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 – VIII – 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 – VIII 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 Activity, General - Remainders
15. General tips for effective communication and Leadership skills.
16. TANCET - Model Question Paper
17. UG Project Format
18. Bonafide Certificate and Leave Application Form

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION AND MISSION OF THE COLLEGE

VISION:

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

MISSION:

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

VISION AND MISSION OF THE DEPARTMENT

VISION:

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

MISSION:

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

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

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

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

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

PEO3: to work in international and multi-disciplinary Environments

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

Electrical and Electronics Engineering Graduates will be able to:

PSO1:

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

PSO2:

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

PSO3:

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

PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

OUTCOME BASED EDUCATION (OBE)

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

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

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

BENEFITS AND SIGNIFICANCE OF ACCREDITATION

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

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

Accreditation signifies different things to different stakeholders. These are:

Benefits to Institutions

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

Benefits to Students

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

Benefits to Employers

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

Benefits to the Public

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

Catalyst for International Accreditations

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

Benefits to Industry and Infrastructure Providers

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

Benefits to Parents

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

Benefits to Alumni

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

Benefits to Country

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

ENGINEERING ETHICS

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

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

Electrical Engineering Ethics

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

IEEE code of Ethics

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

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

Engineering Ethics in College/Education

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

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

Engineering Ethics in the Professional World

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

Engineering Ethics in Companies

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

BLOOM'S TAXONOMY

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

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

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

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

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

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

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

List of Action Words Related to Critical Thinking Skills

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

Date: 21.12.2016

ANNA UNIVERSITY: : CHENNAI – 600 025

ACADEMIC SCHEDULE

for the

January 2017 – May 2017 (EVEN SEMESTER) SESSION OF THE

ACADEMIC YEAR 2016 – 2017

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

Sl. No.	Programme	Semester	Commencement of Classes	Last working day	Commencement of End Semester Examinations
1.	**B.E. / B.Tech.(Full-Time)**	**VIII**	**04.01.2017**	**13.04.2017***	**17.04.2017**
2.	B.E. / B.Tech.(Full-Time)	II,IV,VI	**04.01.2017**	**24.04.2017**	**27.04.2017**
3.	B.E. (Part-Time)	III,V,VII			
4.	B.Arch. (Full-Time)	II,IV,VI,VIII,X			
5.	M.E. / M.Tech./ M.Arch.(FT)	II,IV	**23.01.2017**	**05.05.2017****	**10.05.2017**
6.	M.C.A. (Full-Time)	II,IV,VI			
7.	M.B.A. (FT)	II,IV			
8.	M.Sc (5 Yrs-Integrated)	II,IV,VI,VIII,X			
9.	M.Sc.(2 Yrs)	II,IV			
10.	M.B.A. (5 Yrs-Integrated)	II			

RE - OPENING DAY FOR THE NEXT SEMESTER: 03.07.2017 (Monday)

***6 Saturdays are Working days**
****4 Saturdays are Working days**

NOTE:

1. The Theory and Practical Examination schedules will be published in the due course (Practical Examinations will be conducted before the theory examinations).
2. If necessary, loss of classes due to various curricular / co-curricular activities of the department / college may be compensated by conducting classes on Saturdays.

DIRECTOR
ACADEMIC COURSES

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)

With effect from: 02.01.2017

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

TIME→ DAY↓	**09.00 – 09.50**	**09.50 – 10.40**	**10.55- 11.45**	**11.45- 12.35**		**01.15- 02.05**	**02.05- 02.55**	**02.55- 03.45**	**04.00- 05.00**
PERIOD→	**I**	**II**	**III**	**IV**		**V**	**VI**	**VII**	**VIII**
MON	**EEGUC** NVRV	**PERES** ASSM	**EEGUC** NVRV	**VLSID** RJR	*L U N C H*	**PROJECT** AM(5), ASSM(6), APSR(7)			-
TUE	**VLSID** RJR	**EEGUC** NVRV	**PERES** ASSM	**EEGUC** NVRV		**VLSID** RJR	**PROJECT** CVR(6), SM(7)		**PROJECT** SM(8)
WED	**PERES** ASSM	**PROJECT** CVR	**PROJECT** ASSM	**VLSID** RJR		**PROJECT** JS	**PERES** ASSM	**PROJECT** AM	**VLSID** RJR
THU	**VLSID** RJR	**EEGUC** NVRV	**PROJECT** CVR(3,4)			**PERES** ASSM	**PERES** ASSM	**PROJECT** JS	**EEGUC** NVRV
FRI	**PROJECT** TG(1), MJM(2)		**PROJECT** SPS(3), ASSM(4)			**PROJECT** SPRR(5), MML(6), MGK(7)			-

Year/Sem/Sec : IV / VIII / B **Faculty In-charge: M.Jegadeesan.**

TIME→ DAY↓	**09.00 – 09.50**	**09.50 – 10.40**	**10.55- 11.45**	**11.45- 12.35**		**01.15- 02.05**	**02.05- 02.55**	**02.55- 03.45**	**04.00- 05.00**
PERIOD→	**I**	**II**	**III**	**IV**		**V**	**VI**	**VII**	**VIII**
MON	**EEGUC** MM	**PERES** MJ	**VLSID** RSD	**PERES** MJ	*L U N C H*	**PROJECT** RD(5,6), JS(7)			-
TUE	**VLSID** RSD	**PROJECT** MJ	**PROJECT** MML(3,4)			**EEGUC** MML	**PROJECT** MB	**EEGUC** MML	**PERES** MJ
WED	**EEGUC** MM	**VLSID** RSD	**EEGUC** MML	**VLSID** RSD		**PERES** MJ	**PROJECT** SM(6), RJPP(7)		**PROJECT** RJPP
THU	**PERES** MJ	**EEGUC** MML	**PERES** MJ	**VLSID** RSD		**VLSID** RSD	**PROJECT** MJ(6), MBL(7)		**PROJECT** MBL
FRI	**PROJECT** MBL(1,2)		**PROJECT** MJ(3,4)			**PROJECT** NVRV(5,6), TG(7)			-

Year/Sem/Sec : IV / VIII / C **Faculty In-charge : Dr.S.Venkata Narayanan.**

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	**VLSID** AMJ	**PROJECT** APSR	**PROJECT** APSR(3), CVR(4)		*L U N C H*	**EEGUC** SVN	**PERES** SV	**EEGUC** SVN	-
TUE	**PERES** SV	**PROJECT** JS	**PROJECT** RD(3,4)			**VLSID** AMJ	**PROJECT** SVN	**VLSID** AMJ	**PERES** SV
WED	**EEGUC** SVN	**VLSID** AMJ	**PERES** SV	**EEGUC** SVN		**VLSID** AMJ	**PROJECT** RD		**PROJECT** RD
THU	**VLSID** AMJ	**PERES** SV	**EEGUC** SVN	**PERES** SV		**EEGUC** SVN	**PROJECT** JS(6), CVR(7)		**PROJECT** CVR
FRI	**PROJECT** APSR(1), CVR(2)		**PROJECT** CVR(3), SM(4)			**PROJECT** SPS			-

SUB CODE	**SUBJECT NAME**		**STAFF NAME**		
			Section - A	**Section - B**	**Section - C**
EE6801	Electric Energy Generation, Utilization and Conservation	EEGUC	N.Vimal Radha Vignesh	M.Mahalakshmi	Dr. S.Venkata Narayanan
EE6009	Power Electronics for Renewable Energy Systems (Elective IV)	PERES	Dr.A.S.S.Murugan	M.Jegadeesan	Dr.S.Venkatesan
EC6601	VLSI Design (Elective V)	VLSID	R. Jeyarohini	R. Sridevi	A.Manoj
EE6811	Project Work	Project	Dr.A.S.S.Murugan	M.Jegadeesan	Dr. S.Venkata Narayanan

FACULTY INCHARGE HOD/EEE

1

EE6801 ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION **LT P C**
3 0 0 3

OBJECTIVES:

- To analyze the various concepts behind renewable energy resources.
- To introduce the energy saving concept by different ways of illumination.
- To understand the different methods of electric heating and electric welding.
- To introduce knowledge on Solar Radiation and Solar Energy Collectors
- To introduce concepts of Wind Energy and its utilization

UNIT I ELECTRIC DRIVES AND TRACTION **9**

Fundamentals of electric drive - choice of an electric motor - application of motors for particular services - traction motors - characteristic features of traction motor - systems of railway electrification - electric braking - train movement and energy consumption - traction motor control - track equipment and collection gear.

UNIT II ILLUMINATION **9**

Introduction - definition and meaning of terms used in illumination engineering - classification of light sources - incandescent lamps, sodium vapour lamps, mercury vapour lamps, fluorescent lamps – design of illumination systems - indoor lighting schemes - factory lighting halls - outdoor lighting schemes - flood lighting - street lighting - energy saving lamps, LED.

UNIT III HEATING AND WELDING **9**

Introduction - advantages of electric heating – modes of heat transfer - methods of electric heating - resistance heating - arc furnaces - induction heating - dielectric heating - electric welding – types - resistance welding - arc welding - power supply for arc welding - radiation welding.

UNIT IV SOLAR RADIATION AND SOLAR ENERGY COLLECTORS **9**

Introduction - solar constant - solar radiation at the Earth's surface - solar radiation geometry – estimation of average solar radiation - physical principles of the conversion of solar radiation into heat – flat-plate collectors - transmissivity of cover system - energy balance equation and collector efficiency - concentrating collector - advantages and disadvantages of concentrating collectors - performance analysis of a cylindrical - parabolic concentrating collector – Feedin Invertors.

UNIT V WIND ENERGY **9**

Introduction - basic principles of wind energy conversion - site selection considerations - basic components of a WECS (Wind Energy Conversion System) - Classification of WECS - types of wind Turbines - analysis of aerodynamic forces acting on the blade - performances of wind.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and analyze power system operation, stability, control and protection.
- Ability to handle the engineering aspects of electrical energy generation and utilization.

TEXT BOOKS:

1. N.V. Suryanarayana, "Utilisation of Electric Power", Wiley Eastern Limited, New Age International Limited,1993.
2. J.B.Gupta, "Utilisation Electric power and Electric Traction", S.K.Kataria and Sons, 2000.
3. G.D.Rai, "Non-Conventional Energy Sources", Khanna Publications Ltd., New Delhi, 1997.

REFERENCES:

1. R.K.Rajput, Utilisation of Electric Power, Laxmi publications Private Limited.,2007.
2. H.Partab, Art and Science of Utilisation of Electrical Energy", Dhanpat Rai and Co., New Delhi, 2004.
3. C.L.Wadhwa, "Generation, Distribution and Utilisation of Electrical Energy", New Age International Pvt.Ltd., 2003.
4. S. Sivanagaraju, M. Balasubba Reddy, D. Srilatha,' Generation and Utilization of Electrical Energy', Pearson Education, 2010.
5. Donals L. Steeby,' Alternative Energy Sources and Systems', Cengage Learning, 2012.

EE6009 POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS LT P C
3 0 0 3

OBJECTIVES:

- To Provide knowledge about the stand alone and grid connected renewable energy systems.
- To equip with required skills to derive the criteria for the design of power converters for renewable energy applications.
- To analyse and comprehend the various operating modes of wind electrical generators and solar energy systems.
- To design different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems.
- To develop maximum power point tracking algorithms.

UNIT I INTRODUCTION 9

Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) - Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass, Fuel cell, Hydrogen energy systems and hybrid renewable energy systems.

UNIT II ELECTRICAL MACHINES FOR RENEWABLE ENERGY CONVERSION 9

Reference theory fundamentals-principle of operation and analysis: IG, PMSG, SCIG and DFIG.

UNIT III POWER CONVERTERS 9

Solar: Block diagram of solar photo voltaic system -Principle of operation: line commutated converters (inversion-mode) - Boost and buck-boost converters- selection of inverter, battery sizing, array sizing Wind: Three phase AC voltage controllers- AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid Interactive Inverters-matrix converters.

UNIT IV ANALYSIS OF WIND AND PV SYSTEMS 9

Stand alone operation of fixed and variable speed wind energy conversion systems and solar system-Grid connection Issues -Grid integrated PMSG, SCIG Based WECS, grid Integrated solar system

UNIT V HYBRID RENEWABLE ENERGY SYSTEMS 9

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV Maximum Power Point Tracking (MPPT).

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and analyze power system operation, stability, control and protection.
- Ability to handle the engineering aspects of electrical energy generation and utilization.

TEXT BOOK:

1. S. N. Bhadra, D.Kastha, S.Banerjee, "Wind Electrical Systems", Oxford University Press, 2005.
2. B.H.Khan Non-conventional Energy sources Tata McGraw-hill Publishing Company, New Delhi,2009.

REFERENCES:

1. Rashid .M. H "power electronics Hand book", Academic press, 2001.
2. Ion Boldea, "Variable speed generators", Taylor & Francis group, 2006.
3. Rai. G.D, "Non conventional energy sources", Khanna publishes, 1993.
4. Gray, L. Johnson, "Wind energy system", prentice hall linc, 1995.
5. Andrzej M. Trzynnadlowski, 'Introduction to Modern Power Electronics', Second edition, wiley India Pvt. Ltd, 2012.

EC6601 **VLSI DESIGN** **L T P C**
3 0 0 3

OBJECTIVES:

- In this course, the MOS circuit realization of the various building blocks that is common to any microprocessor or digital VLSI circuit is studied.
- Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed.
- The main focus in this course is on the transistor circuit level design and realization for digital operation and the issues involved as well as the topics covered are quite distinct from those encountered in courses on CMOS Analog IC design.

UNIT I MOS TRANSISTOR PRINCIPLE 9

NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams

UNIT II COMBINATIONAL LOGIC CIRCUITS 9

Examples of Combinational Logic Design, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles

UNIT III SEQUENTIAL LOGIC CIRCUITS 9

Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design

UNIT IV DESIGNING ARITHMETIC BUILDING BLOCKS 9

Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, dividers, Barrel shifters, speed and area tradeoff

UNIT V IMPLEMENTATION STRATEGIES 9

Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students should

- Explain the basic CMOS circuits and the CMOS process technology.
- Discuss the techniques of chip design using programmable devices.
- Model the digital system using Hardware Description Language.

TEXTBOOKS:

1. Jan Rabaey, Anantha Chandrakasan, B.Nikolic, "Digital Integrated Circuits: A Design Perspective", Second Edition, Prentice Hall of India, 2003.
2. M.J. Smith, "Application Specific Integrated Circuits", Addisson Wesley, 1997

REFERENCES:

1. N.Weste, K.Eshraghian, "Principles of CMOS VLSI Design", Second Edition, Addision Wesley 1993
2. R.Jacob Baker, Harry W.LI., David E.Boyee, "CMOS Circuit Design, Layout and Simulation", Prentice Hall of India 2005
3. A.Pucknell, Kamran Eshraghian, "BASIC VLSI Design", Third Edition, Prentice Hall of India, 2007.

EE6811 **PROJECT WORK** **L T P C**
0 0 12 6

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 180 PERIODS

OUTCOMES:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

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 code &Name: **EE6801-ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION**
Duration: **Jan-Apr 2017** Semester: **VIII** Regulation: **2013/AUC**

AIM

To expose students to the main aspects of generation, utilization and conservation.

OBJECTIVE:

To impart knowledge on

- To analyze the various concepts behind renewable energy resources.
- To introduce the energy saving concept by different ways of illumination.
- To understand the different methods of electric heating and electric welding.
- To introduce knowledge on Solar Radiation and Solar Energy Collectors.
- To introduce concepts of Wind Energy and its utilization.

