K.L.N. COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)

(Accredited by NAAC for 5 Years W.e.f November 2018)

(An ISO 9001:2015 Certified Institution)

Pottapalayam -630612,Sivagangai District,Tamilnadu

(11km From Madurai City)

ESTD:1994

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Permanently Affliated to Anna University,Chennai)

(Research Centre of Anna University,Chennai)

(Accredited by NBA up to 30.06.2022)

FOR III YEAR

ELECTRICAL AND ELECTRONICS ENGINEERING

STUDENTS HAND BOOK

Anna University, Chennai

Regulation - 2017

(Academic Year 2019-2020)

K.L.N. COLLEGE OF ENGINEERING

Department of Electrical and Electronics Engineering

STUDENTS HAND BOOK

B.E. – EEE – III Year- 2019 – 2020

This book contains the following:

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 EEE 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) Program represent major accomplishments that we expect our graduates to achieve after three to five years of graduation. More specifically our graduates are expected:

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

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

PEO3: to work in international and multi-disciplinary Environments

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

Electrical and Electronics Engineering Graduates will be able to:

PSO1: Apply the fundamentals of mathematics, science and engineering knowledge to identify, formulate, design and investigate complex engineering problems of electric circuits, analog and digital electronic circuits, electrical machines and power systems.

PSO2: Apply appropriate techniques and modern Engineering hardware and software tools in power systems to engage in life- long learning and to successfully adapt in multi disciplinary environments.

PSO3: Understand the impact of Professional Engineering solutions in societal and environmental context, commit to professional ethics and communicate effectively.

PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

OUTCOME BASED EDUCATION (OBE)

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

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

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

BENEFITS AND SIGNIFICANCE OF ACCREDITATION

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

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

Accreditation signifies different things to different stakeholders. These are:

Benefits to Institutions

Accreditation is market-driven and has an international focus. It assesses the characteristics of an Institution and its programme 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 programs, activities and processes. It signifies that he has entered the portals of an Institution, which has the essential and desirable features of quality professional education.

Benefits to Employers

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

Benefits to the Public

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

Catalyst for International Accreditations

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

Benefits to Industry and Infrastructure Providers

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

Benefits to Parents

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

Benefits to Alumni

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

Benefits to Country

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

ENGINEERING ETHICS

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

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

Electrical Engineering Ethics

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

IEEE code of Ethics

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

1. to accept responsibility in making decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology; its appropriate application, and potential consequences;
6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;

7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons and to not engage in acts of discrimination based on race, religion, gender, disability, age, national origin, sexual orientation, gender identity, or gender expression;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Engineering Ethics in College/Education

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

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

Engineering Ethics in the Professional World

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

Engineering Ethics in Companies

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

BLOOM'S TAXONOMY

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

1. **Remember** – recalling relevant terminology, specific facts, or different procedures related to information and/or course topics. At this level, a student can remember something, but may not really understand it.
2. **Understand** – the ability to grasp the meaning of information (facts, definitions, concepts, etc.) that has been presented.
3. **Apply** – being able to use previously learned information in different situations or in problem solving.
4. **Analyze** – the ability to break information down into its component parts. Analysis also refers to the process of examining information in order to make conclusions regarding cause and effect, interpreting motives, making inferences, or finding evidence to support statements/arguments.
5. **Evaluate** – being able to judge the value of information and/or sources of information based on personal values or opinions.
6. **Create** – the ability to creatively or uniquely apply prior knowledge and/or skills to produce new and original thoughts, ideas, processes, etc. At this level, students are involved in creating their own thoughts an ideas.

List of Action Words Related to Critical Thinking Skills

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

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

ACADEMIC CALENDAR - ODD Semester of 2019 – 2020

Fifth Semester - B.E./B.Tech Courses

K.L.N. COLLEGE OF ENGINEERING – 630 612
ACADEMIC CALENDAR - ODD Semester of 2019-2020
III, V, VII SEMESTER UG & PG COURSES – (as on 19.06.2019)

June 2019		July 2019	
1. Sat		1. Mon(9)	Commencement of Classes- III & V Semester M.E.,MBA &MCA Courses
2. Sun		2. Tues (10)	Project awareness and guidance meeting for students (2-5 July 2019).
3. Mon		3. Wed (11)	
4. Tues		4. Thurs (12)	
5. Wed	***Ramzan – Holiday***	5. Fri (13)	NBA-CO attainment-Odd semester of 2018-2019-Last date for submission.
6. Thur		6. Sat	
7. Fri		7. Sun	
8. Sat		8. Mon(14)	
9. Sun		9. Tue (15)	End Date – Unit – I (UG)
10. Mon		10. Wed (16)	Class Test-I- UG (10^{th} – 17^{th} July 2019)
11. Tues		11. Thurs(17)	
12. Wed		12. Fri (18)	Attendance Shortage Review – I
13. Thurs		13. Sat	Academic Performance evaluation of faculty-Phase-I-Review - Grievance Redressal Committee Meeting -IIPC & IDCA review meeting-I - Training, Arrear&Remedial coaching classes- Phase – I
14. Fri		14. Sun	
15. Sat		15. Mon (19)	
16. Sun		16. Tues (20)	
17. Mon	Display of time table UG / PG Faculty Meeting – I, Roles and responsibilities Plan of academic activities-staff/students- Schedule of Administrative committee meeting for NBA, Course Committee Meeting – I Conduct of Bridge course / Value Added course (17^{th} -28^{th} June 2019)	17. Wed (21)	
18. Tues	Program Assessment Committee Meeting – Schedule of Content Beyond Syllabus-plan	18. Thurs (22)	End Date – Unit – I (PG)
19. Wed(1)	Commencement of Classes- III,V&VII Semester B.E./B.Tech Courses Class Committee Meeting – I (19^{th} – 25^{th} June 2019)	19. Fri(23)	Class Test-I PG(19^{th} – 26^{th} July 2019)
20. Thurs(2)		20.Sat	
21. Fri(3)	Last date for uploading course material (T/P), Lecture schedule in the college website.	21.Sun	
22. Sat		22.Mon(24)	
23. Sun		23. Tue (25)	
24. Mon(4)		24. Wed (26)	
25. Tues(5)		25. Thurs (27)	
26. Wed(6)	Student Counselor Meeting – I –	26. Fri (28)	
27. Thurs(7)		27. Sat	Anti-Ragging Committee Meeting Program Assessment Committee meeting-PO-Assessment-2015-2019 Batch-Planning for DAC meeting-Faculty Meeting-II Training, Arrear&Remedial coaching classes-Phase – II
28. Fri(8)	Last date for updating of Change of address / Phone no. in the dept. & college Office: 28^{th} June 2019 – collection of Aadhar Number, Passport size photograph and uploading in the AU web portal.	28. Sun	
29. Sat		29. Mon(29)	Final Year Project Last date for the submission of selection of project guide End Date – Unit – II (UG)
30.Sun		30. Tues(30)	CIT–I–(UG) 30^{th} July- 6^{th} August 2019
		31. Wed (31)	

19/6/2019

August 2019		September 2019	
1. Thurs (32)	Commencement of Classes – First semester B.E / B.Tech-Tentative	1.Sun	
2.Fri (33)	Attendance Shortage – Review – II	2. Mon	***Vinayagar Chathurthi – Holiday***
3.Sat		3. Tues (51)	
4.Sun		4.Wed (52)	
5.Mon(34)		5.Thurs(53)	Teacher's Day
6. Tues (35)	End Date – Unit – II (PG)	6. Fri (54)	
7. Wed (36)	CIT – I – (PG) 7th – 16th August 2019	7. Sat	
8. Thurs (37)		8. Sun	
9.Fri (38)		9. Mon (55)	
10.Sat	National Level Technical Symposium – Mechanical Training, Arrear &Remedial coaching classes-Phase – III	10. Tues	***Moharam - Holiday***
11.Sun		11. Wed (56)	
12.Mon	***Bakrid – Holiday***	12. Thurs (57)	
13.Tues(39)		13. Fri (58)	End Date – Unit – IV (UG)
14. Wed(40)		14. Sat	Faculty Meeting – III Attendance Shortage – Review – III Training, Arrear &Remedial coaching classes-Phase –V
15.Thurs	***Independence Day – Holiday***	15. Sun	Engineers Day
16.Fri (41)		16. Mon (59)	CIT – II– (UG) 16th – 23rd Sep 2019
17. Sat		17. Tues (60)	Last date for the finalization of Elective Subjects to be offered in the even semester of 2019 – 2020.
18.Sun		18. Wed (61)	End Date – Unit – IV (PG)
19.Mon(42)	Class Committee Meeting – II – 19th –22nd Aug 2019	19. Thurs (62)	CIT– II– (PG) 19th – 26th Sep 2019
20.Tues (43)		20. Fri (63)	**Last date for the Payment of Anna University Examinations fees – November/December 2019**
21.Wed (44)		21. Sat	
22. Thurs (45)	Student Counselor Meeting – II	22. Sun	
23.Fri	***Krishna Jeyanthi – Holiday***	23. Mon (64)	
24. Sat	Training, Arrear & Remedial coaching classes-Phase – IV Parents – Teachers Meeting	24. Tues (65)	
25.Sun		25. Wed (66)	
26. Mon(46)	Class Test-II-(UG) 26th August- 3rd September 2019	26. Thurs (67)	
27. Tues (47)		27. Fri (68)	Model Practical Examinations 27th Sep- 4th Oct 2019
28. Wed (48)	End Date – Unit – III (PG)	28. Sat	Training, Arrear &Remedial coaching classes-Phase VI
29. Thurs (49)	Class Test-II-(PG) 29th Aug -6th September 2019	29. Sun	
30. Fri (50)		30.Mon (69)	
31.Sat			

19/6/2019

October 2019		November 2019	
1.Tues(70)		1.Fri (90)	
2. Wed	***Gandhi Jeyanthi & Holiday***	2. Sat	
3.Thurs (71)	Students feedback on faculty, college Facility, Course Outcome Survey.	3.Sun	
4.Fri (72)	End Date – Unit – V (UG) Class Committee Meeting – III	4.Mon (91)	Winter vacation-Phase-I- (4th Nov 2019-1st Dec 2019)
5.Sat		5.Tues (92)	
6. Sun		6. Wed (93)	Commencement of end semester Exams - III,V&VII Semester UG & PG
7.Mon	***Saraswati Pooja / Ayutha Pooja- Holiday***	7.Thurs (94)	
8.Tues	***Vijaya Thasami – Holiday***	8.Fri (95)	
9. Wed (73)	Class Test – III (UG) 9th – 11th Oct 2019	9. Sat	
10.Thurs (74)	End Date – Unit – V (PG)	10.Sun	***Miladi Nabi-Holiday***
11.Fri (75)	Class Test- III (PG) 11th -18th October 2019	11.Mon (96)	
12.Sat	Faculty Meeting – IV- Instructions regarding conduct of practical examinations –Theory examination question paper discrepancy reporting& follow up of students.	12.Tues (97)	
13. Sun		13. Wed (98)	
14.Mon (76)	Model Theory Examinations - UG 14th – 19th Oct 2019	14.Thurs (99)	
15.Tues (77)		15.Fri (100)	
16. Wed (78)		16. Sat	
17.Thurs (79)		17.Sun	
18.Fri (80)		18.Mon (101)	
19.Sat	Last working Day- III,V&VII Semester UG&PG	19.Tues (102)	
20.Sun		20.Wed (103)	
21. Mon (81)	Commencement of Anna University Practical Examinations – (UG & PG)	21. Thurs (104)	
22.Tues (82)		22.Fri (105)	
23.Wed (83)		23.Sat	
24.Thurs (84)		24.Sun	
25.Fri (85)		25.Mon (106)	
26. Sat		26. Tue (107)	
27. Sun	***Deepavali – Holiday***	27.Wed (108)	
28. Mon (86)		28. Thurs (109)	
29. Tues (87)		29.Fri (110)	
30.Wed (88)		30.Sat	
31.Thurs(89)			

Reopening day for the staff after Winter Vacation: 02.12.2019 (Monday)
Bridge course for even semester courses/Value added courses: 2nd -6th Dec 2019.
Reopening day for the Even semester of 2019 – 2020: 09.12.2019 (Monday)

19/6/2019

With effect from: 30.08.2018

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

Department of Electrical and Electronics Engineering

CLASS WISE TIME TABLE -2019-2020 (ODD SEMESTER)

With effect from 24.06.2019

Batch : 2017-2021 **Year/Sem/Sec : III / V / A** **[Class Room:EE04]**

Faculty In-charge : R.Jeyapandiprathap **Staff Code : 10235044**

TIME→ / *DAY↓*	09.00 – 09.50	09.50 – 10.40	10.55 - 11.45	11.45 - 12.35	12.35 - 01.10	01.10 - 01.55	01.55 - 02.40	02.50 - 03.35	03.35 - 04.20
PERIOD→	I	II	III	IV		V	VI	VII	VIII
MON	ST CVR	OOP AMJ	PSA KG	DSP MGK	*L*	PSA KG	MPMC SM	PE RJPP	MPMC SM
TUE	DSP MGK	OOP AMJ	MPMC SM	PE RJPP	*U*	C&I LAB / OOP LAB RJPP, KRJ *[Venue: CS LAB]* / AMJ, SM *[Venue: PSS LAB-I]*			
WED	OOP AMJ	PE RJPP	DSP MGK	MPMC SM	*N*	PE RJPP	ST CVR	PSA KG	ST CVR
THU	MPMC SM	PSA KG	OOP AMJ	ST CVR	*C*	OOP LAB / C&I LAB AMJ, SM *[Venue: PSS LAB-I]* / RJPP, KRJ *[Venue: CS LAB]*			
FRI	PE RJPP	ST CVR	DSP(T) MGK,TG	PSA KG	*H*	DSP MGK	OOP AMJ	Professional Communication ENG, TG *[Venue: Eng Comn Lab]*	

STAFF CODE	STAFF NAME		SUB CODE	SUBJECT NAME	ABBREVIATION	TOTAL PERIODS
10210005	Dr.K.Gnanambal	KG	EE8501	Power System Analysis	PSA	5
10230016	S. Manoharan	SM	EE8551	Microprocessors and Microcontrollers	MPMC	5
10235044	R.Jeyapandiprathap	SV	EE8552	Power Electronics	PE	5
10230018	M. Ganesh Kumari	MGK	EE8591	Digital Signal Processing (T)	DSP	5
10235048	A.Manoj	AMJ	CS8392	Object Oriented Programming	OOP	5
10220009	Dr.C.Vimalarani	RJPP	OAN551	Sensors and Transducers (Open Elective-I)	ST	5
10235044	R.Jeyapandiprathap	RJPP	EE8511	Control and Instrumentation Laboratory	C&I LAB	4
10235041	Eng Dept / T.Gopu		HS8581	Professional Communication	Prof. Comn	2
10235048	A.Manoj	AMJ	CS8383	Object Oriented Programming Laboratory	OOP LAB	4

19/6/19
FACULTY INCHARGE

HOD/EEE
19/6/2019

3

With effect from: 30.08.2018

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

Department of Electrical and Electronics Engineering

CLASS WISE TIME TABLE -2019-2020 (ODD SEMESTER)

With effect from 24.06.2019

Batch : 2017-2021 **Year/Sem/Sec : III / V / B** **[Class Room:EE05]**

Faculty In-charge : M.Ganeshkumari **Staff Code : 10230018**

TIME→ / *DAY↓*	09.00 – 09.50	09.50 – 10.40	10.55 - 11.45	11.45 - 12.35	12.35 - 01.10	01.10 - 01.55	01.55 - 02.40	02.50 - 03.35	03.35 - 04.20
PERIOD→	I	II	III	IV		V	VI	VII	VIII
MON	**PSA** KG	**DSP** MGK	**MPMC** TG	**OOP** AMJ	*L*	**C&I LAB / OOP LAB** KRJ, TG *[Venue: CS LAB]* / AMJ, MGK *[Venue: PSS LAB-I]*			
TUE	**PE** SV	**ST** KRJ	**DSP** MGK	**OOP** AMJ	*U*	**MPMC** TG	**PSA** KG	**PE** SV	**MPMC** TG
WED	**ST** KRJ	**MPMC** TG	**OOP** AMJ	**PE** SV	*N*	**OOP LAB / C&I LAB** AMJ, MGK *[Venue: PSS LAB-I]* / KRJ, TG *[Venue: CS LAB]*			
THU	**OOP** AMJ	**MPMC** TG	**ST** KRJ	**PSA** KG	*C*	**DSP** MGK	**PSA** KG	**PE** SV	**DSP** MGK
FRI	**DSP(T)** MGK,TG	**PSA** KG	**ST** KRJ	**PE** SV	*H*	**Professional Communication** ENG, TG *[Venue: Eng Comn Lab]*		**ST** KRJ	**OOP** AMJ

STAFF CODE	STAFF NAME		SUB CODE	SUBJECT NAME	ABBREVIATION	TOTAL PERIODS
10210005	Dr.K.Gnanambal	KG	EE8501	Power System Analysis	PSA	5
10235041	T.Gopu	SM	EE8551	Microprocessors and Microcontrollers	MPMC	5
10210004	Dr.S.Venkatesan	SV	EE8552	Power Electronics	PE	5
10230018	M. Ganesh Kumari	MGK	EE8591	Digital Signal Processing (T)	DSP	5
10235048	A.Manoj	AMJ	CS8392	Object Oriented Programming	OOP	5
10235021	K.R.Jeyavelumani	KRJ	OAN551	Sensors and Transducers (Open Elective-I)	BBMI	5
10235021	K.R.Jeyavelumani	KRJ	EE8511	Control and Instrumentation Laboratory	C&I LAB	4
10235041	Eng Dept T.Gopu		HS8581	Professional Communication	Prof. Comn	2
10235048	A.Manoj	AMJ	CS8383	Object Oriented Programming Laboratory	OOP LAB	4

19/6/19

FACULTY INCHARGE

HOD/EEE

19/6/2019.

4

ANNA UNIVERSITY, CHENNAI

AFFILIATED INSTITUTIONS

REGULATIONS – 2017

CHOICE BASED CREDIT SYSTEM

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

&

B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING

CURRICULUM AND SYLLABUS – FIFTH & SIXTH SEMESTER

SEMESTER V

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EE8501	Power System Analysis	PC	3	3	0	0	3
2.	EE8551	Microprocessors and Microcontrollers	PC	3	3	0	0	3
3.	EE8552	Power Electronics	PC	3	3	0	0	3
4.	EE8591	Digital Signal Processing	PC	4	2	2	0	3
5.	CS8392	Object Oriented Programming	ES	3	3	0	0	3
6.		Open Elective I*	OE	3	3	0	0	3
PRACTICALS								
7.	EE8511	Control and Instrumentation Laboratory	PC	4	0	0	4	2
8.	HS8581	Professional Communication	EEC	2	0	0	2	1
9.	CS8383	Object Oriented Programming Laboratory	ES	4	0	0	4	2
			TOTAL	29	17	2	10	23

SEMESTER VI

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EE8601	Solid State Drives	PC	3	3	0	0	3
2.	EE8602	Protection and Switchgear	PC	3	3	0	0	3
3.	EE8691	Embedded Systems	ES	3	3	0	0	3
4.		Professional Elective I	PE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
PRACTICALS								
6.	EE8661	Power Electronics and Drives Laboratory	PC	4	0	0	4	2
7.	EE8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
8.	EE8611	Mini Project	EEC	4	0	0	4	2
			TOTAL	27	15	0	12	21

EE8501	POWER SYSTEM ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To model the power system under steady state operating condition
- To understand and apply iterative techniques for power flow analysis
- To model and carry out short circuit studies on power system
- To model and analyze stability problems in power system

UNIT I POWER SYSTEM 9

Need for system planning and operational studies - Power scenario in India - Power system components – Representation - Single line diagram - per unit quantities - p.u. impedance diagram - p.u. reactance diagram - Network graph, Bus incidence matrix, Primitive parameters, Bus admittance matrix from primitive parameters - Representation of off-nominal transformer - Formation of bus admittance matrix of large power network.

UNIT II POWER FLOW ANALYSIS 9

Bus classification - Formulation of Power Flow problem in polar coordinates - Power flow solution using Gauss Seidel method - Handling of Voltage controlled buses - Power Flow Solution by Newton Raphson method**.**

UNIT III SYMMETRICAL FAULT ANALYSIS 9

Assumptions in short circuit analysis - Symmetrical short circuit analysis using Thevenin's theorem - Bus Impedance matrix building algorithm (without mutual coupling) - Symmetrical fault analysis through bus impedance matrix - Post fault bus voltages - Fault level - Current limiting reactors.

UNIT IV UNSYMMETRICAL FAULT ANALYSIS 9

Symmetrical components - Sequence impedances - Sequence networks - Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG - unsymmetrical fault occurring at any point in a power system - computation of post fault currents in symmetrical component and phasor domains.

UNIT V STABILITY ANALYSIS 9

Classification of power system stability – Rotor angle stability - Swing equation - Swing curve - Power-Angle equation - Equal area criterion - Critical clearing angle and time - Classical step-by-step solution of the swing equation – modified Euler method.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to model the power system under steady state operating condition
- Ability to understand and apply iterative techniques for power flow analysis
- Ability to model and carry out short circuit studies on power system
- Ability to model and analyze stability problems in power system

- Ability to acquire knowledge on Fault analysis.
- Ability to model and understand various power system components and carry out power flow, short circuit and stability studies.

TEXT BOOKS:

1. John J. Grainger, William D. Stevenson, Jr, 'Power System Analysis', Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.
3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.

REFERENCES

1. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.
2. J. Duncan Glover, Mulukutla S.Sarma, Thomas J. Overbye, 'Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
3. Gupta B.R., 'Power System - Analysis and Design', S. Chand Publishing, 2001.
4. Kundur P., 'Power System Stability and Control', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

EE8551 MICROPROCESSORS AND MICROCONTROLLERS **L T P C 3 0 0 3**

OBJECTIVES:

To impart knowledge on the following Topics

- Architecture of µP8085 & µC 8051
- Addressing modes & instruction set of 8085 & 8051.
- Need & use of Interrupt structure 8085 & 8051.
- Simple applications development with programming 8085 & 8051

UNIT I 8085 PROCESSOR **9**

Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts.

UNIT II PROGRAMMING OF 8085 PROCESSOR **9**

Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation& control instructions – Programming: Loop structure with counting & Indexing – Look up tability - Subroutine instructions - stack.

UNIT III 8051 MICRO CONTROLLER **9**

Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts- Data Transfer, Manipulation, Control Algorithms& I/O instructions, Comparison to Programming concepts with 8085.

UNIT IV PERIPHERAL INTERFACING 9

Study on need, Architecture, configuration and interfacing, with ICs: 8255, 8259, 8254, 8279, - A/D and D/A converters &Interfacing with 8085& 8051.

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS 9

Simple programming exercises- key board and display interface –Control of servo motor-stepper motor control- Application to automation systems.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to acquire knowledge in Addressing modes & instruction set of 8085 & 8051.
- Ability to need & use of Interrupt structure 8085 & 8051.
- Ability to understand the importance of Interfacing
- Ability to explain the architecture of Microprocessor and Microcontroller.
- Ability to write the assembly language programme.
- Ability to develop the Microprocessor and Microcontroller based applications.

TEXT BOOKS:

1. Sunil Mathur &Jeebananda Panda, “Microprocessor and Microcontrollers”, PHI Learning Pvt. Ltd, 2016.
2. R.S. Gaonkar, ‘Microprocessor Architecture Programming and Application’, with 8085, Wiley Eastern Ltd., New Delhi, 2013.
3. Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely ‘The 8051 Micro Controller and Embedded Systems’, PHI Pearson Education, 5th Indian reprint, 2003.

REFERENCES

1. Krishna Kant, “Microprocessor and Microcontrollers”, Eastern Company Edition, Prentice Hall of India, New Delhi, 2007.
2. B.RAM,” Computer Fundamentals Architecture and Organization” New age International Private Limited, Fifth edition, 2017.
3. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.
4. Ajay V.Deshmukh, ‘Microcontroller Theory &Applications’, McGraw Hill Edu,2016
5. Douglas V.Hall, ‘Microprocessor and Interfacing’, McGraw Hill Edu,2016.

EE8552 POWER ELECTRONICS L T P C

3 0 0 3

OBJECTIVES:

To impart knowledge on the following Topics

- Different types of power semiconductor devices and their switching
- Operation, characteristics and performance parameters of controlled rectifiers
- Operation, switching techniques and basics topologies of DC-DC switching regulators.
- Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
- Operation of AC voltage controller and various configurations.

UNIT I POWER SEMI-CONDUCTOR DEVICES 9

Study of switching devices, SCR, TRIAC, GTO, BJT, MOSFET, IGBT and IGCT- Static characteristics: SCR, MOSFET and IGBT - Triggering and commutation circuit for SCR- Introduction to Driver and snubber circuits.

UNIT II PHASE-CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulseconverters– performance parameters –Effect of source inductance— Firing Schemes for converter–Dual converters, Applications-light dimmer, Excitation system, Solar PV systems.

UNIT III DC TO DC CONVERTERS 9

Step-down and step -up chopper-control strategy– Introduction to types of choppers-A, B, C, D and E -Switched mode regulators- Buck, Boost, Buck- Boost regulator, Introduction to Resonant Converters, Applications-Battery operated vehicles.

UNIT IV INVERTERS 9

Single phase and three phase voltage source inverters (both120^0 mode and 180^0 mode)– Voltage& harmonic control--PWM techniques: Multiple PWM, Sinusoidal PWM, modified sinusoidal PWM – Introduction to space vector modulation –Current source inverter, Applications-Induction heating, UPS.

