_h=1.44 hours, T_c=0.932hrs.)	C314.1	1,2,3
T.2.1.	Calculate mmf required for the airgap of a machine having length=0.32m,including 4ducts of 10mm each,pole arc =0.19m,slot pitch =65.4mm,slot opening=5mm,airgap length=5mm,flux per pole=52mWb. Given Cater's coefficient is 0.18 for opening/ gap=1 and 0.28for opening / gap=2.width of the slot=5mm.(3590AT)	C314.2	1,2,3
T.2.2.	A 50 kW,220V,4pole,DC m/c has the following data:Armature diameter=0.25m, Length=0.125m,flux per pole=11.7mWb,length of airgap at pole centre=2.5mm,the ratio of pole arc to pole pitch =0.66. Calculate the mmf required for airgap (i).if the armature is treated as smooth.(ii).if the armature is slotted and the gap contraction factor is 1.18. (1,451AT,1712AT)	C314.2	1,2,3
T.2.3.	Determine the apparent flux density in the teeth of a DC m/c when the real flux density is 2.15Tesla.Slot pitch=28mm,slot width=10mm,gross core length=0.35m,No.of ventilating ducts=4,each 10mm wide.The magnetizing force for a flux density 2.15T is 55,000AT/m.The iron stacking factor=0.9.(2.215T.)	C314.2	1,2,3
T.2.4.	Estimate the main dimensions of a 4 pole ,100kW,1500rpm,DC generator, assuming a specific electric and magnetic loading as 19,000amp cond/m, and 0.4 Tesla respectively. Assume that the length of armature=pole pitch. (D=0.41m;L=0.318m.)	C314.2	1,2,3
T.2.5.	A 350kW,500V,450rpm,6pole,DC generator is built with an armature diameter of 0.87m&core length of 0.32m.The lap wound armature has 660 conductor. Calculate the specific electric & magnetic loading.(B_{av}=0.69Wb/m^2, ac=28,172 amp cond/m)	C314.2	1,2,3
T.2.6.	Calculate the main dimension of 20kW,1000rpm,DC motor. Given that B_{av}=0.37Tesla, ac=16,000amp.cond/m.Make the necessary assumption.(D=0.38m;L=0.14m)	C314.2	1,2,3
T.3.1.	Calculate kVA output of a 1φtransformer from the following data: Core height/Distance bt core centre=2.8;Diameter of circumscribing circle/Distance bt core centre=0.56.Net iron area/area of circumscribing circle=0.7,Current	C314.3	1,2,3

	density=2.33A/mm^2, Window space factor=0.27, frequency =50Hz,Flux density of core=1.2Wb/m^2,Distance between Core centres =0.4m.(454kVA)		
T.3.2.	Determine the main dimensions of core, No.of turns, cross sectional area of conductors for 5kVA, 11,000/400V,50Hz, 1φ,core type distribution transformer.The net conductor area in the window is 0.6 times net cross-sectional area of iron in the core. Assume a square core section for the core, flux density as 1Wb/m^2,currnt density as 1.4A/mm^2,and a window space factor=0.2,height of window is 3 time its width.(**W_w=0.0855m, H_w=0.2566m**, ∴ T_p=**6,769Turns, T_s=246**, a_p=0.454/1.4=0.32mm^2;a_s=8.928mm^2.)**,**	C314.3	1,2,3
T.3.3.	Calculate the overall dimensions of 200kVA,440V,50Hz,3φ core type transformer.The following data may be assumed.Emf/turn=10V,Max.flux density=1.3Wb/m^2,window space factor=0.3,current density=2.5A/mm^2,Stacking factor=0.9,Overall height=Overall width.Use 3 stepped core.(H=0.8635m=W)	C314.3	1,2,3
T.3.4.	A tank of a 1250kVA,natural oil cooled transformer has the dimension, length, width, height as 1.55x0.65x1.85m respectively. The full load losses is 13.1kW.Find the No.of tubes of the transformer, assuming the following:Loss dissipation due to radiation=6W/m^2-°C, Loss dissipation due to convection=6.5W/ m^2-°C, improvement in convection due to provision of tubes is 40%,temperature rise=40°C,length of each tube=1m,diameter of tube=50mm.Neglect the top and bottom surf of the tank as regards cooling .(164 tubes)	C314.3	1,2,3
T.3.5.	Calculate the active and reactive component of no load current of a 400V, 50 Hz, 1ϕ Tr. having the following particular core of Tr. Sheath; stacking factor = 0.9, density = 7.8 X 10^3Kg/m^3, length of the mean flux path = 2.2m, Gross iron section = 10 X $10^{-3}$$m^2$; Py. Turn =200; joints = 0.2mm air gap. Use the following data.(Active comp, I_l = 0.502A;Reactive comp, I_m = 3.833A.)	C314.3	1,2,3
T.4.1.	Determine the approximate diameter and length of stator core, No. of stator slots and No. of conductors for a 11kW,400V,3φ,4pole,1425rpm,delta connected induction motor. Specific magnetic and electric loadings are0.45Wb/m^2 and 23,000 Amp.cond/m , respectively. Full load efficiency=0.85, Power factor=0.88.Ratio Pole arc to pole pitch =1.The stator employs a double layer winding. (D=0.191m,L=0.1496m,T_s=189Turns. S_s=36; Z_s=6T_s=1134;Z_{ss}=Z/S_s=32 conductors)	C314.4	1,2,3
T.4.2.	Estimate the core dimension,No.of stator slots and No.of stator conductors/slot for a 100kW,3300V, 12 pole,50Hz,Star connected, slip ring induction motor. B_{av}=0.4Wb/m^2, ac=25,000amp.cond/m,η=0.9, pf=0.9.Choose the main dimension to give best power factor. The slot loading should not exceed 500AT. (D=0.771m,L=0.23m. S_s=144,T_s=S_sxZ_{ss}=144 x20=2880conductors.)	C314.4	1,2,3
T.4.3.	Estimate the main dimension, airgap length, stator slots, stator turns per phase and cross sectional area of stator and rotor conductors for a 3φ,15HP,400V, 6pole, 50Hz,975rpm,induction motor. The motor is suitable for star-delta starting. B_{av}=0.45Wb/m^2,ac=20,000 amp. cond/m, L/τ=0.85,η=0.9,pf=0.85.(D=0.272m, L=0.1212m, l_g=0.563mm, T_s=243Turns, S_r=33.a_e=810.7/4x10^6=202.6mm^2.	C314.4	1,2,3
T.5.1.	Prove that for a m phase synchronous machine, the effective rotor volume , given by Volume=Qx 10^3/$\sqrt{2}\pi^2$$B_{av}$ac n_s .A rough estimate of the dimension and winding of 100MVA,11kV,3000rpmStar connected,3φ,turboalternator is required. The maximum value of flux density in the airgap of a machineis to be limited to 1Wb/m^2.The specific electric loading is 80,000 amp.cond./m.(i).Determine the approximate volume of the cylindrical part of the rotor.(ii).The peripheral speed of rotor is to be limited to	C314.5	1,2,3

B_m	0.9	1	1.2	1.3	1.4
Mmf	130	210	420	660	1300
P_i(W/kg)	0.8	1.3	1.9	2.4	2.9

	200m/sec.Estimate the required diameter and length.(iii)Estimate the No.of turns /phase. (Vol.=2.811m^3, D=1.273m, L=2.209m, T_{ph}=10turns.)		
T.5.2.	For a 250kVA,1100V,12pole,500rpm,3φ,alternator,determine the airgap diameter, core length, No.of stator conductors, No.of stator slots and cross section of stator conductor. Assume average airgap density as 0.6Wb/m^2,Specific electric loading of 30,000amp.cond./m.The alternator is star connected, the value of L/τ=1.5. (D=0.728m,L=0.285m, T_{ph}=88Turns;Z_s=528, S_s=72; Z_{ss}=Z_s /S_s=8, a_s=131.2/4=32.8mm^2)	C314.5	1,2,3
T.5.3.	A 500kVA,3.3kV,10pole,3φ,Delta connected salient pole alternator has 180turns/phase.Estimate the length of airgap, if the average flux density is 0.54Wb/m^2.The ratio of pole arc to pole pitch is 0.66,SCR is 1.2.The gap contraction factor is 1.15.The mmf required for airgap is 80% of no load field mmf and the winding factor is 0.955. (l_g=2.99mm.)	C314.5	1,2,3
	6.Assignments/Seminar/Self study topics.		
A.1.1.	(a).Modern methods of cooling of Turbo alternators(2pages-assignment), (b).Effect of environmental factors on rating of machines(one page-self study) (c). Embedded temperature detectors and modern methods of measurement of winding temperature (seminar).	C314.1	1,2,3,5
A.2.1.	Sketch the magnetic circuit of D.C. Machines		
A.3.1.	Sketch the different cooling methods of Transformer.		
A.4.1.	Sketch different types of leakage flux in an induction machines.		
A.5.1.	Draw a typical flow chart for the design of Electrical Machines.		

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6002- Power System Transients [C315E3]

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

1. Course outcomes

Course	Course outcomes	POs
C315E3.1	Explain the concept of transients and Compute the solution of transient current equation for RL and RLC system. (K2)	1,2
C315E3.2	Illustrate the importance of switching transients; Explain the concept of resistance switching, load switching and capacitance switching. (K4)	1,2,7
C315E3.3	Explain the concept of lightning mechanism, Describe the interaction between lightning and power system (K2)	1,2,6,7,8
C315E3.4	Apply the concept of reflection and refraction, Draw the Bewley Lattice diagram for different systems. (K3)	1,2,5
C315E3.1	Explain the concept of transients and Compute the solution of transient current equation for RL and RLC system. (K2)	1,2,5

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

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
C315E3.1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
C315E3.2	3	3	-	-	-	-	2	-	-	-	-	-	2	-	1
C315E3.3	3	1	-	-	-	1	2	1	-	-	-	-	1	-	1
C315E3.4	3	1	-	-	2	-	-	-	-	-	-	-	1	1	-
C315E3.5	3	1	-	-	2	-	-	-	-	-	-	-	1	1	-
C315E3	3	2	-	-	1	-	1	-	-	-	-	-	1	-	-

S.No.	**4. Important Questions.**	COs	POs
Q.1.1.	Define Power system Transients? Derive the expression for transients due to Series and parallel RLC elements?	C315E3.1	1,2
Q.1.2.	With illustration, explain the various types of power system transients?	C315E3.1	1,2
Q.1.3.	Draw a simple circuit that produces transients? What are the sources, causes and effects of transients on power system? Explain them in detail?	C315E3.1	1,2
Q.1.4.	Elaborate your comment on double frequency transients on power systems?	C315E3.1	1,2
Q.1.5.	State and explain the importance of transient study in power system planning?	C315E3.1	1,2
Q.2.1.	Define switching transients? What is the need of resistance switching and explain the concept of resistance switching with the equivalent circuit for interrupting the resistor current? Explain its significance in power system?	C315E3.2	1,2,7
Q2.2.	What is capacitance switching? What are the causes of capacitor inrush currents? Explain the theory of capacitance switching including the effect of source regulation. Also discuss the effects of restrike and multiple re-strikes. Give an illustration for multiple re-striking transients?	C315E3.2	1,2,7
Q.2.3.	Explain with appropriate waveform (a) current suppression (b) current chopping (c) ferro resonance condition.	C315E3.2	1,2,7
Q2.4.	Define transient recovery voltage Explain the characteristics of energy released by transformer when the magnetising current is chopped and derive the expression? Explain the switching in both normal and abnormal conditions with neat sketches.	C315E3.2	1,2,7