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

CO	Course Outcomes	POs	PSO
C409.1	Evaluate tractive effort for the propulsion of train, name the traction motors, list the traction motor control, track equipment and collection gear.	1,2,3,6,7	1,3
C409.2	Categorize different light sources and design various illumination systems for the indoor lighting schemes, factory lighting, halls, outdoor lighting schemes, flood lighting, street lighting.	1,2,3,6,7	1,3
C409.3	Compare the different methods of electric heating and types of electric welding.	1,2,3,6,7	1,3
C409.4	Estimate average solar radiation and illustrate the physical principles of the conversion of solar radiation into heat.	1,2,3,6,7,11	1,3
C409.5	Analyze aerodynamic forces acting on the blade and draw basic components of a WECS.	1,2,3,6,7,11	1,3

S. No	Date	Period Number	Topics to be covered	Book No [Page No]
UNIT-I			**ELECTRIC DRIVES AND TRACTION**	**Target Periods: 9**
1			Fundamentals of electrical drive and choice of an electric motor	R3 [356-358]
2			Application of motor for particular services	R3 414
3			Traction motor, Characteristic features of traction motor	R3 [379-384]
4				
5			Systems of railway electrification	R3 [357-362]
6			Electric Breaking	R3 [422-428]
7			Train movement and energy consumption	R3 [365-372]
8			Traction motor control	R3 [390-402]
9				
10			Track equipment and collection gear	R3 [412-414]
Total Periods:		**10**	***Assignment-I*** ***Test-I***	
UNIT II			**ILLUMINATION**	**Target Periods: 9**
11			Definition and terms used in illumination engineering	R3 [315-318]
12			Classification of light sources	R3 338
13			Incandescent lamps, sodium vapour lamps	R3 [338-342]
14			Mercury vapour lamps, fluorescent lamps	R3 [338-342]
15			Design of illumination systems	R3[337-338]
16			Indoor lighting scheme, Factory lighting halls	Notes
17			Outdoor lighting scheme, Flood lighting and street lighting	R3 [343-345]
18				
19			Energy saving lamps, LED	Notes
20				
Total Periods:		**10**	***Assignment –II*** ***CIT-I***	
UNIT III			**HEATING AND WELDING**	**Target Periods: 9**
21			Introduction and Advantages of electric heating	R3 [279-280]
22			Modes of heat transfer	Notes

23			Methods of electric heating	R3 [280-281]
24			Resistance heating, Arc furnaces	R3 [283-286]
25			Induction heating, Dielectric heating	R3 [289-299]
26			Electric welding and types	R3 [301-302]
27			Resistance welding, Arc welding	R3 [302-308]
28			Power supply for arc welding	**Notes**
29			Radiation welding	Notes
Total Periods:		**09**	***Assignment-III***	***Test-3***
UNIT IV			**SOLAR RADIATION AND SOLAR ENERGY COLLECTORS**	**Target Periods: 9**
30			Introduction, Solar constant and Solar radiation in earth surface	T3 [43-53]
31			Solar radiation geometry	T3 [53-60]
32			Estimation of average solar radiation	T3[66-71]
33			Physical principles of the conversion of solar radiation into heat	T3 [73-76]
34			Flat-plate collectors, Transmissivity of cover system, Energy balance equation and collector efficiency	T3 [76-94]
35				
36			Concentrating collector, Advantages and disadvantages of concentrating collector	T3 [102-112]
37				
38			Performance analysis of a cylindrical and parabolic concentrating collector, Feed in invertors	T3 [112-120]
39				
40			***Content beyond syllabus***	
41			***Seminar-1***	
Total Periods:		**11**	***CIT-II***	
UNIT V			**WIND ENERGY**	**Target Periods: 9**
42			Introduction	T3 [227-230]
43			Basic principles of wind energy conversion	T3 [230-245]
44			Site selection considerations	T3 [252-255]
45			Basic components of WECS	T3 [256-260]
46			Classification of WECS	T3 [260-262]
47			Types of wind turbine	T3 [262-285]
48			Analysis of aerodynamic force acting on the blade	T3 [285-287]
49			Performance of the wind	T3 [287-292]
50			***Quiz-1***	
Total Periods:		**10**	***CIT-III***	

Books: Text/Reference Book

S. No		Title of the Book	Author	Publisher	Year
1	**T1**	Utilisation of Electric Power	Suryanarayana N.V	Wiley Eastern Limited, New age International limited	1993
2	**T2**	Utilization of Electric Power and Electric Traction	Gupta.J.B	S.K.Kataria and Sons	2000
3	**T3**	Non-Conventional Energy Sources	G.D. Rai	Khanna Publication Limited	1997
4	**R1**	Utilization of Electric Power	R.K.Rajput	Laxmi Publication Private Limited	2007
5	**R2**	Art and Science of Utilization of Electrical Energy	Partab, H.	Dhanpat Rai and Co	2004
6	**R3**	Generation, Distribution and Utilization of Electrical Energy.	Wadhwa, C.L.	New Age International Pvt. Ltd	2003
7	**R4**	Generation and Utilization of Electrical Energy	S.Sivanagaraju, M.Balasubba Reddy and D.Srilatha	Pearson Education	2010
8	**R5**	Alternative energy sources and systems	Donals L.Steeby	Cengage learning	2012

STAFF INCHARGE **HOD/EEE**

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6801-ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION(C409)

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

1. Course outcomes

Course	Course outcomes	POs
C409.1	List the traction motor control, track equipment and collection gear also evaluate tractive effort for the propulsion of train.	1,2,3,6,7
C409.2	Categorize different light sources and design various illumination systems for the indoor lighting schemes, factory lighting, halls, outdoor lighting schemes, flood lighting, street lighting.	1,2,3,6,7
C409.3	Compare the different methods of electric heating and types of electric welding.	1,2,3,6,7
C409.4	Estimate average solar radiation and illustrate the physical principles of the conversion of solar radiation into heat.	1,2,3,6,7,11
C409.5	Analyze aerodynamic forces acting on the blade and draw basic components of a WECS.	1,2,3,6,7,11

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
C409.1	3	2	2	-	-	1	1	-	-	-	-	-	2	-	1
C409.2	3	2	2	-	-	1	1	-	-	-	-	-	2	-	1
C409.3	3	2	2	--	-	1	1	-	-	-	-	-	2	-	1
C409.4	3	2	2	-	-	1	1	-	-	-	2	-	2	-	1
C409.5	3	2	2	-	-	1	1	-	-	-	1	-	2	-	1
C409	3	2	2	-	-	1	1	-	-	-	1	-	2	-	1

3.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.

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.

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.

S.No	**4. Important Questions.**	COs	POs
Q.1.1.	What are the various types of electric braking used in traction? Discuss in detail	C409.1	1,2,3
Q.1.2.	What is the speed controls of different system of motors used in electric train?	C409.1	1,2,3
Q.1.3.	Write about mechanics of train movement	C409.1	1,6
Q.1.4.	State the principle of regenerative braking. Explain regenerative braking in respect of a) DC motors, b) Induction motors.	C409.1	1,7
Q.1.5.	Derive an expression for tractive effort required to run an electric locomotive.	C409.1	1,2,3
Q.2.1.	Explain the method of working of a Neon lamp with a neat sketch.	C409.2	1,2,3
Q2.2.	Estimate the number and wattage of lamps which would be required to illuminate ever shop space 60 X 15metres, by means of lamps mounted 5metres above the working plane. The average illumination required is about 100 Flux, Co-efficient of utilization = 0.4, luminous efficiency is 16 lumens per Watt. Assume a space height ratio of unity candle power depreciation of 20%	C409.2	1,2,3
Q.2.3.	Two lamps one 200cp and another 500cp are hung at a height of 10metres and25metres respectively. The horizontal distance between the poles is 80metres. Determine the illumination at the mid-point between the poles on the ground. What is the requirement of good heating materials?	C409.2	1,2,3
Q2.4.	Explain the working of a sodium vapour lamp with in a neat sketch.	C409.2	1
Q.2.5.	Explain the types of lamps and lighting fitments you should select for (i)A large machine shop with rows of drilling machines (ii) A drawing office and lathes.	C409.2	1,6,7
Q.2.6.	A lamp of 300 candle power is placed 1.5 m below a reflecting plane mirror surface, which reflects 70% of the light falling on it. Find the illumination at a point 4m.	C409.2	1,2,3
Q2.7.	Explain the principle of street lighting? Show different types of lighting with neat Sketches.	C409.2	1
Q.3.1.	Explain the various types of resistance heating.	C409.3	1
Q.3.2.	Explain the construction and working principle of dielectric heating. Calculate the energy required to melt one metric ton of brass in a single – phase Induction furnace. If the time taken is 1.5 hour, find the power input to the furnace. Specific heat of brass = 0.094 Latent heat of fusion of brass = 38 kcal / kg Melting point of brass = 920º C Furnace efficiency = 80%, Temperature of charge = 20º C	C409.3	1,2,3
Q.3.3.	With the help of neat diagrams explain in detail the various methods of resistance welding	C409.3	1,6,11
Q.3.4.	Discuss with neat diagram different types of arc welding methods	C409.3	1,6,11
Q.3.5.	Explain the working of core type induction furnace with a neat sketch.	C409.3	1
Q.3.6.	A 5KW, 440volts, 3 phase resistance oven is to have a 3star connected nichrome strip of 0.3mm thick heating element. If the wire temperature is to be 1500°c and that of the charge 1000°c, estimate the suitable width of the strip. Resistively of nichrome alloy is 1.016 X 10-6.Assume the radiating efficiency and emissivity of the element as 0.6 and 0.91 respectively.	C409.3	1,2,3
Q.4.1.	What are solar collectors? Give their classification and compare them based on	C409.4	1,2,3

	construction and area of application.		
Q.4.2.	With neat sketches, discuss important part of the any flat plate solar collector.	C409.4	1,2,3
Q.4.3.	Explain the basic phenomenon of solar energy conversion with suitable diagram	C409.4	1,2,7
Q.4.4.	Derive the energy balance equation and collector efficiency for different types of collector.	C409.4	1,2,6
Q.4.5.	With the help of neat diagrams explain in detail about different types of concentrate plate collector.	C409.4	1,2,11
Q.4.6.	Write the comparison of different types of solar collectors.	C409.4	1,2,3
Q.5.1.	With a neat diagram explain wind electric power generating system also lists its merits and demerits.	C409.5	1,2,6
Q5.2.	List out the factors consideration for wind power plant site selection.	C409.5	1,2,3
Q.5.3.	With a neat block diagram, explain the basic function different components of WECS.	C409.5	1,2,11
Q.5.4.	With the help of neat diagrams explain in detail about the construction and the working principle of different wind turbines.	C409.5	1,2,3
Q.5.5.	Describe the analysis of aerodynamic force acting on the wind blades and Estimate the wind performance.	C409.5	1,2,7
	5.Assignments		
A.1.1.	The distance between the two stations is 1.6 kms and the average speed of the train is 40kmph, the acceleration, retardation during coasting and braking are 2km/h/s, 0.16kmphps and 3.2 km/h/s respectively. Assume quadrilateral approximation of the speed time curve; determine the duration of the acceleration, coasting and braking periods and distance covered during these periods.	C409.1	1,2,3
A.1.2	An electric train weighting 400 tonnes running along an up gradient of 1% with following speed time curve: (i)uniform acceleration of 1.5 km/h/s for 30 sec (ii) free running for 36 sec (iii)coasting for 25 sec (iv) braking at 2.6 km/h/s to rest. If tractive resistance is 45N/tonne, rotational inertia effect 10%, overall efficiency of the transmission and motor is 75%. Determine the specific energy consumption	C409.1	1,2,3
A.1.3	Discuss the various methods of speed control of industrial drives. Write typical examples for each drive.	C409.1	1,2,3
A.2.1	A 200 c.p lamp is hung 4 m above the Centre of a circular area of 5 m diameter. Determine the illumination at the (i) Centre of the area (ii) Periphery of the area (iii) Average illumination if reflector of 80% efficiency is used.	C409.2	1,2,3,6
A.2.2	An illumination on the working plane of 32 lux is required in a room 80mx15m. The lamps are required to be hung 4.5m above the work bench. Assume a COU of 0.5, lamp efficacy of 14 lumens per watt and COD of 0.2. Estimate the number rating and disposition of the lamps. Assume suitable value of space ratio.	C409.2	1,2,3
A.2.3	Explain the various factors to be taken into account for designing street lighting and flood Lighting.	C409.2	1,2,3,6
A.3.1.	Determine the efficiency of a induction furnace which takes 10 minutes to melt 1.815Kg of aluminium to the furnace being 5KW and the initial temperature 15 degree centigrade. Specific heat of aluminium: 0.212 K Cal/Kg^{0}C Melting point: 660 degrees centigrade. Latent heat of fusion of aluminium = 76.8 K Cal/Kg	C409.3	1,2,3
A.3.2.	The power required for dielectric heating of a slap of resin 150 sq.cm in area and 2 cm thick is 200W at frequency of 30MHz. The material has relative permittivity of 5 and a p.f 0.05. determine the voltage necessary and current flowing through the material. If the voltage is limited to 600V, what will be the value of the frequency to obtain the same heating?	C409.3	1,2,3,6
A3.3	Compare the performance of various electrodes used in electric arc furnaces.	C409.3	1,2,3

	6. Seminar topics		
S4.1	Overview of Solar energy	C409.4	1,2
S4.2	Solar cell	C409.4	1,2
S4.3	Types of solar cell	C409.4	1,2,6
S4.4	Solar water heating	C409.4	1,2
S4.5	Photo-Voltaic power generation	C409.4	1,2,3
S4.6	Solar Distillation	C409.4	1,2
S4.7	Solar pumping	C409.4	1,2
S4.8	Solar furnace	C409.4	1,2,7
S4.9	Solar cooking	C409.4	1,2,3
S4.10	Agriculture & Industrial process heat using Solar energy	C409.4	1,2
S4.11	Optical efficiency of solar collectors.	C409.4	1,2
S4.12	Solar energy conversion	C409.4	1,2,3
S4.13	Comparison of different solar collectors	C409.4	1,2,3
S4.14	Maximum Power point tracking	C409.4	1,2,3
S4.15	Solar Chimney	C409.4	1,2

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

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

Lecture Schedule

Course/Branch : **B.E / EEE** Subject: **POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS**
Duration: **Jan-Apr 2017.** Subject Code: **EE6009** Semester: **VIII** Section**:A,B,C** Regulation: **2013**
Staff Handling: Dr. A.S.S.Murugan, Mr.M.Jegadeesan, Dr.S.Venkatesan

AIM

To understand the significance of power electronic converters to harness the energy from the various types of renewable energy sources.

OBJECTIVES

1. To provide knowledge about the stand alone and grid connected renewable energy systems.
2. To equip with required skills to derive the criteria for the design of power converters for renewable energy applications.
3. To analyze and comprehend the various operating modes of wind electrical generators and solar energy systems.
4. To design different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems.
5. To develop maximum power point tracking algorithms.