UNIT V AC TO AC CONVERTERS 9

Single phase and Three phase AC voltage controllers–Control strategy- Power Factor Control – Multistage sequence control -single phase and three phase cyclo converters – Introduction to Matrix converters, Applications –welding .

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to analyse AC-AC and DC-DC and DC-AC converters.
- Ability to choose the converters for real time applications.

TEXT BOOKS:

1. M.H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, Third Edition, New Delhi, 2004.
2. P.S.Bimbra "Power Electronics" Khanna Publishers, third Edition, 2003.
3. Ashfaq Ahmed 'Power Electronics for Technology', Pearson Education, Indian reprint, 2003.

REFERENCES

1. Joseph Vithayathil,' Power Electronics, Principles and Applications', McGraw Hill Series, 6^{th} Reprint, 2013.
2. Philip T. Krein, "Elements of Power Electronics" Oxford University Press, 2004 Edition.
3. L. Umanand, "Power Electronics Essentials and Applications", Wiley, 2010.
4. Ned Mohan Tore. M. Undel and, William. P. Robbins, 'Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition, 2003.
5. S.Rama Reddy, 'Fundamentals of Power Electronics', Narosa Publications, 2014.
6. M.D. Singh and K.B. Khanchandani, "Power Electronics," Mc Graw Hill India, 2013.
7. JP Agarwal," Power Electronic Systems: Theory and Design" 1e, Pearson Education, 2002.

EE8591 DIGITAL SIGNAL PROCESSING

L	T	P	C
2	2	0	3

OBJECTIVES: To impart knowledge about the following topics:

- Signals and systems & their mathematical representation.
- Discrete time systems.
- Transformation techniques & their computation.
- Filters and their design for digital implementation.
- Programmability digital signal processor & quantization effects.

UNIT I INTRODUCTION 6+6

Classification of systems: Continuous, discrete, linear, causal, stability, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect.

UNIT II DISCRETE TIME SYSTEM ANALYSIS 6+6

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Discrete Time Fourier transform , magnitude and phase representation.

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION 6+6

Discrete Fourier Transform- properties, magnitude and phase representation - Computation of DFT using FFT algorithm – DIT &DIF using radix 2 FFT – Butterfly structure.

UNIT IV DESIGN OF DIGITAL FILTERS 6+6

FIR & IIR filter realization – Parallel & cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. Analog filter design – Butterworth and Chebyshev approximations; IIR Filters, digital design using impulse invariant and bilinear transformation Warping, pre warping.

UNIT V DIGITAL SIGNAL PROCESSORS 6+6

Introduction – Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial DS Processors.

TOTAL : 60 PERIODS

OUTCOMES:

1. Ability to understand the importance of Fourier transform, digital filters and DS Processors.
2. Ability to acquire knowledge on Signals and systems & their mathematical representation.
3. Ability to understand and analyze the discrete time systems.
4. Ability to analyze the transformation techniques & their computation.
5. Ability to understand the types of filters and their design for digital implementation.
6. Ability to acquire knowledge on programmability digital signal processor & quantization effects.

TEXT BOOKS:

1. J.G. Proakis and D.G. Manolakis, ‘Digital Signal Processing Principles, Algorithms

and Applications', Pearson Education, New Delhi, PHI. 2003.
2. S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', McGraw Hill Edu, 2013.
3. Lonnie C.Ludeman ,"Fundamentals of Digital Signal Processing",Wiley,2013

REFERENCES

1. Poorna Chandra S, Sasikala. B ,Digital Signal Processing, Vijay Nicole/TMH,2013.
2. Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab", Cengage Learning,2014.
3. B.P.Lathi, 'Principles of Signal Processing and Linear Systems', Oxford University Press, 2010 3. Taan S. ElAli, 'Discrete Systems and Digital Signal Processing with Mat Lab', CRC Press, 2009.
4. SenM.kuo, woonseng…s.gan, "Digital Signal Processors, Architecture, Implementations & Applications, Pearson,2013
5. DimitrisG.Manolakis, Vinay K. Ingle, applied Digital Signal Processing,Cambridge,2012

CS8392 OBJECT ORIENTED PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment **-** Java Source File - Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 8

Differences between multi-threading and multitasking, thread life cycle, creating threads,

synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Develop Java programs using OOP principles
- Develop Java programs with the concepts inheritance and interfaces
- Build Java applications using exceptions and I/O streams
- Develop Java applications with threads and generics classes
- Develop interactive Java programs using swings

TEXT BOOKS

1. Herbert Schildt, “Java The complete reference”, 8th Edition, McGraw Hill Education, 2011.
2. Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

REFERENCES

1. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.
2. Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

EE8511 CONTROL AND INSTRUMENTATION LABORATORY L T P C

0 0 4 2

OBJECTIVES:

- To provide knowledge on analysis and design of control system along with basics of instrumentation.

LIST OF EXPERIMENTS

CONTROLSYSTEMS:

1. P, PI and PID controllers
2. Stability Analysis
3. Modeling of Systems – Machines, Sensors and Transducers
4. Design of Lag, Lead and Lag-Lead Compensators
5. Position Control Systems
6. Synchro-Transmitter- Receiver and Characteristics
7. Simulation of Control Systems by Mathematical development tools.

INSTRUMENTATION:

8. Bridge Networks –AC and DC Bridges
9. Dynamics of Sensors/Transducers

   (a) Temperature (b) pressure (c) Displacement (d) Optical (e) Strain (f) Flow

10 Power and Energy Measurement

11 Signal Conditioning

   (a) Instrumentation Amplifier

   (b) Analog – Digital and Digital –Analog converters (ADC and DACs)

12 Process Simulation

TOTAL: 60 PERIODS

OUTCOMES:

- Ability to understand control theory and apply them to electrical engineering problems.
- Ability to analyze the various types of converters.
- Ability to design compensators
- Ability to understand the basic concepts of bridge networks.
- Ability to the basics of signal conditioning circuits.
- Ability to study the simulation packages.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CONTROLSYSTEMS:

1. PID controller simulation and learner kit – 1 No.
2. Digital storage Oscilloscope for capturing transience- 1 No

   2 Personal Computer with control

   system simulation packages - 10 Nos
3. DC motor –Generator test set-up for evaluation of motor parameters
4. CRO 30MHz – 1 No.
5. 2MHz Function Generator – 1No.
6. Position Control Systems Kit (with manual) – 1 No., Tacho Generator Coupling set
7. AC Synchro transmitter& receiver – 1No.
8. Sufficient number of Digital multi meters, speed and torque sensors

INSTRUMENTATION:

9. R, L, C Bridge kit (with manual)
10. a) Electric heater – 1No.
    Thermometer – 1No.Thermistor (silicon type) RTD nickel type – 1No.

    b) 30 psi Pressure chamber (complete set) – 1No. Current generator (0 – 20mA) Air foot pump – 1 No. (with necessary connecting tubes)

    c) LVDT20mm core length movability type – 1No. CRO 30MHz – 1No.

    d) Optical sensor – 1 No. Light source

    e) Strain Gauge Kit with Handy lever beam – 1No.

100gm weights – 10 nos
f) Flow measurement Trainer kit – 1 No.
(1/2 HP Motor, Water tank, Digital Milliammeter, complete set)

11. Single phase Auto transformer – 1No. Watt-hour meter (energy meter) – 1No. Ammeter Voltmeter Rheostat Stop watch
Connecting wires (3/20)
12. IC Transistor kit – 1No.
13. Instrumentation Amplifier kit-1 No
14. Analog – Digital and Digital –Analog converters (ADC and DACs)- 1 No

HS8581	PROFESSIONAL COMMUNICATION	L T P C
		0 0 2 1

OBJECTIVES: The course aims to:

- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional
- Make them Employability Graduates
- Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes.

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be ability to:

- Make effective presentations

- Participate confidently in Group Discussions.
- Attend job interviews and be successful in them.
- Develop adequate Soft Skills required for the workplace

Recommended Software

1. **Globearena**
2. **Win English**

REFERENCES:

1. Butterfield, Jeff **Soft Skills for Everyone.** Cengage Learning: New Delhi, 2015
2. **Interact** English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
3. E. Suresh Kumar et al. **Communication for Professional Success.** Orient Blackswan: Hyderabad, 2015
4. Raman, Meenakshi and Sangeeta Sharma. **Professional Communication**. Oxford University Press: Oxford, 2014
5. S. Hariharanetal. **Soft Skills**. MJP Publishers: Chennai, 2010.

CS8383	OBJECT ORIENTED PROGRAMMING LABORATORY	L T P C 0 0 4 2

COURSE OBJECTIVES

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.
- To develop applications using generic programming and event handling.

List of experiments

1. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection(i.e domestic or commercial). Compute the bill amount using the following tariff. If the type of the EB connection is domestic, calculate the amount to be paid as follows:
    - First 100 units - Rs. 1 per unit
    - 101-200 units - Rs. 2.50 per unit
    - 201 -500 units - Rs. 4 per unit
    - > 501 units - Rs. 6 per unit

   If the type of the EB connection is commercial, calculate the amount to be paid as follows:
    - First 100 units - Rs. 2 per unit
    - 101-200 units - Rs. 4.50 per unit
    - 201 -500 units - Rs. 6 per unit
    - > 501 units - Rs. 7 per unit
2. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.
3. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the

inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.

4. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.
5. Write a program to perform string operations using ArrayList. Write functions for the following

   a. Append - add at end
   b. Insert – add at particular index
   c. Search
   d. List all string starts with given letter
6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
7. Write a Java program to implement user defined exception handling.
8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
10. Write a java program to find the maximum value from the given type of elements using a generic function.
11. Design a calculator using event-driven programming paradigm of Java with the following options.

    a) Decimal manipulations
    b) Scientific manipulations
12. Develop a mini project for any application using Java concepts.

TOTAL : 60 PERIODS

COURSE OUTCOMES

Upon completion of the course, the students will be able to

- Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.
- Develop and implement Java programs with arraylist, exception handling and multithreading .
- Design applications using file processing, generic programming and event handling.

OAN551 SENSORS AND TRANSDUCERS L T P C
3 0 0 3

OBJECTIVES:

- To understand the concepts of measurement technology.
- To learn the various sensors used to measure various physical parameters.
- To learn the fundamentals of signal conditioning, data acquisition and communication systems used in mechatronics system development.

UNIT I INTRODUCTION 9

Basics of Measurement – Classification of errors – Error analysis – Static and dynamic characteristics of transducers – Performance measures of sensors – Classification of sensors – Sensor calibration techniques– Sensor Output Signal Types.

UNIT II MOTION, PROXIMITY AND RANGING SENSORS 9

Motion Sensors – Potentiometers, Resolver, Encoders – Optical, Magnetic, Inductive, Capacitive, LVDT
– RVDT – Synchro – Microsyn, Accelerometer.,– GPS, Bluetooth, Range Sensors – RF beacons, Ultrasonic Ranging, Reflective beacons, Laser Range Sensor (LIDAR).

UNIT III FORCE, MAGNETIC AND HEADING SENSORS 9

Strain Gage, Load Cell, Magnetic Sensors –types, principle, requirement and advantages: Magneto resistive – Hall Effect – Current sensor Heading Sensors – Compass, Gyroscope, Inclinometers.

UNIT IV OPTICAL, PRESSURE AND TEMPERATURE SENSORS 9

Photo conductive cell, photo voltaic, Photo resistive, LDR – Fiber optic sensors – Pressure – Diaphragm, Bellows, Piezoelectric – Tactile sensors, Temperature – IC, Thermistor, RTD, Thermocouple. Acoustic Sensors – flow and level measurement, Radiation Sensors - Smart Sensors - Film sensor, MEMS & Nano Sensors, LASER sensors.

UNIT V SIGNAL CONDITIONING and DAQ SYSTEMS 9

Amplification – Filtering – Sample and Hold circuits – Data Acquisition: Single channel and multi channel data acquisition – Data logging - applications - Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring.

OUTCOMES : TOTAL:45 PERIODS

The students will be to
CO1: Expertise in various calibration techniques and signal types for sensors
CO2: Apply the various sensors in the automotive and Mechatronics applications.
CO3: Study the basic principles of various smart sensors
CO4: Implement the DAQ systems with different sensors for real time applications.

TEXT BOOKS:

1. Ernest O Doebelin, “Measurement Systems – Applications and Design”, Tata McGraw-Hill, 2009
2. Sawney A K and Puneet Sawney, “A Course in Mechanical Measurements and Instrumentation and Control”, 12th edition, Dhanpat Rai & Co, New Delhi, 2013.

REFERENCES:

1.Patranabis D, “Sensors and Transducers”, 2nd Edition, PHI, New Delhi, 2010.
2.John Turner and Martyn Hill, “Instrumentation for Engineers and Scientists”, Oxford Science Publications, 1999.
3.Richard Zurawski, “Industrial Communication Technology Handbook” 2nd edition, CRC Press,2015.

EE8601	SOLID STATE DRIVES	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

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

UNIT I DRIVE CHARACTERISTICS 9

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

UNIT II CONVERTER / CHOPPER FED DC MOTOR DRIVE 9

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

UNIT III INDUCTION MOTOR DRIVES 9

Stator voltage control–V/f control– Rotor Resistance control-qualitative treatment of slip power recovery drives-closed loop control— vector control- Applications.

UNIT IV SYNCHRONOUS MOTOR DRIVES 9

V/f control and self-control of synchronous motor: Margin angle control and power factor control-Three phase voltage/current source fed synchronous motor- Applications.

UNIT V DESIGN OF CONTROLLERS FOR DRIVES 9

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

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and suggest a converter for solid state drive.
- Ability to select suitability drive for the given application.
- Ability to study about the steady state operation and transient dynamics of a motor load system.
- Ability to analyze the operation of the converter/chopper fed dc drive.
- Ability to analyze the operation and performance of AC motor drives.
- Ability to analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

TEXT BOOKS:

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

REFERENCES

1. Vedam Subramanyam, " Electric Drives Concepts and Applications ", 2e, McGraw Hill, 2016

2. Shaahin Felizadeh, “Electric Machines and Drives”, CRC Press (Taylor and Francis Group), 2013.
3. John Hindmarsh and Alasdain Renfrew, “Electrical Machines and Drives System,” Elsevier 2012.
4. Theodore Wildi, “ Electrical Machines ,Drives and power systems ,6th edition, Pearson Education ,2015
5. N.K. De., P.K. SEN” Electric drives” PHI, 2012.

EE8602 PROTECTION AND SWITCHGEAR L T P C
3 0 0 3

OBJECTIVES:

To impart knowledge on the following Topics

- Causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
- Characteristics and functions of relays and protection schemes.
- Apparatus protection, static and numerical relays
- Functioning of circuit breaker

UNIT I PROTECTION SCHEMES 9

Principles and need for protective schemes – nature and causes of faults – types of faults – Methods of Grounding - Zones of protection and essential qualities of protection – Protection scheme

UNIT II ELECTROMAGNETIC RELAYS 9

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

UNIT III APPARATUS PROTECTION 9

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

UNIT IV STATIC RELAYS AND NUMERICAL PROTECTION 9

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

UNIT V CIRCUIT BREAKERS 9

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

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and analyze Electromagnetic and Static Relays.
- Ability to suggest suitability circuit breaker.
- Ability to find the causes of abnormal operating conditions of the apparatus and system.

- Ability to analyze the characteristics and functions of relays and protection schemes.
- Ability to study about the apparatus protection, static and numerical relays.
- Ability to acquire knowledge on functioning of circuit breaker.

TEXT BOOKS:

1. Sunil S.Rao, 'Switchgear and Protection', Khanna Publishers, New Delhi, 2008.
2. B.Rabindranath and N.Chander, 'Power System Protection and Switchgear', New Age International (P) Ltd., First Edition 2011.
3. Arun Ingole, 'Switch Gear and Protection' Pearson Education, 2017.

REFERENCES

1. BadriRam ,B.H. Vishwakarma, 'Power System Protection and Switchgear', New Age InternationalPvt Ltd Publishers, Second Edition 2011.
2. Y.G.Paithankar and S.R.Bhide, 'Fundamentals of power system protection', Second Edition,Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. C.L.Wadhwa, 'Electrical Power Systems', 6th Edition, New Age International (P) Ltd., 2010
4. RavindraP.Singh, 'Switchgear and Power System Protection', PHI Learning Private Ltd., NewDelhi, 2009.
5. VK Metha," Principles of Power Systems" S. Chand, 2005.
6. Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chotani,'Protection and Switchgear' Oxford University Press, 2011.

EE8691	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

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

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

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

UNIT II EMBEDDED NETWORKING 9

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols RS232 standard – RS422 – RS 485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I^2C) –need for device drivers.

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT 9

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model,

Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN 9

Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance.

UNIT V EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT 9

Case Study of Washing Machine- Automotive Application- Smart card System Application-ATM machine –Digital camera

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and analyze Embedded systems.
- Ability to suggest an embedded system for a given application.
- Ability to operate various Embedded Development Strategies
- Ability to study about the bus Communication in processors.
- Ability to acquire knowledge on various processor scheduling algorithms.
- Ability to understand basics of Real time operating system.

TEXT BOOKS:

1. Peckol, “Embedded system Design”, John Wiley & Sons,2010
2. Lyla B Das,” Embedded Systems-An Integrated Approach”, Pearson, 2013
3. Shibu. K.V, “Introduction to Embedded Systems”, 2e, Mc graw Hill, 2017.

REFERENCES

1. Raj Kamal, ‘Embedded System-Architecture, Programming, Design’, Mc Graw Hill, 2013.
2. C.R.Sarma, “Embedded Systems Engineering”, University Press (India) Pvt. Ltd, 2013.
3. Tammy Noergaard, “Embedded Systems Architecture”, Elsevier, 2006.
4. Han-Way Huang, “Embedded system Design Using C8051”, Cengage Learning, 2009.
5. Rajib Mall “Real-Time systems Theory and Practice” Pearson Education, 2007.

EE8661 POWER ELECTRONICS AND DRIVES LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To provide hands on experience with power electronic converters and testing.

LIST OF EXPERIMENTS

1 Gate Pulse Generation using R, RC and UJT.
2 Characteristics of SCR and TRIAC
3 Characteristics of MOSFET and IGBT
4 AC to DC half controlled converter
5 AC to DC fully controlled Converter
6 Step down and step up MOSFET based choppers
7 IGBT based single phase PWM inverter

8 IGBT based three phase PWM inverter
9 AC Voltage controller
10 Switched mode power converter.
11 Simulation of PE circuits (1Φ & 3Φ semi converters, 1Φ & 3Φ full converters, DC-DC converters, AC voltage controllers).
12 Characteristics of GTO & IGCT.
13 Characteristics of PMBLDC motor

TOTAL: 60 PERIODS

OUTCOMES:

- Ability to practice and understand converter and inverter circuits and apply software for engineering problems.
- Ability to experiment about switching characteristics various switches.
- Ability to analyze about AC to DC converter circuits.
- Ability to analyze about DC to AC circuits.
- Ability to acquire knowledge on AC to AC converters
- Ability to acquire knowledge on simulation software.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Device characteristics(for SCR, MOSFET, TRIAC,GTO,IGCT and IGBT kit with built-in / discrete power supply and meters) - 2 each
2. SinglephaseSCRbasedhalfcontrolledconverterandfullycontrolledconverteralong with built-in/separate/firing circuit/module and meter – 2 each
3. MOSFET based step up and step down choppers (Built in/ Discrete) – 1 each
4. IGBT based single phase PWM inverter module/Discrete Component – 2
5. IGBT based three phase PWM inverter module/Discrete Component – 2
6. Switched mode power converter module/Discrete Component – 2
7. SCR &TRIAC based 1 phase AC controller along with lamp or rheostat load - 2
8. Cyclo converter kit with firing module – 1
9. Dual regulated DC power supply with common ground
10. Cathode ray Oscilloscope –10
11. Isolation Transformer – 5
12. Single phase Auto transformer –3
13. Components (Inductance, Capacitance) 3 set for each
14. Multimeter – 5
15. LCR meter – 3
16. Rheostats of various ranges – 2 sets of 10 value
17. Work tabilitys – 10
18. DC and AC meters of required ranges – 20
19. Component data sheets to be provided

EE8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To provide training on programming of microprocessors and microcontrollers and understand the interface requirements.
- To simulate various microprocessors and microcontrollers using KEIL or Equivalent simulator.

LIST OF EXPERIMENTS

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

TOTAL: 60 PERIODS

OUTCOMES:

- Ability to understand and apply computing platform and software for engineering problems.
- Ability to programming logics for code conversion.
- Ability to acquire knowledge on A/D and D/A.
- Ability to understand basics of serial communication.
- Ability to understand and impart knowledge in DC and AC motor interfacing.
- Ability to understand basics of software simulators.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Sl.No.	Description of Equipment	Quantity required
1.	8085 Microprocessor Trainer with Power Supply	15
2.	8051 Micro Controller Trainer Kit with power supply	15
3.	8255 Interface boards	5
4.	8251 Interface boards	5

5.	8259 Interface boards	5
6.	8279 Keyboard / Display Interface boards	5
7.	8254 timer/ counters	5
8.	ADC and DAC cards	5
9.	AC & DC motor with Controller s	5
10.	Traffic Light Control Systems	5

EE8611 **MINI PROJECT** **L T P C**
0 0 4 2

OBJECTIVES:
- To develop their own innovative prototype of ideas.
- To train the students in preparing mini project reports and examination.

The students in a group of 5 to 6 works on a topic approved by the head of the department and prepares a comprehensive mini project report after completing the work to the satisfaction. The progress of the project is evaluated based on a minimum of two reviews. The review committee may be constituted by the Head of the Department. A mini project report is required at the end of the semester. The mini project work is evaluated based on oral presentation and the mini project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 60 PERIODS

OUTCOMES:
On Completion of the mini project work students will be in a position to take up their final year project work and find solution by formulating proper methodology.

EE8002 **DESIGN OF ELECTRICAL APPARATUS** **L T P C**
3 0 0 3

OBJECTIVES: To impart knowledge about the following topics:
- Magnetic circuit parameters and thermal rating of various types of electrical machines.
- Armature and field systems for D.C. machines.
- Core, yoke, windings and cooling systems of transformers.
- Design of stator and rotor of induction machines and synchronous machines.
- The importance of computer aided design method.

UNIT I DESIGN OF FIELD SYSTEM AND ARMATURE 9

Major considerations in Electrical Machine Design – Materials for Electrical apparatus – Design of Magnetic circuits – Magnetising current – Flux leakage – Leakage in Armature. Design of lap winding and wave winding.

UNIT II DESIGN OF TRANSFORMERS 9

Construction - KVA output for single and three phase transformers – Overall dimensions – design of yoke, core and winding for core and shell type transformers – Estimation of No load current – Temperature rise in Transformers – Design of Tank and cooling tubes of Transformers. Computer program: Complete Design of single phase core transformer

UNIT III DESIGN OF DC MACHINES 9

Construction - Output Equations – Main Dimensions – Choice of specific loadings – Selection of number of poles – Design of Armature – Design of commutator and brushes – design of field Computer program: Design of Armature main dimensions

UNIT IV DESIGN OF INDUCTION MOTORS 9

Construction - Output equation of Induction motor – Main dimensions – choice of specific loadings – Design of squirrel cage rotor and wound rotor –Magnetic leakage calculations – Operating characteristics : Magnetizing current - Short circuit current – Circle diagram - Computer program: Design of slip-ring rotor

UNIT V DESIGN OF SYNCHRONOUS MACHINES 9

Output equations – choice of specific loadings – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field MMF – Design of field winding – Design of turbo alternators -Computer program: Design of Stator main dimensions-Brushless DC Machines

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand basics of design considerations for rotating and static electrical machines
- Ability to design of field system for its application.
- Ability to design sing and three phase transformer.
- Ability to design armature and field of DC machines.
- Ability to design stator and rotor of induction motor.
- Ability to design and analyze synchronous machines.

TEXT BOOKS:

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai& Sons, New Delhi, Fifth Edition, 1984.

2. M V Deshpande 'Design and Testing of Electrical Machines' PHI learning Pvt Lt, 2011.

3. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, Second Edition, 2009.

REFERENCES

1. A.Shanmugasundaram, G.Gangadharan, R.Palani 'Electrical Machine Design Data Book', New Age International Pvt. Ltd., Reprint 2007.

2. 'Electrical Machine Design', Balbir Singh, Vikas Publishing House Private Limited, 1981.

3. V Rajini, V.S Nagarajan, 'Electrical Machine Design', Pearson, 2017.

4. K.M.Vishnumurthy 'Computer aided design of electrical machines' B S Publications,2008

EE8005	SPECIAL ELECTRICAL MACHINES	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

- Construction, principle of operation, control and performance of stepping motors.
- Construction, principle of operation, control and performance of switched reluctance motors.
- Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
- Construction, principle of operation and performance of permanent magnet synchronous motors.
- Construction, principle of operation and performance of other special Machines.

UNIT I STEPPER MOTORS 9

Constructional features –Principle of operation –Types – Torque predictions – Linear Analysis – Characteristics – Drive circuits – Closed loop control – Concept of lead angle - Applications.

UNIT II SWITCHED RELUCTANCE MOTORS (SRM) 9

Constructional features –Principle of operation- Torque prediction–Characteristics Steady state performance prediction – Analytical Method – Power controllers – Control of SRM drive- Sensor less operation of SRM – Applications.

UNIT III PERMANENT MAGNET BRUSHLESS D.C. MOTORS 9

Fundamentals of Permanent Magnets- Types- Principle of operation- Magnetic circuit analysis- EMF and Torque equations- Power Converter Circuits and their controllers - Characteristics and control- Applications.

UNIT IV PERMANENT MAGNET SYNCHRONOUS MOTORS (PMSM) 9

Constructional features -Principle of operation – EMF and Torque equations - Sine wave motor with practical windings - Phasor diagram - Power controllers – performance characteristics -Digital controllers – Applications.