Q.2.5.	What is meant by subsidence transients? Draw and explain the waveforms for transient voltage across the load switch with equivalent circuit?	C315E3.2	1,2,7
Q.3.1.	What are the effects of lightning? What are the types of over voltages? Explain with neat sketches the mechanism of lightning discharge.	C315E3.3	1,2,6, 7,8
Q.3.2.	What are the different types of strokes? Mention the different theories of charge formation and explain with neat diagrams the two different theories of charge generation in a thunder cloud.	C315E3.3	1,2,6, 7,8
Q.3.3.	What is back flashover? Define isokeraunic level or thunderstorm days? Give the mathematical model for lightning discharges and explain them.	C315E3.3	1,2,6, 7,8
Q.3.4.	Draw the lumped parameters equivalent circuits for lightning stroke to Tower? Explain the interaction between lightning and power system.	C315E3.3	1,2,6, 7,8
Q.3.5.	Explain the significance of tower footing resistance? What are the factors that contribute good line design? Explain the protection offered by ground wires.	C315E3.3	1,2,6, 7,8
Q.4.1.	How is the transmission lines classified? Explain the transient response of a system with series and shunt and lumped parameters	C315E3.4	1,2,5
Q.4.2.	What is surge impedance of a line and why is it also called the natural impedance? Why velocity of propagation over all overhead lines is same? Explain the travelling wave concept with step response.	C315E3.4	1,2,5
Q.4.3.	What do you mean by travelling waves? Define crest and front of a travelling wave? Distinguish between reflection and refraction of travelling waves. Derive the expression for reflection coefficient and refraction coefficient and explain the behavior of travelling waves at short circuited lines.	C315E3.4	1,2,5
Q.4.4.	Draw the lattice diagram for single transmission line terminated in impedance? Explain the Bewley's lattice diagram with an example.	C315E3.4	1,2,5
Q.4.5.	What is meant by switching surges? Define standing wave voltage ratio. Derive the wave equation and express the various parameters? Derive an expression for standing wave equation.	C315E3.4	1,2,5
Q.5.1.	What is meant by kilometric fault and explain the occurrence and effects in a power system	C315E3.5	1,2,5
Q.5.2.	Explain in detail about the switching surges on an integrated power system.	C315E3.5	1,2,5
Q.5.3.	What is meant by EMTP? Explain the network modeling for EMTP calculation. Explain the modeling of lumped parameters R, L & C for EMTP calculation	C315E3.5	1,2,5
Q.5.4.	What are the causes of over voltage? Explain and analyze the causes of over voltages induced by various faults occurring in power system. Explain the voltage transients on closing and reclosing lines with expressions.	C315E3.5	1,2,5
Q.5.5.	Discuss the effects on power system due to Line dropping and load rejection.	C315E3.5	1,2,5
	6.Assignments/Seminar/Self study topics.		
A.1.1.	Illustrate with practical examples, what would happen if transients occur on power system?	C315E3.1	1,2
A.1.2.	Determine the double frequency transients on power systems from the equivalent circuit?	C315E3.1	1,2
A.2.1.	Justify that the energy is released by transformer when the magnetizing current is chopped with the help of necessary equations?	C315E3.2	1,2,7
A.2.2.	Differentiate resistance switching from capacitance switching?	C315E3.2	1,2,7
A.3.1.	Analyze the phenomenon of charge formation in the clouds?	C315E3.3	1,2,6, 7,8

A.3.2.	Outline the factors that affecting the design of a good line?	C315E3.3	1,2,6, 7,8
	Seminar		
S.1	Transient analysis using the Laplace transform techniques		
S.2	Transient analysis using the Fourier transform		
S.3	Transient analysis using state variables		
S.4	Transients in three-phase systems		
S.5	Transient behavior of transmission lines		
S.6	Transient behavior of Synchronous Generators		
S.7	Transient behavior of Transformers		
S.8	Transient behavior of Induction Motors		
S.9	Transient behavior of Synchronous Motors		
S.10	Transients of Shunt Capacitor Banks		
S.11	Transients in Grounding Systems		

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

Question Paper Code : 80348

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

Sixth Semester

Electronics and Instrumentation Engineering

EC 6651 — COMMUNICATION ENGINEERING

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

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define modulation index.
2. Differentiate NBFM and WBFM.
3. Why flat top PAM is preferred over natural PAM?
4. What is slope overload error?
5. State the channel capacity theorem.
6. What is BCC and BSC?
7. What are the benefits of multiple access techniques in Communication Engineering?
8. Mention the significance of CDMA technique.
9. What is optical link?
10. List the merits and demerits of geosynchronous satellites.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the generation of DSB-SC wave using Balanced Modulator. Derive the power of DSB-SC signal. (16)

Or

(b) Explain in detail about indirect method of FM generation. (16)

12. (a) Explain the generation and detection of PWM signals. (16)

Or

(b) (i) Explain the concept of BPSK and QPSK techniques in data communication. (12)

(ii) Compare PCM and DM. (4)

13. (a) Explain the procedure of Shannon fano algorithm and calculate the entropy for the following probabilities using the algorithm. (16)

m1	m2	m3	m4	m5	m6	m7	m8
4/32	2/32	16/32	2/32	2/32	1/32	1/32	4/32

Or

(b) (i) Briefly discuss on various error control codes and explain in detail with one example for convolutional code. (12)

(ii) Draw the polar, unipolar, bipolar and Manchester NRZ line code format for an information {1 0 11 0 0}. (4)

14. (a) Explain the operation of FH-SS. Compare slow and fast FH-SS. (16)

Or

(b) Discuss the FDMA and TDMA techniques used in wireless communication with their merits and demerits. (16)

15. (a) (i) Write a brief note on INSAT. (8)

(ii) Write a brief note on Intelsat. (8)

Or

(b) (i) Draw the block diagram of satellite link and explain. (8)

(ii) Explain in detail about SCADA. (8)

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

Question Paper Code : 57299

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

Sixth Semester

Electronics and Instrumentation Engineering

EC 6651 – COMMUNICATION ENGINEERING

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

(Regulations 2013)

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

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Draw the Frequency Spectrum of AM.
2. Mention the advantages and disadvantages of SSB Transmission.
3. Define Sampling theorem and Aliasing.
4. Compare the performance of FSK and PSK based on the power and bandwidth efficiency.
5. Define source coding. State the significance of source coding.
6. Draw the NRZ and RZ waveforms for the pulse stream 10101011.
7. Define Pseudo-Noise sequence.
8. Define near-far problem in CDMA.
9. What are the different types of satellites ?
10. Write about aperture actuators used in satellite.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Explain the Method of generating single side band signal using balance modulators. **(8)**

(ii) Discuss the principle of AM super heterodyne receiver with block diagram. **(8)**

OR

(b) Explain in detail Armstrong method of FM generation and compare NBFM and WBFM. **(16)**

12. (a) With neat sketch, explain the generation of DM signals. State the drawbacks of DM and suggest a method to correct it. **(16)**

OR

(b) (i) Explain the QPSK modulation schemes with its constellation diagram. **(10)**

(ii) Briefly describe the concept of QAM and draw the constellation diagram of QAM. **(6)**

13. (a) Six symbols of the alphabet of discrete memory less source and their probabilities are given below. S = {S0, S1, S2, S3, S4, S5} P (S) = {0.1, 0.1, 0.2, 0.2, 0.25, 0.15} Code the symbols using Huffman coding and Shannon fano coding and compare the efficiency. **(16)**

OR

(b) Explain briefly about Convolution and Linear block codes with neat block diagram with an example. **(16)**

14. (a) Explain the principle of operation of direct sequence spread spectrum with its n performance parameters. How pseudo noise is generated ? **(16)**

OR

(b) (i) Describe CDMA technique in detail. **(8)**

(ii) Explain the role of SDMA in wire and wireless communications. **(8)**

15. (a) Discuss briefly the Multiple access techniques used in satellite communications. **(16)**

OR

(b) Write short notes on :

(i) Optical sources and detection **(8)**

(ii) SCADA **(8)**

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

Question Paper Code : 57325

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

Sixth Semester

Electrical and Electronics Engineering

EE 6601 – SOLID STATES DRIVES

(Regulations 2013)

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

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Sketch the speed-torque characteristic curve of a fan type load.
2. State the condition for steady state stability of motor load system.
3. What are the applications of chopper fed DC drives ?
4. Draw the torque speed characteristics of single phase fully controlled rectifier fed separately excited DC motor with different firing angles.
5. Compare Current source and Voltage source inverter fed drives.
6. What are the drawbacks of stator voltage control method ?
7. Write down the torque equation of salient pole synchronous motor.
8. What is self-control mode of synchronous motor ?
9. Draw the basic block diagram of a closed loop control of DC motor.
10. What is the necessity of inner current control loop is employed in closed loop operation of DC motor ?

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Classify and explain various types of load of electrical drive based on the speed - torque characteristics. **(10)**

(ii) Discuss the various factors involved in the selection of electrical drives. **(6)**

OR

(b) (i) Explain in detail the multi quadrant dynamics in the speed torque plane. **(8)**

(ii) Based on the mathematical condition, examine the stability of equilibrium point as shown in fig. 1 below. **(8)**

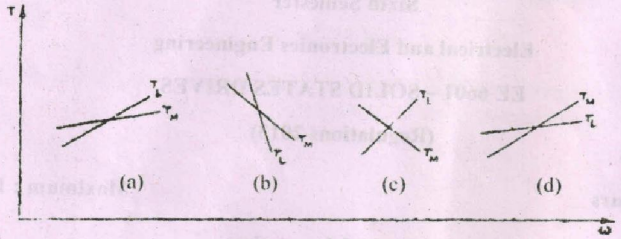

Fig. 1

12. (a) (i) Describe the operation of a four quadrant chopper fed separately excited DC motor with neat diagram. **(10)**

(ii) Explain in detail about time ratio and current limit control. **(6)**

OR

(b) Explain the operation of a three phase fully controlled rectifier fed separately excited DC motor and obtain the expression of motor speed and torque for continuous conduction mode. **(16)**

13. (a) (i) Explain the concept of v/f control of induction motor drives. **(8)**

(ii) A 3 Phase, 50 Hz induction motor, has the following parameters for its equivalent circuit R1 = R2 = 0.02 Ω and X1 = X2 = 0.1 Ω is to be operated at one half of its rated voltage and 25 Hz frequency. Calculate (i) the Maximum torque at this reduced voltage and frequency operation in terms of its normal value and (ii) the starting torque at this reduced frequency and voltage in terms of its normal value. **(8)**

OR

(b) (i) Describe the operation of voltage sources inverter fed induction motor drives. **(12)**

(ii) State the drawbacks of an induction motor drive fed from stepped wave inverter. **(4)**

14. (a) Explain the concept of self-control technique of synchronous motor in detail with the operation of rotor position encoder.

OR

(b) Explain the forward motoring and braking operation of open loop volts/Hz control of multiple PM synchronous motor with relevant neat phasor diagram and control characteristics curve.

15. (a) Explain in detail the design of speed controller of closed loop speed control system of separately excited DC motor.

OR

(b) Explain the armature voltage control with field weakening mode of closed loop operation of separately excited DC motor drive.