Prerequisites: Power Electronics and Electrical Machines

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

Course	Course Outcome	Pos	PSOs
C410E1.1	Discuss and analyze the various types of renewable energy sources	**1,2,6,7,8,11,12**	**1,2,3**
C410E1.2	Analyze the performance of IG,PMSG,SCIG AND DFIG		**1,2,3**
C410E1.3	Design different power converters namely AC to DC,DC to DC and Ac to AC converters for renewable energy sources		**1,2,3**
C410E1.4	Analyze various operating modes of wind electrical generators and solar energy systems		**1,2,3**
C410E1.5	Develop maximum power point tracking algorithms		**1,2,3**

S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I: INTRODUCTIONS				**Target Periods : 9**
1			Environment aspects of electric energy conversion	Material
2			Impacts of renewable generation on environment (cost – GHG Emission)	
3			Qualitative study of different renewable energy resources: Ocean Energy	2(495-558) 3(311-331)
4			Biomass Energy	2(311435) 3(243-277)
5			Hydrogen energy systems	2(609-657) 3(379-389)
6			Operating principles and characteristics of: solar PV	2(73-238) 3(82-188)
7			Wind Energy	2(227-310) 3(196-236)
8			Fuel cell Energy	2(227-310) 3(196-236)
9			Hybrid renewable systems	material
Test-I-Class test – I				
UNIT II: ELECTRICAL MACHINES FOR RENEWANLE ENERGY CONVERSION				**Target Periods : 9**
10.			Reference theory Fundamentals	Material
11			Principle of operation of IG	1(74-97)
12			Analysis of IG	5(5.27-5.47)
13			Principles of operation of PMSG	1(111-117)
14			Analysis of PMSG	5(5.15-5.26) 5(6.11-6.17)
15			Principles of operation of SCIG	5(6.20-6.36)
16			Analysis of SCIG	Material)
17			Principles of operation of DFIG	Material
18			Analysis of DFIG	
Test-II- CIT-I : *Assignment 1* *Date of Announcement :* *Date Of Submission:*				
UNIT III : POWER CONVERTERS				**Target period:9**
19			Solar : Block diagram of solar photo voltaic system, Principle of operation	4(667-670)

20			Line commutated converters(inversion – mode),	1(145-151) 4(201-220)
21			Boost and buck-boost converters	1(151-157) 4(245-261)
22			Selection of inverter , battery sizing, array sizing	4(680)
23			Wind: three phase AC voltage controllers	4(483-516)
24			AC-DC-AC converters	4(150-155)
25			Uncontrolled rectifiers	
26			PWM inverters	4(353-400)
27			Grid Interactive inverters- matrix converters	Material
28			**Seminar-1**	
Test-III-Class test II : *Assignment 2* *Date of Announcement :* *Date Of Submission :*				
UNIT IV : ANALISIS OF WIND AND PV SYSTEMS				**Target period:9**
29			Stand alone operation of fixed speed and variable speed wind energy conversion systems	4(704-710)
30				
31			Stand alone operation of solar system	4(677-678)
32			Grid Connection Issues	4(706)
33			Grid integrated operation of variable speed wind energy conversion systems	4(705-710)
34				
35			Grid integrated PSMG Based WECS	4(711-712)
36			Grid integrated SCIG Based WECS	4(713-715)
37			Grid integrated operation of solar systems	4(689-690)
38			**Seminar-2**	
39			**Content beyond syllabus**	
Test-IV-CIT – II: *Assignment 3* *Date of Announcement :* *Date Of Submission :*				
UNIT V : HYBRID RENEWABLE ENERGY SYSTEMS				**Target period:9**
40			Need for Hybrid Systems	4(685-686)
41				
42			Range and type of Hybrid Systems	4(687-689)
43				
44			Case studies of wind	Material
44				
45			PV Maximum Power Point Tracking(MPPT)	4(663-679)
46				
47			**Quiz**	
Test-V-Class test III :				

Books: Text/Reference

S. No	Title of the Book	Author	Publisher	Year
1.	Wind Electrical Systems	S.N.Bhadra, D.Kastha , S.Banerjee	Oxford University Press	2005
2	Non conventional energy sources	Rai. G.D	Khanna publishes	1993
3	Non-conventional Energy sources	B.H.Khan	Tata McGraw-hill Publishing Company, New Delhi.	1995
4	power electronics Hand book	Rashid .M. H	Academic press	2001
5	Wind energy system	Gray, L. Johnson	prentice hall linc,	1995
6	Variable speed generators	Ion boldea	Taylor&Francis group	2006

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	PSO3
C410E1.1	1	2	-	-	-	1	2	-	-	-	-	-	1	-	1
C410E1.2	3	3	-	-	-	1	1	2	-	-	-	3	2	2	1
C410E1.3	3	3	-	-	-	1	1	1	-	-	2	3	2	2	1
C410E1.4	3	3	1	-	-	3	2	3	-	-	3	3	2	2	2
C410E1.5	3	3	1	-	-	3	2	3	-	1	3	3	2	2	2
C410E1	3	3	-	-	-	2	2	2	-	-	2	2	2	2	1

Content beyond the syllabus:

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit

STAFF INCHARGE **HOD/EEE**

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.

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6009- POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

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

1. COURSE OUTCOMES:

Course	Course Outcome	POs	PSOs
C410E1.1	Discuss and analyze the various types of renewable energy sources	**1,2,6,7,8,11,12**	**1,2,3**
C410E1.2	Analyze the performance of IG,PMSG,SCIG AND DFIG		**1,2,3**
C410E1.3	Design different power converters namely AC to DC,DC to DC and Ac to AC converters for renewable energy sources		**1,2,3**
C410E1.4	Analyze various operating modes of wind electrical generators and solar energy systems		**1,2,3**
C410E1.5	Develop maximum power point tracking algorithms		**1,2,3**

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	PSO3
C410E1.1	1	2	-	-	-	1	2	-	-	-	-	-	1	-	1
C410E1.2	3	3	-	-	-	1	1	2	-	-	-	3	2	2	1
C410E1.3	3	3	-	-	-	1	1	1	-	-	2	3	2	2	1
C410E1.4	3	3	1	-	-	3	2	3	-	-	3	3	2	2	2
C410E1.5	3	3	1	-	-	3	2	3	-	1	3	3	2	2	2
C410E1	3	3	-	-	-	2	2	2	-	-	2	2	2	2	1

S.No.	**3. Important Questions.**	COs	POs
Q.1.1.	Discuss the qualitative study of different renewable energy resources.	C410E1.1	1,2,6,7
Q.1.2.	Describe various biomass energy conversion techniques.	C410E1.1	1,2,6,7
Q.1.3.	How does environment get affected by the use of the renewable energy? And also discuss GHG emissions from the various energy sources.	C410E1.1	1,2,6,7
Q.1.4.	Show various types of wave energy conversion device and explain how to generate electrical power from waves.	C410E1.1	1,2,6,7
Q.1.5.	Discuss the influence of different renewable energy sources with special reference to the global warming and climate change context.	C410E1.1	1,2,6,7
Q.2.1.	Explain about PMSG based wind energy conversion system in detail. Also discuss its advantages and operating issues.	C410E1.2	1,2,6,7
Q2.2.	Draw the schematic of Double Fed Induction Generator and explain its construction and principle of operation in detail. Discuss its characteristics and limitations briefly.	C410E1.2	1,2,6,7,8
Q.2.3.	Why are induction generators preferred over DC generators in WECS? Give reasons.	C410E1.2	1,2,6,7,8
Q2.4.	Explain the construction and operation of PMSG.	C410E1.2	1,2,6,7,8
Q.2.5.	Explain the principle of operation and constructional features of SCIG with a neat diagram. Analyze the merits and demerits of the above.	C410E1.2	1,2,6,7,8
Q.3.1.	Explain the space vector PWM technique to control 3-phase inverter with neat schematic diagrams.	C410E1.3	1,2,6,7,8
Q.3.2.	Draw and discuss the operation of a Matrix converter.	C410E1.3	1,2,6,7,8

Q.3.3.	Explain with neat diagram the philosophy of operation of a solar source fed boost converter and Point out the delicacies involved in sizing the solar arrays.	C410E1.3	1,2,6,7,8
Q.3.4.	Describe the operation of line commutated converter under inversion mode with the help of a neat circuit diagram and necessary waveforms.	C410E1.3	1,2,6,7,8
Q.3.5.	Explain about various aspects of grid interactive inverters.	C410E1.3	1,2,6,7,8
Q.4.1.	Draw and discuss the operation of grid integrated PMSG system with a neat block diagram. Also discuss its limitation with regard to implementation and operation.	C410E1.4	1,2,3,6,7
Q.4.2.	Discuss in detail the grid system characteristics and explain with a neat diagram the stand alone and grid integrated solar system.	C410E1.4	1,2,3,6,7
Q.4.3.	Design a converter to interface a PV module to the grid and extract the maximum power from it.	C410E1.4	1,2,3,6,7
Q.4.4.	Explain the grid related problems in wind farms and refer the performance improvements of generator controls.	C410E1.4	1,2,3,6,7
Q.4.5.	A HAWT is installed at a location having free wind velocity of 15m/s. The 80m diameter rotor has three blades attached to the hub. Calculate the rotational speed of the turbine for optimal energy extraction.	C410E1.4	1,2,3,6,7
Q.5.1.	Enlighten the need and advantages of hybrid renewable energy systems. also explain the operation of wind-PV hybrid system with neat diagrams in details	C410E1.5	1,2,3,6,7
Q.5.2.	Explain the incremental-conductance based maximum power point tracking algorithm with a suitable illustration.	C410E1.5	1,2,3,6,7
Q.5.3.	Summarize the importance of MPPT in the operation of a photovoltaic system.	C410E1.5	1,2,3,6,7
Q.5.4.	Discuss with case study how to get maximum power generation in wind energy conversion system.	C410E1.5	1,2,3,6,7
Q.5.5.	Design solar PV pump and clearly explain the accessories required. Also justify the importance of implementing MPT for the pump system.	C410E1.5	1,2,3,6,7
	4. Assignments/Seminar/Self study topics.		
A.1.1.	Explain briefly the influence of different renewable energy sources with special reference to the global warming context.	C410E1.1	1,2
A.1.2.	Explain DFIG based wind power generation. Illustrate the independent dq control strategy adopted for dq control.	C410E1.2	1,2
A.2.1.	Explain about various aspects of grid interactive inverters.	C410E1.3	1,2,7
A.2.2.	Explain the grid related problems in wind farms and refer the performance improvements of generator controls.	C410E1.3	1,2,7
A.3.1.	Is wind energy an excellent supplement to the PV? IF so justify with a suitable case study.	C410E1.4	1,2,6,7,8
A.3.2.	Formulate an expression for the total cost of a hybrid system and three from deduce a simple condition for the feasibility of the system.	C410E1.5	1,2,6,7,8
	5. Seminar		
S.1	Hydrogen energy system-A case study		
S.2	Hybrid renewable energy systems- A case study.		
S.3	Space vector PWM inverter		
S.4	Wind energy conversion system-A case study		
S.5	Grid integrated solar system		

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM - 630 612
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Lecture Schedule

Course/Branch : **B.E / EEE** Subject: **VLSI DESIGN** Duration: **Jan-Apr 2017**
Subject Code : **EC6601** Semester: **VIII** Section: **A, B & C** Regulation: **2013 (AUC)**
Staff Handling :**R Sridevi, R. Jeyarohini & A. Manoj**

AIM

To expose student to concepts of MOS transistor, design of Combinational, Sequential logic circuits & arithmetic building blocks & implement different strategies.

PRE-REQUISITE : Digital Logic Circuits

OBJECTIVES

- To realize principle of MOS transistor & CMOS process technology.
- To design Combinational & Sequential logic circuits.
- To study arithmetic buildings blocks & design various adders.
- To implement different strategies in digital system.

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

Course	Course Outcome	POs	PSOs
C411E5.1	Explain basic CMOS circuits and CMOS process technology.	1,2,3,12	1,2
C411E5.2	Discuss factors of combinational logic design and power dissipation in CMOS circuits.	1,2,3,12	1,2
C411E5.3	Design different types of sequential logic circuits and compare low power memory circuits.	1,2,3,12	1,2
C411E5.4	Summarize architecture of arithmetic building blocks.	1,2,3,12	1,2
C411E5.5	Illustrate implementation strategies of FPGA architecture.	1,2,3,12	1,2

S. No.	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I - MOS TRANISTOR PRINCIPLE				**Target periods :9**
1.			Introduction	R3[6-9]
2.			NMOS transistor - characteristics	R1[43-47],R3[9-13]
3.			PMOS transistor - characteristics	R1[47-51]
4.			Process parameters of MOS & CMOS	R6[1.37-1.54]
5.			Electrical properties of CMOS circuits	R3[24-29]
6.			Device modeling	T1[57-61],R1[58-59]
7.			Scaling principles & Fundamental units	R1[250-255],R3[114-118]
8.			CMOS inverter - characteristics	R1[61-71],R3[44-46]
9.			Stick diagram	R3[57-64]
10.			Layout diagram	R1[142-156], R3[77-78]
Total Periods		**10**	***ASSIGNMENT – I***	
			CLASS TEST – I	
UNIT II - COMBINATIONAL LOGIC CIRCUITS				**Target periods :9**
11.			Design of combinational logic circuits	T1[235-236]
12.			Elmore's constant	R6[2.5-2.10]
13.			Pass transistor logic	T1[269-284],R3[105-106]
14.			Transmission gate	R1[86-91],T2[66-69]

15.			Static CMOS design	T1[236-263]
16				
17.			Dynamic CMOS design	T1[284-302]
18.				
19.			Power dissipation in CMOS	R1[231-238]
20.			Principles of low power design	R6[2.72-2.74]
Total Periods		**10**	***ASSIGNMENT – II***	
CENTRALIZED INTERNAL TEST – I				
UNIT III – SEQUENTIAL LOGIC CIRCUITS				**Target Periods: 9**
21.			Sequential circuit design of latches and flip-flops	T1[326-329]
22.			Static latches	T1[330-343]
23.			Dynamic latches and registers	T1[344-353]
24.			Timing issues in sequential circuits	T1[491-531]
25.			Pipelining	T1[358-363]
26.			Clock strategies	T1[370-371],R1[317-356]
27.			Memory architecture & memory control circuits	T1[627-634]
28.			Low power memory circuits	
29.			Synchronous design	T1[549-550]
30.			Asynchronous design	T1[549-550]
Total Periods		**10**	***ASSIGNMENT – III***	
CLASS TEST – II				
UNIT IV – DESIGNING ARITHMETIC BUILDING BLOCKS				**Target Periods: 9**
31.			Data path circuits	T1[560-561]
32.			Architecture of ripple carry adders	T1[563-564],T2[79-80]
33.			Architecture of carry look ahead adders	T1[578-586],T2[83-84]
34.			Architecture of high speed adders	
35.			Accumulator	T1[598-600]
36.			Multipliers	T1[586-594],T2[87-94]
37.				
38.			Dividers	T1[596-97]
39.			Barrel shifters	T1[595-596]
40.			Speed and area trade off	T1[601-619]
Total Periods		**11**	***TECHNICAL SEMINAR -I***	
CENTRALIZED INTERNAL TEST – II				
UNIT V – IMPLEMENTATION STRATEGIES				**Target Periods :9**
41.			Full custom design	R1[417]
42.			Semi Custom design	T1[396-399]
43.			Standard cell design	T1[385-395]
44.			Standard cell libraries	R1[414-416]
45.			FPGA building block architecture	T1[404-420],R6[5.19-5.26]
46.				
47.			FPGA interconnect routing procedure	R6[5.27-5.28]
48.				
49.				
50.			NPTEL	
Total Periods		**11**	***TECHNICAL QUIZ - I***	
CLASS TEST – III				

Books: Text/Reference

Book No	Title of the Book	Author	Publisher	Year
T1	Digital Integrated Circuits: A Design Perspective	Jan Rabaey, Anantha Chandrasekaran, B.Nikolic	Prentice Hall of India	2005
T2	Application Specific Integrated Circuits	M.J. Smith	Addisson Wesley	1997
R1	Principles of CMOS VLSI Design	N. Weste, K. Eshraghian,	Addisson Wesley	1993
R2	CMOS Circuit Design, Layout And Simulation	R. Jacob Baker, Harry W.L.I David E.Boyee	Prentice Hall of India	2005
R3	Basic VLSI Design	A. Pucknell Kamran Eshraghian	Prentice Hall of India	2006
R4	VLSI Design	R. Rajaragavi	Suchitra Publications	2016

NPTEL LECTURES

S. No	UNIT	Date[Period]	TOPIC	Ref / Link
1	V		System design using FPGA	https://www.youtube.com/watch?v=t2Iba9CG6qE

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C411E5.1	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
C411E5.2	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
C411E5.3	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
C411E5.4	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
C411E5.5	3	-	2	1	-	-	-	-	-	-	-	1	2	1	-
C411E5	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
System Verilog :Design Features – Verification Features – Verification & Synthesis Software- Programming	PO5 (Vacant filled)	C411E5.4 / IV

STAFF INCHARGE **HOD/EEE**

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

Department of Electrical & Electronics Engineering

EE6601 – VLSI DESIGN

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

1. **Course Outcomes**

Course	Course Outcome	POs	PSOs
C411- E5.1	Explain basic CMOS circuits and CMOS process technology.	1,2,3,12	1,2
C411- E5.2	Discuss factors of combinational logic design and power dissipation in CMOS circuits.	1,2,3,12	1,2
C411- E5.3	Design different types of sequential logic circuits and compare low power memory circuits.	1,2,3,12	1,2
C411- E5.4	Summarize architecture of arithmetic building blocks.	1,2,3,12	1,2
C411- E5.5	Illustrate implementation strategies of FPGA architecture.	1,2,3,12	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
C411- E5.1	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
C411- E5.2	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
C411- E5.3	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
C411- E5.4	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
C411- E5.5	3	-	2	1	-	-	-	-	-	-	-	1	2	1	-
C411- E5	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-

3. PROGRAM OUTCOMES (POs)

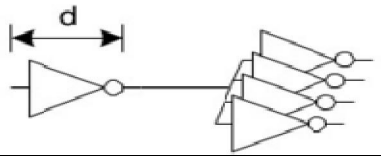
PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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

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

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

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.