UNIT V OTHER SPECIAL MACHINES 9

Constructional features – Principle of operation and Characteristics of Hysteresis motor-Synchronous Reluctance Motor–Linear Induction motor-Repulsion motor- Applications.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to analyze and design controllers for special Electrical Machines.
- Ability to acquire the knowledge on construction and operation of stepper motor.
- Ability to acquire the knowledge on construction and operation of stepper switched reluctance motors.
- Ability to construction, principle of operation, switched reluctance motors.
- Ability to acquire the knowledge on construction and operation of permanent magnet brushless D.C. motors.
- Ability to acquire the knowledge on construction and operation of permanent magnet synchronous motors.
- Ability to select a special Machine for a particular application.

TEXT BOOKS:

- K.Venkataratnam, 'Special Electrical Machines', Universities Press (India) Private Limited, 2008.
- T. Kenjo, 'Stepping Motors and Their Microprocessor Controls', Clarendon Press London, 1984
- E.G. Janardanan, 'Special electrical machines', PHI learning Private Limited, Delhi, 2014.

REFERENCES

1. R.Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.
2. T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London, 1988.
3. T.J.E.Miller,'Brushless Permanent-Magnet and Reluctance Motor Drives', Oxford University Press, 1989.
4. R.Srinivasan, 'Special Electrical Machines', Lakshmi Publications, 2013.

EE8006	POWER QUALITY	L	T	P	C
		3	0	0	3

OBJECTIVES: To impart knowledge about the following topics:

- Causes & Mitigation techniques of various PQ events.
- Various Active & Passive power filters.

UNIT I INTRODUCTION TO POWER QUALITY 9

Terms and definitions & Sources – Overloading, under voltage, over voltage - Concepts of transients - Short duration variations such as interruption - Long duration variation such as sustained interruption - Sags and swells - Voltage sag - Voltage swell - Voltage imbalance – Voltage fluctuations - Power frequency variations - International standards of power quality – Computer Business Equipment Manufacturers Associations (CBEMA) curve

UNIT II VOLTAGE SAG AND SWELL 9

Estimating voltage sag performance - Thevenin's equivalent source - Analysis and calculation of various faulted condition - Estimation of the sag severity - Mitigation of voltage sag, Static transfer switches and fast transfer switches. - Capacitor switching – Lightning - Ferro resonance - Mitigation of voltage swell.

UNIT III HARMONICS 9

Harmonic sources from commercial and industrial loads - Locating harmonic sources – Power system response characteristics - Harmonics Vs transients. Effect of harmonics – Harmonic distortion - Voltage and current distortions - Harmonic indices - Inter harmonics – Resonance Harmonic distortion evaluation, IEEE and IEC standards.

UNIT IV PASSIVE POWER COMPENSATORS 9

Principle of Operation of Passive Shunt and Series Compensators, Analysis and Design of Passive Shunt Compensators Simulation and Performance of Passive Power Filters-Limitations of Passive Filters Parallel Resonance of Passive Filters with the Supply System

and Its Mitigation. Fundamentals of load compensation – voltage regulation & power factor correction.

UNIT V POWER QUALITY MONITORING & CUSTOM POWER DEVICES 9

Monitoring considerations - Monitoring and diagnostic techniques for various power quality problems - Quality measurement equipment - Harmonic / spectrum analyzer - Flicker meters Disturbance analyzer - Applications of expert systems for power quality monitoring. Principle& Working of DSTATCOM – DSTATCOM in Voltage control mode, current control mode, DVR Structure – Rectifier supported DVR – DC Capacitor supported DVR -Unified power quality conditioner.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand various sources, causes and effects of power quality issues, electrical systems and their measures and mitigation.
- Ability to analyze the causes & Mitigation techniques of various PQ events.
- Ability to study about the various Active & Passive power filters.
- Ability to understand the concepts about Voltage and current distortions, harmonics.
- Ability to analyze and design the passive filters.
- Ability to acquire knowledge on compensation techniques.
- Ability to acquire knowledge on DVR.

TEXT BOOKS:

1. Roger. C. Dugan, Mark. F. Mc Granagham, Surya Santoso, H.WayneBeaty, “Electrical Power Systems Quality”, McGraw Hill,2003
2. J. Arrillaga, N.R. Watson, S. Chen, “Power System Quality Assessment”, (New York : Wiley),2000.
3. Bhim Singh, Ambrish Chandra, Kamal Al-Haddad,” Power Quality Problems & Mitigation Techniques” Wiley, 2015.

REFERENCES

1. G.T. Heydt, “Electric Power Quality”, 2nd Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994.
2. M.H.J Bollen, “Understanding Power Quality Problems: Voltage Sags and Interruptions”, (New York: IEEE Press), 2000.

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. If the candidate has registered for arrears – subjects only, invalidating the examinations of all the arrears – subjects registered by the candidate.
11	The candidate possessing cell phone(s)/programmable calculator(s)/any other electronic storage device(s) **gadgets** and containing incriminating materials (whether used or not).	
12	The Candidate possessing the question paper of another candidate with additional writing on it.	
13	The candidate passing his/her question paper to another candidate with additional writing on it	
14	The candidate passing incriminating materials brought into the examination hall in any medium (hard/soft) to other candidate(s).	
15	The candidate copying from neighbouring candidate.	
16	The candidate taking out of the examination hall answer booklet(s), used or unused	
17	Appeal by the candidate in the answer script coupled with a promise of any form of consideration.	
18	Candidate destroying evidence relating to an alleged irregularity.	Invalidating the examinations of the subject concerned and all the theory and the practical subjects of the current semester registered by the candidate. Further the candidate is not considered for revaluation of answer scripts of the arrears-subjects. If the candidate has registered for arrears – subjects only, invalidating the examinations of all the arrears – subjects registered by the candidate. **Additional Punishment:** 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 four subsequent semesters.
25	The candidate harass or engage others to harass on his/her behalf an invigilator, official, witnesses or any other person in relation to an irregularity by making telephone calls, visits, mails or by any other means.	
26	Candidate possessing any firearm/weapon inside the examination hall.	
27	Cases of Impersonation	(i)Handing over the impersonator to the police with a complaint to take appropriate action against the person involved in the impersonation by the Chief Supt. (ii)If a student of this University is found to impersonate a 'bonafide student', the impersonating student is debarred from continuing his/her studies and writing the examinations **permanently.** He/she is not eligible for any further admission to any programme of the University. (iii)Debarring the 'bonafide student' for whom the impersonation was done from continuing his/her studies and writing the examinations **permanently.** He/she is not eligible for any further admission to any programme of the University.

CONTROLLER OF EXAMINATIONS

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

STUDENTS LEAVE APPLICATION FORM

Department of Electrical and Electronics Engineering **Date:**

Name of the Student: **Roll No. :** **Sem / Sec. :**

Details of leave availing / applied: Date & Day: **No. of. Days (a):**

Reason for Leave :

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

% of Attendance as on : _____ is _____

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

Recommended / Not Recommended

Class Coordinator **HOD/EEE**

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

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

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

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

HOD/EEE

K.L.N.COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Format No.: F127

ON DUTY REQUISITION FORM

STUDENTS – TO ATTEND SKILL DEVELOPMENT PROGRAMMES

(Workshop / Seminar / Symposium etc.)

Date: _____

To,

The Principal,

KLNCE,

Pottapalayam.

Respected Sir,

Sub.: Request for OD to attend _____

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

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

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

Discipline / misbehavior, reported if any :

Clash with Internal test if any :

Recommended by		
Class Co-ordinator	HOD	
	OD Permitted	OD Approved

BONAFIDE CERTICATE

To

The Principal,

KLNCE,

Pottapalayam.

Sub: Requisition for Bonafide Certificate

****

Respected Sir,

Kindly issue Bonafide Certificate to me

Purpose :

Venue :

Name :

Father's Name :

Roll No. :

Department :

Year & Sem :

Thanking You,

Yours Sincerely,

Date :

Station :

Recommended by :

Received :

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

Lecture Schedule

Course/Branch : **B.E / EEE** Subject: **DIGITAL SIGNAL PROCESSING** Duration: **June-Nov 2019**
Subject Code : **EE8591** Semester: **V** Section**: A & B** Regulation: **2017(AUC)**
Staff Handling :**Mrs. M. Ganesh Kumari**

AIM

To introduce the concept of analyzing discrete time signals & systems in time and frequency domain.

PRE-REQUISITE: Digital Logic Circuits

OBJECTIVES

- To classify signals and systems & their mathematical representation.
- To analyze the discrete time systems.
- To study various transformation techniques & their computation.
- To study about filters and their design for digital implementation.
- To study about a programmable digital signal processor & quantization effects

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

Course	Course Outcome	Po's	PSOs
C304.1	Apply the Mathematical knowledge to evaluate the different types of signals and systems and analyze the sampling process of continuous time signal.	1,2,5,12	1,2
C304.2	Analyze the discrete time systems using z-transform and inverse Z transform	1,2,4,5,12	1,2
C304.3	Apply the Radix-2 Decimation in Time (DIT) and Decimation in Frequency (DIF) FFT Algorithm to Compute the Discrete Fourier Transform.	1,2,4,5,12	1,2
C304.4	Design of different types of Infinite Impulse Response (IIR) filters and Finite Impulse Response (FIR) filters.	1,2,3,5*,12	1,2
C304.5	Analyze the various architectures of Digital Signal Processors and addressing formats.	1,5,12	1,2

S. No.	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I - INTRODUCTION				**Target periods :6+6=12**
1.			Introduction	T1[1-5], R2[1.1]
2.			Classification of Signals: Continuous and Discrete, Mathematical Representation of Signals	T1[6-11], R2[1.3]
3.			**Tutorial 1**	
4.			Classification of Signals: Energy & Power signals	T1[6-11], R2[1.33]
5.			**Tutorial 2**	
6.			Classification of Systems: Continuous, Discrete, Dynamic ,Linear, Causal	R2[1.52], T2[100]
7.			**Tutorial 3**	
8.			Classification of Systems:,Recursive, Time variance, Stable	R2[1.52]
9.			**Tutorial 4**	
10.			Sampling Techniques, Quantization, Quantization Error, Spectral Density	R2[1.28] T1[21], T1[31-35], R2[1.173]
11.			**Tutorial 5**	
12.			Nyquist Rate, Aliasing effect&**Tutorial 6**	T1[28], T1[20], R2[1.170]
ASSIGNMENT – I				***Total Periods:6+6=12***
CLASS TEST – I				
UNIT II - DISCRETE TIME SYSTEM ANALYSIS				**Target periods :6+6**
13.			Z Transform of basic signals	T1[147], R2[2.1]
14.			Properties of Z Transform	T1[157], R2[2.8]

15.				
16.			**Tutorial 1**	
17.			Inverse Z Transform: Long Division & Partial Fraction method	T1[157], R2[2.30]
18.			**Tutorial 2**	
19.			Inverse Z Transform: Residue & Convolution method	T1[156] R2[2.40]
20.			**Tutorial 3**	
21.			Solution to Difference equation using Z Transform, Application to discrete systems	R2[2.52]
22.			**Tutorial 4**	
23.			Stability Analysis, Linear Convolution- **Tutorial 5**	R2[2.26,2.63-2.7], R2[1-64-1-68], T2[146] R2[1.129]
24.			Discrete Time Fourier Transform, Frequency response - Magnitude & Phase representation ,	T1[69] R2[1.60], R2[3.5] R2[3.1]
25.			**Tutorial 6**	-
ASSIGNMENT – II				**Total Periods:7+6=13**
CENTRALIZED INTERNAL TEST – I				
UNIT III - DISCRETE FOURIER TRANSFORM &COMPUTATION				**Target Periods: 6+6**
26.			Discrete Fourier Transform **-Tutorial 1**	T1[464] R2[3.25]
27.			Properties of Discrete Fourier Transform	T1[464] R2[3.25]
28.				
29.			Magnitude & Phase representation of Discrete Fourier Transform, Circular Convolution	R2[3.9]
30.			Introduction to FFT Algorithm& Butterfly Structure, Radix-2 Decimation in Time(DIT)-FFT Algorithm	T1[519] R2[4.1] R2[4.5], R2[4.3]
31.			Computation of DFT using Radix-2 DIT-FFT Algorithm-	R2[4.17] R2[4.36]
32.			**Tutorial 2**	
33.			**Tutorial 3**	
34.			Radix-2 Decimation in Frequency(DIF)-FFT Algorithm	R2[4.19]
35.			Computation of DFT using Radix-2 DIF-FFT Algorithm **Tutorial 4**	R2[4.21], R2[4.27,4.39]
36.			**Tutorial 5**	
37.			Computation of I DFT using Radix-2 DIT-FFT & DIF-FFT Algorithm- **Tutorial 6**	R2[4.29-4.34]
38.			**Technical Quiz-I**	
CLASS TEST – II				**Total Periods:6+6+1=13**
UNIT IV - DESIGN OF DIGITAL FILTERS				**Target Periods: 6+6**
39.			Realization of IIR Filters – Direct form I, II	R2[5.54]
40.			Realization of IIR Filters – Parallel & Cascaded form	T1[567] R2[6.102]
41.			**Tutorial 1**	
42.			Digital filter Transformation techniques-Impulse Invariant & Bilinear Transformation, Warping & Pre-warping effect	R2[5.29], R2[5.33],R2[5.52]
42.			Design of Analog IIR Filter by Butterworth Approximations	R2[5.6]
43.			**Tutorial 2**	
44.			Design of Analog IIR Filter by Chebyshev Approximations	R2[5.17]
45.			**Tutorial 3**	
47.			Design of Digital IIR Filter - **Tutorial 4**	R2[5.40-5.52]
48.			Realization of FIR Filters- **Tutorial 5**	R2[6.102]
49.			Windowing Technique – Need& Choice Design of FIR Filters Using Windowing Technique.	R2[6.29], T2[631
50.			Linear phase characteristics of FIR Filters	R2[6.1]
51.			**Tutorial 6**	
52.			**Content beyond Syllabus:** Computer Aided Design of Digital Filter	Material

ASSIGNMENT – III				**Total Periods:7+6+1=14**
CENTRALIZED INTERNAL TEST -II				
UNIT V – DIGITAL SIGNAL PROCESSORS				**Target Periods :12**
53.			Introduction to Digital Signal Processors	R2[11.1]
54.			Architecture- Von Neumann Architecture	R2[11.5] R2[11.8]
55.			Harvard Architecture, VLIW Architecture	R2[11.9] R2[11.10]
56.			Features of Digital Signal Processors	R2[11.5]
57.			Addressing Formats of Digital Signal Processors	R2[11.25]
58.				
59.			Functional modes of Digital Signal Processors	R2[11.25]
60.				
61.			Introduction to Commercial processors	R2[11.1]
62.			Architecture of TMS320C5X family	R2[11.15]
63.			Applications of Digital Signal Processor	R2[11.6,] R2[10.1]
64.				
65.			**Seminar**	
CLASS TEST – III				***Total Periods:12+1=13***

Books: Text/Reference

Book No	Title of the Book	Author	Publisher	Year
T1	Digital Signal Processing Principles, Algorithms and Applications	J.G. Proakis & D.G. Manolakis	Pearson Education, New Delhi	2003
T2	Digital Signal Processing – A Computer Based Approach	S.K. Mitra	Tata McGrawHill, New Delhi	2001
R1	Digital Signal Processing	S.Salivahanan, A.Vallavaraj, C.Gnanapriya	Tata McGraw Hill, New Delhi	2003
R2	Digital Signal Processing	P. Ramesh Babu	Scitech Publishers	2014 Sixth Edition

NPTEL LECTURES

S.No	UNIT	Date[Period]	TOPIC	Ref / Link
1	III		FFT	http://www.youtube.com/watch?v=vlFdVYAXIxg
2	V		Digital signal processors	http://www.youtube.com/watch?v=SKuywStjBLY

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C304.1	3	2	-	-	1	-	-	-	-	-	-	1	2	1	-
C304.2	3	2	-	1	1	-	-	-	-	-	-	1	2	1	-
C304.3	3	2	-	1	1	-	-	-	-	-	-	1	2	1	-
C304.4	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C304.5	3	1	-	-	1	-	-	-	-	-	-	1	2	1	-
C304	3	2	-	-	1	-	-	-	-	-	-	1	2	1	-

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Computer aided design of Digital filter: Design features – Finding suitable tool – Method of design	PO5(4)(Strengthened)	C304.4 / IV

STAFF INCHARGE **HOD/EEE**

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

Department of Electrical and Electronics Engineering

Lecture Schedule

Degree/Programme : **B.E / EEE** Semester : **V** Section **: A & B**

Course code & Name : **OAN551- SENSORS AND TRANSDUCERS** Regulation : **2017/AUC**

Staff : **DR.C.Vimalarani & KR.Jeyavelumani** Duration : **June'19 – Oct'19.**

AIM: To provide adequate knowledge in sensors and transducers.

OBJECTIVE:

OBJECTIVES:

- To understand the concepts of measurement technology.
- To learn the various sensors used to measure various physical parameters.
- To learn the fundamentals of signal conditioning, data acquisition and communication systems used in mechatronics system development.

Prerequisites: Circuit Theory, Electronic Devices and Circuits, Linear Integrated Circuits and Applications

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

COs	Course Outcomes
C306.1	Classify the Various Types Of Errors And Explain Performance Of Sensors , the Static And Dynamic Characteristics Of Transducers,
C306.2	Explain the operation Motion, Proximity and Ranging Sensors and Used To measure various physical parameters
C306.3	Study the Operation Force, Magnetic And Heading Sensors and Used to measure Various Physical Parameters
C306.4	Describe the operation of various types Of Optical, Pressure And Temperature Sensors.
C306.5	Analyze the DAQ Systems With Different Sensors For Real Time Applications.

Total : 45 Periods

S. No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT-I: INTRODUCTION				**Target periods : 9**
1.			Basics of Measurement	T1 [3- 11]
2.			Classification of errors, Error analysis	T2[60-70]
3.			Static characteristics	R1 [5-9]
4.			Static characteristics	R1 [5-9]
5.			Dynamic characteristics	R1 [5-9]
6.			Performance measures of sensors	Material
7.			Classification of sensors	R1[3-5]
8.			Sensor calibration techniques	Material
9.			Sensor Output Signal Types	Material
Total Periods:		**9**	**Assignment - I**	
		1	**CT – I**	**Portion :** Unit – 1
UNIT – II: MOTION, PROXIMITY AND RANGING SENSORS				**Target periods : 9**
10.			Principle and Types of potentiometer	T1 [154-161], R1[14- 15]
11.			Resolver- synchro and computing resolver	R1[171-175]
12.			Encoders – Optical, Magnetic sensors	Material
13.			Inductive and capacitive Sensors	R1[29- 50]
14.			Working principle of LVDT	R1[168-170]
15.			Working principle of RVDT	Material
16.			Working of Synchro – Microsyn systems	R1[171-175]
17.			Accelerometer.,– GPS, Bluetooth	T1[240-247], Material

18.			Range Sensors – RF beacons sensor, Ultrasonic Ranging sensor	Material, T1[217-219]
19.			Reflective beacons sensor, Laser Range Sensor LIDAR).	Material
Total Periods:		**10**	Assignment - II	
		1,2	**CIT – I**	Portion : Unit – I & II
UNIT-III: FORCE, MAGNETIC AND HEADING SENSORS				**Target Periods : 9**
20.			Working of Strain Gage, Load Cell	T1[292-298]
21.			Types, principle, requirement and advantages of Magnetic Sensors	R1[148-152]
22.			Magneto resistive sensors	R1[148-152]
23.			Principles of Hall Effect and Current sensor	R1[156-160]
24.			Principles of Hall Effect and Current sensor	R1[156-160]
25.			Heading Sensors – Compass	Material
26.			Working of Gyroscope sensors	Material
27.			Working of Inclinometers	Material
28.			Application and requirements of Heading sensors	Material
Total Periods:		**9**	**Assignment - III**	
		1,2	**CT – II**	***Portion :*** *Unit – III*
UNIT-IV: OPTICAL, PRESSURE AND TEMPERATURE SENSORS				**Target Periods: 9**
29.			Photo conductive cell, photo voltaic, Photo resistive	R1[183-190], R1[204]
30.			LDR – Fiber optic sensors	R1[195-198], R1[227-230]
31.			Pressure – Diaphragm, Bellows, Piezoelectric	T1[300-302]
32.			Working and types of Tactile sensors	Material
33.			Temperature – IC, Thermistor, RTD, Thermocouple	T1[518-521], T1[491-494],T1[]513-515]
34.			Acoustic Sensors – flow and level measurement,	R1[74-76]
35.			Radiation Sensors	R1[319-320]
36.			Smart Sensors - Film sensor	R1[282-284]
37.			MEMS & Nano Sensors	R1[292-296]
38.			LASER sensors.	Material
39.			***Quiz***	
Total Periods:		**10+1**	***CIT – II***	***Portion :*** *Unit – III & IV*
UNIT-V: SIGNAL CONDITIONING AND DAQ SYSTEMS				**Target Periods: 9**
40.			Basics of Amplification – Filtering	T1[563-571], T1[579-592]
41.			Sample and Hold circuits	
42.			Data Acquisition: Single channel data acquisition	T1[635]
43.			Data Acquisition: multi channel data acquisition	T1[635]
44.			Operation of Data logging system.	Material
45.			Applications of Sensors in Automobile	Material
46.			Applications of Sensors in Aerospace	Material
47.			Applications of sensors in Home appliances, Manufacturing	Material
48.			Applications of sensors in Environmental monitoring	Material
Total Periods:		**9**	**CT –III**	**Portion :** Unit – V
49.			**Seminar**	
50.			**Content beyond Syllabus**	
51.			**NPTEL**	

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

T1. Ernest O Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill, 2009.

T2. Sawney A K and Puneet Sawney, "A Course in Mechanical Measurements and Instrumentation and Control", 12th edition, Dhanpat Rai & Co, New Delhi, 2013.

REFERENCES

R1. Patranabis D, "Sensors and Transducers", 2nd Edition, PHI, New Delhi, 2010.

R2. John Turner and Martyn Hill, "Instrumentation for Engineers and Scientists", Oxford Science Publications, 1999.
R3. Richard Zurawski, "Industrial Communication Technology Handbook" 2nd edition, CRC Press,2015.

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
C306.1	2	2	-	-	-	-	-	-	-	-	-	-	1	-
C306.2	2	2	-	-	1	-	-	-	-	-	-	1	1	1
C306.3	2	2	-	-	1	-	-	-	-	-	-	1	1	1
C306.4	2	2	-	-	1	-	-	-	-	-	-	1	1	1
C306.5	2	2	#1	-	1	-	-	-	-	-	-	1	1	1
C306	2	2	-	-	1	-	-	-	-	-	-	1	1	1

Content Beyond Syllabus Added (CBS)	POs strengthened / vacant filled	CO / Unit
Industrial Applications of Sensors	PO3(5)(vacant filled)	C306.5/V

STAFF INCHARGE

HOD/EEE

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

K.L.N. COLLEGE OF ENGINEERING - 630612

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

LECTURE SCHEDULE

Degree/Program:**B.E/EEE** Course code & Name: **EE8551 - Microprocessors and Microcontrollers** Duration : **Jun'19- Oct'19**
Semester: **V** Section: **A &B**
Regulation:**2017/AUC**
Staff Handling : **S.Manoharann & T.Gopu**

AIM:

To introduce Microprocessor Intel 8085 and Micro Controller 8051

OBJECTIVE:

i. To study the Architecture of µP 8085 & µC8051
ii. To study the addressing modes & instruction set of 8085 &8051.
iii. To introduce the need & use of Interrupt structure 8085 &8051.
iv. To develop skill in simple applications development with programming 8085 &8051
v. To introduce commonly used peripheral /interfacing

PRE – REQUISITE: Digital Logic Circuits

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

CO	Course Outcomes	POs	PSOs
C302.1	Analyze the functional building blocks of 8085 microprocessor	1,7,5	PSO1
C302.2	Identify the instructions with the help of addressing modes of 8085 microprocessor and developthe assembly language program on addition	1,3,2,5	PSO2
C302.3	Analyze the functional building blocks of 8051 microcontroller	1,7,5	PSO1
C302.4	Analyze the architecture and functional modes of 8255	1,3,2,5	PSO2
C302.5	Apply the instructions of 8051 microcontroller to develop the program for Closed loop control ofservo motor	1,3,2,5	PSO2

S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I -(8085Processor)				**Target periods:9**

1.			Architecture & Pinouts with signals of 8085 Processor	2(71-92), 1(22-30), 4(73-75),6(1-3to1-11)
2.				
3.			Functional Building Blocks of Processor	6(1-3 to1-11)
4.			Memory Interfacing in 8085	2(71-92), 1(22-30), 1(31-46), 6(9-4 to9-16)
5.				
6.			I/O interfacing of 8085	1(31-46), 4(130-155), 6(10-2 to 10-11)
7.			Timing diagram of 8085	1(66-74), 4(122-124), 6(5-2 to5-19)
8.				
9.			Interrupt structure of 8085	4(141-153),6(4-2 to4-16)
10.			Quiz-I	Moodle
Class Test I				Unit-I
UNIT II - (Programming of8085Processor)				**Target periods:9**
11.			Instruction format & Addressing modes	2(102-109),4(79-112), 6(2-2,2-3,2-31 to 2-33)
12.				
13.			Assembly language format	6(2-37 to 2-41)
14.			Data transfer & Arithmetic instructions	6(2-4 to 2-19)
15.			Data manipulation & control instructions	6(2-19 to 2-31)
16.			Programming: Loop structure with counting & indexing	2(102-109), 4(79-112), 1(Appendix F)
17.				
18.			Look up table, sub routines & stack	Notes
19.				
CIT – I				**Unit-I &Unit-II**
				Assignment –1
UNIT III –(8051Microcontroller)				**Target Periods:9**
20.			Functional block diagram with Memory organization	3(54-66, 490-493), 6(17-3 to 17-15)
21.				
22.			Instruction format & Addressing modes	3(119-185), 6(18-2 to 18-5)
23.			Interrupt structure	3(82-86), 6(19-37 to 19-43)
24.			Timing diagram	6(17-15 to 17-20)
25.				
26.			Timer	3(72-76), 6(19-9 to 19-19)
27.			I/O ports	3(66-70), 6(19-2 to 19-4)
28.			Serial communication	3(287-306), 6(19-27to19-32)
29.			Seminar	
Class Test II				**Unit-III**
UNIT IV -(*Peripheral Interfacing*)				**Target Periods:9**
30.			Study of Architecture and programming of 8255 PPI	1(442-458), 4(134-141), 6(11-2to11-9,11-12 to11-21)
31.			Study of Architecture and programming of 8259 PIC	6(12-2 to 12-15)
32.			Study of Architecture and programming of 8254 PIC	NPTEL Material
33.			Study of Architecture and programming of 8279 Key board display controller	1(431-438), 4(835-866), 6(14-15 to 14-34)
34.				
35.			A/D converter interfacing with 8085 & 8051	3(194-201),6(16-12 to16-19)
36.			D/A converter interfacing with 8085 & 8051	3(353), 6(16-2 to 16-8)
Assignment –2				
CIT – II				**Unit-III &Unit-IV**
UNIT V –*(Microcontroller Programming&Applications)*				**TargetPeriods:9**

43.			Simple programming exercises	3(89-113), Notes
44.			Key board and display interface	3(231-251),6(20-2 to 20-19)
45.			Control of servo motor	6(20-21 to 20-23)
46.			Stepper motor control	6(20-23 to 20-25)
47.			Application to automation systems.	6(20-27 to 20-30)
48.			Programming using PIC Controller	***Beyond Syllabus***
49.			Revision	-
50			Quiz-II	Moodle
51			Anna University important Part-A & Part-B Questions Discussion	-
Assignment –3				
Class Test				***Unit-V***

Book Reference

Book No	Title of the Book	Author	Publisher	Year
1.	Microprocessor Architecture, Programming and Application with 8085	Gaonkar, R. S	Prentice Hall & Wiley Eastern Ltd	4th Edition 2000&2016
2.	'Microprocessor: Principles and Applications'	Charles M. Gilmore	McGraw Hill International	1989.
3.	Micro controller architecture and programming	Kenneth J.Ayala	Penram International Publishers	2nd Edition, 1996.
4.	Microprocessors and Micro-computer Based System Design	Mohamed Raffiquzzaman	Intel and Motorola" Prentice Hall,	2003
5.	Microprocessor and Microcontrollers	Sunil Mathur&Jeebanan da Panda	PHILearning Pvt. Ltd.	2016
6.	Microprocessors and Microcontroller	A.P.GodseD. A.Godse	Technical publications	2011
7.	The 8051 Micro Controller and Embedded Systems'	Muhammad Ali Mazidi& Janice GilliMazidi	PHI pearson Education, 5th Indian reprint	2003.