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

Question Paper Code : 80381

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

Sixth Semester

Electrical and Electronics Engineering

EE 6601 — SOLID STATE DRIVES

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate active load torque from passive load torque.
2. List the applications of electrical drives.
3. State the functions of freewheeling diode in phase controlled rectifier.
4. List out the drawbacks of rectifier fed DC drive.
5. Highlight the features of variable frequency control.
6. Enumerate the advantages of AC drives with PWM inverters.
7. What are the different types of PMSM motor?
8. Compare true synchronous mode and self controlled synchronous mode.
9. Write down the transfer function of speed controller.
10. What is field weakening mode control?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain in detail the multi quadrant dynamics of a drive with an example. (8)

(ii) List the common factors to be considered for selecting a motor. (8)

Or

(b) Describe the equation governing load dynamics of drive. Derive the mathematical condition for steady state stability analysis of equilibrium operating point. (16)

12. (a) Discuss the steady state analysis of single phase fully controlled converter fed DC separately excited motor with continuous and discontinuous conduction mode. (16)

Or

(b) (i) Explain the different control strategies of chopper. (8)

(ii) Explain the four quadrant operation of chopper in detail. (8)

13. (a) (i) Explain the concept of V/f control scheme. (8)

(ii) Highlight the features of an induction motor fed from a square wave inverter. (8)

Or

(b) (i) Describe the speed control of induction motor by variable frequency supply. (8)

(ii) A 2.8 kW, 400 V, 50 Hz, 4 pole, 1370 rpm, delta connected squirrel cage induction motor has following parameters referred to the stator: $R_s = 2\ \Omega$, $R_r = 5\ \Omega$, $X_s = X_r = 5\ \Omega$, $X_m = 80\ \Omega$. Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed and rated voltage. Calculate motor terminal voltage, current and torque at 1200 rpm. (8)

14. (a) (i) Discuss the advantages and disadvantages of Margin angle control. (6)

(ii) Compare the features of VSI and PWM fed synchronous motor. (10)

Or

(b) (i) Explain the power factor control of synchronous motor drives. (8)

(ii) Brief about trapezoidal PMAC motor drives. (8)

15. (a) Derive the transfer function of DC motor-load system with converter fed armature voltage control. (16)

Or

(b) Explain the design procedure of speed controller with inner current controller of a separately excited DC motor. (16)

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

Question Paper Code : 57326

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

Sixth Semester

Electrical and Electronics Engineering

EE 6602 – EMBEDDED SYSTEMS

(Common to Electronic 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. List out the challenges in building an embedded system.
2. What is the need of Watch dog timer ?
3. How SPI is differed from other serial interfaces ?
4. What is the need for Device Driver ?
5. Mention different models used for the development of an embedded system.
6. What are the processes involved in Co-design ?
7. Compare Preemptive and Non-preemptive scheduling.
8. Define Thread and Process.
9. List some applications of embedded system.
10. What are the events involved in the smart card application ?

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Explain the possible steps involved in build process of embedded control systems. **(8)**

(ii) Discuss about the Structural units in embedded processor and how a processor is selected for an embedded application. **(8)**

OR

(b) With a neat diagram, explain the working of Direct Memory Access (DMA) and mention the memory management methods. **(12 + 4)**

12. (a) Explain in detail about SPI communication protocol and its interfacing techniques. **(16)**

OR

(b) Write short notes on :

(i) ₹ 232 Standard

(ii) CAN bus

(iii) Inter Integrated Circuit Bus. **(6 + 6 + 4)**

13. (a) Illustrate with functional description about the different phases of Embedded Design Life Cycle model. **(16)**

OR

(b) With a suitable example, explain about the state machine model of a Automatic Chocolate Vending Machine (ACVM) **(16)**

14. (a) Explain how the interrupt routines are handled by RTOS and illustrate the features of VxWorks. **(16)**

OR

(b) Explain the terminologies Semaphores, Mail box, pipes and Shared memory in RTOS. **(16)**

15. (a) With suitable diagram explain in detail about the concept of washing machine application. **(16)**

OR

(b) Elucidate the selection of processor and memory for any one embedded applications with suitable diagram in detail. **(16)**

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

Question Paper Code : 80382

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

Sixth Semester

Electrical and Electronics Engineering

EE 6602 — EMBEDDED SYSTEMS

(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. List out the challenges in building an embedded system.
2. What are the steps involved in build process?
3. Mention the features of CAN and SPI serial interfaces.
4. Point out the purpose of Device Driver.
5. What is state machine model?
6. Write about the processes involved in Co-design.
7. Compare Preemptive and non preemptive scheduling.
8. What are the functions of RTOS?
9. List some applications of embedded system.
10. What are the events involved in the smart card application?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the possible steps are involved in build process of embedded control systems. (8)

(ii) Discuss about the Structural units in embedded processor and how a processor is selected for an embedded application. (8)

Or

(b) With a neat diagram, explain the working of Direct Memory Access (DMA). (16)

12. (a) Explain in detail about SPI communication protocol and its interfacing techniques. (16)

Or

(b) Explain with all necessary sketches to enable intra communications among peripherals using I^2C bus. (16)

13. (a) Illustrate with functional description about the different phases of Embedded Design Life Cycle model. (16)

Or

(b) Explain about the state machine model with an example of an Automatic Chocolate Vending Machine (ACVM). (16)

14. (a) Explain how the interrupt routines are handled by RTOS and illustrate the features of μC/OS-II RTOS. (16)

Or

(b) Explain in detail about the Inter process Communication and Context Switching. (16)

15. (a) With suitable diagram explain in detail about the concept of washing machine application. (16)

Or

(b) With suitable diagram explain in detail about the concept of Smart Card System application. (16)

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

Question Paper Code : 57327

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

Sixth Semester

Electrical and Electronics Engineering

EE 6603 – POWER SYSTEM OPERATION AND CONTROL

(Regulations 2013)

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

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Classify the system load.
2. What is spinning reserve ?
3. What is the objective of tie-line bias control ?
4. Define area control error.
5. What is SVC ?
6. How are voltage and reactive power interrelated ?
7. What is meant by priority list method ?
8. Define incremental transmission loss.
9. Define state estimation.
10. What are the functions of SCADA ?

PART – B (5 × 16 = 80 Marks)

11. (a) Consider an inductive load of type Z=R+jX.

(i) By how much percentage the real load drop, if the voltage is reduced by 5% ?

(ii) How would 2% drop in frequency affect the real load, if the load power factor is 0.8. Derive the relations used. **(16)**

OR

(b) A power station has to meet the following load demands :

Load A : 50 kW between 10 AM and 6 PM
Load B : 30 kW between 6 PM and 10 PM
Load C : 20 kW between 4 PM and 10 AM

Plot the daily load curve and determine i) diversity factor, ii) units generated per day, iii) load factor. **(16)**

12. (a) Draw the block diagram of uncontrolled two area ALFC system and explain the salient features under static and dynamic conditions. **(16)**

OR

(b) (i) Determine the steady state frequency in Hz for an isolated control area having the following data. Total rated area capacity, Pr = 300 MW, frequency, f = 50 Hz, inertia constant, H = 5 s, regulation, R= 0.05 pu, turbine time constant = 0.5 sec, governor time constant = 0.2 sec, load change = 60 MW. The load varies by 0.8 percent for a 1 percent in frequency. **(8)**

(ii) Obtain the state variable model of single area ALFC system. **(8)**

13. (a) Develop the block diagram of AVR and obtain its transfer function and explain the static and dynamic response. **(16)**

OR

(b) Explain the role of tap changing transformer in voltage control. **(16)**

14. (a) Write the algorithm for iterative solution of economic dispatch without and with losses co-ordinated. **(16)**

OR

(b) (i) Discuss the various constraints in unit commitment. **(8)**

(ii) Explain dynamic programming solution for unit commitment with flowchart. **(8)**

15. (a) Briefly explain various functions of SCADA with a neat diagram. **(16)**

OR

(b) Draw a state transition diagram of a power system and explain the different control actions. **(16)**

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

Question Paper Code : 80383

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

Sixth Semester

Electrical and Electronics Engineering

EE 6603 — POWER SYSTEM OPERATION AND CONTROL

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the need for frequency regulation in power system?
2. Define load duration curve.
3. Define control area.
4. Specify the use of static and dynamic response of the ALFC.
5. What are the various functions of an excitation system?
6. Mention the purposes of series compensation.
7. Write the coordination equation taking the effect of transmission losses.
8. Write about the term incremental operating cost of a power system.
9. What are the functions of SCADA?
10. What are the major functions that are carried out in an operational control centre?

PART B — (5 × 16 = 80 marks)

11. (a) (i) A generating station has the following daily loads :

0-6 hrs 4500 kW; 6-8 hrs 3500 kW; 8-12 hrs 7500 kW; 12-14 hrs 2000 kW;

14-18 hrs 8000 kW; 18-20 hrs 2500 kW; 20-24 hrs 5000 kW

Sketch the load duration curve and determine the load factor and plant capacity factor, if the capacity of the plant is 12 MW. (8)

(ii) Discuss the importance of load forecasting with a suitable example. (8)

Or

(b) (i) Peak demand of a generating station is 90 MW. The load factor and the plant capacity factor are 0.6 and 0.5 respectively. Determine

(1) daily energy produced

(2) installed capacity

(3) reserve capacity and

(4) utilization factor. (10)

(ii) What is the significance of load factor and diversity factor? (6)

12. (a) (i) Derive the block diagram of state variable model for ALFC. (8)

(ii) A power system has a total load of 1250 MW at 50 Hz. The load varies 1.5% for every 1% change in frequency. Find the steady-state frequency deviation when a 50 MW load is suddenly tripped, if

(1) There is no speed control;

(2) The system has 250 MW of spinning reserve evenly spread among 500 MW of generating capacity with 5% regulation based on this capacity. Assume that the effect of governor dead bands is such that only 80% of the governor respond to the reduction in system Load. (8)

Or

(b) Derive the transfer function model and draw the block diagram for a single control area provided with governor system. From the transfer function derive the expression for steady state frequency error for a step change.(16)

13. (a) The load at the receiving end of a three-phase overhead line is 25 MW at 0.8 power factor lagging at a line voltage of 33 kV. The line has a resistance 5 ohm per phase and an inductive reactance at 20 ohm per phase. Calculate the sending end voltage. A synchronous compensator is connected at the receiving end and the voltage at both end of the line is maintained at 33 kV. Calculate

(i) the MVAR of the compensator

(ii) transmission losses and efficiency with and without compensator and

(iii) the maximum load that can be transmitted with the compensator. (16)

Or

(b) Derive the complete block diagram representation of AVR. Perform the static and dynamic analysis of the AVR. (16)

14. (a) A two bus systems shown in Fig. 14 (a). If 100 MW is transmitted from plant 1 to the load, a transmission loss of 10 MW is incurred. Find the required generation for each plant and power received by load when the system incremental cost is Rs. 25 MW-hr. The cost equations of the two plants are given below. (16)

$F_1 = 0.01\,P_1^2 + 16P_1 + 180$ Rs/hr $\qquad F_2 = 0.02P_2^2 + 20P_2 + 160$ Rs/hr.