ASSIGNMENT QUESTIONS			
S. No.	Questions	COs	POs
UNIT – I MOS TRANSISTOR PRINCIPLE			
A.1.1	With a neat schematic diagram, explain n-well and channel formation in CMOS process.	C411- E5.1	1
A.1.2	Construct a color-coded stick diagram of the following integrated CMOS structures: (a) Three – phase Nand gate b)three phase Nor gate c)8:1 Multiplexer	C411- E5.1	1,2
A.1.3	Write short notes on SPICE based circuit simulation	C411- E5.1	1,3
A.1.4	A 4-input NOR gate drives 10 identical gates. Find delay in the driving NOR gap.	C411- E5.1	1,2
A.1.5	Develop the necessary stick diagram and layout for the design of inverter, NAND and NOR gates.	C411- E5.1	1,3
A.1.6	Consider transistor is 180nm process with a nominal threshold voltage of 0.4v and doping level of $8x10^{17}cm^{-3}$. Propose the body voltage.	C411- E5.1	1,2
A.1.7	Determine whether transistor with a threshold voltage of 0.7v is operating in the saturation region if V_{GS}=3v and V_{DS}=4v.	C411- E5.1	1,2
UNIT – II COMBINATIONAL LOGIC CIRCUITS			
A.2.1	Design a Pseudo logic gate.	C411- E5.2	1,2,3
A2.2	Evaluate the delay of the fanout-of-4(FO4) inverter. Assume the inverter is constructed in180nm process with τ=15ps. 	C411- E5.2	1,2,3
A2.3	Consider 10mm long, 4 lambda wire metal 2 wire, 200nm process with sheet resistance 1Ω/µm and capacitance 0.4fF/µm. A 10 unit sized inverter drives 2 inverter at the end of 10mm wire. The gate capacitance is C=2 fF/µm and effective resistance is R2.5KΩ/µm for transistors. Estimate the propagation delay using Elmore delay model neglecting diffusion capacitance.	C411- E5.2	1,2
UNIT – III SEQUENTIAL LOGIC CIRCUITS			
A.3.1	Compare the sequencing in traditional Domino and Skew tolerant Domino circuit with neat diagrams.	C411- E5.3	1
A.3.2	Illustrate a floating gate transistor and its programming methodology.	C411- E5.3	1, 2
A.3.3	Evaluate a 1-bit dynamic inverting and non inverting register using pass transistor.	C411- E5.3	1, 2
A3.4	Compare Klass semi dynamic flip flops and differential Flip flops?	C411-E5.3	

IMPORTANT QUESTIONS			
UNIT I – MOS TRANSISTOR PRINCIPLE			
Q.1.1	Explain in detail about the ideal I-V characteristics and non-ideal I-V characteristics of NMOS and PMOS devices.	C411-E5.1	1,
Q 1.2	Explain BICMOS fabrication process in P-well, with a neat schematic diagram	C411-E5.1	1,3
Q.1.3	The transistor is operated in the triode region with the following parameters V_{GS}=4V;V_{tn}=1V;V_{DS}=2V;W/L=100;μnC_{ox}=90$\mu A/V^2$. Find its drain current and drain source resistance.	C411-E5.1	1,2
Q.1.4	Analyze the body effect and its effect in NMOS and PMOS devices.	C411-E5.1	1
Q.1.4	Describe in detail about second order effects in MOS transistor	C411-E5.1	1,2
Q.1.5	Compare NMOS and PMOS technologies. Which fabrication is preferred and why?	C411-E5.1	1
Q.1.6	With a neat schematic diagram explain about SOI technology and list out its advantages and disadvantages.	C411-E5.1	1
Q.1.7	Derive an expression for the rise timer tall timer & propagation delay of a CMOS inverter.	C411-E5.1	1,2
Q.1.8	Explain in detail about small signal AC characteristics of MOS transistor.	C411-E5.1	1
Q.1.9	Explain the DC transistor characteristics of CMOS inverter	C411-E5.1	1
Q.1.10	Explain different fabrication process of CMOS transistor	C411-E5.1	1,2
Q1.11	Discuss about the CMOS process enhancement and layout design rules	C411-E5.1	1,3
Q.1.11	Explain detail about the following i) device model and device characterization ii) SPICE based circuit simulation	C411-E5.1	1,3
Q.1.12	The transistor has the following parameters: Gate oxide thickness =10nm, relative permittivity of gate oxide =3.9, electron mobility=520cm2/v-sec , threshold voltage=0.7v, permittivity of free space=8.85x10-14F/cm and W/L=8. Calculate the drain current when V_{GS}=2v and V_{DS}=1.2v and V_{GS}=2v and V_{DS}=2v and also compute the gate oxide capacitance per unit area. Note that W and L refer to the width and length of the channel respectively.	C411-E5.1	1,2,4
Q.1.13	Discuss the voltage transfer characteristics of CMOS inverter.	C411-E5.1	1
UNIT II – COMBINATIONAL LOGIC CIRCUITS			
Q.2.1	Explain the concept of static & dynamic CMOS design.	C411-E5.2	1,3
Q.2.2	Explain the construction & operation of transmission gates	C411-E5.2	1,3
Q.2.3	Design a XOR gate using CMOS logic	C411-E5.2	1,3
Q.2.4	Construct a 4 input pseudo NAND and NOR gates	C411-E5.2	1,4
Q.2.5	Compare CMOS dynamic Domino and pseudo logic families.	C411-E5.2	1,3
Q.2.6	Illustrate the operation of dynamic CMOS Domino and NP Domino logic with necessary diagrams	C411-E5.2	1,3
Q.2.7	Explain in detail about static and dynamic power dissipation	C411-E5.2	1,2
Q.2.8	List out different methods of reducing static and dynamic power dissipation in CMOS circuits and Explain in briefly.	C411-E5.2	1,2

Q.2.9	Derive the expressions for effective resistance and capacitance estimation Using Elmore's RC delay model.	C411-E5.2	1,3
Q.2.10	Explain in detail about low power design principles.	C411-E5.2	1
Q.2.11	Discuss the working principle and signal integrity issues in dynamic logic families.	C411-E5.2	1,2,3
Q.2.12	Design a 4-input NAND gate using static CMOS and DCVSL logic	C411-E5.2	1,2,3
Q.2.13	Explain detail about the following i) Static CMOS, ii) Bubble pushing, iii) Compound gates.	C411-E5.2	1,2
UNIT – III SEQUENTIAL LOGIC CIRCUITS			
Q.3.1	Explain in detail about Static & Dynamic Latches	C411-E5.3	1,
Q 3.2	Describe timing metrics for sequential circuits	C411-E5.3	1,4
Q.3.2	Discuss in detail about the pipelining concepts used in sequential circuits	C411-E5.3	1,2
Q.3.3	List the methodology of sequential circuit design of latches and flip flops and Explain it.	C411-E5.3	1,2
Q.3.4	Explain about maximum delay constraints for flip-flops, transparent latches and pulsed latches.	C411-E5.3	1,2
Q.3.5	What are the Klass semi dynamic flip flops and differential Flip flops?	C411-E5.3	1,5
Q.3.6	Evaluate a 1-bit dynamic inverting and non inverting register using pass transistor	C411-E5.3	1,2,3
Q.3.7	Illustrate a floating gate transistor and its programming methodology	C411-E5.3	1,2,3
Q.3.8	Discuss about CMOS S-RAM cell and Dynamic RAM cell	C411-E5.3	1,2,3
Q.3.9	Design a 2 input CVSL AND/NAND gate and a 3 input CVSL OR/NOR gate	C411-E5.3	1,2,3,4
Q.3.10	Consider a flip flop built from a pair of transparent latches using non overlapping clocks. Determine the set-up time, hold time and clock-to-Q-delay of the flip flops in terms of the latch timing parameters and $t_{nonoverlap}$	C411-E5.3	1,2
Q.3.11	Discuss about minimum delay constraint for various sequencing element.	C411-E5.3	1
UNIT IV – DESIGNING ARITHMETIC BUILDING BLOCKS			
Q.4.1	Explain in detail about ripple carry adder?	C411-E5.4	1,
Q.4.2	Explain about Carry skip & Carry look ahead adder.	C411-E5.4	1,3,4
Q.4.3	Discuss about types of high speed multiplier	C411-E5.4	1,3
Q.4.4	Explain about Wallace tree Multiplier in detail.	C411-E5.4	1,3,4
Q.4.5	Discuss the design of array multiplier	C411-E5.4	1,2,3
Q.4.6	List out the logic design considerations of binary adder and explain any two adders	C411-E5.4	1,3
Q.4.7	Describe ripple carry adder and derive the worst case delay with example	C411-E5.4	1,2,3
Q.4.8	Illustrate the concepts of monolithic and logarithmic look ahead adder	C411-E5.4	1,2,3
Q.4.9	Explain detail about the following i) linear carry select adder. ii) data paths in digital processor architectures	C411-E5.4	1,3
Q.4.10	List out the types of shifter and Explain it.	C411-E5.4	1,3

UNIT V – IMPLEMENTATION STRATEGIES			
Q.5.1	Explain in detail about different types of ASIC	C411-E5.5	1,3
Q.5.2	Explain ASIC standard cell design & cell Libraries	C411-E5.5	1,2
Q.5.3	Illustrate the concepts of Mask programmable arrays	C411-E5.5	1,12
Q.5.4	Describe the Steps involved in semicustom design flow.	C411-E5.5	1,2
Q.5.5	Explain the interconnect architectures of Altera Max series and Xilinx XC40XX series	C411-E5.5	1,3
Q.5.6	Design an arithmetic logic unit	C411-E5.5	1,2
Q.5.7	Develop the NAND-NAND representation for any one example from simple Boolean manipulations.	C411-E5.5	1
Q.5.8	Explain in detail about building block architectures of FPGA?	C411-E5.5	1,3
Q.5.9	Explain in detail about Horizontal & Vertical routing procedures in FPGA interconnect?	C411-E5.5	1
Q.5.10	Explain about methods of programming of PAL CMOS circuits.	C411-E5.5	1,12
Q.5.11	Draw and explain architecture of an FPGA	C411-E5.5	1,3
Q.5.12	Compare types of macro cells.	C411-E5.5	

SEMINAR TOPICS

1. Applications of FPGA
2. Carrier and Timing recovery using FPGA
3. FPGA prototyping for camera security
4. Compare ASIC & FPGA
5. Digital design in ASIC
6. Reconfigurable logic blocks in FPGA
7. Applications of high speed carry select adder
8. Filtering & information reduction in reconfigurable blocks
9. Architecture of XC9500 Series CPLD
10. Architecture of Spartan FPGA
11. Applications of Xilinx ISE
12. Full custom design in digital system
13. Design approach for full custom design
14. Semi custom IC design
15. Interconnect routing techniques in VLSI
16. Design of standard cell in ASIC
17. Switch box based programmable wiring
18. Array based programmable wiring
19. Island style routing architecture in FPGA
20. Clustering/Packing in FPGA
21. Design of 8-bit carry adder
22. Design of carry save adder
23. Compare PLD and CPLD
24. Altera FPGA
25. Design of 8-bit accumulator

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

Question Paper Code : 52607

B.E/B.Tech. DEGREE EXAMINATION, APRIL 2016

Eighth Semester

Electrical and Electronics Engineering

EE 2451/EE 81/10133 EE 801 – ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION

(Regulations 2008/2010)

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

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Mention the various types of Solar PV Cells.
2. What is meant by Distributed Power Generation ?
3. What is meant by the term two part tariff ?
4. Specify the role of Power Capacitor in industries.
5. Define the term Luminous Efficacy.
6. Suggest suitable Lamps for Sports Ground lighting application.
7. Mention the merits of dielectric heating.
8. Specify the desirable properties of heating element materials.
9. What are the factors governing scheduled speed of a Train ?
10. Draw the speed torque characteristics of an ideal Traction system drive.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Draw the block diagram of a Coal based Thermal Power Plant. Also mention the role of individual blocks. **(8)**

(ii) With a block diagram, explain the working principle of a Wind Electric Generator. **(8)**

OR

(b) (i) Discuss the benefits of Non-conventional Power Generation, when compare to Conventional Power generation. **(8)**

(ii) Explain the working principle of single basin and double basin type Tidal power plant. **(8)**

12. (a) (i) List the various energy efficient electrical equipment. Briefly explain their application and benefit. **(8)**

(ii) A three phase 1000kW Induction Furnace draws an input power of 910kW at 0.72 Power factor Lagging from a 415 Volts 3 Phase Power Supply. Calculate the requirement of Capacitors to be connected in parallel in terms of kVAr rating to improve the existing power factor to Unity. Also calculate the reduction in kVA demand due to power factor improvement of the motor from 0.72 lagging to Unity. **(8)**

OR

(b) (i) What are the factors governing cost of Electrical Energy ? Also explain in details. **(8)**

(ii) An Engineering Industry is charged under three part tariff, based on Demand, Active Energy and Reactive energy Consumption. The monthly energy reading of the consumer is as follow :

Actual Maximum Demand	Energy Consumption	Reactive Energy Consumption
1450 kVA	723840 kWh	43430 kVArh

If the tariff is ₹ 400 per kVA of Actual maximum Demand reached, Units rate is ₹ 4.50 per kWh of consumption plus Reactive Energy rate is 30 paise per kVArh. Calculate the monthly Energy Bill of the above Engineering industry. **(8)**

13. (a) (i) List the various types of lamps commercially available. Also specify the energy efficient lamps for domestic and industrial lighting applications. **(8)**

(ii) A workshop dimension 30 metre × 20 metre is illuminated by 30 Nos. of 400 Watts Metal Halide lamps. The luminous efficacy of Metal Halide lamp is 90 lumens/Watt. The depreciation factor is 1.2 and utilization factor is 0.6. Calculate the illumination level of the working plane. **(8)**

OR

(b) (i) Explain the various steps involved in designing of lighting System for a Workplace. **(8)**

(ii) A Classroom dimension 10 metre × 7.5 metre with a ceiling height of 4 metres is to be provided with general illumination of 300 lux. Considering a co-efficient of utilization is 0.5 and depreciation factor of 1.2. Determine the number of 36 watts fluorescent lamps required. The luminous efficacy of 36 watts fluorescent lamp is 84 lumens per watt. **(8)**

14. (a) (i) Draw the Voltage versus Current characteristics of a Welding trnasformer. How the dropping characteristic is achived in welding transformer ? **(8)**

(ii) Calculate the energy required to melt 1.2 metric ton of Brass in a three phase Induction Furnace, if the time taken is 1 Hour 40 Minutes. The three phase Induction Furnace having the following data :

Latent heat of Brass = 38 kcals / kg

Specific heat of Brass = 0.094

Melting point of Brass = 925°C

Initial temperature of Brass = 25°C

Assume overall efficiency of furnace is 84%. **(8)**

OR

(b) (i) With a conceptual diagram, explain the process of induction heating. **(8)**

(ii) A plywood board 120 cm × 90 cm × 1.5 cm is to be heated to 90°C in 30 minutes by dielectric heating technique at a frequency of 30MHz. The specific heat for wood is 0.35 and specific weight of wood is 0.56 grams/cubic cm. The ambient temperature is 30°C and relative permittivity of 5, absolute permittivity of 8.85×10^{-12}. The operating power factor is 0.05 leading. Calculate the power required for the heating process. **(8)**