NPTEL LECTURES:

(i) http://www.nptel.ac.in/courses/108105057/Pdf/Lesson16.pdf

(ii) http://www.nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C302.1	2	-	-	-	1	-	1	-	-	-	-	-	1	-
C302.2	2	3	3	-	1	-	-	-	-	-	-	-	2	-
C302.3	2	-	-	-	1	-	1	-	-	-	-	-	1	-
C302.4	2	2	3	-	1	-	-	-	-	-	-	-	2	-
C302.5	2	3	3	-	1	-	-	-	-	-	-	-	2	-
C302	2	2	2	-	1	-	-	-	-	-	-	-	2	-

/mod3/M3L3.pdf

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Programming using PIC microcontroller	PO4(2), PO12(2) (vacant filled), PSO1(3)(strengthened)	C302.5 / V

SELF STUDY TOPICS:

S.No	UNIT	TOPIC	Text / Ref book
1	IV Peripheral Interfacing	8254 PIC	Gaonkar, R. S, 'Microprocessor Architecture, Programming and Application with 8085', Prentice Hall, 4th Edition, 2000.

2	V Microcontroller Programming & Applications	Washing Machine Control	Kenneth J.Ayala, 'Micro controller architecture and programming', Penram International Publishers, 2nd Edition, 1996.

STAFF IN CHARGE **HOD/EEE**

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

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

Lecture Schedule

Degree/Program: **B.E / EEE.** Course code &Name: CS8392 –Object Oriented Programming

Duration: **June -October 2019.** Semester: V**.** Section : A & B Staff: Manoj A Regulation: **2017.**

AIM: To facilitate the understanding of Object Oriented Programming Concepts using JAVA.

OBJECTIVES

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

		POs	PSOs
C305.1	Outline OOP principles such as objects, classes, encapsulation, inheritance and polymorphism and associate those principles in java language.	**1, 2, 3, 5, 6, 9, 11, 12**	**1, 2**
C305.2	Design algorithms and develop programs using the concept of Inheritance and Interfaces.		
C305.3	Examine the exception handling concepts and develop I/O streams for reading and writing files.		
C305.4	Develop programs that run in the same instant using multithreading and multitasking concepts and utilize the power of generic programming in java for robust programming.		
C305.5	Design and develop applications in java using forms, AWT, and swing.		

S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I - INTRODUCTION TO OOP AND JAVA FUNDAMENTALS				**Target Periods : 10**
1			OOP introduction	T1:[P3-16]
2			Java Introduction	T1:[P17-34]
3			Fundamentals of Java	T1:[P35-59]
4			Fundamentals of Java	T1:[P35-59]
5			Methods	T1:[P109-160]
6			Methods	T1:[P109-160]
7			Class	T1:[P109-160]
8			Object	T1:[P109-160]
9			Operators	T1:[P61-79]
10			Control Statements	T1:[P81-108]
Assignment - 1				
UNIT II INHERITANCE AND INTERFACES				**Target Periods : 9**
1			Inheritance intro	T1:[P161-186]
2			Super class, sub class, protected members	T1:[P161-186]
3			final methods, abstract classes	T1:[P161-186]
4			Interfaces into	T1:[P187-206]
5			Defining and implementing interfaces	T1:[P187-206]

6			Difference between class and interfaces	T1:[P187-206]
7			Extending interfaces	T1:[P187-206]
8			Object cloning	T1:[P187-206]
9			Inner classes	T1:[P187-206]
10			Arraylists, strings	T1:[P187-206]
			Assignment 2	
UNIT III EXCEPTION HANDLING AND I/O Target Periods : 9				
1			Exceptions intro	T1:[P207-226]
2			Exceptions hierarchy	T1:[P207-226]
3			Throwing and catching exceptions	T1:[P207-226]
4			Built in exceptions	T1:[P207-226]
5			User defined exceptions	T1:[P207-226]
6			I/O basics	T1:[P207-226]
7			Streams	T1:[P207-226]
8			Reading and writing console	T1:[P207-226]
9			Reading and writing console	T1:[P207-226]
10			Reading and writing files	T1:[P207-226]
			Assignment – 3	
UNIT IV MULTITHREADING AND GENERIC PROGRAMMING Target Periods : 8				
1			Multithreading intro	T1:[P227-257]
2			Difference between multi thread and tasking	T1:[P227-257]
3			Creating threads	T1:[P227-257]
4			Synchronizing threads	T1:[P227-257]
5			Inter thread communication	T1:[P227-257]
6			Daemon threads	T1:[P227-257]
7			Thread groups	T1:[P227-257]
8			Generic programming	T1:[P325-267]
9			Generic classes	T1:[P325-267]
10			Restrictions and limitations	T1:[P325-267]
UNIT V EVENT DRIVEN PROGRAMMING Target Periods : 9				
1			Graphics programming	T1:[P289-323]
2			Frame components	T1:[P289-323]
3			Frame components	T1:[P289-323]
4			Event handling	T1:[P289-323]
5			Event handling	T1:[P289-323]
6			AWT event hierarchy	T1:[P289-323]
7			AWT event hierarchy	T1:[P289-323]
8			Swing layout	T1:[P289-323]
9			Swing layout	T1:[P289-323]
10			Swing layout	T1:[P289-323]

Tex/Ref	Title of the Book	Author	Publisher/Edition
T.1	Java The complete reference	Herbert Schildt	8th Edition, McGraw Hill Education, 2011.
T.2	Core Java Volume –I Fundamentals	Cay S. Horstmann, Gary cornell	9th Edition, Prentice Hall, 2013.
R.1	Java SE 8 for programmers	Paul Deitel, Harvey Deitel,	3rd Edition, Pearson, 2015.
R.2	Java 2 Black book	Steven Holzner	Dreamtech press, 2011
R.3	Understanding Object-oriented programming with Java	Timothy Budd,	Updated Edition, Pearson Education, 2000.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C305.1	2	-	-	-	-	-	-	-	-	-	-	-	1	-
C305.2	2	1	2	3	2	-	-	-	-	-	-	-	2	1
C305.3	2	1	2	3	2	-	-	-	-	-	-	-	2	1
C305.4	2	1	2	3	2	-	-	-	-	-	-	-	2	1
C305.5	2	1	2	3	2	-	-	-	-	-	-	-	2	1
C305	2	1	2	3	2	-	-	-	-	-	-	-	2	1

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Java Application Development	PO 9,10,11 (Vacant Filled)	C304.5 / V

Staff in charge **HOD/EEE**

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Lecture Schedule

Course/Branch: B.E./EEE
Duration: June-Dec 2019
Semester: V Section: A&B

Subject : POWER ELECTRONICS
Subject Code: **EE8552**
Staff Handling: Dr.S.Venkatesan & R.Jeyapandipradhap

Regulation: 2017

AIM :

To introduce the application of power electronic devices for conversion, control and conditioning of electric power.

OBJECTIVES:

To impart knowledge on the following Topics

1. Different types of power semiconductor devices and their switching
2. Operation, characteristics and performance parameters of controlled rectifiers
3. Operation, switching techniques and basics topologies of DC-DC switching regulators.
4. Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
5. Operation of AC voltage controller and various configurations.

Prerequisites: Electron devices and circuits, Electrical Machines I,II

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

Course	Course Outcome	POs	PSOs
C304.1	Explain the significance of switching devices and its application to power converters and demonstrate the triggering circuit and snubber circuits.	1,2,3,5	1,2
C304.2	Compare the operation of two, three Pulse Converters and draw output waveforms with and without source and load inductance.		1,2
C304.3	Classify the operation of Choppers and outline the application of SMPS.		1,2
C304.4	Analyze the operation of single phase and three phase Inverters with and without PWM techniques.		1,2
C304.5	Illustrate the operation of AC voltage controller and cycloconverter and its application.		1,2

S. No	Date	Period	Topics to be covered	Book Page No
UNIT I - POWER SEMICONDUCTOR DEVICES Target Periods 9				
1			Structure, operation and characteristics of Power Diodes-Types	T1(1-5)
2			Structure, operation and characteristics of SCR SCR-TURN-on & TURN-off methods	T1(304-307) T1(309-313)
3			Structure, operation and characteristics of TRIAC	T1(770-772)
4			Structure, operation and characteristics of Power Transistor	T1(9-10)
5			Structure, operation and characteristics of MOSFET	T1(137-144)
6			Structure, operation and characteristics of IGBT	T1(147-150)
7			Structure, operation and characteristics of GTO	Material
8			Triggering Circuits	T1(307-309) T1(315)
9			Commutation circuit for SCR	T1(227-230)
10			Snubber circuits	T1(803)
Class Test-I				
UNIT II - PHASE-CONTROLLED CONVERTERS Target Periods 9				
11			Introduction to Phase Controlled Converters	T1(432-434)
12			2-pulse converter, performance measures	T1(432-434)
13			3-pulse converter, performance measures	T1(438-440)
14			6-pulse converter, performance measures,Dual converters	T1(443-446) T1(447-450)
15				
16			Inverter operation of fully controlled converter R, RL and RLC loads. Free Wheeling Diodes	T1(438-440)
17				
18			Effect of Source Impedance	T1(492-494)
19			Effect of load Inductance	T1(492-494)
20				
Assignment 1				
Class Test-II				
UNIT III - DC TO DC CONVERTERS Target Periods 9				
21			Introduction to dc-dc Converters-Step-down choppers	T1(166-176)
22			Principle of Step-up chopper-Performance Parameter	T1(176-181)
23			Time ratio control	T1(170)
24			Current limit control	T1(170)
25			Forced commutated chopper	Material
26			Voltage commutated, Current commutated, Load commutated chopper	Material
27			Introduction to Switching mode regulators	T1(186)
28			Buck Converter	T1(186-190)
29			Boost Converter	T1(190-194)
30			Buck-Boost Converter	T1(194-198)
31			Resonant switching based SMPS	T1(198-204)
32			Self study/Seminar	
33			Quiz	

Assignment 2				
Class Test-III				
UNIT IV - INVERTERS				**Target Periods 9**
34	08.8.2019	7	Single-phase inverters	T1(232-237)
35	09.8.2019	4	Three-phase inverters (120 degree)	T1(237-248)
36	13.8.2019	1,7	Three-phase inverters (180° mode)	
37	14.8.2019	4	PWM techniques Sinusoidal PWM, modified sinusoidal PWM - multiple PWM	T1(264-271)
38	16.8.2019	4	Harmonic control	T1 (248-260)
39	20.8.2019	1	Introduction to space vector modulation	Material
40	20.8.2019	7	Series resonant inverter	T1(353-358)
41	21.8.2019	4	Voltage control	T1(232-234,289)
42	22.8.2019	7	Current source inverters	T1(285-288)
43	27.8.2019	1,7	Content beyond syllabus: Harmonic control techniques for inverters and adaptive active power filters	
Assignment 3				
CIT – II				
UNIT V - AC TO AC CONVERTERS				**Target Periods 9**
44	28.8.2019	4	Single phase AC voltage controllers	T1(501-505)
45	29.8.2019	7		
46	30.8.2019	4	Multistage sequence control	T1(503-509)
47	03.9.2019	1,7		
48	04.9.2019	4	Three-phase AC voltage controllers	T1(509-513)
49	05.9.2019	7		
50	06.9.2019	4	Cycloconverters: single phase,Three-phase	T1(514-522)
51	11.9.2019	4	Introduction to Integral cycle control	Material
52	12.9.2019	7	Power factor control	Material
53	13.9.2019	4	Matrix Converter	Material
54	17.9.2019	1,7	Seminar	
Model Theory Examinations				
				Target Periods-45

BOOK REFERENCE:

S.no	Title	Author	Publisher	Year
TEXT BOOKS:				
1	Power Electronics: Circuits, Devices and Applications	Muhammad H. Rashid	3rdEdition, Pearson Education/Prentice Hall	2004
2	Power Electronics	Bhimbra, P. S	4th Edition, DhanpatRai and Sons	2003
3	Power Electronics Essentials and Applications	L. Umanand	Wiley	2010
REFERENCES:				

1. Joseph Vithayathil,' Power Electronics, Principles and Applications', McGraw Hill Series, 6th Reprint, 2013.
2. Ashfaq Ahmed Power Electronics for Technology Pearson Education, Indian reprint, 2003.
3. Philip T. Krein, "Elements of Power Electronics" Oxford University Press, 2004 Edition.
4. Ned Mohan, Tore. M. Undel and, William. P. Robbins,' Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition,2003.
5. Daniel.W.Hart, "Power Electronics", Indian Edition, McGraw Hill, 3rd Print, 2013.
6. M.D. Singh and K.B. Khanchandani, "Power Electronics," McGraw Hill India, 2013.

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
C304.1	2	2	1	-	2	-	-	-	-	-	-	-	2	1	-
C304.2	3	2	1	-	2	-	-	-	-	-	-	-	3	2	-
C304.3	3	2	1	-	2	-	-	-	-	-	-	-	3	2	-
C304.4	3	2	1	-	2	-	-	-	-	-	-	-	2	2	-
C304.5	2	2	1	-	2	-	-	-	-	-	-	-	2	1	-
C304	3	2	1	-	2	-	-	-	-	-	-	-	2	2	-

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Harmonic control techniques for inverters and adaptive active power filters.	PO5(3),PO6(1) (vacant filled)	C304.4 / IV

WEB REFERENCE:

1. www.nptel.iitm.ac.in

Staff In-Charge HOD/EEE

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

Lecture Schedule

Course/Branch : **B.E/EEE** Subject : **Power System Analysis**
Duration : **June 2019 - Oct 2019** Subject Code : **EE8501**
Semester : **V** Section: **A & B** Staff Handling: **Dr.K.Gnanambal**
Regulation : **2017** `

AIM:

To understand the necessity and to become familiar with the modeling of power system components and to apply different methods to analyze power system for the purpose of system planning and operation

OBJECTIVES:

1. To model the power system under steady state operating condition.
2. To apply iterative techniques to solve the power flow problem.
3. To model and analyze the power systems under abnormal (or) fault conditions.
4. To model and analyze the stability problems in power systems.

Prerequisites: Circuit Theory, Transmission and Distribution, Numerical Methods

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

CO	Course Outcomes	POs	PSOs
C301.1	Apply engineering knowledge to evaluate the per unit values and to formulate bus impedance, admittance matrices for the given power system network.	**1**	**1**
C301.2	Analyze load flow techniques using Newton – Raphson and Gauss Seidel methods for the power system networks and interpret the results	**1,2,4,5***	**1**

C301.3	Analyze the power system network under symmetrical fault condition using Thevenin's theorem and bus impedance matrix	**1,2**	**1**
C301.4	Analyze the power system network under unsymmetrical fault condition using symmetrical components	**1,2**	**1**
C301.5	Analyze the transient stability of power system using equal area criterion and to apply Runge Kutta and Euler's methods to solve the swing equation	**1,2**	**1**

Sl. No	**Date**	**Period Number**	**Topics to be Covered**	**Book No [Page No]**
UNIT - I : POWER SYSTEMS				**Target Periods 9**
1			Introduction to power system analysis – Necessity of Power system planning and operational studies – Power Scenario in India	T1 [4], T2[5-11]
2			Basic components and symbols of power system	T1 [4]
3			Per unit system, Single line diagram representation	T1[36-42],T1[88-90]
4			Impedance and reactance diagrams, Change of base	T1[90-101]
5			Tutorial	
6			Formation of Y-bus using Inspection method	T1[130-180]
7 8 9			Primitive network matrix and Y bus using Singular Transformation method	
10			Representation of off nominal transformer	T2[76-80]
11 12			Tutorial	
Class Test-I				Total Planned periods -12
			Assignment-I	
UNIT - II : POWER FLOW ANALYSIS				**Target Periods: 9**
13			Importance of power flow analysis in planning and operation of power systems.	T1[189]
14			Statement of power flow problem - classification of buses into P-Q buses, P-V (voltage controlled) buses and slack bus.	T1[208]
15				
16			Development of Power flow model in complex variables form and polar variables form.	T1[26-30]
17			Iterative solution using Gauss-Seidel method including Q-limit check for voltage controlled buses - algorithm and flow chart.	T1[209-220] T2[335-342]
18				
19			Iterative solution using Newton-Raphson (N-R) method (polar form) including Q-limit check and bus switching for voltage-controlled buses - Jacobian matrix elements – algorithm and flow chart. Development of Fast Decoupled Power Flow (FDPF) model and iterative solution – algorithm and flowchart; Comparison of solution techniques	T1[232-240] T2[342-356] T1[240-245] T2[368-373]
20				
21				
22			Tutorial	
23			Tutorial	
24			Tutorial	
25			Content Beyond Syllabus – To develop differential evolution based optimization algorithm to solve the load flow problem	Journals

26			**Seminar I**	
CIT – I periods -14				Total Planned
			Assignment II	
UNIT- III : SYMMETRICAL FAULT ANALYSIS				**Target Periods : 9**
27			Introduction to fault analysis. Importance short circuit (or) for fault analysis - basic assumptions in fault analysis of power systems.	T1[353], R2[308]
28			Simple building algorithm for the formation of Z-Bus matrix	T1[190-195]
29			Tutorial	
30			Symmetrical (or) balanced three phase faults – problem formulation Internal voltages of loaded machines under fault conditions.	T1[354-361]
31				
32			Solution using Thevenin's theorem	T1[354-361]
33			Fault analysis using Z-bus matrix – algorithm and flow chart	T1[363-368]
34				
35			Post Fault bus voltages in symmetrical component frame and phase frame. Fault level	T2[383-390]
36			Current Limiting Reactors	
37			Tutorial	
38			Tutorial	
Class Test-II Planned periods -12				Total
			Assignment III	
UNIT- IV : UNSYMMETRICAL FAULT ANALYSIS				**Target Periods :9**
39			Introduction to symmetrical components – sequence impedances – sequence networks	T1[399, 407-420], T2[417-418]
40				
41			Single Line-Ground fault analysis - Derivation	T1[421-422], T2[482-488]
42			Solution of problems	T1[421-422], T2[482-488]
43				
44			Line-Line fault analysis – Derivation and solution of problems	T1[423-425], T2[494-512]
45				
46			Double Line-Ground fault analysis Derivation	T1[425-431]
47				
48			***Quiz I***	
49			Tutorial	
50			Tutorial	
51			Tutorial	
			CIT – II	Total Planned periods -13
			UNIT- V : STABILITY ANALYSIS	**Target Periods: 9**
52			Importance of stability analysis in power system planning and operation	T1[460]
53			classification of power system stability - angle and voltage stability	R1[17-37]
54			Simple treatment of angle stability into small-signal and large-signal (transient) stability Single Machine Infinite Bus (SMIB) system	R1[17-37]
55			Development of swing equation	T1[461-464], T2[698-702]
56			Equal area criterion and solution of SMIB system problems	T1[486-488] T2[717-726]
57				
58			Solution of swing equation by classical step by step method	R1[836-837]

59 60			Determination of critical clearing angle and time by using Modified Euler method	R1[836-838]
61			Tutorial	
62			Tutorial	
63			Tutorial	
				Total Planned periods -12
Class Test III				

TEXT BOOKS

1. Hadi Saadat, "Power System Analysis", Tata McGraw Hill Publishing Company, New Delhi, 2002.
2. John J. Grainger and W.D. Stevenson Jr., "Power System Analysis", McGraw Hill International Book Company, 1994.
3. Nagrath I.J. and Kothari D.P., "Modern Power System Analysis", Tata McGraw-Hill Publishing Company, New Delhi, 1990.

REFERENCE BOOKS

1. Kundur P., "Power System Stability and Control", Tata McGraw Hill, Publications,1994.
2. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.
3. J. Duncan Glover, Mulukutla S.Sarma, Thomas J. Overbye, 'Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
4. Gupta B.R., 'Power System - Analysis and Design', S. Chand Publishing, 2001
5.Nagasarkar K.and Sukhija M.S, "Power System Analysis", Oxford University Press, 2007.

NPTEL Link:

https://www.youtube.com/watch?v=fBm1dr_gRBk&list=PL36A60B630E8C7B56&index=1
https://www.youtube.com/watch?v=BYtY61hOiaw&list=PL36A60B630E8C7B56&index=2

SUBJECT HANDLER **HOD/EEE**

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

Question Paper Code : 52956

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY, 2019.

Fifth Semester

Electrical and Electronics Engineering

EE 6501 — POWER SYSTEM ANALYSIS

(Regulation 2013)

(Common to PTEE 6501 — Power System Analysis for B.E. (Part-Time) for Fifth Semester — Electrical and Electronics Engineering — Regulation 2014)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by base quantities in per unit representation?

2. What is impedance diagram and what are the approximations made in this diagram?

3. What are the information that are obtained from a load flow study?

4. What is swing bus?

5. Write the ways of adding an impedance to an existing system so as to modify bus impedance matrix.

6. What is meant by fault level?

7. Name the faults which are having all three equal sequence current and which do not have zero sequence current.

8. Draw the zero sequence impedance equivalent circuit for $\Delta - \Delta$ type Three-Phase Transformers.

9. Define infinite bus in a power system.

10. Define critical clearing angle.

PART B — (5 × 13 = 65 marks)

11. (a) The one line diagram of three phase power system is shown in Fig. 11(a). Select a common base of 100 MVA and 22 kV on generator side draw the impedance diagram in per – unit

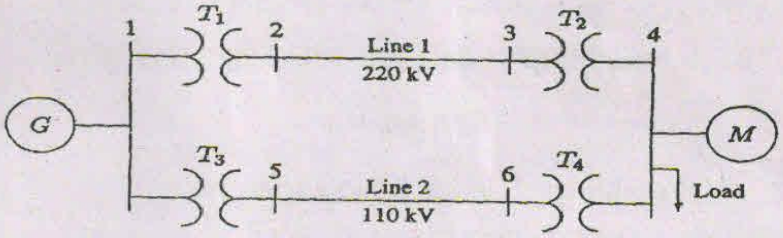

Fig. 11 (a)

G : 90 MVA, 22 KV, X = 18%; T1 : 50 MVA, 22/220 KV, X = 10%

T2 : 40 MVA, 22/220 KV, X = 6%; T3 : 40 MVA, 220/110 KV, X = 6.4%

T4 : 40 MVA, 110/11 KV, X = 8%; M : 66.5 MVA, 10.45 KV, X = 18.5%

The three phase load at bus 4 absorbs 57 MVA, 0.6 power factor lagging at 10.45 kV. Line 1 and line 2 have reactance of 48.4 Ω and 65.43 Ω respectively. (13)

Or

(b) From the impedance diagram shown in Fig.11(b). Compute the bus admittance matrix and draw the admittance diagram. (13)

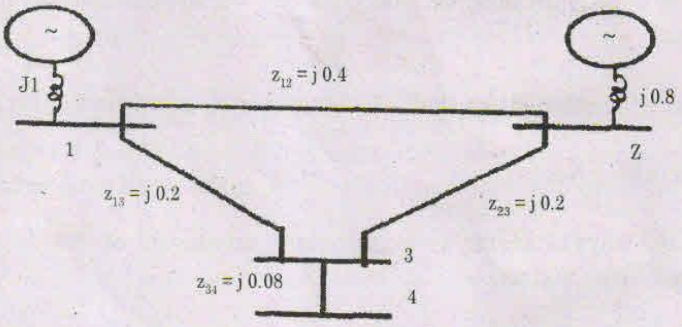

Fig.11(b)

12. (a) With neat flowchart, explain the computational procedure for load flow solution using Gauss-Seidal iterative method. (13)

Or

(b) Evaluate the Jacobian elements for the 3-Bus system shown in Fig. 12(b). All the impedances in this Fig. 12(b) are mentioned in per unit.