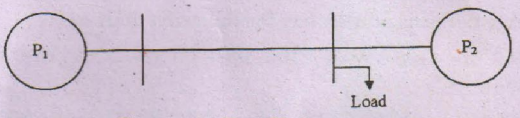

Fig. 14 (a) Two Unit system

Or

(b) (i) Explain with a neat flow chart the lambda iteration method for solving the economic dispatch problem without loss. (8)

(ii) What are the constraints in solving the unit commitment problem? (8)

15. (a) Explain with state transition diagram, the different state of the power system and the various control actions taken under every state to maintain or bring back the system to normal operating mode. (16)

Or

(b) Explain briefly the typical functions of the ECC. What are the main functions common to all SCADA system and the main tasks of control centre at different levels? (16)

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

Question Paper Code : 57328

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

Sixth Semester

Electrical and Electronics Engineering

EE 6604 – DESIGN OF ELECTRICAL MACHINES

(Regulations 2013)

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

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Define specific magnetic loading.
2. Mention the various duty cycles of a motor.
3. What is real and apparent flux density ?
4. Define field form factor.
5. Why the area of yoke of a transformer is usually kept 15-20% more than that of core ?
6. Why the efficiency of transformer is so high ?
7. What are the factors to be considered for the choice of specific electric loading ?
8. How the induction motor can be designed for best power factor ?
9. Define short circuit ratio (SCR).
10. Mention the factors that govern the design of field in an alternator.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) State and explain the advantages of hydrogen cooling as applied to turbo alternator. **(8)**

(ii) Explain the methods by which mmf for teeth are calculated. **(8)**

OR

(b) (i) Calculate the apparent flux density at a section of the teeth of an armature of a D.C. machine from the following data at that section. Slot pitch = 24 mm, slot width = tooth width = 12 mm, length of armature core including five ducts of 10 mm each = 0.38 m, iron stacking factor = 0.92. True flux density in the teeth at that section is 2.2 T for which the mmf is 70000AT/m. **(8)**

(ii) Determine the air gap length of a D.C machine from the following data. Gross core length = 0.12 m, No. of ducts = one of 10 mm width, slot pitch = 25 mm, Carters coefficient for slots and ducts = 0.32, gap density at pole center = 0.7 T. Field mmf per pole = 3900AT, mmf require for iron parts of magnetic circuit = 800AT. **(8)**

12. (a) Find the main dimensions and the number of poles of a 37 kW, 230 V, 1400 rpm shunt motor, so that a square pole face is obtained. The average gap density is 0.5 wb/m^2 and the ampere conductors per meter are 22000. The ratio of pole arc to pole pitch is 0.7 and the full load efficiency is 90%. **(16)**

OR

(b) (i) Derive the output equation of a dc machine and point out the salient features. **(8)**

(ii) State and explain the factors which govern the choice of specific magnetic loading in a DC machine. **(8)**

13. (a) (i) Derive the output equation of three phase transformer. **(8)**

(ii) State and explain the different methods of cooling the transformer. **(8)**

OR

(b) A 250 kVA, 6600/400 V, 3 phase core type transformer has a total loss of 4800 Watts on full load. The transformer tank is 1.25 m in height and 1 m × 0.5 m in plan. Design a suitable scheme for cooling tubes if the average temperature rise is to be limited to 35 degree C. The diameter of the tube is 50 mm and are spaced 75 mm from each other. The average height of the tube is 1.05 m. **(16)**

14. (a) Determine the approximate diameter and length of stator core, the number of stator slots and the number of stator conductors for a 11 kW, 400 V, 3 phase, 4-pole, 1425 rpm, delta connected induction motor. Bav = 0.45 wb/sq.m, ac = 23000 amp.cond/m, full load efficiency = 0.85, pf = 0.88, pole arc to pole pitch is 1 . The stator employs a double layer winding. **(16)**

OR

(b) Design a cage rotor for a 40 HP, 3 - phase, 400V, 50 Hz, 6 pole delta connected induction motor having a full load efficiency of 87% and a full load pf of 0.85. Take D = 33 cm and L = 17 cm. Stator slots = 54, Conductors per slot = 14. Assume suitably the missing data if any. **(16)**

15. (a) (i) State and explain the main factors which influence the choice of specific magnetic loading and specific electric loading in a synchronous machine. **(8)**

(ii) Derive output equation of synchronous machine. **(8)**

OR

(b) For a 250 kVA, 1100 V, 12 pole 500 rpm 3 – phase 3 alternator. Determine the air gap diameter, core length, Number of stator conductors, number of stator slots and cross section of stator conductors. Assuming average gap density as 0.6 wb/sq.m and specific electric loading of 30000 amp.cond/m. pole arc to pole pitch is 1.5. **(16)**

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

Question Paper Code : 80384

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

Sixth Semester

Electrical and Electronics Engineering

EE 6604 — DESIGN OF ELECTRICAL MACHINES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define specific electric loading.
2. What are the factors that affect the size of rotating machines?
3. Write the expression for output coefficient of DC machines.
4. Mention guiding factors for the selection of number of poles.
5. What is window space factor?
6. How heat is dissipated in a transformer?
7. List the advantages of using open slots.
8. Why induction motor is called as rotating transformer?
9. State the factors for separation of D and L for cylindrical rotor machine.
10. Determine the total number of slots in the stator of an alternator having 4 poles, 3 phase, 6 slots per pole for each phase?

PART B — (5 × 16 = 80 marks)

11. (a) (i) A stator of machine has a smooth surface, but its rotor has open type of slots with slot width equal to tooth width = 12 mm. and the length of airgap = 2mm. Find the effective length of airgap, if its Carter's coefficient = $1/(1 + 5(l_g/W_s))$. (8)

(ii) Calculate the apparent flux density at a particular section of tooth from the following data: Tooth width = 12 mm, slot width = 10 mm, gross core length = 0.32 m, No. of ventilating ducts = 4 with each 10 mm wide, real flux density = 2.2 wb/m^2. Permeability of teeth corresponding to real flux density = 31.4×10^{-6} H/m. Stacking factor = 0.9. (8)

Or

(b) (i) State and explain the advantages of hydrogen cooling as applied to turbo alternator. (8)

(ii) Calculate the mmf required for the airgap of a machine having core length 0.32 m including 4 ducts of 10 mm each. Pole arc = 0.19 m, slot pitch = 65.4 mm, slot opening = 5 mm, airgap length = 5 mm. flux per pole = 52 mwb. Given Carter's coefficient is 0.18 for opening/gap = 1 and is 0.28 opening per gap = 2. (8)

12. (a) Explain the procedure for the selection of number of poles in dc machine. (16)

Or

(b) For a preliminary design of a 50 HP, 230V, 1400 rpm, dc shunt motor. Calculate the armature diameter and core length, the number of poles and peripheral speed. Take Bav = 0.5 wb/sq.m, ac/m = 25000, Efficiency = 0.9. (16)

13. (a) Estimate the main dimensions including winding conductor area of a 3-phase delta-star core type transformer rated at 300 kVA, 6600/440 V. 50 Hz. A suitable core with 3 — steps having a circumscribing circle of 0.25m diameter and leg spacing of 0.4m is available. Emf per turn 8.5 V, Current density = 2.5 A/mm sq, Kw = 0.28, stacking factor S_f = 0.9. (16)

Or

(b) The tank of 1250 kVA natural oil cooled transformer has the dimensions length, width and height as $0.65 \times 1.55 \times 1.85$ m respectively The load loss = 13.1 kW, loss dissipation due to radiations 6 W/m.sq-0 C, loss dissipation due to convection = 6.5 W/m.sq-0 C, improvement in convection due to provision of tubes = 40%, temperature rise is 40 deg C, length of each tube is 1 m, dia of each tube is 50 mm. Find the number of tubes for this transformer. Neglect the top and bottom surface of the tank as regards the cooling. (16)

14. (a) (i) Derive the expression for output equation of induction motor. (6)

(ii) Derive the expressions for design of rotor and end rings of squirrel cage. (10)

Or

(b) Calculate the magnetizing current of a 450 V, 4 pole, 3 phase, 50 Hz, induction motor having the following data. No of stator slots = 36, No. of stator conductors/slot = 30, stator bore diameter = 13 cm, Axial length of stator = 13 cm, effective airgap length = 0.1 cm, winding is full pitched , phase spread angle is 60°, gap contraction factor = 1, Assume that the iron loss has infinite permeability. (16)

15. (a) (i) Explain the construction of synchronous machine with neat diagrams. (8)

(ii) Discuss the choice of specific magnetic loadings of synchronous machines in detail. (8)

Or

(b) A 100 kVA, 3300V, 50 Hz, 300 rpm, 3 phase alternator has 180 slots with 5 conductors per slot, Single layer winding with full pitched coil is used. The winding is star connected with one circuit per phase. Determine the specific electric and magnetic loading, if the stator bore is 2.0 m and the core length is 0.4 m. Using the same loading, determine corresponding data for a 1250 kVA, 3300 V, 50 Hz, 250 rpm, 3 phase star connected alternator having 2 circuits per phase. The machines has 60° phase spread. (16)

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

Question Paper Code : 57305

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

Sixth Semester

Electrical and Electronics Engineering

EE 6002 – POWER SYSTEM TRANSIENTS

(Regulations 2013)

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

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What are the causes for transients ?
2. Draw the TRV wave form across the circuit breaker following the interruption of fault current.
3. Define current chopping.
4. Draw the resistance switching circuit.
5. Give the measurement details of induced voltage on overhead lines due to lightning.
6. What is the significance of tower footing resistance ?
7. Draw the diagrams of meeting of two positive current waves in opposite directions.
8. Draw the neat sketch of Bewley's Lattice diagram.
9. Write an expression for amplitude of the over voltage with circuit diagram during the load rejection.
10. Write a short note on EMTP.

PART – B (5 × 16 = 80 Marks)

11. (a) Explain the double frequency transient in a power system with a circuit diagram, wave forms and expressions.

OR

(b) Briefly explain the importance of study of transients in planning.

12. (a) (i) Explain load switching with equivalent circuit and wave forms. **(8)**

(ii) Explain in detail 'ferro resonance' with circuit and wave form diagrams. **(8)**

OR

(b) Explain capacitance switching with circuit and waveforms showing the effect of source regulation, one and multiple restrikes.

13. (a) (i) Discuss in detail about the lighting flash parameters. **(10)**

(ii) Differentiate between direct and indirect lightning strokes. **(6)**

OR

(b) (i) What are the factors that contribute to good line design? Discuss in detail. **(8)**

(ii) How the ground wires protect the transmission line from lightning transients ? Explain. **(8)**

14. (a) Describe the transient response of systems with series and shunt distributed parameters.

OR

(b) Derive the reflection and refraction coefficients of a travelling wave with diagrams.

15. (a) Discuss in detail about the kilometric fault with necessary diagrams, expressions and voltage and recovery voltage wave forms.

OR

(b) Explain the voltage transients on closing and reclosing of lines and switching surges on integrated system.

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

Question Paper Code : 80357

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

Sixth Semester

Electrical and Electronics Engineering

EE 6002 — POWER SYSTEM TRANSIENTS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the need for study of transients in a power system.
2. Classify transients based on its frequency.
3. Define current chopping.
4. What is meant by resistance switching?
5. Define isokeraunic level or thunderstorm days?
6. What is ground wire?
7. What are the damages caused by the travelling waves?
8. Define crest and front of a travelling wave.
9. What is meant by kilometric fault?
10. Write the network calculation to model a transmission network of EMTP.