15. (a) (i) Discuss the series-parallel control of electric traction motor. Also specify the advantages of the above control. **(8)**

(ii) A train runs with an average speed of 50 kmph. Distance between stations is 4.5 km. Values of acceleration and retardation are 1.5 kmphps and 1.8 kmphps respectively. Find the maximum speed of the train assuming a trapezoidal speed time curve. **(8)**

OR

(b) (i) Explain the recent trends in electric traction system. **(8)**

(ii) A sub-urban traction system has a maximum speed of 60 kmph. The scheduled speed including a station stop of 60 seconds in 40 kmph. If the acceleration is 1.8 kmphps, calculate the value of retardation, when the average distance between stop is 3 km. **(8)**

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

Question Paper Code : 71518

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

Eighth Semester

Electrical and Electronics Engineering

EE 2451/ EE 81/ 10133 EE 801 — ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION

(Regulation 2008 / 2010)

(Common to PTEE 2451/ 10133 EE 801 – Electric Energy Generation, Utilization and Conservation for B.E. (Part-Time) Seventh Semester – EEE Regulation 2009 / 2010)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the objective of load control in wind energy systems? How load control is achieved in small stand alone wind turbine?
2. List the various control rods used in nuclear reactor?
3. Differentiate load curve and load duration curve.
4. Compare two part tariff with power factor tariff.
5. How does the operation of a fluorescent tube differ when it is used on ac and dc supply?
6. If the total lumens required are 7200 and coefficient of utilization is 0.3, Calculate lamp lumens required.
7. Mention the factors which limit the choice of frequency in induction and dielectric heating?
8. What is meant by arc welding, also list its types?
9. Define specific energy consumption and discuss the factors which effect the specific energy consumption.
10. What type of braking is employed on a tram car driven by two series motor?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Describe with neat sketch the construction and principle of operation used for Thermal power plant. (10)

(ii) Explain the working of pumped storage power plant. (6)

Or

(b) (i) Explain the working of a co-generation power plant with neat layout. (8)

(ii) Discuss various bus bar systems for distribution network. (8)

12. (a) (i) A consumer requires 10 lakh units per year and his yearly load factor is 30%. The tariff in force is Rs.420 per kw per year + Rs.19 per unit. Estimate the saving in energy costs if the load factor is improved to 100%. (8)

(ii) List the points to be considered for selection of size and number of generating units. (8)

Or

(b) (i) What is energy auditing. Explain with few examples how energy auditing can improve the performance of the power system. (10)

(ii) Explain briefly the various factors which affect the quality of power supply. (6)

13. (a) (i) State and prove laws of illumination. (6)

(ii) Design a street lighting of a road of 300 m long which is required to be illuminated by providing 40 W fluorescent lamp. The width of the road is 4 m. Illumination is 0.6 lux. Assume efficacy of lamp as 70 Lumen/watt. (10)

Or

(b) (i) With neat diagram explain the construction and working of CFL lamp. (8)

(ii) Explain the various steps followed in calculation of illumination for designing the residential lighting. (8)

14. (a) (i) Draw a neat sketch of induction furnace and explain its working. (6)

(ii) An insulating material 2 cm thick and 150 sq.cm. in area is to be heated by dielectric heating. The material has permittivity of 4 and p.f. as 0.04. Power required is 400 watts and frequency of 40 MHz. Determine the voltage and the current that will flow through the material. If the voltage were limited to 700 volts, what will the frequency to get the same loss? (10)

Or

(b) (i) Discuss the principle of arc welding and the difference between carbon and metal arc welding and their relative merits and demerits. (8)

(ii) Explain the characteristics of a welding transformer. (8)

15. (a) (i) Explain about multi motor speed control. (8)

(ii) A sub-urban electric train has a maximum speed of 65 kmph. The schedule speed including a station stop of 30 seconds is 43.5 kmph. If the acceleration is 1.3 kmphps, find the value of retardation when the distance between stops is 3 k.m. (8)

Or

(b) (i) Explain the principle and operation of a modern ac locomotive. (6)

(ii) What are the various types of electric braking used in traction? Discuss in detail. (10)

Reg. No. : 9 1 0 6 1 9 4 1 1 0 0 6

Question Paper Code : 17971

M.E. DEGREE EXAMINATION, NOVEMBER/ DECEMBER 2016.

Third Semester

Electrical Drives and Embedded Control

PX 7301 — POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

(Common to M.E. Energy Engineering / M.E. Power Electronics and Drives and Powers Systems Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List out the major factors influencing the amount of GHG emissions.
2. What is SOFC? State its Limitations.
3. Draw the equivalent circuit model of a PMSG.
4. Why are induction generators preferred over DC generators in WECS?
5. What are the factors to be considered for the selection of batteries for solar energy conversion system?
6. What is a grid interactive inverter? State its significance.
7. What are the issues in connecting the renewable energy systems to the grid?
8. Differentiate between fixed and variable speed wind energy conversion systems.
9. What is the necessity of Maximum power point tracking in PV system?
10. What are the advantages of PV-Diesel hybrid system?

PART B — (5 × 13 = 65 marks)

11. (a) What are the different types of fuel cells? Explain them with neat diagrams.

Or

(b) Discuss the influence of different renewable energy sources with special reference to the global warming and climate change context.

12. (a) Draw the schematic of Double Fed Induction Generator and explain its construction and principle of operation in detail. Discuss its characteristics and limitations briefly.

Or

(b) Explain about PMSG based wind energy conversion system in detail. Also discuss its advantages and operating issues.

13. (a) A single phase fully controlled converter is used for obtaining a regulated D.C output voltage. The RMS value of the A.C input voltage is 230 V, and the firing angle is maintained at 60° so that the load current is 4A.

(i) Calculate D.C output voltage and active and reactive power input.

(ii) Calculate the above quantities if a free wheeling diode is used at the output. The firing angle is maintained at 60° assuming the same load with resistance.

Or

(b) (i) Explain the space vector PWM technique to control 3-phase inverter with neat schematic diagrams. (8)

(ii) Draw and discuss the operation of a Matrix converter. (5)

14. (a) Draw and discuss the operation of grid integrated PMSG system with a neat block diagram. Also discuss its limitation with regard to implementation and operation.

Or

(b) Discuss in detail the grid system characteristics and explain with a neat diagram the stand alone and grid integrated solar system.

15. (a) Enlighten the need and advantages of hybrid renewable energy systems. Also explain the operation of Wind-PV hybrid system with neat diagrams in detail.

Or

(b) Explain the incremental-conductance based maximum power point tracking algorithm with a suitable illustration.

PART C — (1 × 15 = 15 marks)

16. (a) Design and implement a suitable converter for a 20 kW wind turbine generator. The converter should consists of a phase controlled rectifier and a DC/DC boost converter. Assume suitable data and components necessary for design and implementation.

Or

(b) Design a converter to interface a PV module to the grid and extract the maximum power from it.

———————

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

Question Paper Code : 61679

M.E. DEGREE EXAMINATION, MAY/JUNE 2014.

Elective

Power Systems Engineering

PE 9272/PE 972/10233 PEE 51/10233 PSE 62 — POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

(Common to M.E. Power Electronics and Drives/M.E. Electrical Drives and Embedded Control/M.E. Power Management)

(Regulation 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the significance of renewable energy.

2. What are the factors influencing solar power extraction?

3. State the advantages of induction generator based wind energy conversion system.

4. State the principle of PMSG.

5. What is the significance of buck boost converter?

6. What is a grid interactive inverter?

7. What is meant by fault ride through capability?

8. What is the impact of high penetration of wind power in to power grid?

9. What are the power quality issues that affect wind power integration?

10. What is the need for maximum power point tracking?

PART B — (5 × 16 = 80 marks)

11. (a) Describe various biomass energy conversion technique.

Or

(b) Compare the power extraction aspects of solar PV system with wind energy system.

12. (a) Explain about DFIG based energy conversion system.

Or

(b) Explain the construction and operation of PMSG.

13. (a) Explain the converters used for solar energy conversion.

Or

(b) Describe the grid interactive inverters in detail.

14. (a) Explain about SCIG based WECS.

Or

(b) Explain about various grid connection issues and its impact on system stability.

15. (a) Explain MPPT techniques for WECS.

Or

(b) Explain the hybrid energy conversion system with neat sketches.

———————

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

Question Paper Code : 57297

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

Sixth Semester

MEDICAL ELECTRONICS

EC 6601 – VLSI DESIGN

(Common to Electronics and Communication Engineering

(Regulations 2013)

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

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. State channel-length modulation. Write down the equation for describing the channel length modulation effect in NMOS transistors.
2. What is Latch-up ? How to prevent latch up ?
3. Give Elmore delay expression for propagation delay of an inverter.
4. Why single phase dynamic logic structure cannot be cascaded ? Justify.
5. Draw the switch level schematic of multiplexer based nMOS latch using nMOS only pass transistors for multiplexers.
6. What is clocked CMOS register ?
7. What is meant by bit-sliced data path organization ?
8. Determine propagation delay of n-bit carry select adder.
9. What are feed-through cells ? State their uses.
10. State the features of full custom design.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Describe the equation for source to drain current in the three regions of operation of a MOS transistor and draw the VI characteristics. **(8)**

(ii) Explain in detail about the body effect and its effect in MOS device. **(8)**

OR

(b) (i) Explain the DC transfer characteristics of a CMOS Inverter with necessary conditions for the different regions of operation. **(8)**

(ii) Discuss the principles of constant field and lateral scaling. Write the effects of the above scaling methods on the device characteristics. **(8)**

12. (a) (i) Draw the static CMOS logic circuit for the following expression **(8)**

(a) $Y = \left(\overline{A \cdot B \cdot C \cdot D}\right)$

(b) $Y = \overline{D(A + BC)}$

(ii) Discuss in detail the characteristics of CMOS transmission gate ? **(8)**

OR

(b) What are the sources of power dissipation in CMOS and discuss various design techniques to reduce power dissipation in CMOS ? **(16)**

13. (a) Explain the operation of master-slave based edge triggered register. **(16)**

OR

(b) Discuss in detail various pipelining approaches to optimize sequential circuits. **(16)**

14. (a) Design a 16 bit carry bypass and carry select adder and discuss their features. **(8 + 8)**

OR

(b) Design a 4 × 4 array multiplier and write down the equation for delay. **(16)**

15. (a) With neat sketch explain the CLB, IOB and programmable interconnects of an FPGA device. **(16)**

OR

(b) Write brief notes on :

(a) Full custom ASIC **(8)**

(b) Semi custom ASIC **(8)**

ANNA UNIVERTISY, CHENNAI -25.

OFFICE OF THE CONTROLLER OF EXAMINATIONS

RULES OF THE EXAMINATIONS

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

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

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

Sl.No.	Nature of Malpractice	Maximum Punishment
1	Appeal by the candidate in the answer script to show mercy by way of awarding more than deserving marks.	Fine of Rs. 1000/- per subject.
2	The candidate writing his/her name in the answer script.	
3	The candidate writing his/her registration number/college name in places other than specified in the answer script	
4	Any special marking in the answer script by the candidate.	
5	The candidate communicating with neighbouring candidate orally or non-verbally; the candidate causing suspicious movement of his/her body.	
6	Irrelevant writing by the candidate in the answer script.	
7	The candidate marking on the question paper or writing answer on his/her question paper or making use of his/her question paper for rough work	
8	The candidate possessing cell phones/programmable calculator(s)/any other electronic storage device(s) **gadgets**	Invalidating the examination of the particular subject written by the candidate
9	The Candidate facilitating the other candidate(s) to copy from his /her answer script	
10	The candidate possessing any incriminating material(s) (whether used or not). For example:- Written or printed materials, bits of papers containing written information, writings on scale, calculator, handkerchief, dress, part of the body, Hall Ticket, etc.	Invalidating the examinations of the subject concerned and all the theory and the practical subjects of the current semester registered by the candidate. Further the candidate is not considered for revaluation of answer scripts of the arrears-subjects.
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	If the candidate has registered for arrears – subjects only, invalidating the examinations of all the arrears – subjects registered by the candidate.
14	The candidate passing incriminating materials brought into the examination hall in any medium (hard/soft) to other candidate(s).	
15	The candidate copying from neighbouring candidate.	
16	The candidate taking out of the examination hall answer booklet(s), used or unused	
17	Appeal by the candidate in the answer script coupled with a promise of any form of consideration.	
18	Candidate destroying evidence relating to an alleged irregularity.	Invalidating the examinations of the subject concerned and all the theory and the practical subjects of the current semester registered by the candidate. Further the candidate is not considered for revaluation of answer scripts of the arrears-subjects. If the candidate has registered for arrears – subjects only, invalidating the examinations of all the arrears – subjects registered by the candidate. **Additional Punishment:** 1. if the candidate has not completed the programme, he/she is debarred from continuing his/her studies for one year i.e., for two subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects up to the last semester during the debarred period. 2. if the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for two subsequent semesters.
19	Vulgar/offensive writings by the candidate in the answer script.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears –subjects registered by the candidate.
20	The candidate possessing the answering script of another candidate	
21	The candidate passing his /her answer script to another candidate	
22	Involved in any one or more of the malpractices of serial no. 8 to 21 for the second or subsequent times.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears –subjects registered by the candidate. **Additional Punishment:** (i) If the candidate has not completed the programme, he/she is debarred from continuing his/her studies for one year i.e., for two subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects up to the last semester during the debarred period. (ii) If the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for two subsequent semesters.
23	The candidate substituting an answer book let prepared outside the examination hall for the one already distributed to the candidate	
24	The candidate indulge in any disruptive conduct including, but not limited to, shouting, assault of invigilator, officials or students using abusive and /or threatening language, destruction of property.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears –subjects registered by the candidate. **Additional Punishment:** (i) if the candidate has not completed the programme, he/she is debarred from continuing his/her studies for **two years** i.e., for four subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects up to the last semester during the debarred period. (ii) if the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for
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.	

		four subsequent semesters.
27	Cases of Impersonation	(i)Handing over the impersonator to the police with a complaint to take appropriate action against the person involved in the impersonation by the Chief Supt. (ii)If a student of this University is found to impersonate a 'bonafide student', the impersonating student is debarred from continuing his/her studies and writing the examinations **permanently.** He/she is not eligible for any further admission to any programme of the University. (iii)Debarring the 'bonafide student' for whom the impersonation was done from continuing his/her studies and writing the examinations **permanently.** He/she is not eligible for any further admission to any programme of the University.