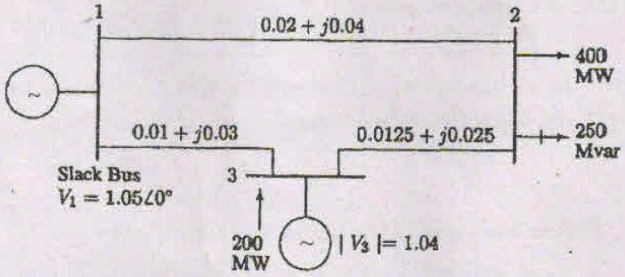

Fig. 12(b)

13. (a) A 25 MVA, 11 kV generator with Xd'' = 20% is connected through a transformer, line and a transformer to a bus that supplies three identical motors as shown in Fig.13(a). Each motor has Xd'' = 20% and Xd' = 30% on a base of 5 MVA, 6.6 kV. The three-phase rating of the step-up transformer is 25 MVA, 11/66 kV with a leakage reactance of 10% and that of the step-down transformer is 25 MVA, 66/6.6kV with a leakage reactance of 10%.The bus voltage at the motors is 6.6 kV when a three-phase fault occurs at the point F. For the specified fault, calculate (i) the sub transient current in the fault, (ii) the sub transient current in the breaker B. (iii) the momentary current in breaker B, and (iv) the current to be interrupted by breaker B in five cycles. (13)

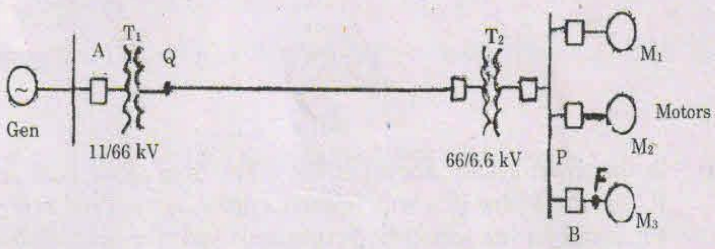

Fig. 13(a)

Or

(b) (i) Write a short notes on fault current in synchronous machine. (8)

(ii) What are the assumptions made in fault analysis? (5)

14. (a) Derive the expression for fault current in double line to ground fault on unloaded generator. Draw the equivalent network showing the interconnection of networks to simulate double line to ground fault. (13)

Or

(b) The reactances of an alternator rated 10 MVA, 6.9 kV are $X_1 = X_2 = 15$ % and $X_{g0} = 5$ %. The neutral of the alternator is grounded through a reactance of 0.38 Ω. Single Line to ground (SLG) fault occurs at the terminals of the alternator. Determine the line currents, fault current and the terminal voltages. (13)

15. (a) Derive the swing equation of single machine connected to a infinite bus system and draw the swing curve. (13)

Or

(b) (i) Define and classify the power system stability (8)

(ii) A 4-pole, 50 Hz, 11 KV turbo generator is rated 75 MW and 0.86 power factor lagging. The machine rotor has a moment of intertia of 9000 Kg-m^2. Find the inertia constant in MJ / MVA and M constant or momentum in MJs/elec degree. (5)

PART C — (1 × 15 = 15 marks)

16. (a) Construct Z Bus using bus building algorithm : (15)

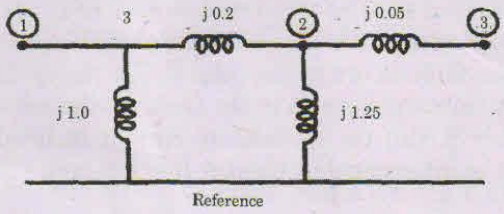

Fig. 16 (a)

Or

(b) In the power system shown in Fig. 16(b) three phase fault occurs at point P and the faulty line was opened a little later. Find the power output equations for the pre-fault, during fault and post-fault conditions.

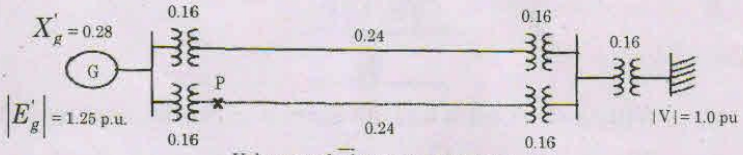

Fig. 16(b)

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Question Paper Code : 20458

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fifth Semester

Electrical and Electronics Engineering

EE 6501 — POWER SYSTEM ANALYSIS

(Regulations 2013)

(Also Common to PTEE 6501 — Power System Analysis — For B.E. (Part – Time) — Fifth Semester — Electrical and Electronics Engineering – Regulations – 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the need for base values?

2. What are the approximations made in impedance diagram?

3. What is the need for slack bus?

4. When the generator bus is treated as load bus in NR load flow study? What will be the reactive power and bus voltage when the generator bus is treated as load bus?

5. What is the need for short circuit studies or fault analysis?

6. What is the significance of subtransient reactance and transient reactance in short circuit studies?

7. Define negative sequence and zero sequence components.

8. Define the operator 'a' and express the value of 'a' and 'a^2' in both polar and rectangular form.

9. What are coherent machines?

10. How to improve the transient stability limit of the power system.

PART B — (5 × 13 = 65 marks)

11. (a) 300 MVA, 20 kV three-phase generator has a subtransient reactance of 20%. The generator supplies a number of synchronous motors over 64-km transmission line having transformers at both ends, as shown in Figure.1 All motors are rated as 13.2 kV and represented by just two equivalent motors. Rated inputs to the motors are 200 MVA and 100 MVA for M1 and M2, respectively. For both motors X" = 20%. The three phase transformer T1 is rated 350 MVA, 230/20 kV with leakage reactance of 10%. Transformer T2 is composed of three single-phase transformers each rated 127/13.2 kV, 100 MVA with leakage reactance of 10%. Series reactance of the transmission line is 0.5Ω/km. Draw the impedance diagram, with all impedances marked in per-unit. Select the generator rating as base in the generator circuit. (13)

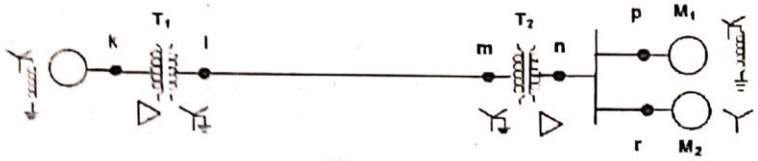


Figure. 1

Or

(b) Draw the impedance diagram of the power system shown in below Figure. 2.

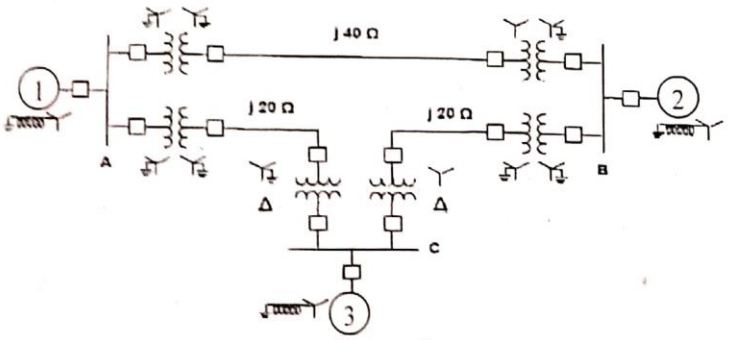


Figure. 2

Mark impedances in per unit. Neglect resistance and use a base of 50 MVA, 138 kV in the 40 – Ω line. The ratings of the generator, motors and transformers are:

Generator 1: 20 MVA, 18 kV, X" = 20%

Generator 2: 20 MVA, 18 kV, X" = 20%

Synchronous motor 3:30 MVA, 13.8 kV, X" = 20%

Three phase Y-Y transformers: 20 MVA, 138Y/20Y kV, X = 10%

Three phase Y- Δ transformers: 15 MVA, 138Y/13.8 Δ kV, X = 10%. (13)

12. (a) With a neat flow chart explain the computational procedure for load flow solution using Gauss-Seidal method when the system contains all types of busses.

Or

(b) (i) Develope a power flow equation at any bus in a power system. (6)

(ii) Evaluate the Jacobian elements for NR load flow. (7)

13. (a) Construct Z Bus for the given network shown in Figure. 3 (13)

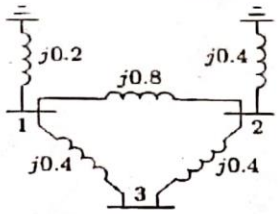


Figure. 3

Or

(b) A 25 MVA, 11 kV generator with Xd" = 20% is connected through a transformer, line and a transformer to a bus that supplies three identical motors as shown in Figure. 4. Each motor has Xd" = 25% and Xd' = 30% on a base of 5 MVA, 6.6 kV. The three-phase rating of the step-up transformer is 25 MVA, 11/66 kV with a leakage reactance of 10% and that of the step-down transformer is 25 MVA, 66/6.6 kV with a leakage reactance of 10%. The bus voltage at the motors is 6.6 kV when a three-phase fault occurs at the point F.

Figure. 4

For the specified fault, calculate

(i) the subtransient current in the fault,

(ii) the subtransient current in the breaker

(iii) the momentary current in breaker B, and

(iv) the current to be interrupted by breaker B in five cycle (13)

14. (a) Derive an expression for fault current as line–to–line fault on an unloaded generator. (13)

Or

(b) A single line to ground fault (on phase a) occurs on the bus I of the system of Figure shown Figure. 5

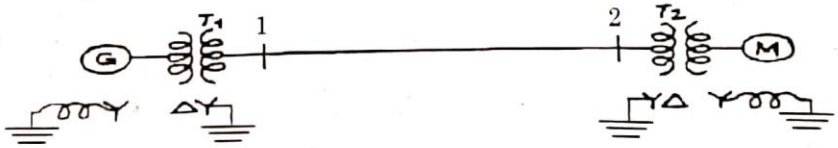


Figure. 5

Using bus impedence (ZBUS) method Find

(i) Current in the fault.

(ii) SC current on the transmission line in all the three phases.

(iii) SC current in phase 'a' of the generator.

(iv) Voltage of the healthy phases of the bus1. (13)

Given: Rating of each machine 1200 kvA, 600 v with X' = X_2 = 10% X_0 = 5%. Each three-phase transformer is rated 1200 kvA, 600/3300v (Delta/Star) with leakage reactance of 5%. The reactances of the transmission line are $X_1 = X_2$ = 20% and X_0 = 40% on a base of 1200 kVA, 3300 V. The reactances of the neutral grounding reactors are 5% on the kVA and voltage base of the machine. (13)

15. (a) Write the swing equation describing the rotor dynamics of a synchronous machine connected to infinite bus through a double circuit transmission line. (13)

Or

(b) The per unit system reactances that are converted in a common base, are shown in this Figure. 6. Let us assume that the infinite bus voltage is $1\angle 0^\circ$. The generator is delivering 1.0 per unit real power at a lagging power factor of 0.9839 to the infinite bus. While the generator is operating in steady state, a three-phase bolted short circuit occurs in the transmission line connecting buses 2 and 4 — very near to bus 4. The fault is cleared by opening the circuit breakers at the two ends of this line, find the critical clearing time for various values of *H*. (13)

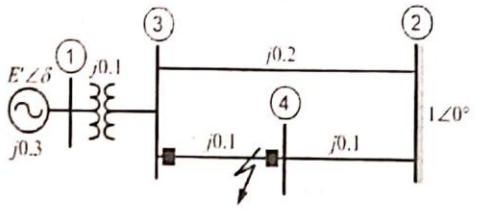


Figure. 6

PART C — (1 × 15 = 15 marks)

16. (a) Figure. 7 shows a part of a power system, where the rest of the system at two points of coupling have been represented by their Thevenin's equivalent circuit (or by a voltage source of 1 pu together its fault level which corresponds to the per unit value of the effective Thevenin's impedance). (15)

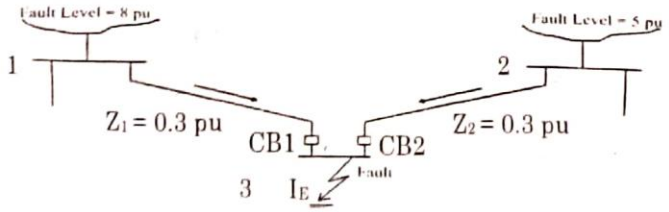


Figure. 7

With CB1 and CB2 open, short circuit capacities are
SCC at bus 1 = 8 pu. gives Zg1 = 1/8 = 0.125 pu
SCC at bus 2 = 5 pu. gives Zg2 = 1/5 = 0.20 pu
Each of the lines are given to have a per unit impedance of 0.3 pu.
$Z_1 = Z_2$ = 0.3 p.u.
Determine the fault current at bus 3.

Or

(b) Discuss in detail the importance of Power system stability study. Also discuss the solution of swing equation by Euler method and RK method.

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

Question Paper Code : 41003

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Fifth Semester
Electrical and Electronics Engineering
EE 6501 – POWER SYSTEM ANALYSIS
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Mention the requirements of planning the operation of a power system.
2. What is the need for base values ?
3. What is the need for slack bus in power flow analysis ?
4. Discuss the effect of acceleration factor in the load flow solution algorithm.
5. What is meant by fault calculations ?
6. What are all the assumption to be made to simplify the short circuit study ?
7. What is meant by symmetrical fault ?
8. Explain the concept of sequence impedances and sequence networks.
9. Define stability.
10. What is the significance of sub-transient reactance and transient reactance in short circuit studies ?

PART – B **(5×13=65 Marks)**

11. a) i) In the single line diagram shown in figure 1, each three phase generator G is rated at 200 MVA, 13.8 kV and has reactances of 0.85 pu and are generating 1.15 pu. Transformer T_1 is rated at 500 MVA, 13.5 kV/220 kV and has a reactance of 8%. The transmission line has a reactance of 7.8 Ω.

Transformer T_2 has a rating of 400 MVA, 220 kV/33 kV and a reactance of 11%. The load is 250 MVA at a power factor of 0.85 lag. Convert all quantities to a common base of 500 MVA and 220 kV on the line and draw the circuit diagram with values expressed in pu. **(10)**

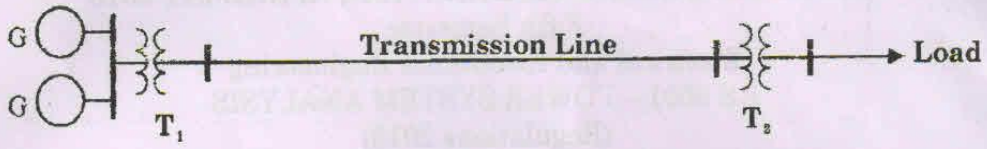


Figure 1

ii) A 200 MVA, 13.8 kV generator has a reactance of 0.85 p.u. and is generating 1.15 pu voltage. Determine the actual values of the line voltage, phase voltage and reactance. **(3)**

(OR)

b) Determine Z-bus for system whose reactance diagram is shown in given figure 2 where the impedance is given in p.u. preserve all the nodes. **(13)**

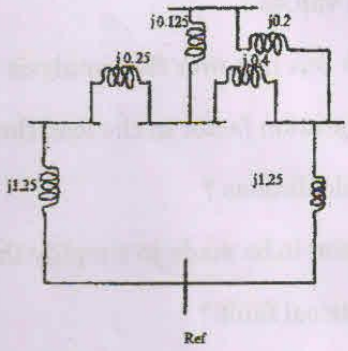


Figure 2

12. a) For the system shown in fig.3, determine the voltages at the end of the first iteration by Gauss-Seidal method. Assume base MVA as 100. **(13)**

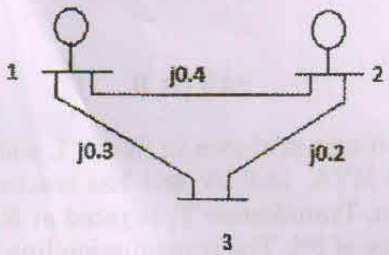


Figure 3

Bus No.	Voltage	Generator		Load		Q_{min} MVAR	Q_{max} MVAR
		P	Q	P	Q		
1	1.05 ∠0° p.u.	–	–	–	–	–	–
2	1.02 p.u.	0.3 p.u.	–	–	–	–10	100
3	–	–	–	0.4 p.u.	0.2 p.u.	–	–

(OR)

b) Perform an iteration of Newton-Raphson load flow method and determine the power flow solution for the given system. Take base MVA as 100. **(13)**

Line	Bus From	Bus To	R(p.u.)	X(p.u.)	Half line charging admittance (Yp/2 (p.u.))
1	1	2	0.0839	0.5183	0.0636

Bus	P_L	Q_L
1	90	20
2	30	10

13. a) Figure shows a part of a power system, where the rest of the system at two points of coupling have been represented by their Thevenin's equivalent circuit (or by a voltage source of 1 pu together its fault level which corresponds to the per unit value of the effective Thevenin's impedance). **(13)**

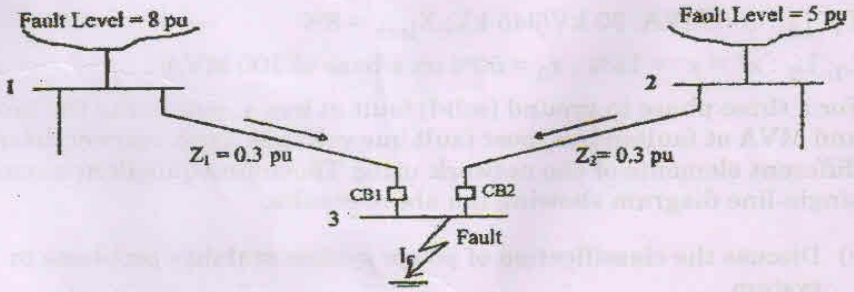


Figure 3

With CB1 and CB2 open, short circuit capacities are

SCC at bus 1 = 8 p.u. gives Zg1 = 1/8 = 0.125 pu

SCC at bus 2 = 5 p.u. gives Zg2 = 1/5 = 0.20 pu

Each of the lines are given to have a per unit impedance of 0.3 pu.

Z1 = Z2 = 0.3 p.u.

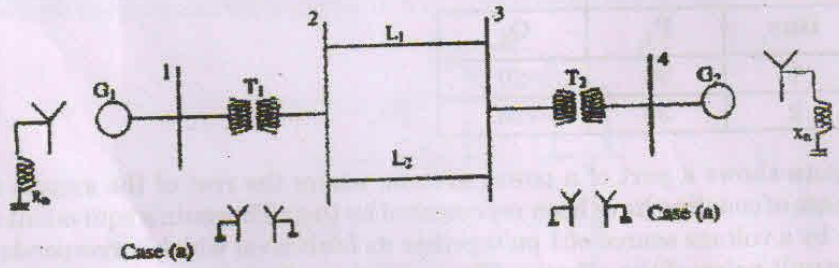
(OR)

b) Explain how the fault current can be determined using Z_{bus} with neat flow chart. **(13)**

14. a) Brief discuss about the analysis of asymmetrical Faults in the power system with neat circuit diagrams and necessary equations. **(13)**

(OR)

b) It is proposed to conduct fault analysis on two alternative configurations of the 4-bus system.



G_1, G_2 : 100 MVA, 20 kV, $x^+ = x^- = x_d" = 20\%$; $x_0 = 4\%$; $x_n = 5\%$.

T_1, T_2 : 100 MVA, 20 kV/345 kV; $X_{leak} = 8\%$

L_1, L_2 : $x^+ = x^- = 15\%$; $x_0 = 50\%$ on a base of 100 MVA

For a three phase to ground (solid) fault at bus 4, determine the fault current and MVA at faulted bus, post fault bus voltages, fault current distribution in different elements of the network using Thevenin equivalent circuit. Draw a single-line diagram showing the above results. **(13)**

15. a) i) Discuss the classification of power system stability problems in the power system. **(6)**

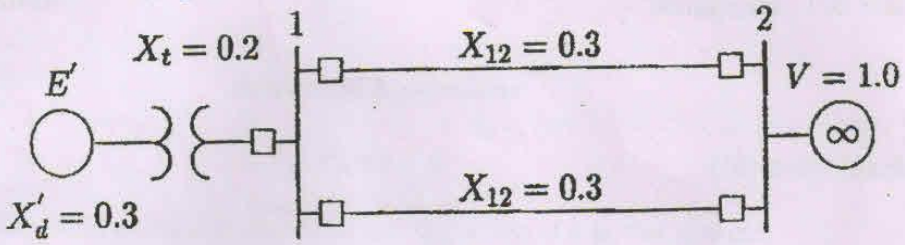
ii) Derive the swing equation of a synchronous machine swinging against an infinite bus. **(7)**

(OR)

b) A 60 Hz synchronous generator having inertia constant H = 9.94 MJ/MVA and a transient reactance X_d' = 0.3 per unit is connected to an infinite bus through a purely reactive circuit as shown in figure. Reactances are marked on the diagram on a common system base. The generator is delivering real power of 0.6 per unit, 0.8 power factor lagging to the infinite bus at a voltage of V = 1 per unit. Assume the per unit damping coefficient is D = 0.138. Consider a small disturbance of $\Delta\delta = 10° = 0.1745$ radian (the breakers open and then quickly close). **(13)**

i) Obtain equations describing the motion of the rotor angle and the generator frequency.

ii) The maximum power input that can be applied without loss of synchronism.



PART – C **(1×15=15 Marks)**

16. Describe the importance of stability analysis of in power system planning and operation. **(15)**

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

Question Paper Code : 50485

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fifth Semester

Electrical and Electronics Engineering

EE 6501 – POWER SYSTEM ANALYSIS

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Define per unit value of an electrical quantity and write the equation for base impedance for a three phase power system.

2. Write the equation for per unit impedance if change of base occurs.

3. What is the need for load flow analysis ?

4. Mention the various types of buses in power system with specified quantities for each bus.

5. State and explain symmetrical fault.

6. What is bolted fault or solid fault ?

7. What are the features of zero sequence current ?

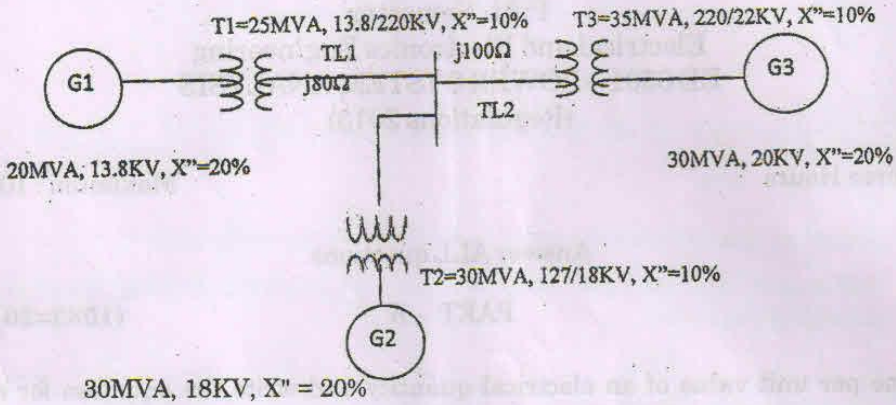
8. Write down the equation to determine symmetrical components currents from unbalanced currents.