PART B — (5 × 16 = 80 marks)

11. (a) Examine the sources of transients? Also explain how transients affect the power systems.

Or

(b) Explain the concept of double frequency transients in power system.

12. (a) Write short notes on (i) Ferro resonance (ii) current chopping.

Or

(b) What is meant by current suppression? Explain the concept in an unloaded transformer with relevant wave forms.

13. (a) Explain the mechanism of lightning discharge and concept of tower footing resistance.

Or

(b) Sketch the characteristics of lightning strokes and also discuss the parameters of lightning flash.

14. (a) Explore the steps involved in Bewely's lattice diagram construction with an example.

Or

(b) Discuss transient response of systems with series and shunt lumped parameters and distributed lines.

15. (a) Describe in detail about the causes of over voltages due to various faults occurring in a Power System.

Or

(b) Examine the computation of Transients in power system using EMTP.

ANNA UNIVERSITY, 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	
4	Any special marking in the answer script by the candidate.	
5	The candidate communicating with neighboring 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	
9	The Candidate facilitating the other candidate(s) to copy from his /her answer script	
10	The candidate possessing any	Invalidating the examinations of the subject

	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.	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.
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).	
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: 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. 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

20	The candidate possessing the answering script of another candidate	arrears –subjects registered by the 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: 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. 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: 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 student is permitted to appear for the examination in all the arrears-subjects up to the last semester during the debarred period. if the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for four subsequent semesters.
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.	
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 actionagainst 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 theexaminations 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

College / Department norms

OD norms for Students

1. HODs are permitted to grant On Duty for those students attending events like paper presentation in student technical symposium, paper presentation in National / International Conferences, participating in quiz programme, project contest, workshops, placement programmes, seminar, sports etc.

2. Students should submit the filled in OD form, signed by student counselor or class coordinator to the concerned HODs (Second, Third and Final year students of B. E / B. Tech degree courses, and all PG courses). Such requisition should be submitted at least a day before availing the OD.

3. Students should submit the evidence for attending the event (copies of Certificate of attendance, Train Ticket, Bus ticket etc.) within one week after the OD applied, failing which the OD requisition submitted will be cancelled.

4. Students should submit parents undertaking, in case of the students attending the above events, other than the local colleges (beyond 50 km). Girls students should be accompanied by the parents, in case of their participation in the events as listed above, other than the local colleges (beyond 50 km).

5. Students should maintain discipline while attending events in other colleges. It is the responsibility of the students and the parents to maintain discipline throughout, while attending the events as listed above in other colleges. Indiscipline activities, if any, as reported by other colleges, the college will take necessary discipline action leading to suspension of the students from the college. Such reports will be communicated to Anna University and such students will not be permitted to write the Anna University Examination, till the clearance obtained from the college concerned and Anna University. Hence students are to be cautious while attending such events as listed above.

6. It is the responsibility of the students to check whether the OD applied was approved and to check the college website whether the OD applied was properly marked. Discrepancy, if any, should be reported within 10 days (in written to HOD), otherwise the OD applied will not be considered.

7. HODs / class coordinator / student counselors / staff recommending the students to apply for paper presentation, to ensure that the papers are reviewed properly, and to assure that quality paper is submitted based on student's own contribution (they should check paper submitted are not copied from internet, repeated work, plagiarismetc.).

8. If the students are not physically presented in the class, they should be marked as absent, even though he or she attending a program inside the college. He or She should get prior permission from the staff concerned while attending such programme. However, he or she should submit a letter to the concerned staff to give attendance before attending such programme.

9. For calculation of internal assessment mark, student's attendance including OD applied will be considered. Hence students should request the concerned staff members to grant OD and such OD requisition should be updated in the concerned faculty attendance cum assessment record (within 10 days after availing OD).

10. HODs may assign the department faculty / clerk / Lab assistant for proper filing of the OD applied by the students for future reference.

11. First year students are not to be granted OD, unless it is extremely essential.

12. Attendance, OD of students are valuable records for future reference, all faculty and HODs are to ensure that such attendance and OD are properly registered / recorded so as to avoid any kind of discrepancy.

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

2. **INFRASTRUCTURE**

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

3. STAFF

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

4. RESEARCH AND DEVELOPMENT

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

5. STUDENTS

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

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Placement Activity – Remainder

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

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

All India Installed Capacity (in MW) of Power Stations

This is a **list of states and territories of India by installed capacity of power utilities** with electricity generation mode break-up

as on **30 June 2016** with figures in Megawatts.

Revised

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

SOUTHERN REGION

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

(As on 30.06.2016)

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	1758.87	89.50	5169.68
	Private	2990.00	3074.11	16.97	6081.08	0.00	0.00	2911.71	8992.79
	Central	1473.30	0.00	0.00	1473.30	127.16	0.00	0.00	1600.46
	Sub-Total	**7549.21**	**3309.51**	**16.97**	**10875.69**	**127.16**	**1758.87**	**3001.21**	**15762.94**
Telangana	State	4806.59	0.00	0.00	4806.59	0.00	2135.66	0.00	6942.25
	Private	270.00	1570.89	19.83	1860.72	0.00	0.00	895.29	2756.01
	Central	1721.88	0.00	0.00	1721.88	148.62	0.00	0.00	1870.50
	Sub-Total	**6798.47**	**1570.89**	**19.83**	**8389.19**	**148.62**	**2135.66**	**895.29**	**11568.76**
Karnataka	State	4220.00	0.00	127.92	4347.92	0.00	3599.80	155.33	8103.05
	Private	2060.00	0.00	106.50	2166.50	0.00	0.00	4960.05	7126.55
	Central	1628.46	0.00	0.00	1628.46	475.86	0.00	0.00	2104.32
	Sub-Total	**7908.46**	**0.00**	**234.42**	**8142.88**	**475.86**	**3599.80**	**5115.38**	**17333.92**
Kerala	State	0.00	0.00	159.96	159.96	0.00	1881.50	138.92	2180.38
	Private	0.00	174.00	0.00	174.00	0.00	0.00	116.55	290.55
	Central	1038.69	359.58	0.00	1398.27	228.60	0.00	0.00	1626.87
	Sub-Total	**1038.69**	**533.58**	**159.96**	**1732.23**	**228.60**	**1881.50**	**255.47**	**4097.80**
Tamil Nadu	State	4770.00	524.08	0.00	5294.08	0.00	2182.20	122.70	7598.98
	Private	2950.00	503.10	411.66	3864.76	0.00	0.00	9654.60	13519.36
	Central	4155.10	0.00	0.00	4155.10	986.50	0.00	0.00	5141.60
	Sub-Total	**11875.10**	**1027.18**	**411.66**	**13313.94**	**986.50**	**2182.20**	**9777.30**	**26259.94**
NLC	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Central	100.17	0.00	0.00	100.17	0.00	0.00	0.00	100.17
	Sub-Total	**100.17**	**0.00**	**0.00**	**100.17**	**0.00**	**0.00**	**0.00**	**100.17**
Puducherry	State	0.00	32.50	0.00	32.50	0.00	0.00	0.00	32.50
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
	Central	249.32	0.00	0.00	249.32	52.78	0.00	0.00	302.10
	Sub-Total	**249.32**	**32.50**	**0.00**	**281.82**	**52.78**	**0.00**	**0.03**	**334.63**
Central - Unallocated		1523.08	0.00	0.00	1523.08	300.48	0.00	0.00	1823.56
Total (Southern Region)	State	16882.50	791.98	287.88	17962.36	0.00	11558.03	506.45	30026.84
	Private	8270.00	5322.10	554.96	14147.06	0.00	0.00	18538.23	32685.29
	Central	11890.00	359.58	0.00	12249.58	2320.00	0.00	0.00	14569.58
	Grand Tota	**37042.50**	**6473.66**	**842.84**	**44359.00**	**2320.00**	**11558.03**	**19044.68**	**77281.71**

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

Advanced Training Institute

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

Annual Training calendar 2016 – 2017

(Regular Scheduled Short Term skill training programme)

Duration: 1 – 2 weeks

	Course Code	Course Title	Duration (Week)	Date From	Date To
GROUP:1		**ELECTRICAL CONTROL MAINTENANCE**			
	01.01	Protective Relays , Circuit Breakers, & Switch Gear Protection	01	04-04-2016	08-04-2016
				09-05-2016	13-05-2016
				20-06-2016	24-06-2016
				08-08-2016	12-08-2016
				12-09-2016	16-09-2016
				24-10-2016	28-10-2016
				19-12-2016	23-12-2016
				06-02-2017	10-02-2016
				13-03-2017	17-03-2017
	01.02	Operation and Maint. Of Power Transformers	01	11-04-2016	15-04-2016
				16-05-2016	20-05-2016
				27-06-2016	01-07-2016
				01-08-2016	05-08-2016
				29-08-2016	02-09-2016
				31-10-2016	04-11-2016
				05-12-2016	09-12-2016
				26-12-2016	30-12-2016
				13-02-2017	17-02-2017
				20-03-2017	24-03-2017
	01.03	Trouble shooting & Maintenance of Electric Motors	01	25-04-2016	29-04-2016
				23-05-2016	27-05-2016
				11-07-2016	15-07-2016
				19-09-2016	23-09-2016
				17-10-2016	21-10-2016
				07-11-2016	11-11-2016
				02-01-2017	06-01-2017
				20-02-2017	24-02-2017
	01.04	Operation & Control of Industrial AC/DC Motors	01	02-05-2016	06-05-2016
				30-05-2016	03-06-2016
				13-06-2016	17-06-2016
				18-07-2016	22-07-2016
				26-09-2016	30-09-2016
				21-11-2016	25-11-2016
				09-01-2017	13-01-2017
				27-02-2017	03-03-2017
	01.05	Electrical Safety at Work Place and First Aid	01	02-05-2016	06-05-2016
				06-06-2016	10-06-2016
				25-07-2016	29-07-2016
				03-10-2016	07-10-2016
				28-11-2016	02-12-2016
				16-01-2017	20-01-2017
				06-03-2017	10-03-2017
GROUP:1		**ELECTRONIC CONTROL MAINTENANCE**			
Course Code		Course Title	Duration (Week)	Date From	Date To
02.01		Maintenance and Servicing of SMPS Inverter & UPS	02	11-07-2016	22-07-2016
				02-01-2017	13-01-2017
02.02		Power Electronics and its Industrial Applications	02	04-04-2016	15-04-2016
				26-09-2016	07-10-2016
				27-02-2017	10-03-2017
02.03		Industrial Drives & Automation using Siemens PLC	02	16-05-2016	27-05-2016
				06-06-2016	19-06-2016
				23-01-2017	03-02-2017
02.04		SIEMENS S7 400 PLC Step 7 (Level- 1)	01	25-04-2016	29-04-2016
				29-08-2016	02-09-2016
				06-02-2017	10-02-2017
02.05		SIEMENS S7 400 PLC WinCC SCADA (Level- 2)	01	02-05-2016	06-05-2016
				05-09-2016	09-09-2016
				13-02-2017	17-02-2017
02.06		SIEMENS S7 400 PLC TIA Portal (Level- 1)	01	16-05-2016	20-05-2016
				27-06-2016	01-07-2016
				08-08-2016	12-08-2016
				28-11-2016	02-12-2016
				23-01-2017	27-01-2017

List of PSUs through GATE Exam

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

Lists of TPO 10 software companies to offer jobs in India

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

Lists of TOP 10 core companies to offer Electrical jobs

1 | Bharat Heavy Electricals Ltd.
Corporate office – New Delhi, India | **Establishment** – 1964 |
Business – Electrical equipments | **Website** – *www.bhel.com* |
Bharat Heavy Electricals Ltd established in the year 1964 is a leading power plant equipment manufacturer and has expertise in engineering, manufacture, construction, testing, designing and servicing of various products of the core sectors such as defense, power, industries etc. BHEL is among the top electrical companies in India and which has total 16 manufacturing divisions and four regional offices. It is currently operating more than 150 project sites across India and abroad.