CONTROLLER OF EXAMINATIONS

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

On duty (OD) norms for students – Reminder

1. Students who apply for OD should submit the filled in OD form, forwarded by class co-ordinator, to the Department office. Such OD should be applied, **atleast a day before** availing it. Only after getting permission from the HOD, students are permitted to avail OD.
2. Students are permitted to **apply** for OD for attending co-curricular and extra curricular activities, inside / outside the college, only after getting prior permission from the class co-ordinator and HOD. Permission will be granted, considering students port folio, (performance in the University examination, Class test / CITs and attendance). Also the relevance of the seminar / workshop / technical events / certificate courses etc. will be reviewed with the class co-ordinators to sanction OD.
3. On duty will be approved only after the submission of relevant certificates (Copies to submitted to the staff in-charge,Mr. S. Rajalingam, and to the college office).
4. Final year Students having more than 6 arrears, third year students having more than 4 arrears and Second year students having more than 3 arrears (cumulative) will not be permitted to attend the Co-curricular / extra curricular activities. This is to ensure them to concentrate more on academic subjects. However, this will be relaxed, at the request of parents and students, considering the students contribution in the co –curricular / extra curricular activities.
5. Students who failed in 3 and above subjects in class tests / CITs will not be permitted to participate in any inside / outside the college co curricular activities. This is to ensure them to concentrate on academic subjects.
6. Students with less than 90% of attendance will not be permitted to apply for OD.
7. Students with the history of indiscipline activities reported in the past in the class room / laboratories / campus etc. will not be permitted to apply for OD.
8. Status of Students who have applied for OD for attending Co-curricular / extra curricular activities inside / outside the college will be monitored. Their presence in the concerned venue will be constantly monitored. Non availability of students, in the concerned venue, is reported, if any, disciplinary action will be taken.
9. First and Second year students of B.E-EEE are not encouraged to participate in the Co-curricular / extra curricular activities, as subject content of first and second year is heavy and basics are to be studied in deep for successful career.
10. Curricular / co-curricular events, are planned and periodically conducted by the department. Also certificate / certification courses are regularly conducted by the department during summer / winter holidays. Students are encouraged to attend such courses / events organized by the department, as it will not affect the regular academics.
11. Students are encouraged to attend curricular / co-curricular events, inside / outside the college, after college working hours or during holidays, as it will not affect the regular academics.
12. Students will be selectively permitted to attend curricular / co-curricular events inside / outside the college, if it is highly recommended by the faculty. A maximum of 10% of the students from each class will be permitted for attending such events. Preference will be given for those students having no history of arrears and passed all the class test / CITs.
13. Students attending curricular / co-curricular events inside / outside the college should maintain highest order of discipline. Indiscipline reports received, if any, students will not be permitted for attending any events thereafter and suitable disciplinary action will be taken.
14. It was reported that students who involved in indiscipline activities, while participating in the curricular / co-curricular activities, outside the college, were not permitted to appear for the University Examinations, as such issues reported to the University. Hence students should be very cautious while attending events inside / outside the college.

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

HOD / EEE

A Brief History of The College

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

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

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

Campus :

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SALIENT FEATURES OF THE DEPARTMENT

1. GENERAL

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

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

2. INFRASTRUCTURE

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

3. STAFF

- Teams of well qualified, and experienced 32 faculties with cadre ratio as per AICTE, are guiding the students to attain the best educational objectives.
- Excellent research environment promotes the staff and students to participate, present and publish their research works in the National/International Journals and National/International conferences.
- Facility and experienced faculty available for guiding Ph.D. scholars.

- Staff development Programme / Faculty development programme / Workshop/ Seminar are organized regularly to share the knowledge of our experienced faculty with parent institution and other colleges staff and students and Industrial persons.

4. RESEARCH AND DEVELOPMENT

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

5. STUDENTS

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

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FACULTY LIST

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

Placement Activity – Reminder

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

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

GENERAL REMINDERS.

I. General

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

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

II. Education:

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

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

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

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

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

III. Health

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

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

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

---

Annual Training calendar 2016 – 2017

(Short Term Skill Training Programme)

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

Tips for Effective Communication

Have courage to say what you think.

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

Practice.

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

Make eye contact.

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

Use gestures.

These include gestures with your hands and face. Make your whole body talk. Use smaller gestures for individuals and small groups. The gestures should get larger as the group that one is addressing increases in size.

Manifest constructive attitudes and beliefs.

The attitudes you bring to communication will have a huge impact on the way you compose yourself and interact with others. Choose to be honest, patient, optimistic, sincere, respectful, and accepting of others. Be sensitive to other people's feelings, and believe in others' competence.

Develop effective listening skills:

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

Enunciate your words.

Speak clearly and don't mumble. If people are always asking you to repeat yourself, try to do a better job of articulating yourself in a better manner.

Pronounce your words correctly.

People will judge your competency through your vocabulary. If you aren't sure of how to say a word, don't use it.

Use the right words.

If you're not sure of the meaning of a word, don't use it. Grab a dictionary and start a daily habit of learning one new word per day. Use it sometime in your conversations during the day.

Slow your speech down.

People will perceive you as nervous and unsure of yourself if you talk fast. However, be careful not to slow down to the point where people begin to finish your sentences just to help you finish.

Developing Leadership Skills

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

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

1. What kind of leader am I? One who helps to solve problems? A leader who helps people get along? How do others see me as a leader?
2. What are my goals, purposes, and expectations in working with this particular group? Identify areas for improvement.

Ask yourself these questions:

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

Then after analyzing your strengths and weaknesses -- take action

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

1) Communicate effectively:

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

Try these steps to effective communication:

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

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

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

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

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

• Portray disagreement as simply a difference of opinion. Get rid of the "I'm right, you're wrong" attitude.

2) Encourage enthusiasm and a sense of belonging. Show:

• Friendliness: others will be more willing to share ideas if you're interested in them as people too.

• Understanding: everyone makes mistakes. Try to be constructive, tolerant and tactful when offering criticism.

• Fairness: equal treatment and equal opportunity lead to an equally good effort from all group members.

• Integrity: members will take tasks more seriously if you show that you're more interested in group goals than your own personal gain.

3) Keep everyone working toward agreed upon goals:

• Remind everyone of the group's purposes from time to time. It's easy to become too narrowly focused and lose sight of the larger goals.

• Provide encouragement and motivation, by showing your appreciation for good ideas and extra effort.

• Harmonize differences and disagreements between group members by stressing compromise and cooperation.

• Involve everyone in discussions and decisions, even if asking for opinions and ideas means a longer discussion.

4) Get to know the people around you Everyone has different abilities, wants, needs, and purpose in life.

To get along with others and get results, you need to get to know them.

• Interact with group members as often as possible. The only way to get to know someone is through direct personal contact.

• Become familiar with every member of your group. Take note of each person's unique qualities and characteristics.

5) Treat others as individuals

Put your knowledge and understanding of each group member to work!

• Be aware of expectations. Everyone expects something different: recognition, a chance to learn, a chance to work with other people, etc.

• Be creative. A repetitious routine can cause boredom. A successful leader thinks of new and better approaches to old ways of doing things.

• Provide rewards. Recognition by the group is a source of personal satisfaction and positive reinforcement for a job well done.

• Delegate responsibilities. If everyone shares the work, everyone can share pride in the group's accomplishments. Let each member know what's expected of him/her, available resources, deadlines, etc.

6) Accept responsibility for getting things done

• Take the initiative. Why stand around and wait for someone else to get things started? Set an example.

• Offer help and information. Your unique knowledge and skills may be just what's needed.

• Seek help and information. Ask for advice if you need it. This will encourage group involvement and help accomplish group goals.

• Make things happen. By being decisive, energetic, and enthusiastic, you can and will help get things done!

• Know when and how to say "no."

If your time and resources are already committed, turn down extra tasks, but do it nicely.

7) Problem solve in a step - by-step way

Whether you are faced with a decision to make or a conflict to resolve, following a logical approach will help.

1. State the problem as simply and clearly as possible.
2. Gather all relevant information and available resources.
3. Brainstorm as many ideas or solutions as you can think of (with others if possible).
4. Evaluate each idea or solution and choose the best one.
5. Design a plan for using your idea or solution. Include a timetable, assigned roles, and resources to be used.
6. Follow up on your plan by asking if your idea worked and why or why not.

NG 27

PART 01 - MATHEMATICS

(Common to all candidates)

(Answer ALL questions)

1. The unit normal to the surface $x^2y+2xz = 4$ at the point (2, -2, **3)** is

   1. $-i+2j+2\bar{k}$
   2. $\frac{1}{3}(-i+2j+2\bar{k})$
   3. $\frac{1}{3}(i-2j+2\bar{k})$
   4. $i-2j-2\bar{k}$

2. If r = $\sqrt{x^2+y^2+z^2}$, then $\nabla\left(\frac{1}{r}\right)$ is equal to

   1. $\frac{\bar{r}}{r^3}$
   2. $\frac{\bar{r}}{r^2}$
   3. $\frac{-\bar{r}}{r^2}$
   4. $\frac{-\bar{r}}{r^3}$

3. If $\bar{A}=x^2zi-2y^3z^2\bar{j}+xy^2z\bar{k}$, then $div\,\bar{A}$ at $(1,-1,1)$ is

   1. 0
   2. –3
   3. 3
   4. 1

4. If $\bar{A}=x^2yi-2xz\bar{j}+2yz\bar{k}$, then $curlcurl\,\bar{A}$ is

   1. $(x+2)\bar{j}$
   2. $(2x+2)\bar{j}$
   3. $(2x+1)\bar{j}$
   4. $(2x+2y)\bar{j}$

5. If $\bar{V}=(x+2y+az)i+(bx-3y-z)\bar{j}+(4x+cy+2z)\bar{k}$ is irrotational, then

   1. $a=4, b=-1, c=2$
   2. $a=2, b=-1, c=4$
   3. $a=4, b=2, c=-1$
   4. $a=4, b=-2, c=1$

6. Which of the following is a factor of the determinant?

$$\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix}$$

   1. a
   2. a - b
   3. $a+b$
   4. $a+b+c$

7. If $a+b+c=0$, one root of $\begin{vmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{vmatrix}=0$ is

   1. $x=1$
   2. $x=2$
   3. $x=a^2+b^2+c^2$
   4. $x=0$

8. If ***A*** is a 4×4 matrix. **A** second order minor of A has its value as 0. Then the rank of ***A*** is

1. < 2
2. $= \mathbf{2}$
3. $> \mathbf{2}$
4. anything

9. Given $A = \begin{pmatrix} 2 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 8 \end{pmatrix}$, then the determinant value of A^{-1} is

1. **32**
2. $\frac{1}{32}$
3. $\frac{1}{64}$
4. 64

10. If $\begin{pmatrix} 3 & 1 \\ 4 & 1 \end{pmatrix} X = \begin{pmatrix} 5 & -1 \\ 2 & 3 \end{pmatrix}$, then

1. $X = \begin{pmatrix} -3 & 4 \\ 14 & 13 \end{pmatrix}$
2. $X = \begin{pmatrix} 3 & -4 \\ -14 & 13 \end{pmatrix}$
3. $X = \begin{pmatrix} -3 & 4 \\ 14 & -13 \end{pmatrix}$
4. $X = \begin{pmatrix} -3 & -4 \\ -14 & 13 \end{pmatrix}$

11. C-R equations for a function $w = P(r, \theta) + iQ(r, \theta)$ to be analytic, in polar form are

1. $\frac{\partial P}{\partial r} = \frac{1}{r}\frac{\partial Q}{\partial \theta}, \frac{\partial Q}{\partial r} = \frac{-1}{r}\frac{\partial P}{\partial \theta}$
2. $\frac{\partial Q}{\partial \theta} = \frac{1}{r}\frac{\partial P}{\partial r}, \frac{\partial P}{\partial \theta} = \frac{1}{r}\frac{\partial Q}{\partial r}$
3. $\frac{\partial P}{\partial r} = \frac{-1}{r}\frac{\partial Q}{\partial \theta}, \frac{\partial Q}{\partial r} = \frac{1}{r}\frac{\partial P}{\partial \theta}$
4. $\frac{\partial P}{\partial \theta} = \frac{1}{r}\frac{\partial Q}{\partial r}, \frac{\partial Q}{\partial \theta} = \frac{-1}{r}\frac{\partial P}{\partial r}$

12. If $f(z) = u + iv$ is an analytic function and u and v are harmonic, then u and v will satisfy

1. one dimensional wave equation
2. one dimensional heat equation
3. Laplace equation
4. Poisson equation

13. In the analytic function $f(z) = u + iv$, the curves $u(x, y) = c_1$ and $v(x, y) = c_2$ are orthogonal if the product of the slopes m_1 and m_2 are

1. $m_1 m_2 = 0$
2. $m_1 m_2 = -\pi$
3. $m_1 m_2 = \frac{-\pi}{2}$
4. $m_1 m_2 = -1$

14. If the imaginary part of the analytic function $f(z) = u + iv$ is constant, then

1. u is not a constant
2. $f(z)$ is not a complex constant
3. f(z) is equal to zero
4. u is a constant

15. If $f(z) = P(r, \theta) + iQ(r, 8)$ is analytic, then $f'(z)$ is equal to

1. $e^{i\theta}\left(\frac{\partial P}{\partial r} + i\frac{\partial Q}{\partial \theta}\right)$
2. $e^{-i\theta}\left(\frac{\partial P}{\partial r} + i\frac{\partial Q}{\partial \theta}\right)$
3. $e^{-i\theta}\left(\frac{\partial P}{\partial r} + i\frac{\partial Q}{\partial r}\right)$
4. $e^{+i\theta}\left(\frac{\partial P}{\partial r} + i\frac{\partial Q}{\partial r}\right)$

16. The formula for the radius of curvature in cartesian coordinate is

1. $\frac{\left(1+(y')^2\right)^{1/2}}{y''(x)}$

2. $\frac{\left(1+(y')^2\right)^{3/2}}{y''(x)}$

3. $\frac{\left(1+(y')^2\right)^{3/2}}{(y'')^2}$

4. $\frac{\left(1+(y')^2\right)^{1/2}}{(y''(x))^2}$

17. The stationary point of $f(x,y)=x^2-xy+y^2-2x+y$ is

1. $(0,1)$
2. $(1,0)$
3. $(-1,0)$
4. $(1,-1)$

18. $\int x\cos x\,dx$ is

1. $x\sin x+\cos x$
2. $x\sin x-\cos x$
3. $x\sin x-x\cos x$
4. $x\sin x+x\cos x$

19. For the following data :

x:	0	2	4	6
y:	−1	3	7	11

the straight line $y=mx+c$ by the method of least square is

1. $y=-2x-1$
2. $y=x-1$
3. $y=1-2x$
4. $y=2x-1$

20. The velocity v (km/min) of a train which starts from rest, is given at fixed intervals of time t (min) a s follows :

t:	2	4	6	8	10	12	14	16	18	20
v:	10	18	25	29	32	20	11	5	2	0

The approximate distance covered by Simpson's 1/3 rule is

1. 306.3
2. 309.3
3. 310.3
4. 307.3

21. Find the cubic polynomial by Newton's forward difference which takes the following

x :	0	1	2	3
$f(x)$:	1	2	1	10

Then f (4) is

1. 40
2. 41
3. 39
4. 42

22. The first derivative $\frac{dy}{dx}$ at $x=0$ for the given data

x :	0	1	2	3
$f(x)$:	2	1	2	5

is

1. 2
2. –2
3. –1
4. 1

23. Error in Simpson's $\frac{1}{3}$ rule is of the order

1. $-h^2$
2. h^3
3. h^4
4. $\frac{2h^3}{3}$

24. A lot consists of ten good articles, four with minor defects and two with major defects. Two articles are chosen from the lot a t random (without replacement). Then the probability that neither of them good is

1. $\frac{5}{8}$
2. $\frac{7}{8}$
3. $\frac{3}{8}$
4. $\frac{1}{8}$

25. If A , B, C are any three events such that

$$P(A)=P(B)=P(C)=\frac{1}{4};$$

$$P(A\cap B)=P(B\cap C)=0,\quad P(C\cap A)=\frac{1}{8}.$$

Then the probability that atleast one of the events A , B, C occurs, is

1. $\frac{1}{32}$
2. $\frac{3}{32}$
3. $\frac{7}{8}$
4. $\frac{5}{8}$

26. To establish the mutual independence of n events, the equations needed are

1. 2^n+n+1
2. n^2+n+1
3. $2^n-(n+1)$
4. $2^n+2(n+1)$

27. If atleast one child in a family with two children is a boy, then the probability that both children are boys is

1. 3/4
2. 1/3
3. 1/4
4. 1/2

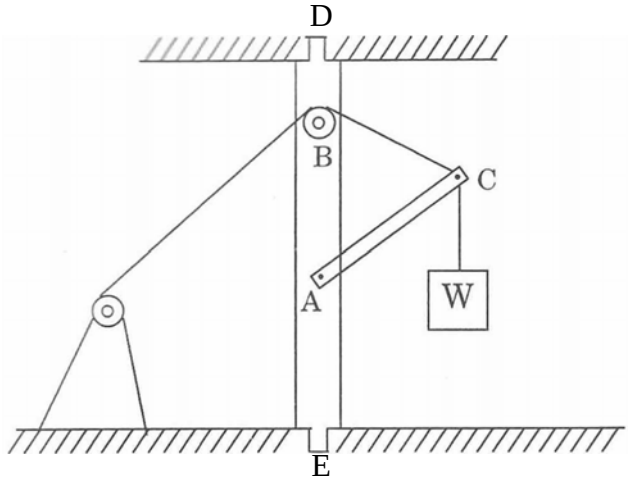
28. A discrete random variable X takes the values $a, ar, ar^2, \cdots, ar^{n-1}$ with equal probability. Then Arithmetic Mean (A.M) is

1. $a(1-r^n)$
2. $\frac{1}{n}a(1-r^n)$
3. $\frac{a}{n}\frac{(1-r^n)}{1-r}$
4. $\frac{a}{n}\frac{(r^n-1)}{1-r}$

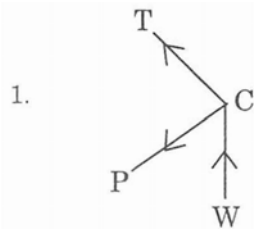
PART 02 — BASIC ENGINEERING AND SCIENCE

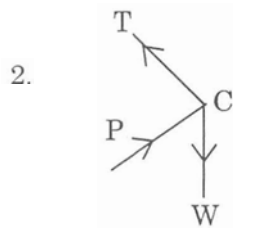
(Common to all candidates)

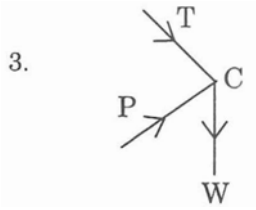
31. Free body diagram of point C of the Derrick shown below is

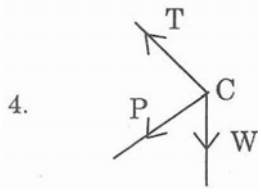


Derrick

1. 