9. State equal area criterion.

10. Define transient stability of a power system.

PART – B (5×13=65 Marks)

11. a) The single line diagram of an unloaded power system is shown in figure 11(a) along with components data determine the new per unit values and draw the reactance diagram. Assume 50 MVA and 13.8 KV as new base on generator 1. **(13)**



(OR)

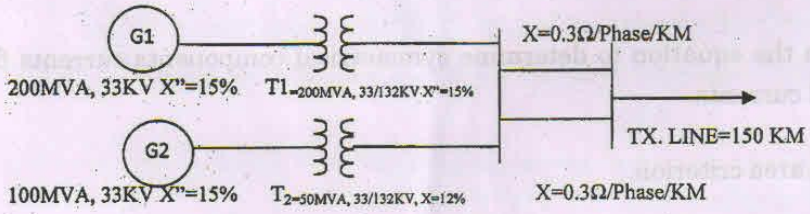
b) Describe the Z_{Bus} building algorithm in details by using a three bus system. **(13)**

12. a) With a neat flow chart, algorithm and explain the computational procedure for load flow solution using Gauss-Seidal Methods. **(13)**

(OR)

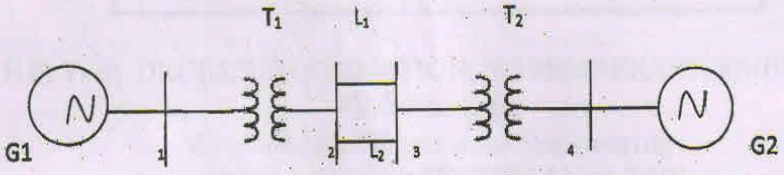
b) Draw the detailed flow chart and explain he algorithm of Newton-Raphson method when the system contains all types of buses. **(13)**

13. a) A generating stations feeding 132 KV system is shown in Fig. 13(a). Determine the total fault current, fault level and fault current supplied by each alternator for a 3 phase solid fault at the receiving end bus. The length of the transmission line is 150 KM long. **(13)**



(OR)

b) A symmetrical fault occurs at bus 4 for the system shown in fig. 13(b). Determine the fault current using Z_{bus} building algorithm. **(13)**



G1, G2 : 100 MVA, 20 KV, X" = 15% Transformers T1, T2 : $X_{Leakage}$ = 9%

L1, L2 : X" = 10%

14. a) i) What are the assumption to be made in short circuit studies ? **(4)**

ii) Deduce and draw the sequence network for LLG fault at the terminal of unloaded generator. **(9)**

(OR)

b) Derive the expression for fault current in line fault on unloaded generator. Draw an equivalent network showing the interconnection of networks to simulate line to ground fault. **(13)**

15. a) i) A generator is operating at 50 Hz, delivers 1.0 p.u. power to an infinite bus through a transmission circuit in which resistance is ignored. A fault takes place reducing the maximum power transferred to 0.5 p.u. Before the fault, the power was 2.0 p.u. and after the clearance of the fault it is 1.5 p.u. by the use of equal area criterion, determine the critical clearing angle. **(8)**

ii) Discuss the methods by which transient stability can be improved. **(5)**

(OR)

b) Write the computational algorithm for obtaining swing curves using modified-Euler method. **(13)**

PART – C **(1×15=15 Marks)**

16. a) i) Distinguish between steady state stability and dynamic stability. **(8)**

ii) Explain the importance of stability analysis in power system. **(7)**

(OR)

b) Explain the term critical clearing angle and critical clearing time in connection with the transient stability of a power system. **(13)**

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

Question Paper Code : 52957

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fifth/Sixth Semester

Electrical and Electronics Engineering

EE 6502 – MICROPROCESSORS AND MICROCONTROLLERS

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Manufacturing Engineering/Robotics and Automation Engineering)

(Regulation 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Mention the use of ALE in 8085 microprocessor.
2. What is the function of HOLD and HLDA in 8085 microprocessor?
3. What is a Subroutine. Mention the instructions related to subroutine in 8085 microprocessor?
4. If the 8085 adds 87H and 79H, specify the contents of the accumulator and the status of the S, Z, and CY flag?
5. What are the addressing modes supported by 8051?
6. Name the interrupts of 8051 microcontroller.
7. What is the use of 8251 IC?
8. What is the function of the DMA controller?
9. List the 8051 instructions that always clear the carry flag.
10. Distinguish between the functions of the instructions XCHG and SWAP of 8051.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the features in the architecture of 8085 microprocessor with a neat diagram. Explain the function of the various registers available in it.

Or

(b) (i) Explain the function of the various interrupts available with 8085 microprocessor. (7)

(ii) Explain with timing diagrams, the opcode fetch machine cycle of 8085 microprocessor. (6)

12. (a) (i) Explain the various addressing modes of 8085 microprocessor with example. (8)

(ii) Explain the Compare instructions of 8085 microprocessor. (5)

Or

(b) (i) Explain the various arithmetic instructions of 8085 with illustrative examples? (6)

(ii) Write an ALP for 8085 microprocessor to add data stored in memory from 4200H. The first element in the location 4200H gives the number of elements in the array. Store the result of the addition in 4300h and 4301 H. Assume the sum does not exceed 16 bits. (7)

13. (a) Describe the importance of the Program Counter, Data pointer, Program status word, Special Function Registers in 8051. (13)

Or

(b) (i) Explain the memory organization of 8051 microcontroller. (6)

(ii) Explain the function of the I/O ports available in 8051 microcontroller for data transfer. (7)

14. (a) Explain the features and operating modes of 8255. Explain its interfacing with 8085 microcontroller. (13)

Or

(b) Describe the features of the IC 8279 keyboard/display controller. (13)

15. (a) Explain with diagram the interfacing of keyboard and display using 8051 microcontroller. (13)

Or

(b) (i) Explain the various program branching instructions available with 8051 microcontroller. (6)

(ii) Write a Assembly language for 8051 microcontroller to divide the 8 bit number stored in memory location 2400H by the 8-bit data stored in memory location 2401H. Store the quotient in 2402 H and the remainder in 2403 H. (7)

PART C — (1 × 15 = 15 marks)

16. (a) With a neat diagram explain how stepper motor can be interfaced with 8085 microprocessor. Give both program and the interfacing circuit.

Or

(b) Differentiate between the following instructions clearly

(i) Push and POP (5 × 2 = 10)

(ii) CALL and Jump

(iii) ADD and ADC

(iv) INC and INX

(v) MOV B, B and MOV B, A

(vi) What is the general format of an 8085 instruction set? (5)

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

Question Paper Code : 20459

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fifth/Sixth Semester

Electrical and Electronics Engineering

EE 6502 — MICROPROCESSORS AND MICROCONTROLLERS

(Common to : Electronics and Instrumentation Engineering/ Instrumentation and Control Engineering/Manufacturing Engineering/ Robotics and Automation Engineering)

(Regulations 2013)

(Also common to : PTEE 6502 — Microprocessors and Microcontrollers for B.E. (Part-Time) – Fourth Semester – Electrical and Electronics Engineering — Regulation 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the registers of 8085 processor.

2. State any four pins of 8085 processor which are used to generate control and status signals.

3. State any four data transfer instructions and their function.

4. Define subroutine.

5. State any four inbuilt features of 8051 microcontroller.

6. How multiplication is performed in 8085 and 8051?

7. Find the control word of 8255 if port A is configured as input and port B is configured as output in mode 0.

8. State the application of 8251 and 8279 ICs.

9. Specify the difference between MOV and MOVX instructions.

10. State any four applications of microcontroller.

PART B — (5 × 13 = 65 marks)

11. (a) With neat block diagram, explain the various functional building blocks of 8085 processor.

Or

(b) Define vector address. List the various interrupts of 8085 processor and elucidate the use of Interrupt service routine.

12. (a) Define addressing mode. Identify the addressing mode of the following instructions and explain them.

(i) STA 6350H

(ii) CMA

(iii) MOV A,M

(iv) MOV D,E

(v) MVI A,A7H.

Or

(b) Develop an algorithm and 8085 assembly language program to sort 100 byte type data. Explain the instructions used in the program.

13. (a) Explain the pinouts of 8051 microcontroller.

Or

(b) Describe the timing diagram of external data memory read cycle of 8051.

14. (a) (i) Explain the architecture of 8259. (9)

(ii) How 8259 is interfaced with 8085 or 8051? (4)

Or

(b) Explain the Interfacing of DAC with 8051 or 8085 with neat diagram and write a program for generating any typical waveform.

15. (a) Explain the various bit manipulation instructions in 8051 with examples.

Or

(b) Develop a 8051 ALP to evaluate an arithmetic expression (A-B) X C where A, B, C are 8 bit data in internal memory. Assume A>B and store the result in external memory. Explain the program developed.

PART C — (1 × 15 = 15 marks)

16. (a) Design a system using 8085 or 8051 to blink four LEDs.

Or

(b) Design a stepper motor control system using 8051 microcontroller.

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

Question Paper Code : 41004

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fifth Semester

Electrical and Electronics Engineering

EE6502 – MICROPROCESSORS AND MICROCONTROLLERS

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Manufacturing Engineering/Robotics and Automation Engineering)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. List the features of accumulator.
2. Write the difference between standard I/O and memory mapped I/O.
3. List the classification of instruction based on its size.
4. Define stack.
5. Compare microprocessor and microcontroller.
6. How the microcontrollers respond to any interrupt request ?
7. How the DMA operations perform in microprocessor ?
8. Write the modes of operation in 8254.
9. What is use of data pointer register ?
10. What is the advantage of closed loop control system for interfacing ?

PART – B (5×13=65 Marks)

11. a) Draw and explain the building blocks and its signal of 8085 processor. (13)

(OR)

b) i) Describe the interrupts of 8085 and its types with service routine. (7)

ii) Draw the timing diagram of MOV A, M instruction and explain each machine cycle. (6)

12. a) i) Explain the types of addressing modes in 8085 with suitable example. **(7)**

ii) Write an 8085 program to find the greatest number among 10 numbers. **(6)**

(OR)

b) i) Explain the types of instruction in 8085 with example. **(7)**

ii) Write an 8085 program to find the average of 10 numbers and find the execution time of program. **(6)**

13. a) Draw and explain the architecture of 8051 microcontroller. **(13)**

(OR)

b) Briefly discuss the ports of 8051, internal circuits and its functions in detail. **(13)**

14. a) Draw the functional diagram of 8255 and explain its control word, modes of operation. **(13)**

(OR)

b) Draw the functional diagram of 8251 and explain its block in detail. **(13)**

15. a) Illustrate the keyboard and display interface with 8051 and write the program to get the input 45H from the external keyboard and display it on the external display device. **(13)**

(OR)

b) Interface the stepper motor with 8051 and explain its operation of stepper motor with neat diagram and program to rotate in clockwise direction. **(13)**

PART – C **(1×15=15 Marks)**

16. a) Design an 8085 based system with 512B RAM, 4KB ROM, external keyboard and seven segment display device. **(15)**

(OR)

b) Design a microcontrolled based system to control the water level in the tank. **(15)**

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

Question Paper Code : 50486

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fifth/Sixth Semester

Electronics and Instrumentation Engineering

EE 6502 – MICROPROCESSORS AND MICROCONTROLLERS

(Common to : Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Manufacturing Engineering, Robotics and Automation Engineering)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. What are the flags available in 8085 processor ?
2. What are the interrupts available in 8085 ?
3. What are the types of addressing mode in 8085 microprocessor ?
4. Differentiate CALL instruction from JUMP instruction.
5. What are the addressing modes of 8051 microcontroller ?
6. What are the main features of 8051 microcontroller ?
7. Give the difference between maskable and non-maskable interrupts.
8. How is keyboard interfaced with microprocessor ?
9. What is baud rate ?
10. What is duty cycle in PWM ?

PART – B (5×13=65 Marks)

11. a) Explain with a neat block diagram, the architecture of 8085 microprocessor. (13)

(OR)

b) i) Describe the interrupts of 8085 microprocessor. (7)

ii) Draw and explain the flag register of 8085 in brief. (6)

12. a) With example, explain the different addressing modes of 8085 and the different types of instruction formats. (13)

(OR)

b) Explain the operations carried out when 8085 executes the instructions : (13)

i) MOV A, M (2)

ii) XCHG (2)

iii) DAD B (2)

iv) DAA (3)

v) LDA 6000 (2)

vi) SHLD 4000. (2)

13. a) i) Draw the data memory structure of 8051 microcontroller and explain. (7)

ii) Explain with block diagram, how to access external memory devices in an 8051 based system. (6)

(OR)

b) Discuss in detail, the hardware and software support provided by 8051 for serial communication. (13)

14. a) Draw the block diagram of 8255 (PPI) and explain its various operating modes. (13)

(OR)

b) With a neat diagram, explain the internal architecture of keyboard and display controller IC-8279. (13)

15. a) Explain with a neat diagram, the closed loop control of servomotor using microcontroller. (13)

(OR)

b) Explain the different types of instructions set used in 8051 microcontroller. (13)

PART – C (1×15=15 Marks)

16. a) Explain, the interfacing concept of analog to digital conversion with 8085 microprocessor. (15)

(OR)

b) With necessary diagram, explain the different modes of operation of 8254, in detail. (15)

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

Question Paper Code : 52958

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fifth Semester

Electrical and Electronics Engineering

EE 6503 — POWER ELECTRONICS

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

(Regulation 2013)

(Also common to PTEE 6503 – Power Electronics for B.E. Part-Time – Fourth semester – Electrical and Electronics Engineering – Regulation 2014)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by commutation of SCR and list its types?

2. What are the advantages of GTO over SCR?

3. Classify the different types of controlled Rectifier.

4. What is the function of freewheeling diode and state its advantages.

5. What is the effect of load inductance on the load current waveforms in the case of DC chopper?

6. What is the disadvantage of frequency modulated chopper?

7. Compare CSI and VSI.

8. Give the use of resonant switching in power electronic circuits.

9. What is integral cycle control ?

10. What are the different control techniques for AC regulator?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the static and switching characteristics of IGBT and MOSFET. (13)

Or

(b) Explain why triac is rarely used in I quadrant with negative pulse and in III quadrant with positive pulse. (13)

12. (a) Explain the operating principle of a single phase full controlled bridge converter.

Or

(b) Explain the operating principle of three phase dual converter with necessary waveforms.

13. (a) Derive the expression for voltage gain in a dc – dc boost converter and explain the modes of operation with relevant waveforms.

Or

(b) Explain the working principle of voltage commutated chopper showing the current and voltage waveform across each device.

14. (a) Explain the operation of 3 phase bridge inverter for 120 degree mode of operation with phase and line voltage waveforms.

Or

(b) State different methods of voltage control in inverters. Describe about PWM control in inverter.

15. (a) Explain the working of three phase to single phase cycloconverter with neat circuit diagram and necessary waveforms.

Or

(b) (i) Write a short notes on matrix converter.

(ii) Explain the operation of single phase full wave A.C voltage regulator with help of voltage and current waveform.

PART C — (1 × 15 = 15 marks)

16. (a) A single-phase, half-wave rectifier with an AC voltage of 150 V has a pure resistive load of 9Ω. The firing angle α of the thyristor is $\frac{\pi}{2}$. Determine the

(i) Rectification efficiency

(ii) Form factor

(iii) Transformer derating factor

(iv) Peak inverse voltage of the SCR

(v) Ripple factor of the output voltage.

Assume that the transformer ratio is 2 : 1.

Or

(b) The series resonance turn-off circuit of Fig.16.b has the following data: E = 160 V, L = 8 MH, resistance of inductor coil $r_L = 0.2\Omega$, $R_{ld} = 0.6\Omega$ and $C = 65\mu F$.

Determine:

(i) Derive an expression for the current i(t).

(ii) The pulse width and

(iii) The time required for the capacitor voltage to attain a voltage equal to 1.7 E.

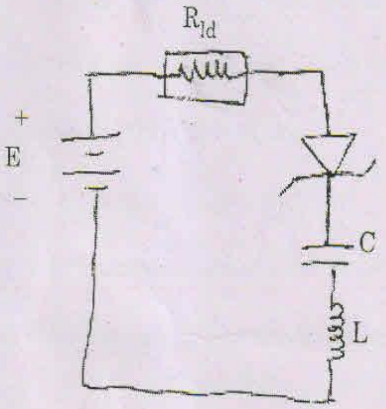


Fig.16.b

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

Question Paper Code : 20460

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fifth Semester

Electrical and Electronics Engineering

EE 6503 — POWER ELECTRONICS

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

(Regulations 2013)

(Also common to PTEE 6503 — Power Electronics for B.E. (Part-Time) Fourth Semester – Electrical and Electronics Engineering – Regulations 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How is $\frac{di}{dt}$ and $\frac{dv}{dt}$ protection provided in SCR?

2. Mention the merits and demerits of GTO.

3. Why is the power factor of semi converters better than that of full converters?

4. What is the cause of circulating current in dual converters?

5. What are the advantages and disadvantages of a resonant pulse chopper?

6. A step up chopper is operated with a duty ratio of 0.6 for a dc input of 100 V. Determine the output voltage for a load resistance of R_L = 5 ohm.

7. What are the purposes of feedback diodes in inverters?

8. What are the main differences between voltage-source and current-source inverters?

9. Mention merits and demerits of AC voltage controller.

10. What is a cycloconverter?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the various types of turn ON methods of SCR. (8)

(ii) Explain the design procedure of snubber circuit. (5)

Or

(b) Explain the steady state and switching characteristics of MOSFET with aid of diagrams.

12. (a) Explain the operation of a single phase full converter with RLE load using relevant waveforms. Obtain the expressions for its average output voltage and RMS value of output voltage. (13)

Or

(b) Explain the operation of single phase dual converter with aid of relevant waveforms. Obtain the expression of its instantaneous circulating current. (13)

13. (a) Draw the diagram of voltage commutated chopper and explain its operation with different mode diagrams and relevant waveforms. (13)

Or

(b) With a neat power circuit diagram, explain the operation of boost converter. Draw the load voltage and load current waveforms and derive the expression for the output voltage. (13)

14. (a) Describe the principle of operation of three phase inverter operating in 120° conduction mode with necessary diagrams. (13)

Or

(b) Explain the principle of operation of 3-ϕ auto sequentially commutated CSI with power circuit. Draw the equivalent circuits and relevant waveforms. (13)

15. (a) Describe the basic principle of working of single-phase to single-phase step down cycloconverter for both continuous and discontinuous conduction. (13)

Or

(b) Draw the circuit diagram of single phase A.C. voltage controller with RL load. Explain the circuit operation with necessary waveforms. (13)

PART C — (1 × 15 = 15 marks)

16. (a) The full-wave three-phase controlled rectifier has a three-phase 415 V, 50 Hz source (240 V phase), and provides a 100 A constant load current. Determine :

(i) The average and rms thyristor current.

(ii) The rms and fundamental line current.

(iii) The fundamental apparent power. (15)

Or

(b) For Type A step down chopper of dc source voltage = 230 V, load resistance = 10 ohm. Take a voltage drop of 2 V across chopper when it is on. For a duty cycle of 0.4, calculate (i) average and rms values of output voltage and (ii) chopper efficiency. (15)

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

Question Paper Code : 41005

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fifth Semester

Electrical and Electronics Engineering

EE 6503 – POWER ELECTRONICS

(Common to : Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Mechatronics Engineering)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

PART – A (10×2=20 Marks)

1. What is meant by commutation of a SCR ?
2. Mention the advantages of 'RC' triggering over 'R' triggering.
3. List out the differences between full and semi converter.
4. Give the applications of fly wheel diode in a full converter.
5. What is meant by 'current limit control' of a chopper ?
6. What is a resonant converter ?
7. What is meant by 'space vector modulation' ?
8. Differentiate CSI over VSI.
9. List out the applications of AC voltage controller.
10. Mention the advantages of matrix converter over conventional converter.

PART – B (5×13=65 Marks)

11. a) Explain the working of a current commutation technique. (13)

(OR)

b) Describe the UJT triggering circuit with neat sketch. (13)

12. a) Discuss the operation of a 3 phase semi converter with 'R' load and also draw the output voltage waveforms for 30° and 90°. (13)

(OR)

b) Explain the working of single phase full converter for 'RL' load discontinuous mode of operation with neat sketch and waveforms. (13)

13. a) With neat sketch and output voltage waveforms explain the working of a boost converter. **(13)**

(OR)

b) Describe the voltage commutated chopper with neat sketch. **(13)**

14. a) Discuss the working of a 3 phase inverter in 120° conduction mode. **(13)**

(OR)

b) Explain the SPWM and modified SPWM techniques for inverter switching. **(13)**

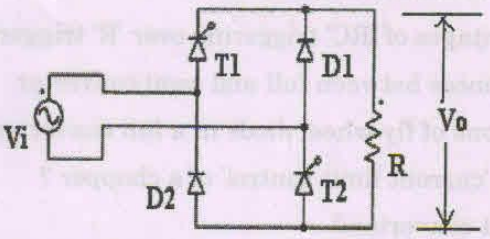
15. a) Explain the operation of a multi stage sequential control in single phase AC voltage controller. **(13)**

(OR)

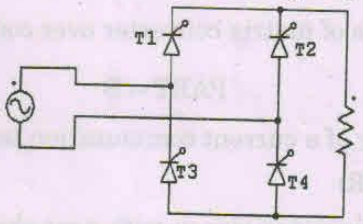
b) Explain the operation of a three phase to three phase cyclo converter. **(13)**

PART – C **(1×15=15 Marks)**

16. a) i) Explain the working of the following circuits. Draw and find out the expression for output voltage. **(8)**



ii) In this single phase full converter T1 and T4 are given pulses at every 'α'. T2 and T3 are given pulses at every 'α + 180'. Unknowingly the gate pulses of T2 and T3 are removed and was given by the pulses of T1 and T2. Now explain, draw and derive the output voltage equation. **(7)**



(OR)

b) i) A single phase full converter is connected to 'R' load. The source voltage is of 230 V, 50 Hz. The average load current is of 20 A. For R = 10 Ω, find the firing angle and also find the RMS output voltage. **(8)**

ii) A 2 kW, 400 V resistive load is connected to a three phase semi converter. The input to the converter is 400 V, 50 Hz. Find the load average voltage and current when the load consumes 1000 watts. **(7)**

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

Question Paper Code : 50487

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fifth Semester

Electrical and Electronics Engineering

EE6503 – POWER ELECTRONICS

(Common to : Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Mechatronics Engineering)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Why Triac is not popular as compared to SCR ? Justify.
2. What are the advantages of IGBTs ?
3. Distinguish between symmetric and asymmetric semiconductor configuration.
4. Define input power factor.
5. What is the effect of load inductance on the load current waveforms in the case of DC chopper ?
6. What is the disadvantage of frequency modulated chopper ?
7. State the necessity of return current diodes in inverter.
8. What is the function of feedback diodes in bridge inverter ?
9. Why is half wave AC voltage regulator not used ?
10. Explain the term sequence control of ac voltage regulators.

PART – B (5×13=65 Marks)

11. a) Explain the static and switching characteristics of IGBT and MOSFET. (13)

(OR)

b) Explain why triac is rarely used in I quadrant with negative pulse and in III quadrant with positive pulse. (13)

12. a) Explain the functional modes of dual converter with necessary diagrams. (13)

(OR)

b) Explain the operation of 3 phase fully controlled bridge rectifier with necessary waveforms. (13)

13. a) Explain the working of buck converter with neat waveform and also derive the expression of peak to peak voltage across the capacitor. (13)

(OR)

b) Explain the steady state analysis of step down chopper. (13)

14. a) Explain the operation of series resonant inverter. (13)

(OR)

b) Discuss the operation of 180° conduction of three phase inverter. (13)

15. a) Explain the operation of single phase to single phase cycloconverter. (13)

(OR)

b) Explain the operation of matrix converter. (13)

PART – C (1×15=15 Marks)

16. a) A single-phase, half-wave rectifier with an AC voltage of 150 v has a pure resistive load of 9 Ω. The firing angle α of the thyristor is $\pi/2$. Determine the

a) Rectification efficiency
b) Form factor
c) Transformer derating factor
d) Peak inverse voltage of the SCR
e) Ripple factor of the output voltage.

Assume that the transformer ratio is 2 : 1.

(OR)

b) The series resonance turn-off circuit of Fig. 16 b has the following data : $E = 160$ v, $L = 8$ MH, resistance of inductor coil $r_L = 0.2\ \Omega$, $R_{ld} = 0.6\ \Omega$ and $C = 65\ \mu F$.

Determine :

a) Derive an expression for the current i(t).

b) The pulse width and

c) The time required for the capacitor voltage to attain a voltage equal to 1.7 E.

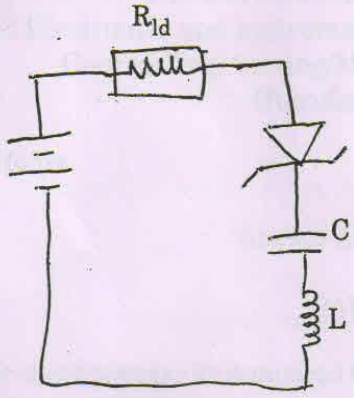

Fig. 16. b

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Question Paper Code : 52954

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fourth Semester

Electrical And Electronics Engineering

EE 6403 – DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

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

(Regulation 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Is the system $y(n) = |x(n)|$ linear and time invariant? Justify your answer.

2. Define unit sample response of a system and state its significance.

3. If $x(n)$ represents the signal and $X(\omega)$ represents the Discrete Time Fourier Transform of $x(n)$, then prove : $x(n-k) \xleftrightarrow{FT} e^{-jwk} X(\omega)$.

4. Obtain the circular convolution of $x_1(n) = \{1, 2, 3\}$ and $x_2(n) = \{-3, 1, -2\}$.

5. Write any two properties of Discrete Fourier Transform.

6. Obtain the IDFT of the sequence $X(k) = \{10, -2 + j2, -2, -2 - j2\}$ using DIT-FFT algorithm.

7. The most straight forward approach to FIR filter design is to truncate the impulse response of an ideal IIR filter. Why this is usually an undesirable approach?

8. Obtain the transfer function for a normalized Butterworth filter of order 2.

9. State how a Digital Signal Processor is different from other processors.

10. Mention any four applications of Digital Signal Processor.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the features of Linear. Time Invariant, Causal and Stable Systems. (7)

(ii) A Digital System is characterized by the difference equation $y(n) = x(n) - 0.5y(n-1) + 0.25x(n-1)$. Check the system for Linearity, Time invariance Causality and Stability. (6)

Or

(b) (i) Explain the process of converting an analog signal to discrete time discrete amplitude signal with necessary diagrams. (7)

(ii) A signal $x(t) = \sin c(50\pi t)$ is sampled at a rate of 20 Hz, 50 Hz and 75 Hz. For each of these three cases, explain if you can recover the signal $x(t)$ from the sampled signal. (6)

12. (a) (i) State and explain any four properties of Z-transform. (8)

(ii) Evaluate the frequency response of the system described by the system function

$$H(z) = \frac{1}{1 - 0.5z^{-1}}. \quad (5)$$

Or

(b) (i) Determine the pole-zero plot for the system described by the difference equation $y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n) - x(n-1)$. (8)

(ii) Prove that a system having system function $H(z)$ is stable, if and only if all poles of $H(z)$ are inside the unit circle. (5)

13. (a) (i) Compute the 2N point DFT of $y(n)$ in terms of $X(k)$, where $X(k)$ is the N-point DFT of the sequence $x(n)$, $0 \le n \le N-1$. (5)

(ii) Compute the DFT of the three point sequence $x(n) = \{2, 1, 1\}$. (4)

(iii) When $X(k)$ is the DFT of an N-point sequence $h(n)$, prove that $X(k)$ is real and even, when $x(n)$ is real and even. (4)

Or

(b) (i) Compute the DFT sequence for the following sequence using Radix-2 decimation-in-frequency FFT algorithm. (9)

$X(n) = \{1, 2, 2, 1, 1, 2, 2, 1\}$.