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 EasunReyrolle 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 – RueilMalmaison, France | **Establishment** – 1981 |
Business – Electric Equipment | **Website** – *www.schneider-electric.co.in* |

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

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

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

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

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

List of Core Companies to offer Electrical Jobs in India

Types of Electrical Core Companies

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

Electrical motors and Generators

1. Ajay Engineers http://www.ajayengineers.com
2. All India Electric Motor Manufacturers' Association http://www.aiemma.com/
3. Aqua Brand Submersible Sewage Pump http://www.aquapumps.com
4. Compact http://www.compactlighting.net
5. Crown Electric Company http://www.crown-gear.com
6. Lawkim http://lawkimindia.com/
7. MMC Electric Company http://www.dynafluxindia.com
8. MS Enterprises and Trimega Power Corporation http://www.msein.com

9. National Electrical Industries - Ahmedabad. http://www.elmomachines.com/
10. Numeric Power Systems http://www.numericups.com
11. Pranshu Electricals http://www.pranshuelec.com/
12. Reva Industries http://www.reva.com/
13. Rotomag Motors & Controls Pvt. Ltd. http://www.rotomag.com
14. Rudrashakti Electronics http://www.rudrashakti.com
15. Sanjay Diesels - Diesel Generating Sets. http://www.dgsets.com/
16. Venus Industrial Corporation http://www.venusind.com/
17. A-One Industries. http://www.aoneindustries.com/contactus.html

Consultancy (Electrical Engineering)

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

Electrical appliances

1. Ajay Industrial Corporation http://www.ajayindustrial.com/
2. Ankit Electricals http://www.ankitelectricals.com
3. A.P.C. System & Products Pvt. Ltd http://www.apcsp.com
4. Arka Trading & Services http://www.mfdplaza.in
5. Bajaj Electricals Ltd - Part of Bajaj Group. http://www.bajajelectricals.com/
6. Electroil http://www.electroil.com/
7. Eveready Industries India Ltd http://www.evereadyindustries.com/
8. Graftecindia 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. PragatiElectrocom 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. SanghiYantraUdyog 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. ArihantEnterprises : 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. LitrayLighting : 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. AkshOptifibre 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. SurbhiTelelink 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

MOCK EMAIL WRITING QUESTIONS

Directions:

1. Use all the phrases given
2. Minimum words should be 50 otherwise your email cannot be validated
3. Addressing and signing should be done as in the question given.
4. Common grammatical rules, punctuation should be according to standard English.
5. You can use your own phrases along with the phrases given.

Question : 1

As a member of your residential society, write an email to inspector of local Police station, Mr.Sharma, informing him about miscreants who ride their bikes rashly every evening outside your society. Sign the email as william.

residential area - ride - rashly - children - play - elderly - walk - grocery shop - across the road - dangerous - accidents - nuisance - action - immediately.

Sample Answer:

Dear Mr.Sharma,

We are the residents of Siddartha Nagar. We would like to bring to your notice that a few guys are riding their bikes very rashly in the evening hours in the main road of the colony. As you know that this is the time when children play on the road and elderly go for an evening walk. Also there is a grocery shop across the road and many housewife's used to cross the road to buy any groceries. In the recent times we observed that due this rash driving many accidents were happened and several injured. This is creating a constant nuisance for all. So we would like to request you to take necessary action to curb these activities.

Thanking you
Yours sincerely,
William.

Question 2:

As a recent buyer of their car, write an email to the Manager of Smart Automotive company, Mr.Ahmed, regarding the poor quality of service facility available in the city. Sign the email as Chopra.

Outline:

very few - service centers - complaints - pending problems - maintenance - cost - time - delivery - increase - customer satisfaction

Dear Mr. Ahmed

I recently bought Fiat palio from "Sridhar Fiat show room" in Nagole. Recently I faced small problem with car AC and bought the car for maintenance. But to my utter surprise, the howroom staff told me that service is not available in their showroom and they asked me to take the car to nearby service center. I found that there are very few service centers available compared to sales showrooms, and there are many complaints regarding this. This in turn is causing many pending problems and increased maintenance cost, time and delivery time. I would like to suggest you that if more service centers are opened in the city, customer satisfaction also goes up which finally converts into more sales.

Thanks and Regards
Chopra

Question 3:

As a former student, write an email to your professor, Mr.Matt, thanking her for teaching and guidance that contributed to your overall development. Sign the email as peter.

Outline:
Successful - Placed - grateful - help - advice - grooming - values - shaping my future - sincere - professional

Dear Mr.Matt
I am very happy to tell you that I got successful in the recently conducted campus placement drive at my college. I am placed with TCS. I am extremely grateful for your help regarding my preparation. More over your advice regarding personality development helped for my personal grooming. In addition to that, your style of teaching inculcates not only those skills related to professional success but also for developing values which I believe helps for shaping my career. Once again I would like to thanks for your sincere and professional help.
with warm regards
Peter.

Question 4:
As an intern at ABC consulting Pvt.Ltd, write an email to your internship Project Manager, Mr.Ramesh, informing about the progress that you are making and some difficulties that you are encountering. Sign the email as Ben.

Outline:
Thank - challenging - progress - tight schedule - support - report - analytics - guidance - access - doubt - requirements - design.

Dear Mr.Ramesh
Thank you for allotting a challenging project for my internship. I am making steady progress and learning many new things. The project is due next month and we are on tight schedule. I need some additional support with regard to the reporting of Analytics. Your guidance helped me access the database with ease but I have several doubts regard to the requirements of the design. But I am facing little problem in reporting.

Thanks and regards
Ben

Latest Placement Paper
Aptitude Test consists of 35 questions and here we have been given NegativeMarking of 0.33 per wrong answer. At the selection the bench mark was 22marks.It's an easy test where more than 25 questions can be cleared easilyComing to questions first search for the numerical data in the questions and just
the logic how the questions can be solved

1. Two bowls are taken, one contains water and another contains tea.One spoon ofwater is added to second bowl and mixed well, and a spoon of mixture is takenfrom second bowl and added to the second bowl. which statement will hold goodfor the above?
(Ans: second liquid in first bowl is smaller than the first mixture in second bowl)
2. Which is the smallest no divides 2880 and gives a perfect square?
a.1 b.2 c.5 d.6

Ans: c

3. Form 8 digit numbers from by using 1, 2,3,4,5 with repetition is allowed andmust be divisible by4?
a.31250 b.97656 c.78125 d.97657
Ans: c

4. One problem on (a3-b3)/(a2+ab+b2)
Ans: 'a-b'

5. Rearrange and categorize the word 'RAPETEKA'?
Ans: bird

6. In school there are some bicycles and 4wheeler wagons.one Tuesday there are190 wheels in the campus. How many bicycles are there?
Ans: 15

7. Key words in question (Fibonacci series, infinite series, in the middle of thequestion one number series is there….I got the series 3 12 7 26b 15?
Ans:54
(Logic: 3*2+1=7 12*2+2=26
7*2+1=15 26*2+2=54)

8. A father has 7 penny's with him and 1 water melon is for 1p, 2chickoos for 1p, 3grapes foe 1p.he has three sons. How can he share the fruits equally?
Ans: 1 watermelon,2chickoos,1grape

9. A lies on mon, tues, wed and speak truths on other days, B lies on thur, fri, satand speaks truths on other days.. one day a said I lied today and B said I too liedtoday. What is the day?

10. Man, Bear, North, South, walks.
Ans: White

11. (1/2) of a number is 3 times more than the (1/6) of the same number?
Ans: 9

12. There are two pipes A and B. If A filled 10 liters in hour B can fills 20 liters insame time. Likewise B can fill 10, 20, 40, 80,160….if B filled in (1/16) th of a tankin 3 hours, how much time will it take to fill completely?
Ans:7 hours

13. KEYWORDS:T.Nagar,Chennai,1-100,prime numbers b/n 140-180,How many 2'sare there?
Ans: 20 (Not only 2's ,1's,3's,4's,5's,6's,7's,8's,9's,0's also 20)

14. One question has last part like difference between two terms is 9 and productof two numbers is 14, what is the squares of sum of numbers?
Ans:109

15. A man is standing before a painting of a man and he says I have no bro and sisand his father is my father's son?
Ans: His son

16. What is the value of [(3x+8Y)/(x-2Y)]; if x/2y=2?
Ans:10 {the numerical may change)

17. A pizza shop made pizzaswith to flavours.in home there are 'N' different flavors, in that 'M' flavors are taken to made pizza in how many ways they can arrange?
(Logic: NcM)

18. One grandfather has three grandchildren, two of their age difference is 3,eldest child age is 3 times youngest child's age and eldest child's age is two timesof sum of other two children. What is the age of eldest child?
Ans:15

19. In a market 4 man are standing. the average age of the four before 4years is45, after some days one man is added and his age is 49.what is theaverage weight of all?
Ans: 49

20. KEYWORDS: one organization, material labor and maintenance are in the ratioof 4:6:7, the material cost is:100,what is the total cost?
Ans: 425

21. KEYWORDS: density, reluctance, sensitivity, voltage, current, what is theresistance Formula is "R=V/I"

22. KEYWORDS: Sports readers,10 tables,4chairs per table, each table hasdifferentnumber of people then how many tables will left without at least oneperson?

Ans : 6

23. KEYWORDS: Die, card, coin, b/n 2 to 12
24. Ans: All are equal

24. In a school for a student out of a 100 he got 74 of average for 7 subjects andhe got 79 marks in 8th subject. what is the average of all the subjects?

Ans: 74.625

25. In a question, last part has, the ages of two people has the ratio of 6:6 and byadding the numbers we get 44, after how many years the ratio would be 8:7?

Ans: 8

26. Two years before Paul's age is 2times the Alice age and the present age ofPaul is 6times the Alice. what is the presents Paul's age?