2. 

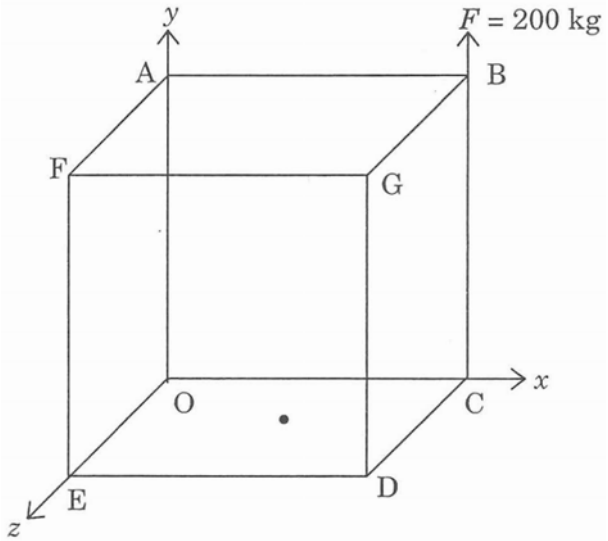
3. 

4. 

32. **A** 200 kg block is in contact with a plane inclined a t ***30"*** to the horizontal. **A** force P, parallel to and acting up the plane, is applied to the body. If the coefficient of static friction is 0.20, the value of P to just cause motion up the plane is

1. 1.35 kg
2. 13.5 kg
3. 135 kg
4. 530 kg

33. Find the moment of the Force 'F acting along the edge ***'CB*** of a cube of edge 1 m about the centre of the base of the cube OCDE, shown below.



1. 4140 Nm
2. 144 Nm
3. 1414 Nm
4. 4144 Nm

34. The motion of a particle is given by $a = 6v^{112}$ where a is in m/sec^2 and v is in m/sec, when $t = 0$, $v = 0$. Find the relation between v and t

1. $v = 9t^2$
2. $t = v/4$
3. $v^2 = 9t$
4. $t = 9v^2$

NG 27

35. A particle of mass 10 kg is moving along the circumference of a circle of radius 1 0 m. If the tangential velocity of the particle is 5 m/sec, then the kinetic energy gained by the body in **10** rotations is

1. 500 J
2. 0 J
3. 400 J
4. 1250 J

36. The packing factor for y - iron is

1. **0.34**
2. 0.52
3. 0.68
4. 0.74

37. Which one among the following is a thermoset material?

1. Rubber
2. Nylon
3. Urea formaldehyde
4. Teflon

38. Which metal among the following would not undergo corrosion?

1. Copper
2. Gold
3. Silver
4. Iron

39. Domain structure is exhibited by

1. ferromagnets
2. paramagnets
3. diarnagnets
4. both dia and paramagnets

40. At absolute zero, the probability of occupation of energy levels below the Fermi energy level, by electrons, is

1. 1
2. 1/2
3. 1/3
4. 1/4

41. A water column of volume 6.5 litres is subjected to a direct pressure of $1.8\times10^{6}\ N/m^{2}$. Determine the change in volume of water column if the bulk modulus of water is taken as $2\times10^{9}\ N/mm^{2}$

1. $5.85\times10^{-6}\ m^{3}$
2. $58.5\times10^{-3}\ m^{3}$
3. $2.05\times10^{-4}\ m^{3}$
4. $1.85\times10^{-5}\ m^{3}$

42. Density index of a material is

1. greater than one
2. less than one
3. equal to one
4. indeterminate

43. The constituent of cement that imparts quick setting quality to cement is

1. Magnesia
2. Iron oxide
3. Alumina
4. Silica

44. A surveyor's mark cut on a stone or rock or any reference point to indicate a level in a levelling survey is called

1. reduced level
2. change point
3. levelling mark
4. bench mark

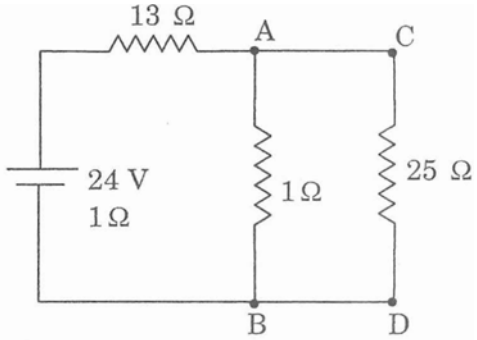
45. According to the United States Bureau of soil classification, the soil is designated as 'coarse clay' if the particle size varies from

1. 0.0001 mm to 0.002 mm
2. 0.02 mm to 0.06 mm
3. 0.2 mm to 0.6 mm
4. 0.6 mm to 2 mm

46. Two capacitors **A** and B are placed in series. Capacitors $C_A = 100\,\mu F$ and $C_B = 50\,\mu F$. The maximum energy stored in the circuit when 240 V, 50 Hz supply is applied to the circuit is

1. 19.2 J
2. 1.92 J
3. 192 J
4. 12.9 J

47. With reference to the network shown below, by applying Thevenin's theorem, find the equivalent voltage of the network when viewed from the terminals CD



1. 12 V
2. 6 V
3. 18 V
4. 21.5 V

48. "In a Delta/Star transformation of meshes, it must be remembered that the resistance of each arm of the star is given by the of the resistance of the two delta sides that meet at its ends divided by the resistances." of the three delta

1. product, product
2. sum, product
3. product, sum
4. sum, sum

49. An alternating voltage of $(8+j6)V$ is applied to a series a.c. circuit and the current passing is $(2+j5)A$. The impedance of the circuit is

1. 8.6 Ω
2. 18.6 Ω
3. 1.68 Ω
4. 1.86 Ω

50. A moving coil ammeter is wound with 40 turns and gives full scale deflection with 5 A. How many turns would be required on the same bobbin to give full scale deflection with 20 A?

1. 10
2. 40
3. 12
4. 21

51. The percentage of carbon in eutectoid steel is

1. 0.8
2. 0.4
3. 0.02
4. 1.2

52. Which one of the following is not using electron as a source of energy?

1. Solar cell
2. MHD generator
3. Fuel cell
4. Atomic power plant

53. Temporary metal forming process is

1. Welding
2. Brazil
3. Mechanical bonding
4. Soldering

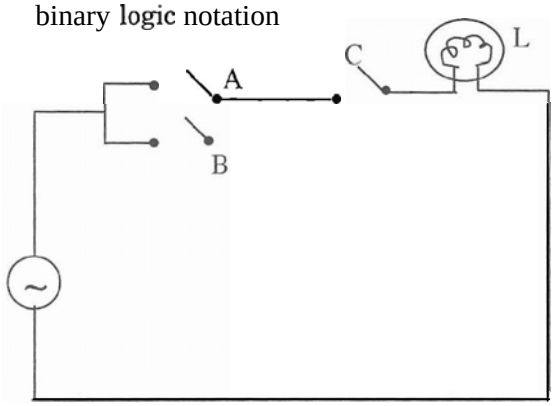
54. Under isobaric conditions, the Gibb's phase rule takes the form

1. F = C - P + 2
2. F = C - P + 1
3. F = C - P + 3
4. F = C - P

55. Which one of the following metals is more ductile?

1.. Copper
2. Silver
3. Gold
4. Nickel

56. Express the following switching circuit in binary logic notation



1. $L = (AC + BC)$
2. $L = (A + B) \cdot C$
3. $L = (A + B) + C$
4. $L = A + (B + C)$

57. Applying DeMorgan's theorem find the equivalent of $(x + yz)'$

1. $(x' + y') \cdot z'$
2. $(x' + z') \cdot y'$
3. $(y' + x') + z'$
4. $x' \cdot (y' + z')$

58. LAN stands for

1. Local Access Network
2. Local Area Network
3. Link Access Network
4. Listed Area Network

59. An electronic semiconductor device that is fabricated with permanently stored information, which cannot be erased is called

1. Random Access Memory
2. Read Only Memory
3. Memory Data Register
4. Memory Address Register

60. Which of the following are the system directories in

1. bin, etc, lib, tmp
2. local, usr, dev, bin
3. bash, etc, lib, tmp
4. sys, dev, bin, usr

61. If θ is the angle between the vectors $\vec{a}$ and $\vec{b}$ such that $|\vec{a} \times \vec{b}| = \sqrt{10}$ and $\vec{a} \cdot \vec{b} = \sqrt{30}$, then the value of $\cos\theta$ is

1. $1/3$
2. $1/2$
3. $\frac{2}{\sqrt{3}}$
4. $\frac{\sqrt{3}}{2}$

62. If $a = \sqrt{2}i$, then which of the following is true?

1. $a = (\pm\sqrt{2})i$
2. $a + i = 1$
3. $a - i = 1$
4. $a = (-\&)i$

63. The value of the determinant given below is

$$\mathbf{A} = \begin{vmatrix} \alpha^2 & a^3 & \alpha^4 \\ \alpha^3 & a^4 & \alpha^5 \\ a^4 & \alpha^6 & \alpha^7 \end{vmatrix}$$

1. a^9
2. α^{13}
3. $2\alpha^2$
4. 0

64. Which of the following points lies on the circle with centre $(3, -2)$ and radius **3** units?

1. $(3, 1)$
2. $(1, 3)$
3. $(-1, 3)$
4. $(-3, 1)$

65. **A** die and a coin are thrown together. The probability of obtaining a prime number on the die and tail on the coin is

1. $1/2$
2. $(1/2)^2$
3. $(1/2)^3$
4. $(1/2)^4$

66. Two coils connected in series have resistances of 600 Ω and 300 Ω and temperature coefficient of 0.001 and 0.004 respectively a t 20° C. The resultant of the combination at 20° C is

1. 954 Ω
2. 549 Ω
3. 1094 Ω
4. 850 Ω

67. A boat is at rest under the action of three forces, two of which are $F_1 = 4i$ and $F_2 = 6j$. Then the z–component of the third force is

1. - 4 units
2. - 6 units
3. 0 units
4. - 10 units

68. **A** body that absorbs all the radiation falling on it is called a

1. good absorber
2. perfect black body
3. black body
4. good emitter

69. Quantum nature of light is not supported by the phenomenon of

1. Compton effect
2. Photoelectric emission
3. Emission or absorption spectrum
4. Diffraction of light

70. Current carriers in an electrolyte are

1. electrons and negative ions
2. electrons and positive ions
3. positive and negative ions
4. electrons and ions

71. A real gas would approach the behaviour of an ideal gas a t

1. low temperature and high pressure
2. low temperature and low pressure
3. high temperature and low pressure
4. high temperature and high pressure

72. Boron trifluoride (BF_3) will act as

1. a base
2. an acid
3. both as a base and an acid
4. neither a base nor an acid

73. An electric current is passed through an aqueous solution given below. Which one shall decompose?

1. Urea
2. Silver Nitrate
3. Ethyl alcohol
4. Glucose

74. The element of highest electronegativity is

1. Flourine
2. Chlorine
3. Oxygen
4. Caesium

75. Which one of the following involves a polar bond?

1. Cl — Cl
2. O — O
3. Br- Br
4. H- Cl

PART 05 — ELECTRICAL, ELECTRONICS, COMMUNICATIONAND INSTRUMENTATION ENGINEERING

(Answer ALL questions)

76. How much energy is stored by a 100 mH inductance with a current of **1 A?**

1. 100 J
2. **1 J**
3. 0.05 J
4. 0.01 J

77. If a network contains B branches and N nodes then the number of mesh current equations would be

1. $B-(N-1)$
2. $N-(B-1)$
3. B – N – 1
4. $(B+N)-1$

78. When $R = 10\ \Omega, X_C = 18\ \Omega$ and $X_L = 12\ \Omega$, the current

1. leads the applied voltage
2. lags behind the applied voltage
3. is in phase with the voltage
4. is in quadrature with the voltage

79. In a certain series RC circuit, the true power is 2W and the reactive power is **3.5** VAR. What is the apparent power?

1. **3.5** VA
2. 2VA
3. 4.03 VA
4. 3VA

80. A sine wave voltage is applied across an inductor when the frequency of voltage is increased, the current

1. increases
2. decreases
3. remains the same
4. is zero

81. A shunt generator running at 1000 r.p.m. has generated e.m.f. as 200 V. If the speed increases to 1200 rpm, the generated emf will be nearly

1. 150 V
2. 175 V
3. 240 V
4. 290V

82. In a d.c. generator in case the resistance of the field winding is increased then output voltage will

1. increase
2. decrease
3. remain unaffected
4. fluctuate heavily

83. D.C. motors are widely used in

1. Pump sets
2. Air compressors
3. Electric traction
4. Machine shops

84. The starting winding of a single-phase motor is placed in

1. armature
2. field
3. rotor
4. stator

85. An over-excited synchronous motor takes

1. leading current
2. lagging current
3. both (1) and (2)
4. in phase current

86. In open loop system the control action

1. depends on the size of the system
2. depends on system variables
3. depends on the input signal
4. is independent of the output

87. **A** controller is essentially a

1. Sensor
2. Clipper
3. Comparator
4. Amplifier

88. **A** signal flow graph is a

1. topological representation of a set of differential equations
2. polar graph
3. log log graph
4. special type of graph to analyse modern control systems

89. When the gain margin is positive and the phase margin is negative, the system is

1. stable
2. unstable
3. stable or unstable depending on the system
4. undeterministic

90. The effect of adding poles and zeros can be determined quickly by which of the following?

1. Root locus
2. Nyquist plot
3. Bode plot
4. Nicholar chart

91. **A** Norton's equivalent is

1. parallel circuit
2. series circuit
3. series-parallel circuit
4. none of the above

92. **A** resistor of **5** ohms is connected in one branch of a complex network. The current in this branch is 5 **A.** If this **5** Ω resistor is replaced by **10** Ω resistor the current in this branch will be

1. 10 A
2. 2.5 **A**
3. **5 A**
4. less than 5 **A**

93. To determine the polarity of the voltage drop across a resistor, it is necessary to know the

1. value of the resistor
2. value of current through the resistor
3. direction of current through the resistor
4. power consumed by the resistor

94. In a network the number of tree branches

1. is equal to the number of links
2. cannot be equal to number of links
3. is twice the number of links
4. has no relation with the number of link branches

95. For a voltage source

1. the source emf and terminal voltage are equal
2. terminal voltage is always lower than source emf
3. terminal voltage cannot be higher than source emf
4. terminal voltage is zero