(ii) Indicate how inverse DFT can be computed by using FFT Algorithm. (4)

14. (a) (i) Realize the IIR system with difference equation

$y(n) + \frac{1}{4} y(n-1) - \frac{1}{8} y(n-2) = x(n) - 2x(n-1) + x(n-2)$ in cascade and parallel form. (7)

(ii) Determine $H(z)$ for Chebyshev filter satisfying the following specifications.

$0.8 \leq |H(e^{j\omega})| \leq 1$ for $0 \leq \omega \leq 0.2\pi$

$|H(e^{j\omega})| \leq 0.2$ for $0.6\pi \leq \omega \leq \pi$

Assume $T = 0.1$ sec. Apply bilinear transformation method. (6)

Or

(b) (i) Design a high pass filter using Hamming window with a cut-off frequency of 1.2 radians/sec and $N = 9$. (7)

(ii) Summarize the factors that decide the choice of window in FIR filter design using windowing techniques. Also compare the merits and demerits of windowing techniques. (6)

15. (a) Sketch the block diagram of typical digital signal processor and explain the functional elements. (13)

(b) (i) Illustrate the different addressing formats of a DSP processor with examples. (7)

(ii) Highlight the features of a commercial digital signal processor. (6)

PART C — (1 × 15 = 15 marks)

16. (a) Explain how digital signal processors can be used to implement Biomedical Signal Processing Algorithms with a case study of your choice.

Or

(b) Suggest a DSP Architecture required for a DSP device to implement each of the following

(i) FIR filter

(ii) 8 point DIT FFT.

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

Question Paper Code : 20456

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fourth Semester

Electrical and Electronics Engineering

EE 6403 — DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

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

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define spectral density.

2. What is Nyquist rate?

3. Find the stability of the system whose impulse response $h(n) = 2^n u(n)$.

4. What is relation between Z transform and DTFT?

5. Find the DFT sequence of $x(n) = \{1, 1, 0, 0\}$.

6. State and proof the circular frequency shifting property of DFT.

7. Draw the direct form I realization for the given system $y(n) = -0.1\,y(n-1) + 0.2\,y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$.

8. Define warping effect.

9. What are buses used in DSP processor?

10. List the features to select the digital signal processor.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Illustrate the condition of the system to be causal and linearity. Check the same for the given system $y(n) = x(n) + \frac{1}{x(n-1)}$. (7)

(ii) Check the time invariant and stability of the given system $y(n) = \cos x(n)$. (6)

Or

(b) (i) Determine the values of power and energy of the given signal $x(n) = \sin\left(\frac{\pi}{4} - n\right)$. (5)

(ii) Explain the types of signals with its mathematical expression and neat diagram. (8)

12. (a) Find the inverse Z transform of $X(z) = \frac{z^3 + z^2}{(z-1)(z-3)}$ $ROC\ |z| > 3$. (13)

Or

(b) Find the frequency response for the given sequence and plot its magnitude response and phase response $x(n) = \begin{cases} 1 & \text{for } n = -2, -1, 0, 1, 2 \\ 0 & \text{otherwise.} \end{cases}$ (13)

13. (a) Determine the DFT of a sequence $x(n) = \{1,1,1,1,1,1,10\}$ using DIT algorithm. (13)

Or

(b) Determine the DFT of the given sequence $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using DIF FFT algorithm. (13)

14. (a) Determine the order of the filter using Chebyshev approximation for the given specification $\alpha_p = 3$ dB, $\alpha_s = 16$ dB, $f_p = 1$ KHz and $f_s = 2$ KHz. Find $H(s)$. (13)

Or

(b) Design an ideal highpass filter using Hanning window with the specification N = 11 of the system $H_d(e^{j\omega}) = 1$ for $\frac{\pi}{4} \le |\omega| \le \pi$; otherwise zero $|\omega| \le \frac{\pi}{4}$. (13)

15. (a) Explain the various types of addressing modes of digital signal processor with suitable example. (13)

Or

(b) Draw the structure of central processing unit and explain each unit with its function. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Design an ideal bandpass filter with a frequency response $H_d(e^{j\omega}) = \begin{cases} 1 & \text{for } \frac{\pi}{4} \le |\omega| \le \frac{3\pi}{4} \\ 0 & \text{otherwise} \end{cases}$ find the values of $h(n)$ for $N = 11$ and plot the frequency response. (15)

Or

(b) Compute the response of the system $y(n) = 0.7y(n-1) - 0.12y(n-2) + x(n-1) + x(n-2)$ to input $x(n) = nu(n)$. Is the system stable? (15)

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

Question Paper Code : 41001

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fourth Semester

Electrical and Electronics Engineering

EE 6403 – DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

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

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is aliasing effect ?
2. List the sampling techniques.
3. What is the inverse Z transform of $H(Z) = \frac{2Z}{Z - \frac{1}{2}}$?
4. What is zero padding ?
5. Find the DFT sequence of x(n) = {1, 1, 0, 0}.
6. What is meant by radix-4 FFT ?
7. Obtain the direct form-I realization for the given difference equation $y(n) = 0.5y(n-1) - 0.25y(n-2) + x(n) + 0.4x(n-1)$.
8. Distinguish the IIR and FIR filter.
9. What are the stages in pipelining process ?
10. Write the applications of commercial digital signal processor.

PART – B **(5×13=65 Marks)**

11. a) Explain the classification of continuous time signals with its mathematical representation. **(13)**

(OR)

b) Describe the different types of system and write the condition to state the system with its types. **(13)**

12. a) i) Find the Z transform of $x(n) = r^n \cos(n\theta)\, u(n)$. (9)

ii) State and proof the Parseval's theorem. (4)

(OR)

b) i) Find the circular convolution of the two sequences $x_1(n) = \{1, 2, 2, 1\}$ and $x_2(n) = \{1, 2, 3, 1\}$. (8)

ii) How do you obtain the magnitude and phase response of DTFT ? (5)

13. a) State and proof any four properties of DFT. (13)

(OR)

b) Determine the DFT of the given sequence $x(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}$ using DIT FFT algorithm. (13)

14. a) Design a Chebyshev filter for the following specification using bilinear transformation. (13)

$0.8 \le \left|He^{(j\omega)}\right| \le 1, 0 \le \omega \le 0.2\pi$

$\left|He^{(j\omega)}\right| \le 0.2, 0.6\pi \le \omega \le \pi$

(OR)

b) Design a filter using Hamming window with the specification N = 7 of the system $H_d\left(e^{jw}\right) = e^{-j3\omega}, \frac{-\pi}{4} \le \omega \le \frac{\pi}{4}$; otherwise zero. (13)

$\frac{-\pi}{4} \le \omega \le \pi$

15. a) Explain the various types of addressing modes of digital signal processor with suitable example. (13)

(OR)

b) Draw the structure of central processing unit and explain each unit with its function. (13)

PART – C **(1×15=15 Marks)**

16. a) Determine the frequency response $H\left(e^{jw}\right)$ for the given system and plot magnitude and phase response, $y(n) + \frac{1}{4}y(n-1) = x(n) + x(n-1)$. (15)

(OR)

b) Determine the impulse response of the given difference equation $y(n) = y(n-1) + 0.25y(n-2) + x(n) + x(n-1)$. Plot the pole zero pattern and check its stability. (15)

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

Question Paper Code : 50483

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fourth Semester

Electrical and Electronics Engineering

EE 6403 – DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

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

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. State the Parseval's theorem for discrete time signal.
2. What is meant by aliasing effect ?
3. List the methods to find inverse Z transform.
4. Write the conditions to define stability in ROC.
5. Find the DFT of the signal $x(n) = a^n$.
6. Draw the butterfly structure for 2 point DFT using DIT – FFT algorithm.
7. Draw the direct form I structure for 3^{rd} order system.
8. What is prewarping effect ?
9. Write the features of DSP processor.
10. List some example of commercial digital signal processor.

PART – B (5×13=65 Marks)

11. a) i) Determine the power and energy of the given signal. State the signal is power or energy $x(n) = \sin\left(\frac{\pi n}{4}\right)$. (4)

ii) Determine the given signal is periodic or not $x(n) = \cos\left(\frac{2\pi n}{3}\right)$. (3)

iii) Discuss the mathematical representation of signal. Write the difference between continuous and discrete time signal. (6)

(OR)

b) i) Determine whether the system is linear or not $y(n) = ax(n) + bx(n-1)$. (3)

ii) Determine whether the given system is causal or not $y(n) = x(n) + x^2(n-1)$. (4)

iii) Determine whether the system is time invariant and stability : $y(n) = e^{x(n)}$. (6)

12. a) i) State and prove any three properties of Z transform. (8)

ii) Find the Z transform of $x(n) = r^n \cos(n\theta)\, u(n)$. (5)

(OR)

b) i) A discrete system has a unit sample response

$h(n) = \frac{1}{2}\partial(n) + \partial(n-1) + \frac{1}{2}\partial(n-2)$. Find the system frequency response. (7)

ii) Find the convolution of the two sequences $x(n) = \{1, 2, -1, 1\}$ and $h(n) = \{1, 0, 1, 1\}$ using graphical method. (6)

13. a) i) State and prove any two properties of DFT. (6)

ii) Determine the DFT of the following sequence $x(n) = \{5, -1, 1, -1, 2\}$. (7)

(OR)

b) Find the DFT of a sequence $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using DIT – FFT algorithm. (13)

14. a) Obtain an analog Chebyshev filter transfer function that satisfies the given constraints $\frac{1}{\sqrt{2}} \le |H(j\Omega)| \le 1; \quad 0 \le \Omega \le 2$

$|H(j\Omega)| < 0.1; \quad \Omega \ge 4$ (13)

(OR)

b) Design an ideal lowpass FIR filter with a frequency response.

$$H_d(e^{j\omega}) = 1 \text{ for } -\frac{\pi}{2} \le \omega \le \frac{\pi}{2}$$
$$= 0 \text{ for } \frac{\pi}{2} \le \omega \le \pi$$

Find the values of h(n) for N = 11. Find H(z). Assume rectangular window. **(13)**

15. a) Draw the architecture of TMS320C50 and explain its functional units. **(13)**

(OR)

b) Explain the classification of instructions in DSP processor with suitable examples. **(13)**

PART – C **(1×15=15 Marks)**

16. a) Design Butterworth filter using the impulse invariance method for the following specifications :

$$0.8 \le |H(e^{j\omega})| \le 1 \quad , \quad 0 \le \omega \le 0.2\pi$$
$$|H(e^{j\omega})| \le 0.2 \quad , \quad 0.6\pi \le \omega \le \pi$$

Realize the designed filter using direct form II structure. **(15)**

(OR)

b) i) How mapping from S-domain to Z-domain is achieved in bilinear transformation. **(8)**

ii) Apply Bilinear transformation to $H(S) = \frac{2}{(S+1)(S+2)}$. **(7)**

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

Question Paper Code : 52865

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fourth Semester

Electrical and Electronics Engineering

CS 6456 – OBJECT ORIENTED PROGRAMMING

(Common to: Electronics and Instrumentation Engineering, Instrumentation and Civil Engineering)

(Regulation 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define oops.
2. List the advantages of using object oriented programming.
3. Differentiate data hiding and encapsulation.
4. What is polymorphism and give examples?
5. What is a class and object?
6. How generic programming is used in C++?
7. Is a string a primitive data type?
8. Does java support "goto"?
9. Mention about packages and interfaces.
10. Why do we use loops in java?

PART B — (5 × 13 = 65 marks)

11. (a) When would you use a pointer to a function? (13)

Or

(b) Explain in detail with an example about ADT's in stack and queue. (13)

12. (a) Explain different types of constructors in C++ with example.

Or

(b) Describe virtual functions with an example.

13. (a) Illustrate Templates with an example in C++.

Or

(b) (i) Explain different types of inheritance in C++ with an example. (8)

(ii) Discuss the advantages of STL in detail. (5)

14. (a) Enlighten all the control statements supported by java with an example? (13)

Or

(b) (i) Write a java program to generate the Fibonacci series. 0,1,1,2,3,5,8,... (5)

(ii) Write a java inheritance program, which should have two classes namely calculation and My calculation. My-calculation should inherit the methods addition ( ) and subtraction ( ) of calculation class. (8)

15. (a) (i) Write a java program to Concatenate the specified string at the end of the string. (6)

(ii) Explain 'Divide by zero' Exception with an example. Java program. (7)

Or

(b) Write a program to test whether the string is having specified prefix, if yes then it returns true else false. (13)

PART C — (1 × 15 = 15 marks)

16. (a) How exceptions are handled in C++? Specify its syntax. (15)

Or

(b) Describe in detail about the Multithreaded programming. (15)

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

Question Paper Code : 20366

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fourth Semester

Electrical and Electronics Engineering

CS 6456 — OBJECT ORIENTED PROGRAMMING

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

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define pointer. Give example.
2. What is an abstract data type? Give example.
3. Why do we need the preprocessor directive # include <iostream> in a C++ program?
4. What is data abstraction? Give example.
5. How do templates benefit a C++ developer?
6. Define inheritance.
7. What is java virtual machine?
8. List the logical operators in java.
9. What is package in java?
10. Define multithreading.

PART B — (5 × 13 = 65 marks)

11. (a) Outline the features of the object oriented programming paradigm. (13)

Or

(b) Write a C++ program to store 'n' names in an array name, sort the names in alphabetic order and print the result. Use classes and member functions. (13)

12 (a) What is a constructor? Explain the different types of constructors in C++ with an example (13)

Or

(b) (i) Write a C++ program to accept a square matrix, find the transpose and print the result. Use classes and member functions. (5)

(ii) What is polymorphism? Explain the different types of polymorphism in C++ with an example (8)

13 (a) (i) Explain templates in C++ with an example (8)

(ii) Present an overview of exception handling in C++. (5)

Or

(b) Explain single inheritance and multiple inheritance in C++ with an example. (13)

14 (a) (i) Write a java program to print the first 'N' prime numbers. (5)

(ii) Write a java program to perform computation of sin (x) as given below (8)

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} \ldots\ldots \text{N terms.}$$

Or

(b) Explain the types of inheritance in java with suitable examples.

15 (a) (i) Explain interfaces in java with an example. (8)

(ii) Write a java program to accept a string, count the number of vowels in the string and print the result. (5)

Or

(b) What is exception handling? Discuss exception handling in java with an example. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Consider a book shop which sells both books and video-tapes. Create a class media that store the title and price of a publication. Create two derived classes, one for storing the number of pages in a book and another for storing the playing time of a tape. Write a function display () is used in all the classes to display the class contents.

Note : that the function display () has been declared virtual in media, the base class. Write a C++ program for the above. (15)

Or

(b) (i) Write a java program to sort an array of 'N' numbers in ascending order. Use classes and methods. (8)

(ii) Write a java program to accept a string, reverse the string, check whether the string is a palindrome and print the result. Use classes and methods.

Note : An example for palindrome : consider the string 'MALAYALAM' when you reverse the string you get back the original string 'MALAYALAM' and hence the string "Malayalam" is a palindrome. (7)

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

Question Paper Code : 40908

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fourth Semester

Electrical and Electronics Engineering

CS 6456 – OBJECT ORIENTED PROGRAMMING

(Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. What is an object ? Give example.
2. Define an abstract data type.
3. What is a member function ?
4. Define polymorphism.
5. Outline the relationship between containers, iterators and algorithms.
6. Write the syntax for defining a function template.
7. What is a class ? Give an example for a class in java.
8. Name the access modifiers in java.
9. Define a package in java and write the syntax to declare a package.
10. What is multithreading ?

PART – B (5×13=65 Marks)

11. a) Appraise the characteristics of object oriented programming languages. (13)

(OR)

b) Compare the features of C++ and Java. (13)

12. a) Write a C++ program to sort an array of 'n' numbers in ascending order. Use classes and member functions. **(13)**

(OR)

b) What is an iterator ? Explain with an example iterators in C++. **(13)**

13. a) What is a template ? Outline the need for templates in C++ and appraise with an example the different types of templates. **(13)**

(OR)

b) What is inheritance ? Explain with an example the different types of inheritance in C++. **(13)**

14. a) Explain with an example the control statements in Java. **(13)**

(OR)

b) Write a Java program to accept two matrices, multiply the matrices and print the result. Use classes and methods. **(13)**

15. a) What is a java interface ? How to implement an interface ? Explain with an example. **(13)**

(OR)

b) What is exception handling ? Explain with an example exception handling in java. **(13)**

PART – C **(1×15=15 Marks)**

16. a) Write a C++ program to perform the following : **(15)**

Define a class account to represent a bank account. Include the following :

Data members :

- Account number
- Name of the depositor
- Type of account
- Balance amount in the account

Member functions :

- To assign initial values
- To deposit an amount
- To withdraw an amount after checking the balance
- To display name and balance

(OR)

b) Write a Java program to sort an array of 'n' names in alphabetic order. Use classes and methods. **(15)**

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

Question Paper Code : 52383

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fifth Semester

Electrical and Electronics Engineering

CS 2311 – OBJECT ORIENTED PROGRAMMING

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

(Regulations 2008)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. List the differences between constructors and destructors.
2. Write a C++ program to find greatest of three numbers.
3. What are friend function ? Give the syntax to declare friend functions.
4. Present the operators that cannot be overloaded in C++.
5. Write the purpose of any two standard exceptions present in C++.
6. Give the advantages of using namespaces in C++.
7. Distinguish between instance variables and static variables in Java.
8. Write a simple Java program to concatenate two strings.
9. Give an example to view how an array be passed as argument to a method in Java.
10. Recall the dissimilarities between a class and an interface in Java.

PART – B (5×16=80 Marks)

11. a) i) Explain the features of object oriented programming. (8)

ii) Write a C++ program to check if the given integer is prime or composite. (8)

(OR)

b) i) What are the types of constructors ? Discuss how constructors are overloaded with an example. (10)

ii) Write a C++ program to multiply two 3×3 matrices. (6)

12. a) State the advantages of operator overloading and demonstrate the same by overloading '+' operator to add two complex numbers. (16)

(OR)

b) Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class ACCOUNT that stores the necessary customer details. From this derive the classes cur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks : in C++ language.

i) Accept deposit from a customer and update the balance.

ii) Display the balance.

iii) Compute and deposit interest.

iv) Permit withdrawal and update the balance.

v) Check for minimum balance, impose penalty if needed and update balance. (16)

13. a) i) Present the different file opening modes in C++. (4)

ii) Write a C++ program to create two files A and B. Write the address of 5 students in file A and write their grades in file B. Close the files and append the contents of file B onto file A. (12)

(OR)

b) Explain the components of standard template with an example. (16)

14. a) i) Explain the working of Java virtual machine (JVM) with a neat architecture diagram. (8)

ii) What is Javadoc ? Describe the tags recognized by Javadoc. (8)

(OR)

b) What are packages in Java ? How can they be created and accessed ? Demonstrate with an example. (16)

15. a) Explain the types of inheritance supported in Java with suitable examples of your choice. (16)

(OR)

b) i) Write a Java program to read two numbers of type double from keyboard and perform division of them. Use a try block to throw an exception when a wrong type of data is keyed in an another try block to detect and throw an exception if the condition "divide-by-zero" occurs. Use appropriate catch block to handle the corresponding exceptions thrown. (8)

ii) Describe the different states in which a thread can be present during its lifetime. (8)

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
REGULATIONS – 2017

CHOICE BASED CREDIT SYSTEM

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING
&
B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING

CURRICULUM AND SYLLABUS – SIXTH SEMESTER

SEMESTER VI

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EE8601	Solid State Drives	PC	3	3	0	0	3
2.	EE8602	Protection and Switchgear	PC	3	3	0	0	3
3.	EE8691	Embedded Systems	ES	3	3	0	0	3
4.		Professional Elective I	PE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
PRACTICALS								
6.	EE8661	Power Electronics and Drives Laboratory	PC	4	0	0	4	2
7.	EE8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
8.	EE8611	Mini Project	EEC	4	0	0	4	2
			TOTAL	27	15	0	12	21

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

Question Paper Code : 52961

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Sixth Semester

Electrical and Electronics Engineering

EE 6602 – EMBEDDED SYSTEMS

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

(Regulation 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the role of incircuit emulator?

2. Identify the role played by a watch dog timer.

3. Differentiate synchronous communication from iso-synchronous communication for serial devices.

4. Draw and label the I^2C bus frame format.

5. Identify the different phases of EDLC.

6. Compare concurrent development model with object oriented model.

7. Mention the different states of threads.

8. What is cause and effect of dead lock condition in RTOS?

9. State any three features that are required in the software used in automotive applications.

10. Why are critical tasks given higher priority in comparison to ordinary tasks during embedded auto mobile application development?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the structural units of an embedded processor in detail. (7)

(ii) With a neat diagram of a DMA controller, describe its buses and control signals. (6)

Or

(b) (i) How is allocation of memory to program segments carried out? Explain. (7)

(ii) Illustrate a hardware timer device with its signals, clock inputs and control bits. (6)

12. (a) (i) Explain the need for serial communication bus with Communication protocol and with handshaking. (7)

(ii) How do UART and HDLC indicate the start and end of a byte in a data frame ? (6)

Or

(b) (i) Discuss in detail about serial communication using I^2C bus. (7)

(ii) List the characteristics taken into consideration when interfacing a device and a port. (6)

13. (a) (i) Explain the various objectives of EDLC. (5)

(ii) With a neat diagram explain the synchronous data flow graph model. (8)

Or

(b) (i) How does abstraction of processes help in object oriented design ? Explain. (8)

(ii) Enumerate the issues in hardware/software co-design. (5)

14. (a) (i) Differentiate process, task and threads. (5)

(ii) Define Semaphore and discuss on any three functions. Also explain how they are handled? (8)

Or

(b) (i) Explain any task scheduling models of RTOS in detail. (8)

(ii) Discuss semaphore related functions in Micro C /OS-II. (5)

15. (a) Explain the list of tasks and priority assignments in modeling a washing machine. (13)

Or

(b) Tabulate the features needed in the operating system of a smart card and discuss their functions. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Analyze the critical section service by a preemptive scheduler and explain its action.

Or

(b) Identify any FIVE performance metrics that are used in Real Time Systems. Explain the importance of each of these metrics by applying them to any real time system of your choice.

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

Question Paper Code : 20463

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Sixth Semester

Electrical and Electronics Engineering

EE 6602 — EMBEDDED SYSTEMS

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

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How can an embedded system be illustrated?
2. Give the purpose of Watch dog timer.
3. Classify I/O devices in embedded system.
4. Draw the write byte format and read byte format of I^2C.
5. Elucidate on data flow graph.
6. Why is state machine model essential?
7. Elucidate semaphore with a syntax.
8. How can a scheduling process be explained in real time?
9. List some evident examples of Real time embedded application.
10. What are the basic requirements while designing an embedded system?

PART B — (5 × 13 = 65 marks)

11. (a) Mention the necessary hardware units that must be present in the embedded systems.

Or

(b) Explain the various form of memories present in an embedded system.

12. (a) How is I^2C Bus described in a serial communication?

Or

(b) Elaborate the architecture of CAN with necessary sketches.

13. (a) What are the various phases involved in the embedded product cycle?

Or

(b) Give the state machine model for the seat belt alarm system.

14. (a) Explain task, process and thread with their types and examples which aids the real time system.

Or

(b) With an example describe rate monotonic scheduling.

15. (a) Describe with the help of neat block diagram, the application of embedded system in washing machine.

Or

(b) Discuss the case study on adaptive cruise control with class diagram.

PART C — (1 × 15 = 15 marks)

16. (a) Design a smart card with class diagram and hardware architecture. Also draw its flowchart. (15)

Or

(b) Name and explain different phases of ELDC. Also discuss its modelling. (15)

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

Question Paper Code : 41008

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Sixth Semester

Electrical and Electronics Engineering

EE 6602 – EMBEDDED SYSTEMS

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

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What are the typical characteristics of an embedded system ?
2. What are the functional requirements of embedded system ?
3. Define bus.
4. Give the limitations of polling technique.
5. Define and differentiate simulator and emulator in the context of embedded system.
6. Compare Dataflow model and finite state model.
7. Define task and Task state.
8. Compare user threads and kernel threads.
9. List any four applications of Micro-Controller Operating System MUCOS.
10. Classify Electronic Control Unit (ESU). Give its uses.

PART – B **(5×13=65 Marks)**

11. a) Explain :

    i) Concept of DMA. **(6)**

    ii) Structural units of Embedded processor. **(7)**

    (OR)

    b) i) Describe the working principle of incircuit emulator. **(6)**

    ii) Classify and explain the various types of embedded systems. **(7)**

12. a) i) Give the summary of I/O devices used in embedded system. (6)

ii) Demonstrate the signal using a transfer of byte when using the I^2C bus and also the format of bits at the I2C bus with diagram. (7)

(OR)

b) i) Compare the advantages and disadvantages of data transfer using serial and parallel port/devices. (6)

ii) Compare the RS-232C and RS485 Serial interfaces. (7)

13. a) i) What are the issues in hardware software and co-design ? (5)

ii) Discuss in detail about the different phases of EDLC. (8)

(OR)

b) Explain Common computation models and illustrate the purpose of each.