Ans (3years)

27. One train travels 200m from A to B with 70 km/ph. and returns to A with80kmph, what is the average of their speed?

Q1) Given a collection of points P in the plane, a 1-set is a point in P that can be separated from the rest by a line, .i.e the point lies on one side of the line while the others lie on the other side. The number of 1-sets of P isdenoted by n1(P). The minimum value of n1(P) over all configurations P of 5 points in the plane in general position (i.e. no three points in P lie on a line) is

a) 3
b) 5
c) 2

Q2) Paul the octopus who has been forecasting the outcome of FIFA world cup matches with tremendousaccuracy has now been invited to predict ICC world cup matches in 2011. We will assume that the world cup

contenders have been divided into 2 groups of 9 teams each. Each team in a group plays the other teams in the group. The top two teams from each group enter the semifinals (after which the winner is decided byknockout). However, Paul has a soft spot for India and when India plays any team, Paul always backs India. Alas, his predictions on matches involving India are right only 2 out of 3 times. In order to qualify for the semifinals, it is sufficient for India to win 7 of its group matches. What is the probability that India will win the ICC world cup?

a) (2/3)^10
b) (2/3)^9 + 8/3 * (2/3)^9
c) 8/3 * (2/3)^9
d) (2/3)^10 + 8/3*(2/3)^9

Q3) A toy train produces at least 10 different tunes when it moves around a circular toy track of radius 5 meters at 10 meters per minute. However, the toy train is defective and it now produces only two different tunes at random. What are the odds that the toy train produces 4 consecutive music tunes of the same type?

a) 1 in 16
b) 1 in 4
c) 1 in 8

Q4) A number when divided by D leaves a remainder of 8 and when divided by 3D leaves a remainder of 21. What is the remainder left, when twice the number is divided by 3D?

a) 13
b) cannot be determined
c) 3

d) 42 **(solution:c)**

Q5) Six friends decide to share a big cake. Since all of them like the cake, they begin quarreling who gets tofirst cut and have a piece of the cake. One friend suggests that they have a blindfold friend choose from well
shuffled set of cards numbered one to six. You check and find that this method works as it should be simulating a fair throw of a die. You check by performing multiple simultaneous trials of picking the cards blindfold andthrowing a die. You note that the number shown by the method of picking up a card and throwing a real world die, sums to a number between 2 and 12. Which total would be likely to appear more often – 8,9 or 10?
a) 8
b) All are equally likely
c) 9
d) 10
Q6) One day Alice meets pal and byte in fairyland. She knows that pal lies on Mondays, Tuesdays and Wednesdays and tells the truth on the other days of the week byte, on the other hand, lies on Thursdays,Fridays and Saturdays, but tells the truth on the other days of the week. Now they make the followingstatements to Alice – pal. Yesterday was one of those days when I lie byte. Yesterday was one of those days
when I lie too. What day is it?
a) Thursday
b) Tuesday
c) Monday
d) Sunday **(solution:a)**
Q7) A car manufacturer produces only red and blue models which come out of the final testing area completely at random. What are the odds that 5 consecutive cars of the same color will come through the test area at any one time?
a) 1 in 16
b) 1 in 125
c) 1 in 32
d) 1 in 25
Q8) Alok is attending a workshop "How to do more with less" and today's theme is *Working with fewer digits.* The speakers discuss how a lot of miraculous mathematics can be achieved if mankind(as well as womankind) had only worked with fewer digits. The problem posed at the end of the workshop is. How many four digit numbers can be formed using the digits 1, 2,3,4 ,5 (but with repetition) that are divisible by 4?
Can you help Alok find the answer?
a) 100 b) 125 c) 75 d) 85
Q9) Rearrange the following letters to make a word and choose the category in which it Ms RAPETEKA
a) Bird
b) Vegetable
c) City
d) Fruit
Q10) On planet korba, a solar blast has melted the ice caps on its equator. 9 years after the ice melts, tinyplanetoids called echina start growing on the rocks. Echina grows in the form of circle, and the relationshipbetween the diameter of this circle and the age of echina is given by the formula $d = 4*\sqrt{(t-9)}$ for $t \geq 9$where d represents the diameter in mm and t the number of years since the solar blast. Jagan recorded the radius of some echina at a particular spot as 7mm. How many years back did the solar blast occur?
a) 17
b) 21.25
c) 12.25
d) 12.06 **(solution:b)**

Q11) In the reading room of a library, there are23 reading spots. Each reading spot consists of a round tablewith 9 chairs placed around it. There are some readers such that in each occupied reading spot there aredifferent numbers of readers. If in all there are 36 readers, how many reading spots do not have even a single reader?

a) 8

b) None

c) 16

d)15 **(solution:d)**

Q12) Ferrari S.P.A is an Italian sports car manufacturer based in Maranello, Italy. Founded by Enzo Ferrari in1928 as ScuderiaFerrari , the company sponsored drivers and manufactured race cars before moving intoproduction of street-legal vehicles in 1947 as Feraari S.P.A. Throughout its history, the company has been noted for its continued participation in racing, especially in Formula One where it has employed great success.Rohit once bought a Ferrari . It could go 4 times as fast as Mohan's old Mercedes. If the speed of Mohan's Mercedes is 46 km/hr and the distance traveled by the Ferrari is 953 km, find the total time taken for Rohit to drive that distance.

a) 20.72

b) 5.18

c) 238.25

d) 6.18 **(solution:b)**

Q13) A sheet of paper has statements numbered from 1 to 70. For all values of n from 1 to 70. Statement n says ' At least n of the statements on this sheet are false. ' Which statements are true and which are false?

a) The even numbered statements are true and the odd numbered are false.

b) The odd numbered statements are true and the even numbered are false.

c) The first 35 statements are true and the last 35 are false.

d) The first 35 statements are false and the last 35 are false.

(solution:d)

Q14) Middle – earth is a fictional land inhabited by Hobbits, Elves, dwarves and men. The Hobbits and theElves are peaceful creatures who prefer slow, silent lives and appreciate nature and art. The dwarves and the men engage in physical games. The game is as follows . A tournol is one where out of the two teams that play a match, the one that loses get eliminated. The matches are played in different rounds where in every round , half of the teams get eliminated from the tournament. If there are 8 rounds played in a knock-out tournol how many matches were played?

a) 257

b) 256

c) 72

d) 255 **(solution:d)**

Q15) A research lab in Chennai requires 100 mice and 75 sterilized cages for a certain set of laboratoryexperiments . To identify the mice, the lab has prepared labels with numbers 1 to 100 , by combining tagsnumbered 0 to 9. The SPCA requires that the tags be made of toxin-free material and that the temperature of the cages be maintained at 27 degree Celsius. Also , not more than 2 mice can be caged together and each cage must be at least 2 sq.ft in area. The 5 experiments to be conducted by lab are to be thoroughly documented and performed only after a round of approval by authorities. The approval procedure takes around 48 hours. How many times is the tag numbered '4' used by the lab in numbering these mice?

a) 9

b) 19

c) 20

d)21 **(solution:b)**

Q16) There are two water tanks A and B, A is much smaller than B. While water fills at the rate of one litreevery hour in A, it gets filled up like 10, 20, 40, 80, 160... in tank B.(At the end of first hour, B has 10

litres ,second hour it has 20, and so on). If tank B is 1/32 filled after 21 hours, what is the total duration required to fill it completely?
a) 26 hrs
b) 25 hrs
c) 5 hrs
d)27 hrs**(solution:a)**
Q17) Consider two tumblers, the first containing one litre of coffee. Suppose you take one spoon of water out of the first tumbler and pour it into the second tumbler. After moving you take one spoon of the mixture from the second tumbler and pour it back into the first tumbler. Which one of the following statement holds now?
a) There is less coffee in the first tumbler than water in the second tumbler.
b) There is more coffee in the first tumbler than water in the second tumbler
c) There is as much coffee in the first tumbler as there is water in the second tumbler
d) None of the statements holds true.
Q18) Francois Pachet , a researcher at Sony Computer Science laboratories is also a jazz musician. He decided to build a robot able to improvise like a pro. Named Continuator, the robot can duet with a live musician in real- time. It listens to a musical phrase and then computes a complementary phrase with the same playing style. If the cost of making the robot is divided between and then computes a complementary phrase with the same playing style. If the cost of making the robot is divided between materials,labour and overheads in the ratio of 4:6:2.If the materials cost $108. the cost of the robot is
a) $270
b) $324
c) $216
d) $ 648 **(solution:b)**
Q19) A lady has fine gloves and hats in her closet- 18 blue- 32 red and 25 yellow. The lights are out and it istotally dark inspite of the darkness. She can make out the difference between a hat and a glove. She takes out anitem out of the closet only if she is sure that if it is a glove. How many gloves must she take out to make sureshe has a pair of each colour?
a) 50
b) 8
c) 60
d) 42
Q20) A man jogs at 6 mph over a certain journey and walks over the same route at 4 mph. What is his average speed for the journey?
a) 2.4 mph
b) 4 mph
c) 4.8 mph
d) 5 mph **(solution:d)**
Q21) Spores of a fungus, called late blight, grow and spread infection rapidly. These pathogens were responsible for the Irish potato famine of the mid-19th century. These seem to have attacked the tomato crops in England this year. The tomato crops have reduced and the price of the crop has risen up. The price has already gone up to $45 a box from $27 a box a month ago. How much more would a vegetable vendor need to pay tobuy 27 boxes this month over what he would have paid last month?
a) $27
b) $ 18
c) $45
d) $ 486
Q22) Given a collection of 36 points P in the plane and a point equidistant from all points in P, which of the following are necessarily true?
A. The points in P lie on a circle.
B. The distance between any pair of points in P is larger than the distance between X and a point in P

a) A and B
b) Neither A nor B
c) B only
d) A only

Q23) In the year 2002, Britain was reported to have had 4.3m closed – circuit television (CCTV) cameras – onefor every 14 people in the country. This scrutiny is supposed to deter and detect crime. In one criminal case, thepolice interrogates two suspects. The ratio between the ages of the two suspects is 6:5 and the sum of their agesis 6:5 and the sum of their ages is 55 years. After how many years will the ratio be 8:7.?

a) 11
b) 6
c) 10
d) 5

Q24) Susan made a block with small cubes of 8 cubic cm volume to make a block 3 small cubes long, 9 small cubes wide and 5 small cubes deep. She realizes that she has used more small cubes than she really needed. Sherealized that she could have glued a fewer number of cubes together to lock like a block with same dimensions,if it were made hollow. What is the minimum number of cubes that she needs to make the block?

a) 114
b) 135
c) 21
d) 71

Q25) Alok and Bhanu play the following coins in a circle game. 99 coins are arranged in a circle with each cointouching two other coin. Two of the coins are special and the rest are ordinary. Alok starts and the players taketurns removing an ordinary coin of their choice from the circle and bringing the other coins closer until theyagain form a (smaller) circle. The goal is to bring the special coins adjacentto each other and the first player to do so wins the game. Initially the special coins are separated by twoordinary coins O1 and O2. Which of the following is true ?

a) In order to win, Alok should remove O1 on his first turn.
b) In order to win, Alok should remove one of the coins different from O1 and O2 on his first turn.
c) In order to win, Alok should remove O2 on his first turn.
d) Alok has no winning strategy.

Tips for Effective Communication Have courage to say what you think.

Be confident in knowing that you can make worthwhile contributions to conversation. Take time each day to be aware of your opinions and feelings so you can adequately convey them to others. Individuals who are hesitant to speak because they do not feel their input would be worthwhile need not fear. What is important or worthwhile to one person may not be to another and may be more so to someone else.

Practice. Developing advanced communication skills begins with simple interactions. Communication skills can be practiced every day in settings that range from the social to the professional. New skills take time to refine, but each time you use your communication skills, you open yourself to opportunities and future partnerships.

Make eye contact. Whether you are speaking or listening, looking into the eyes of the person with whom you are conversing can make the interaction more successful. Eye contact conveys interest and encourages your partner to be interested in you in return.

- Use gestures. These include gestures with your hands and face. Make your whole body talk. Use smaller gestures for individuals and small groups. The gestures should get larger as the group that one is addressing increases in size.
- Manifest constructive attitudes and beliefs. The attitudes you bring to communication will have a huge impact on the way you compose yourself and interact with others. Choose

tohonest,patient, optimistic, sincere, respectful, and accepting of others. Be sensitive to other people's feelings, and believe in others' competence.