96. Kirchoff's voltage law states that the

1. total voltage drop in a series circuit is always finite
2. sum of emf and voltage drops in a closed mesh is zero
3. sum of emfs in a series circuit is zero
4. sum of emf and voltage drops in a closed mesh is not zero

97. In a thyristor, the magnitude of anode current will

1. increase if gate current is increased
2. decrease if gate current is decreased
3. increase if gate current is decreased
4. not change with variation in gate current

98. For an SCR, $\frac{di}{dt}$ protection is achieved through the use of

1. R in series with SCR
2. L in series with SCR
3. RL in series with SCR
4. RLC in series with SCR

99. Inverter gain is given by the ratio

1. dc output voltage/ac input voltage
2. ac output voltage/ac input voltage
3. dc output voltage/dc input voltage
4. ac output voltage/dc input voltage

100. A zener diode works on the principle of

1. tunnelling of charge carriers across the junction
2. thermionic emission
3. diffusion of charge carriers across the junction
4. hoping of charge carriers across the junction

101. The major application of chopper drive is in

1. traction
2. computers
3. heating furnishes
4. miniature motors

102. When a thyristor gets turned on, the gate drive

1. should not be removed or it will turn off the SCR
2. may or may not be removed
3. should be removed
4. should be removed in order to avoid increased losses and higher function temperature

103. Computer cannot do anything without a

1. chip
2. memory
3. output device
4. program

104. The first computer made available for commercial use was

1. Mark–I
2. ENIAC
3. EDSAC
4. UNIVAC

105. When did Intel announce its 16-bit 80286 chip?

1. 1980
2. 1982
3. 1984
4. 1986

106. How many bits can be stored in the 8 K RAM?

1. 8000
2. 8192
3. 4000
4. 4096

107. The larger the RAM of a computer, the faster its processing speed is since it eliminates the

1. need of ROM
2. need for external memory
3. frequent disk I/Os
4. need for wider data path

108. Which of the following types of transducers can be used for measuring the angular position?

(a) Circular potentiometer

(b) LVDT

(c) E-Pick off

(d) Synchro

Select the correct answer using the codes given below :

1. (a), (b), (c) and (d)
2. (a) and (c)
3. (a), (b) and (d)
4. (a) and (d)

109. The most suitable thermocouple to be used for measuring temperature in the range of 1300° C to 1500" C is

1. Chromel–Constantan
2. Iron–Constantan
3. Chromel–Alumel
4. Platinum–Rhodium

110. LVDT is a

1. displacement transducer
2. velocity transducer
3. acceleration transducer
4. pressure transducer

111. In a strain measuring equipment using a resistance strain gauge the output quantity is

1. resistance
2. voltage
3. current
4. impedance

112. If the temperature increases by 100° C, the resistivity of a thermistor is likely to become

1. one half of initial value
2. one fiftieth of initial value
3. twice the initial value
4. no change

113. The purpose of duplexer is

1. to convert TDM to FDM
2. to provide same antenna both for transmission and reception
3. to convert pulsed transmission to CW transmission
4. both (1) and (3)

114. In FM transmission, amplitude of the modulating signal determines

1. rate of frequency variations

2. amount of frequency shift

3. total balance of transmission

4. distance of broadcast

115. The highest harmonic generated in human voice is

1. 1 kHz

2. 5 kHz

3. 3 kHz

4. 10 kHz

116. If the reflection coefficient of a line is zero, the line is

1. Infinite line

2. Open-circuited

3. Short-circuited

4. Very short line

117. The receiving antenna most commonly used for TV broadcasting in the UHF band is

1. turnstile antenna

2. dipole antenna

3. yagi antenna

4. rhombic antenna

118. Generally the aircraft electrical system uses supply frequency of

1. 50 Hz

2. 60 Hz

3. 400 Hz

4. 115 Hz

119. In GPS Navigation, there can be integration between

1. GPS and INS

2. GPS and LORAN C

3. GPS and ILS

4. GPS and DME

120. Mach Number is defined as the ratio between True air speed and speed of the sound at

1. sea level

2. any altitude

3. a particular altitude

4. all altitudes

K.L.N. College of Engineering.

How to prepare for Anna University Examinations.

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

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

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

4. Presentation – AU exam-General complaints by students that the valuation is not fair or poor valuation. Remarks of examiners that there is nothing in the answer paper. Parents may say that either "college is not good" or "it is a fate". Public may say "poor quality" and the experts may comment that " only 20% are employable". These statements will go on for centuries. Many students believes that they have written right answers mostly(but many

of them actually wrong) and few examiners assumed certain answers by students are wrong(but many of them are actually correct). It is 70% true that students are not presenting the answers well and it is 30% true that the valuation is not fair. But it is 95% true that the deserved students are getting expected results in most of the papers. This is because of good presentation. Good presentation involves many factors such as legible writing, good handwriting. answering correctly(100% correct),all answers with mathematical modeling/pictorial representation/drawing/layout/sketches with different colours, writing 7 pages for 16 mark questions with valid points and sketches, 4 pages for 8 marks with valid points and sketches/drawings/equations, characterizes,. Such students will solve problems correctly without any overwriting/ strikeouts. Simply, they do not cheat. These are the in-born qualities or developed over the years due to good habits, friendship, good character, obedience, hard work, well brought up by parents and blessing by God. Everyone can become like them if their attitude is good. Fear of God is the beginning of Wisdom. The examiners will know about your quality, just by referring the way you have answered Part-A- questions. A well prepared student would get a maximum of 18 out of 20 .This impresses the examiner so that they will award a maximum of 14-16 for each part-B-questions. Most of the students would answer wrongly in the Part-A-questions. This is due to their poor preparation during Class tests/internal tests, frequently taking leave, lot of diversion, skipping the classes for attending Co-Curricular/ /extra-curricular activities etc inside or outside the college.. Attending the classes is more important than attending college. Students are expected to attend 98%classes to maintain the continuity of the subjects learnt. One day absence means it will take a week to study on his/her own. If he/she fails to study on his/her own to review the classes not attended means a loss of 10 marks in the exams.

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

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

ANNA UNIVERSITY :: CHENNAI 600 025

FORMAT FOR PREPARATION OF PROJECT REPORT

FOR

B.E. / B. TECH. / B. ARCH.

1. ARRANGEMENT OF CONTENTS:

The sequence in which the project report material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Bonafide Certificate
3. Abstract
4. Table of Contents
5. List of Tables
6. List of Figures
7. List of Symbols, Abbreviations and Nomenclature
8. Chapters
9. Appendices
10. References

The table and figures shall be introduced in the appropriate places.

2. PAGE DIMENSION AND BINDING SPECIFICATIONS:

The dimension of the project report should be in A4 size. The project report should be bound using flexible cover of the thick white art paper. The cover should be **printed in black letters** and the text for printing should be identical.

3. PREPARATION FORMAT:

3.1 Cover Page & Title Page – A specimen copy of the Cover page & Title page of the project report are given in **Appendix 1.**

3.2 Bonafide Certificate – The Bonafide Certificate shall be in double line spacing using Font Style Times New Roman and Font Size 14, as per the format in **Appendix 2.**

The certificate shall carry the supervisor's signature and shall be followed by the supervisor's name, academic designation (not any other responsibilities of administrative nature),

department and full address of the institution where the supervisor has guided the student. The term **'SUPERVISOR'** must be typed in capital letters between the supervisor's name and academic designation.

3.3 **Abstract –** Abstract should be one page synopsis of the project report typed double line spacing, Font Style Times New Roman and Font Size 14.

3.4 **Table of Contents –** The table of contents should list all material following it as well as any material which precedes it. The title page and Bonafide Certificate will not find a place among the items listed in the Table of Contents but the page numbers of which are in lower case Roman letters. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents of the project report is given in **Appendix 3.**

3.5 **List of Tables –** The list should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head.

3.6 **List of Figures –** The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head.

3.7 **List of Symbols, Abbreviations and Nomenclature** – One and a half spacing should be adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be used.

3.8 **Chapters** – The chapters may be broadly divided into 3 parts (i) Introductory chapter, (ii) Chapters developing the main theme of the project work (iii) and Conclusion.

The main text will be divided into several chapters and each chapter may be further divided into several divisions and sub-divisions.

- ❖ Each chapter should be given an appropriate title.
- ❖ Tables and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited.
- ❖ Footnotes should be used sparingly. They should be typed single space and placed directly underneath in the very same page, which refers to the material they annotate.

3.9 **Appendices** – Appendices are provided to give supplementary information, which is included in the main text may serve as a distraction and cloud the central theme.

- Appendices should be numbered using Arabic numerals, e.g. Appendix 1, Appendix 2, etc.
- Appendices, Tables and References appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.
- Appendices shall carry the title of the work reported and the same title shall be made in the contents page also.

3.10 List of References –The listing of references should be typed 4 spaces below the heading "REFERENCES" in alphabetical order in single spacing left – justified. The reference material should be listed in the alphabetical order of the first author. The name of the author/authors should be immediately followed by the year and other details.

A typical illustrative list given below relates to the citation example quoted above.

REFERENCES

1. Ariponnammal, S. and Natarajan, S. (1994) 'Transport Phonomena of Sm Sel – X Asx', Pramana – Journal of Physics Vol.42, No.1, pp.421-425.

2. Barnard, R.W. and Kellogg, C. (1980) 'Applications of Convolution Operators to Problems in Univalent Function Theory', Michigan Mach, J., Vol.27, pp.81–94.

3. Shin, K.G. and Mckay, N.D. (1984) 'Open Loop Minimum Time Control of Mechanical Manipulations and its Applications', Proc.Amer.Contr.Conf., San Diego, CA, pp. 1231-1236.

3.10.1 Table and figures - By the word Table, is meant tabulated numerical data in the body of the project report as well as in the appendices. All other non-verbal materials used in the body of the project work and appendices such as charts, graphs, maps, photographs and diagrams may be designated as figures.

4. TYPING INSTRUCTIONS:

The impression on the typed copies should be black in colour.

One and a half spacing should be used for typing the general text. The general text shall be typed in the Font style 'Times New Roman' and Font size 14.

*** * * * ***

APPENDIX 1
(A typical Specimen of Cover Page & Title Page)
<Font Style Times New Roman – Bold>

TITLE OF PROJECT REPORT

<Font Size 18><1.5 line spacing>

A PROJECT REPORT
<Font Size 14>

Submitted by
<Font Size 14><Italic>

NAME OF THE CANDIDATE(S)
<Font Size 16>

in partial fulfillment for the award of the degree

of

<Font Size 14><1.5 line spacing><Italic>

NAME OF THE DEGREE
<Font Size 16>

IN

BRANCH OF STUDY
<Font Size 14>

NAME OF THE COLLEGE
<Font Size 14>

ANNA UNIVERSITY : CHENNAI 600 025

<Font Size 16><1.5 line spacing>

MONTH & YEAR
<Font Size 14>

SPECIMEN

SOME PERFORMANCE ASPECTS CONSIDERATIONS OF A CLASS OF ARTIFICIAL NEURAL NETWORK

A PROJECT REPORT

Submitted by

SANDHYA. A

GAYATHRI.R

in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

in

INSTRUMENTATION AND CONTROL ENGINEERING

XXX ENGINEERING COLLEGE, KANCHEEPURAM

ANNA UNIVERSITY:: CHENNAI 600 025

MAY 2005

APPENDIX 2
(A typical specimen of Bonafide Certificate)
<Font Style Times New Roman>

ANNA UNIVERSITY : CHENNAI 600 025

<Font Style Times New Roman – size -18>

BONAFIDE CERTIFICATE

<Font Style Times New Roman – size -16>

<Font Style Times New Roman – size -14>

Certified that this project report **"…….TITLE OF THE PROJECT……..."**

is the bonafide work of "**……..NAME OF THE CANDIDATE(S).……"**

who carried out the project work under my supervision.

<<Signature of the Head of the Department>>
SIGNATURE

<<Name>>
HEAD OF THE DEPARTMENT

<<Department>>

<<Full address of the Dept & College >>

<<Signature of the Supervisor>>
SIGNATURE

<<Name>>
SUPERVISOR

<<Academic Designation>>

<<Department>>

<<Full address of the Dept & College >>

APPENDIX 3
(A typical specimen of table of contents)
<Font Style Times New Roman>

TABLE OF CONTENTS

K.L.N. COLLEGE OF ENGINEERING - 630612

Ref: KLNCE/EEE/project/2017 Date:

Project-Guide/Topic Selection

1. Details of Students

Sl. No.	Roll No.	Name of the Student	Semester/ Section	Email Id / Mobile No.	Signature of the student

2. Details of Supervisor(Internal/External)

(a) Details of Internal Supervisor

Sl.No.	Name of the Supervisor & Designation	Willingness (Yes/No)	Batch No.*	Signature of the Guide

(b) Details of External Supervisor

Sl.No.	Name of the Supervisor & Designation	Department/ Section, Place of Work	Contact Information

3. Title of the Project

4. About the project

5. Societal Importance (Write few lines)

6. Tentative Budget :
7. Applied for funding Agency (Yes/No/In progress) If Yes, give details of funding agency

8. Applied for competitions (Yes/No/In progress) If Yes, give details of competitions:

9. Mapping of COs with POs and PSOs, in terms of level 1 (Low), 2 (medium) and 3 (High)

POs												PSOs		
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3

Declaration

The proposed project is based on the materials collected from the various references and an implementation version of the existing Module, added with new features. It is not the duplicated version of the already available/existing project.

Signature of the Guide **Signature of the Project Coordinator** **HOD/EEE**

*Project Guidance - Batch No.

Note: A faculty permitted to guide 2 batches only (Maximum)

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

STUDENTS LEAVE APPLICATION FORM

Department of Electrical and Electronics Engineering

Date:

Name of the Student :

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

No. of days, leave, already availed :

%of Attendance as on : _____ is _____

Date & Day :

Reason for Leave :

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

Recommended / Not Recommended

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

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

STUDENTS LEAVE APPLICATION FORM

Department of Electrical and Electronics Engineering

Date:

Name of the Student :

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

No. of days, leave, already availed :

%of Attendance as on : _____ is _____

Date & Day :

Reason for Leave :

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

Recommended / Not Recommended

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

TO Date

The Principal

KLNCE

Pottapalayam

Sub: Requisition for Bonafide Certificate

****

Dear Sir,

Kindly issue Bonafide Certificate to me

Purpose :

Venue :

Name :

Father's Name:

Roll No. :

Department :

Year & Sem/Sec:

Thanking You,

Yours Sincerely

Date :

Station:

Recommended by :

Received :

K.L.N. COLLEGE OF ENGINEERING

POTTAPALAYAM - 630 612 (11KM from Madurai City)

SIVAGANGAI DISTRICT, TAMILNADU, INDIA

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

Approved by AICTE, New Delhi

All UG courses are permanently Affiliated to Anna University, Chennai

Approved Research Centres for Mechanical, EEE, ECE, CSE and MBA by Anna University

Accredited by NBA, New Delhi for B.E. – Mechanical, EEE, CSE, B.Tech – IT & MCA

An ISO 9001:2008 Certified Institution, Sourashtra Lunguistic Minority Institution

Ph: 0452 – 6562171 & 2, 0452 – 2090971 & 2, Fax: 0452 – 2090070, Email – info@klnce.edu

COURSES OFFERED

UG COURSES - B.E. / B.TECH

1. Mechanical Engineering (Accredited by NBA)
2. Electrical & Electronics Engineering (Accredited by NBA)
3. Electronics & Communication Engineering
4. Computer Science & Engineering (Accredited by NBA)
5. Information Technology (Accredited by NBA)
6. Automobile Engineering
7. Electronics & Instrumentation Engineering

PG COURSES

1. Master of Computer Applications (Accredited by NBA)
2. Master of Business Administration
3. M.E. – CAD / CAM
4. M.E. – Communication Systems
5. M.E. – Power Systems Engineering
6. M.E. – Computer Science & Engineering
7. M.E. – Computer Science & Engineering (with Specialization in Networks)