Develop effective **listening** skills: Not only should one be able to speak effectively, one must listen to the other person's words and engage in communication on what the other person is speaking about. Avoid the impulse to listen only for the end of their sentence so that you can blurt out the ideas or memories your mind while the other person is speaking.

- Enunciate your words. Speak clearly and don't mumble. If people are always asking you to repeat yourself, try to do a better job of articulating yourself in a better manner.
- Pronounce your words correctly. People will judge your competency through your vocabulary. If you aren't sure of how to say a word, don't use it.
- Use the right words. If you're not sure of the meaning of a word, don't use it. Grab a dictionary and start a daily habit of learning one new word per day. Use it sometime in your conversations during the day.
- Slow your speech down. People will perceive you as nervous and unsure of yourself if you talk fast. However, be careful not to slow down to the point where people begin to finish your sentences just to help you finish.

Developing Leadership Skills

No one is a born leader; everyone can develop leadership skills and everyone can benefit from using them. First, take time to honestly analyze yourself. Learn to understand yourself.

It's the first step to understanding others. Consider these important questions:

What kind of leader am I? One who helps to solve problems? A leader who helps people get along? How do others see me as a leader?

What are my goals, purposes, and expectations in working with this particular group? Identify areas for improvement.

Ask yourself these questions:

1. Do I try to be aware of how others think and feel?
2. Do I try to help others perform to the best of their abilities?
3. Am I willing to accept responsibility?
4. Am I willing to try new ideas and new ways of doing things?
5. Am I able to communicate with others effectively?
6. Am I a good problem solver?
7. Do I accept and appreciate other perspectives and opinions?
8. Am I aware of current issues and concerns on campus or in my community?

Then after analyzing your strengths and weaknesses -- take action

Devise a strategy for upgrading your skills. Here are a few strategies to consider:

1) Communicate effectively:

Effective communication is dialogue. Barriers are created by speaking down to people, asking closed questions that elicit yes or no answers, using excessive authority, and promoting a culture that depends on unanimity. If your focus is winning the argument or if you react defensively to criticism, you'll create fear of openness and hinder the organization's growth.

Try these steps to effective communication:

• Listen actively - ask open questions. Be genuinely interested in what other's say.

• Thank people for their openness -- stress how much you value it -- even if you don't like specifically what is being said.

• Point to areas of agreement before jumping on areas of disagreement - this reduces defensiveness; members wont fear being "attacked."

• Set aside your authority to create an atmosphere of partnership to reduce fear in group members.

• Promote a culture of constructive dissent - though not to the point of paralysis.

• Portray disagreement as simply a difference of opinion. Get rid of the "I'm right, you're wrong" attitude.
2) Encourage enthusiasm and a sense of belonging. Show:
• Friendliness: others will be more willing to share ideas if you're interested in them as people too.
• Understanding: everyone makes mistakes. Try to be constructive, tolerant and tactful when offering criticism.
• Fairness: equal treatment and equal opportunity lead to an equally good effort from all group members.
• Integrity: members will take tasks more seriously if you show that you're more interested in group goals than your own personal gain.
3) Keep everyone working toward agreed upon goals:
• Remind everyone of the group's purposes from time to time. It's easy to become too narrowly focused and lose sight of the larger goals.
• Provide encouragement and motivation, by showing your appreciation for good ideas and extra effort.
• Harmonize differences and disagreements between group members by stressing compromise and cooperation.
• Involve everyone in discussions and decisions, even if asking for opinions and ideas means a longer discussion.
4) Get to know the people around you Everyone has different abilities, wants, needs, and purpose in life.
To get along with others and get results, you need to get to know them.
• Interact with group members as often as possible. The only way to get to know someone is through direct personal contact.
• Become familiar with every member of your group. Take note of each person's unique qualities and characteristics.

5) Treat others as individuals
Put your knowledge and understanding of each group member to work!
• Be aware of expectations. Everyone expects something different: recognition, a chance to learn, a chance to work with other people, etc.
• Be creative. A repetitious routine can cause boredom. A successful leader thinks of new and better approaches to old ways of doing things.
• Provide rewards. Recognition by the group is a source of personal satisfaction and positive reinforcement for a job well done.
• Delegate responsibilities. If everyone shares the work, everyone can share pride in the group's accomplishments. Let each member know what's expected of him/her, available resources, deadlines, etc.
6) Accept responsibility for getting things done
• Take the initiative. Why stand around and wait for someone else to get things started? Set an example.
• Offer help and information. Your unique knowledge and skills may be just what's needed.
• Seek help and information. Ask for advice if you need it. This will encourage group involvement and help accomplish group goals.
• Make things happen. By being decisive, energetic, and enthusiastic, you can and will help get things done!
• Know when and how to say "no."
If your time and resources are already committed, turn down extra tasks, but do it nicely.
7) Problem solve in a step - by-step way
Whether you are faced with a decision to make or a conflict to resolve, following a logical approach will help.
1. State the problem as simply and clearly as possible.
2. Gather all relevant information and available resources.
3. Brainstorm as many ideas or solutions as you can think of (with others if possible).
4. Evaluate each idea or solution and choose the best one.
5. Design a plan for using your idea or solution. Include a timetable, assigned roles, and resources to be used.
6. Follow up on your plan by asking if your idea worked and why or why not.

K.L.N. College of Engineering.

How to prepare for Anna University Examinations.

Don't study just for passing the tests/exams. Ensure that you understood the concepts and you can explain/ demonstrate/justify/analyze/ answer/ argue/ design /implement/draw/develop any mathematical model, based on what you have learnt. If you are confident enough, you can successfully solve any question papers/technical interviews/competitive examinations at any time without fear/confusion/ delay. Remember that, you will be working in an environment, after graduation, where all the process/operation of machineries/equipment's are based on the basic scientific and engineering concepts what you have studied from first year to final year of your Engineering programme, where you are the only person to solve any problems aroused. You can't get away/escape from these. Hence, it is a lifelong learning, a wonderful experience.

Syllabus, books (at least 2-one Text books as prescribed in the syllabus, -one local author book) previous year question papers (atleast10), class notes, are your God/religion/food/ destiny/light. Ensure that you have studied all the contents of the syllabus, prepared correct answers for all questions in the AU question paper. Remember that ignoring any one word in the syllabus means you are losing 5 to 10 marks in each unit in the AU exams. Similarly, ignoring any one questions in the previous year question paper means you are losing 10 marks in each unit of AU exams. Don't expect that your Professor would cover 100% of the syllabus. Even if he/she has covered 100% of the syllabus don't think that he/she has covered 100% of each line in the syllabus. It is your responsibility to prepare 10% in excess of each lines in each units of the syllabus in addition to the contents taught by your Professors. This is possible by referring the books and the questions asked in the competitive exam books like GATE/TANCET/IES.

Plan your studies –right from the second week of the commencement of the classes till the semester examination is over. In a year, you will be attending the college only for 200 days (including theory/practical exams-8hours /day). You have 165 days (24 hours /day) away from the college. Prepare a time table from Monday-Friday. Take a rest on Saturday and Sunday. Allocate 3-4 hours in the evening for study.1-2 hours for completing assignments/observation/record note work. Remaining 2-3 hours for studying subjects A,B.(Mon),C,D(Tue)E,F(Wed), A,B(Thu),C,D(Fri),E,F(Sat or Sun).Each day, in addition to studying subjects for the current syllabus, you should refer competitive exam books (GATE/TANCET/IES/ Objective type questions –technical) corresponding to the current syllabus. This parallel preparation will ensure that you have prepared for state level and National level examinations there by you will be meeting the expectations of the Engineering Educational Objectives. Your preparation for AU examination should be vigorous (minimum), 15 days from the commencement of the exam and it should be maximum 2 days before the exam. You need to allocate for 8 hours per day during minimum days (early morning-6AM-10AM with a break for an hour,10AM-12 Noon-sleep/rest,12 noon-2PM-study,2PM-5PM-sleep/rest,6PM-10PM –study). Repetition/memorizing is required to retain certain contents to improve confidence on the subject. During rest time you can have group discussion with your friends or you can teach slow learners, thereby you will gain more knowledge and also help others.

Presentation – AU Exam-General complaints by students that the valuation is not fair or poor valuation. Remarks of examiners that there is nothing in the answer paper. Parents may say that either "college is not good" or "it is a fate". Public may say "poor quality" and the experts may comment that " only 20% are employable". These statements will go on for centuries. Many students believes that they have written right answers mostly (but many of them actually wrong) and few examiners assumed certain answers by students are wrong(but many of them are actually correct). It is 70% true that students are not presenting the answers well and it is 30% true that the valuation is not fair. But it is 95% true that the deserved students are getting expected results in most of the papers. This is because of good presentation. Good presentation involves many factors such as legible writing, good handwriting. answering correctly (100% correct),all answers with mathematical modeling/pictorial representation/drawing/layout/sketches with different colors, writing 7 pages for 16 mark questions with valid points and sketches, 4 pages for 8 marks with valid

points and sketches/drawings/equations, characterizes,. Such students will solve problems correctly without any overwriting/ strikeouts. Simply, they do not cheat. These are the in-born qualities or developed over the years due to good habits, friendship, good character, obedience, hard work, well brought up by parents and blessing by God. Everyone can become like them if their attitude is good. Fear of God is the beginning of Wisdom. The examiners will know about your quality, just by referring the way you have answered Part-A-questions. A well prepared student would get a maximum of 18 out of 20. This impresses the examiner so that they will award a maximum of 14-16 for each part-B-questions. Most of the students would answer wrongly in the Part-A-questions. This is due to their poor preparation during Class tests/internal tests, frequently taking leave, lot of diversion, skipping the classes for attending Co-Curricular/ /extra-curricular activities atinside or outside the college.. Attending the classes is more important than attending college. Students are expected to attend 98%classes to maintain the continuity of the subjects learnt. One-day absence means it will take a week to study on his/her own. If he/she fails to study on his/her own to review the classes not attended means a loss of 10 marks in the exams.

Know well about Why one should apply for revaluation without /with Photocopy, schedule and fees to be paid. Sometimeswell-deserved students get low CGPA than he/she expected or even may fail. This may be due to error in valuation/data entry. Hence such students should not hesitate to apply for revaluation with/without photocopy. The parents should also be informed, all about these unfortunates (the misunderstanding between parents /sons/daughter/faculty may lead to unnecessary things).90% of those deserved students who applied for revaluation with photo copy benefitted after revaluation. Ignorance/communication failure of these formalities, by deserved students, may damage their life. Some students failed in revaluation secured “S”grade in the REVIEW, shows some hope in the examination system and the better prospect of the students.

Need to maintain high CGPA in every semester. : This is possible only when one gets “S” grade in all practical’s (from first to eighth semester).Those who are regular in attending the lab classes, submitting the observation and record note in time, disciplined behavior with staff and students in the class room/laboratory/campus etc. will impress the faculty in-charge of practical’s, so that he/she will help such students during regular lab classes. This will improve the students to do the lab experiments with confidence and fetch them toget more marks. This will reflect in internal assessment marks also. Classification of degree-First class with distinction-More than 8.5CGPA (passed all subjects in first attempt), First class-More than 6.5CGPA at the end of eighth semester, less than this would be second class.

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POTTAPALAYAM - 630 612 (11KM from Madurai City)

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