14. a) i) Summarize the system level and task service functions of µc/OS. (6)

ii) Enumerate type of semaphores and explain the use of semaphore. (7)

(OR)

b) i) Draw the Microkernel Architecture and explain the basic functions of RTOS kernel. (6)

ii) Explain the need for interprocess communication and IPC functions. (7)

15. a) Design architectural hardware and software units needed in smart card.

(OR)

b) Identify and explain hardware units needed in each of the systems :

i) Camera. (7)

ii) Automatic chocolate vending machine. (6)

PART -- C (1×15=15 Marks)

16. Design and discuss an embed ded system solution for a typical automotive system. Your answer must include design and development of necessary hardwares and software for the automotive system to incorporate efficient fuel management systems, vehicle performance monitoring systems, vehicle tracking and navigation systems.

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

Question Paper Code : 50490

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Sixth Semester

Electrical and Electronics Engineering

EE6602 – EMBEDDED SYSTEMS

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

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Draw the block diagram of embedded system.
2. What is the need for a watchdog timer ?
3. How can we classify the I/O devices ?
4. Draw the data framework of I^2C bus.
5. What is meant by DFG ?
6. Give the purpose of state machine model.
7. Define Semaphore signalling.
8. What do you understand by real-time scheduling ?
9. Mention any 4 real time embedded processor based applications.
10. What are the basic requirements while designing an embedded system ?

PART – B **(5×16=80 Marks)**

11. a) List and explain the hardware units that must be present in the embedded systems.

(OR)

b) Explain the various form of memories present in an embedded system.

12. a) Describe serial bus communication protocol using I^2C bus.

(OR)

b) Explain the CAN architecture with neat diagram.

13. a) Explain embedded product development life cycle.

(OR)

b) Enumerate state machine model for the seat belt alarm system.

14. a) Explain Task, Process and Thread with their types and examples.

(OR)

b) Describe rate monotonic scheduling with example.

15. a) Explain a detailed case study on designing a smart card.

(OR)

b) Brief about the case study on adaptive cruise control in an automobile with class diagram.

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

Question Paper Code : 52960

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Sixth Semester

Electrical and Electronics Engineering

EE 6601 — SOLID STATE DRIVES

(Regulation 2013)

(Common to PTEE 6601 — Solid State Drives for B.E. Part time — Fifth Semester — Electrical and Electronics Engineering — Regulation 2014)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define active load torque.
2. What are the drawbacks of mechanical braking systems?
3. What are the drawbacks of converter fed dc motor drives?
4. Why are self commutated power devices preferred over thyristors in dc-dc converters?
5. Why speed control of induction motor using stator voltage control is suited for fan and pump drives?
6. Why current source inverter fed drives are more reliable than voltage source inverter fed drives?
7. What is self control mode operation of synchronous motors?
8. What are the classifications of permanent magnet synchronous motors?
9. What is the necessity of closed loop control in electric drives?
10. What are the points to be remembered in designing a controller for a drive?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the speed–torque conventions in the four quadrant operation of motor driving a hoist load. (13)

Or

(b) (i) A motor drives two loads. One has rotational motion. It is coupled to the motor through a reduction gear with a gear tooth ratio of 0.1 and efficiency of 90%. The load has a moment of inertia of $10\,kg-m^2$ and a torque of 10 N-m. Other load has translational motion and consists of 1000 kg weight to be lifted up at an uniform speed of 1.5 m/s. Coupling between this load and the motor has an efficiency of 85%. Motor has inertia of $0.2\,kg-m^2$ and runs at a constant speed of 1420 rpm. Determine equivalent inertia referred to the motor shaft and power developed by the motor. (9)

(ii) Draw the typical load torque-speed characteristics of fan, high speed hoist, traction and constant power loads. (4)

12. (a) A 200V, 875 rpm, 150 A separately excited DC motor has an armature resistance of $0.06\,\Omega$. It is fed from a single phase fully controlled rectifier with an AC source voltage of 220 V 50Hz. Assuming continuous conduction, calculate

(i) Firing angle for rated motor torque and 750 rpm.

(ii) Firing angle for rated motor torque and (–500rpm).

(iii) Motor speed for alpha = 160 degrees and rated torque. (13)

Or

(b) Explain three phase fully controlled converter in discontinuous conduction mode operation with necessary circuit diagram, waveforms and equations. (13)

13. (a) Explain theory and operation of energy efficient induction motor driven with constant v/f control in detail with necessary circuit diagram and equations. (13)

Or

(b) A Y–connected squirrel cage induction motor has following ratings and parameter: 400 V, 50 Hz, 4pole, 1370 rpm, $R_s = 2\,\Omega$, $R'_s = 3\,\Omega$, $Xm = X'_r = 3.5\,\Omega$. Motor is controlled by voltage source inverter at constant v/f ratio. Inverter allows frequency variation from 10 to 50Hz.

(i) Obtain the plot between the breakdown torque and frequency.

(ii) Calculate starting torque and current of this drive of the ratio of their values when motor is started at rated voltage and frequency. (13)

14. (a) Explain the operation of self controlled synchronous motor in constant margin angle control technique. (13)

Or

(b) Explain synchronous motor power factor control by the control of field excitation in detail with phasor diagram and 'V' curves. (13)

15. (a) Derive the transfer function of DC motor load system with armature control. (13)

Or

(b) Explain the closed loop operation of armature voltage control with field weakening mode operation with neat diagram. (13)

PART C — (1 × 15 = 15 marks)

16. (a) A 2.8 KW, 400 V, 50 HZ, 4 pole, 1370 rpm, delta connected squirrel cage induction motor has following parameters referred to the stator $R_s = 2\Omega, R'_r = 5\Omega, X_s = X'_r = 5\Omega, X_m = 80\Omega$. Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate

(i) motor terminal voltage at 1200 rpm and

(ii) motor speed, current and torque for the terminal voltage of 300 V. (15)

Or

(b) Explain the step by step procedure of design of speed controller for closed loop control of separately excited dc motor with armature voltage control. (15)

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

Question Paper Code : 20462

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Sixth Semester

Electrical and Electronics Engineering

EE 6601 — SOLID STATE DRIVES

(Regulations 2013)

(Common to PTEE 6601 – Solid State Drives for B.E. (Part-Time) Fifth Semester – Electrical and Electronics Engineering – Regulations 2014)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the fundamental torque equation of motor load system.

2. Write down the components of load torque.

3. Why does the armature voltage control is not preferred for the speeds above the rated value in DC motors?

4. What are the types of control strategies used in a chopper fed DC drive?

5. List out the merits and demerits of stator voltage control.

6. Write down the consequences of increasing the frequency of induction motor without a change in the terminal voltage.

7. When is a synchronous motor said to be self-controlled?

8. Mention the different types of Permanent Magnet Synchronous Motor.

9. What are the advantages of using PI controller in closed loop control for DC drive?

10. What is the role of current limiter in the closed loop control of DC drives?

PART B — (5 × 13 = 65 marks)

11. (a) Explain in detail about the multi-quadrant dynamics in the Speed-Torque plane with an example. (13)

Or

(b) (i) What are the Classification of an Electric Drives? (3)

(ii) Draw the Block diagram of Solid State Drive and explain the functions of an essential parts. (10)

12. (a) Explain the operation and steady state Speed-Torque equation of single phase fully controlled converter fed DC drives with neat waveforms in continuous and discontinuous conduction modes. (13)

Or

(b) Explain the operation of four quadrant chopper fed DC separately excited motor drive with power circuit. (13)

13. (a) Explain the principle of V/f control for induction motor drives. (13)

Or

(b) Describe the closed loop speed control of CSI fed induction motor drives. (13)

14. (a) Explain in detail, the open loop control of synchronous motor with constant v/f ratio. (13)

Or

(b) Draw and explain the block diagram of closed loop control of Permanent magnet synchronous motor in detail. (13)

15. (a) Derive the transfer function of DC motor- load system with converter fed system. (13)

Or

(b) Explain the design procedure of Speed controllers. Used in Electrical Drives. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain the design procedure and derive the transfer function of the current controller. (15)

Or

(b) Mention the factors involved in converter selection and equations involved in controller characteristics. (15)

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

Question Paper Code : 41007

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Sixth Semester

Electrical and Electronics Engineering

EE6601 – SOLID STATE DRIVES

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. What are the types of load torques ?
2. What is meant by regenerative braking ?
3. List out the drawbacks of AC-DC converter fed DC drive.
4. What are the advantages of chopper fed DC drives ?
5. What are the various applications of stator voltage control scheme ?
6. What are the three regions in the speed-torque characteristics of the induction motor ?
7. What are the different types of controls used in synchronous motor drives ?
8. What are the advantages of permanent magnet synchronous motors ?
9. What are the advantages of closed loop speed control schemes ?
10. List out the simulation software packages that can be used for electrical drives.

PART – B (5×13=65 Marks)

11. a) i) Write equations governing motor load dynamics. (6)

ii) Explain in detail with an example multi-quadrant dynamics in the Speed-Torque plane. (7)

(OR)

b) i) What are the factors governing the selection of electric drives for any particular application ? **(6)**

ii) State and explain the functions of essential parts of an electrical drive. **(7)**

12. a) Explain in detail, the operation of a single phase fully controlled converter fed separately excited DC motor in continuous and discontinuous modes with steady state analysis and waveforms. **(13)**

(OR)

b) i) Explain the operation of four quadrant chopper fed DC separately excited motor drive with necessary diagrams. **(7)**

ii) What are the types of control strategies in a dc chopper ? **(6)**

13. a) i) What are the drawbacks of stator voltage control method ? **(5)**

ii) Explain the speed control scheme of induction motor drive with v/f control technique. **(8)**

(OR)

b) Describe the closed loop speed control of VSI fed and CSI fed induction motor drives. **(13)**

14. a) i) Discuss using a block diagram the operation of a voltage source inverter fed synchronous motor in the true synchronous mode. **(7)**

ii) Explain the self control of synchronous motor in detail. **(6)**

(OR)

b) Explain in detail the construction, principle of operation and applications of permanent magnet synchronous motor. **(13)**

15. a) Explain the design procedure and derive the transfer function of the speed and current controller. **(13)**

(OR)

b) Derive the transfer function of DC motor-load system with converter fed system. **(13)**

PART – C **(1×15=15 Marks)**

16. a) Compare in detail V/f control strategies of induction motor and synchronous motor drives. **(15)**

(OR)

b) Design a current controller for a small capacity constant speed drive.

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

Question Paper Code : 50489

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Sixth Semester
Electrical and Electronics Engineering
EE 6601 – SOLID STATE DRIVES
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. What are the typical elements of an Electric Drive ?
2. What are the different modes of operation of an electric drive ?
3. What are the speed control methods of DC motors ?
4. What are the advantages in operating choppers at high frequency ?
5. What are the advantages of induction motors over D.C. motors ?
6. Draw the speed - torque characteristics of Induction motor.
7. State the advantages of permanent magnet synchronous motors.
8. Why a self controlled synchronous motor is free from hunting operation ?
9. How is speed feedback achieved in speed controller design ?
10. What is the role of current limiter in the closed loop control of DC drives ?

PART – B (5×16=80 Marks)

11. a) Explain in detail with an example (low speed hoist), multi-quadrant dynamics in the Speed-Torque plane. (16)

(OR)

b) i) What are the factors governing the selection of electric drives for any particular application ? (8)

ii) Write equations governing motor load dynamics. (8)

12. a) Explain in detail the operation and steady state analysis of single phase fully controlled converter fed DC drives with neat waveforms in continuous and discontinuous conduction modes. **(16)**

(OR)

b) Explain the operation of four quadrant chopper fed DC separately excited motor drive with necessary diagrams. **(16)**

13. a) Explain the operation of v/f control technique of speed control method of induction motor. **(16)**

(OR)

b) i) Explain the speed control scheme of induction motor drive with stator voltage control and also state the disadvantages of this method. **(10)**

ii) Compare VSI and CSI fed induction motor drives. **(6)**

14. a) Explain in detail the construction, principle of operation and applications of permanent magnet synchronous motor. **(16)**

(OR)

b) Explain in detail about the open loop v/f control and self controlled mode of the synchronous motor drives. **(16)**

15. a) i) Discuss the design procedure for current controller of an electric drive. **(8)**

ii) Mention the factors involved in converter selection and equations involved in controller characteristics. **(8)**

(OR)

b) Derive the transfer function of DC motor-load system with converter fed system. **(16)**

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

Question Paper Code : 52963

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Sixth Semester

Electrical and Electronics Engineering

EE 6604 – DESIGN OF ELECTRICAL MACHINES

(Regulation 2013)

(Common to PTEE 6604 – Design of Electrical Machines for B.E. (Part – Time) – Fifth Semester – Electrical and Electronics Engineering Regulation 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Space Factor.
2. What are the Electrical properties of insulating materials?
3. Write down the Carter's Coefficient of D.C Machine.
4. What are the factors to be considered in the design of commutator of a D.C Machine?
5. Define Window Space Factor.
6. What are the methods of cooling of transformer?
7. Write down the equation for output Co-efficient in an induction motor.
8. Why fractional slot winding is not used for induction motor?
9. What are the factors that influence the choice of specific magnetic loading in a synchronous machine?
10. Define Short Circuit Ratio of a synchronous machine.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss about the factors that influence the choice of specific electric and magnetic loadings in the design of rotating machines. (13)

Or

(b) Describe the methods of measurements of temperature rise in various parts of an electrical machine. (13)

12. (a) (i) Derive the output equation of DC machine. (6)

(ii) A 5KW, 250V, 4 pole, 1500 rpm DC shunt generator is designed to have a square pole face. The specific Magnetic loading and specific electric loading are 0.42 wb/m^2 and 15000 ac/m respectively. Find the main dimensions of the machines. Assume full load efficiency is 87% and Poles arc to pole pitch ratio is 0.66. (7)

Or

(b) Calculate the MMF required for the air gab of a salient pole synchronous machines having core length of 0.2 m including 4 ducts of 10 mm each; pole arc = 0.19 m. Slot Pitch = 65.4 mm; slot opening = 5 mm. Air gap Length = 5 mm. Flux per pole = 52 mWb; Carter's Co-efficient is 0.18 for opening/gap = 1; Carter's coefficient is 0.28 for opening/gap = 2. (13)

13. (a) Explain the different methods of cooling of Transformers. (13)

Or

(b) A single Phase, 400V, 50Hz, transformer is built from stampings having a relative permeability of 1000. The length of the flux path is 2.5m; the area of cross section of the core is 2.5×10^{-3} m^2 and the primary winding has 800 turns. Estimate the maximum flux and no load current of the transformer. The iron loss at the working flux density is 2.6W/kg. Iron weight 7.8×10^3 Kg/m^3, stacking factor is 0.9. (13)

14. (a) Write short notes on : (i) Design of rotor bars and slots. (ii) Design of end rings. (7+6)

Or

(b) A 15KW, 440V, 50Hz, 3 phase induction motor is built with a stator bore 0.25m and a core length of 0.16. The specific electric loading is 23000 ampere conductors per meter. Using the data of this machine, determine the core dimensions number of stator slots and number of stator conductors for a 11KW, 460V, 6 Pole, 50 Hz Motor. Assume a full load efficiency of 84% and power factor of 0.82 for each machine. The winding factor is 0.955. (13)

15. (a) Briefly discuss the step by step procedure involved in the design of rotor in salient pole synchronous machine. (13)

Or

(b) Determine the output coefficient for a 1500 KVA, 2200 V, 3 Phase, 10 Pole, 50 Hz, star connected alternator with sinusoidal flux distribution. The winding has 60° Phase Spred Full pitch coils. ac = 30000 amps. Conductor/m, B_{av}= 0.6 Wb/m^2. If the peripheral speed of the rotor must not exceed 100 m/sec and the ratio of pole pitch to core Length is to be between 0.6. and find D and L. Assume an air-gap length of 6mm. Find also the approximate number of stator conductors. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain the various steps involved in the design of armature winding of DC Machines. (15)

Or

(b) Explain the step by step procedure fors the design of field winding of Synchronous machines. (15)

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Question Paper Code : 20465

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Sixth Semester

Electrical and Electronics Engineering

EE 6604 — DESIGN OF ELECTRICAL MACHINE

(Regulations 2013)

(Also common to PTEE 6604 – Design of Electrical Machines for B.E. (Part-Time) Fifth Semester – Electrical and Electronics Engineering /Regulation 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the various duty cycles of motor.

2. What are the different conducting materials used in rotating machines?

3. What are the constituents of magnetic circuits in a DC machine?

4. Define specific electric and magnetic loading.

5. What are the advantages of stepped core in transformers?

6. How is iron loss reduced in transformers?

7. Why induction machine is called a rotating transformer?

8. What is cogging? How is it avoided in induction motor?

9. Define runaway speed of an alternator.

10. Distinguish salient pole and smooth cylindrical rotor construction of alternators.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss in detail the desirable properties and classification of insulating materials used in rotating machines. (13)

Or

(b) Discuss in detail the factors affecting the choice of specific electric and magnetic loading in rotating machines. (13)

12. (a) (i) Derive an expression for the mmf for air gap of a slotted armature with ducts. (6)

(ii) Determine the air gap length of a D.C machine from the following data. Gross core length = 0.12 m, number of ducts = 1 of 10 mm width, slot pitch = 25 mm, slot width = 10 mm, Carters coefficient for slots and ducts = 0.32, gap density at pole center = 0.7 T. Field mmf per pole = 3900 AT, mmf required for iron parts of magnetic circuit = 800 AT. (7)

Or

(b) Calculate the diameter and length of armature for a 55 kW, 110 V, 1000 rpm, 4 pole DC shunt generator assuming specific electric and magnetic loadings as 26000 amp-cond/m and 0.5 wb/m^2 respectively. The pole arc should be about 70% of the pole pitch and length of core about 1.1 times the pole arc. Allow 10 A for the field current and assume a voltage drop of 4 V for the armature circuit. Specify the winding used and also determine suitable values for the number of conductors and number of armature slots. (13)

13. (a) (i) Derive the output equation of three phase transformer. (6)

(ii) Determine the dimensions of core and yoke for a 200 kVA single phase core type transformer. A cruciform core is used with distance between centres of adjacent limbs equal to 1.6 times the width of largest lamination. Assume voltage per turn is 14 V, Maximum flux density, B_m = 1.1 wb/m^2. Window space factor 0.32, current density = 3 A/mm^2. Stacking factor = 0.9. The net iron area is 0.56 d^2 for cruciform core. Width of largest stamping = 0.85 d (7)

Or

(b) A 250 kVA, 6600 / 400 V, three phase core type transformer has a total loss of 4800 W at full load. Transformer tank is 1.25 m in height and 1 m × 0.5 m in plan (top view). Design a suitable scheme for cooling tubes if the temperature rise is to be limited to 35°C. The diameter of the tubes is 50 mm and are placed 75 mm from each other. The average height of the tube is 1.05 m. Sp. heat of dissipation through radiation and convection are 6 and 6.5 W/m^2 – °C. Assume that the convection is improved by 35% due to the provision of tubes. (13)

14. (a) Find the main dimensions, number of radial ventilating ducts, number of stator slots and number of turns per phase of a 3.7 kW, 400 V, 3 phase, 4 pole, 50 Hz, squirrel cage Induction motor to be started by a star delta starter. Work out the winding details. Assume average flux density in the airgap equal to 0.45 wb/m^2, Ampere conductors per meter = 23000, η = 0.85, power factor = 0.84. Choose main dimensions to achieve cheap design. Winding factor = 0.955, Iron stacking factor = 0.9. (13)

Or

(b) (i) Derive an expression for the endring current in three phase Induction motor. (6)

(ii) A 11 kW, three phase 6 pole, 50 Hz, 220 volts star connected induction motor has 54 stator slots, each containing 9 conductors. Calculate the value of bar and end ring currents. The number of rotor bars is 64. The machine has an efficiency of 86 percent and a power factor of 0.85. The rotor MMF may be assumed to be 85 percent of stator MMF. Also find the bar and the end ring sections if the current density is 5 A/mm^2. (7)

15. (a) Determine the main dimensions of a 75000 kVA, 13.8 kV, 50 Hz, 62.5 RPM, 3 phase star connected alternator. The peripheral speed should be about 40 m/s. Assume average gap density = 0.65 Wb/m^2, Ampere conductors per meter = 40,000, current density = 4 A/mm^2. Also find the number of stator slots, conductors per slot and conductor area. Assume slot pitch = 55 mm. (13)

Or

(b) Explain the design procedure for the field system of a salient pole alternator. (13)

PART C — (1 × 15 = 15 marks)

16. (a) The armature of a 10 pole 1000 kW, 500 V, 300 RPM DC generator has a diameter of 1.6 m. There are 450 coils. Determine suitable length and diameter of the commutator, giving details of brushes having regard to commutation conditions and temperature rise. The design limitations are; peripheral speed of commutator $\leq$ 20 m/s, pitch of segments $\geq$ 4, current per brush $\leq$ 70 A, Temperature rise $\leq$ 40°C. The other data given are : The brushes span three segments approximately, brush contact drop 1.5 V, coefficient of friction 1.5, brush pressure 20 kN/m^2. Cooling coefficient = $\frac{0.012}{1+0.1V_c}$. Make suitable assumptions for clearance between brushes, staggering of brushes and end play. (15)

Or

(b) (i) Explain the design of damper winding in synchronous machine. (7)

(ii) A 250 kVA, 3 phase, 6600 V, salient pole alternator has the following data. Airgap diameter = 1.6 m; length of core = 0.45 m; number of poles = 20; a_c = 28000; pole arc to pole pitch ratio = 0.68; stator slot pitch = 28 mm; current density in damper winding = 3 A/mm^2. Design a suitable damper winding for the machine. (8)

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

Question Paper Code : 41010

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Sixth Semester
Electrical and Electronics Engineering
EE 6604 – DESIGN OF ELECTRICAL MACHINES
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What are the major considerations to evolve a good design of electrical machine ?
2. What are the different types of heat transfer methods found in electrical machines ?
3. Mention the two types of armature winding used in dc machine and compare.
4. What factor decides the minimum number of armature coils ?
5. Why stepped core are generally used for transformer ?
6. The voltage per turn of a 500 KVA, 11 KV, Δ/Y three phase transformer is 8.7 V. Calculate the number of turns per phase of LV and HV windings.
7. What happens if the air gap length of induction motor is doubled ?
8. Name the losses that occur in three-phase induction motors.
9. What are the factors to be considered for the choice of specific magnetic loading in synchronous machines ?
10. Give the purpose of providing damper windings in synchronous machines.

14. a) i) What are the advantages of squirrel cage induction motors and slip ring induction motors ? **(5)**

ii) Determine the D and L of a 70 HP, 415 V, 3-phase, 5-Hz, star connected, 6 pole induction motor for which ac = 30000 amp.cond/m and B_{av} = 0.51 Wb/m^2. Take η = 90% and pf = 0.91. Assume τ = L. Estimate the number of stator conductors required for a winding in which the coductors are connected in 2-parallel paths. Choose a suitable number of conductors/slots, so that the slot loading does not exceed 750 amp. cond. **(8)**

(OR)

b) i) List the rules for selecting rotor slots. **(5)**

ii) Design a cage rotor for a 40 HP, 3-phase, 400 V, 50 Hz, 6 pole, delta connected induction motor having a full load η of 87% and a full load pf of 0.85. Take D = 33 cm and L = 17 cm. Stator slots = 54, conductors/slot = 14. Assume suitable values wherever necessary. **(8)**

15. a) Determine for a 250 KVA, 1100 V, 12 pole, 500 rpm, 3-phase alternator.

- Air gap diameter
- Core length
- Number of stator conductors
- Number of stator slots and
- Cross-section of stator conductors.

Assuming average gap density as 0.6 Wb/m^2 and specific electric loading of 30000 amp. cond/m, L/τ = 1.5. **(13)**

(OR)

b) i) Mention the factors that govern the design of field system alternator. **(5)**

ii) Sketch the shape of salient pole rotor and cylindrical rotor. What are the constructional differences between salient pole type alternator and cylindrical rotor type alternator ? **(8)**

PART – C **(1×15=15 Marks)**

16. a) A 600 rpm, 50 Hz, 10000 V, 3 phase, synchronous generator has the following design data. B_{av} = 0.48 Wb/m^2, δ = 2.7 amp/mm^2, slot space factor = 0.35, number of slots = 144, slot size = 120 × 20 mm, D = 1.92 m and L = 0.4 m. Determine the KVA rating of the machine. **(15)**

(OR)

b) Show the design procedure of field system of non-salient pole alternator. **(15)**

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

Question Paper Code : 50492

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Sixth Semester

Electrical and Electronics Engineering

EE6604 – DESIGN OF ELECTRICAL MACHINES

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. Define short time rating.
2. List the standard specifications of transformer.
3. Define specific electric and magnetic loading.
4. State the advantages of having larger number of poles in DC machines.
5. How does a distribution transformer differ from a power transformer in design aspects ?
6. Why stepped cores are used in transformers ?
7. What are the factors to be considered in selecting the number of stator slots in induction machines ?
8. What is unbalanced magnetic pull in induction machines ?
9. What are the design features of turbo alternators.
10. Define runway speed of an alternator.

PART – B (5×16=80 Marks)

11. a) Discuss in detail the factors affecting the choice of specific electric and magnetic loading in rotating machines. (16)

(OR)

b) Derive an expression for the heating and cooling curve in electrical machines. (16)

12. a) i) Derive an expression for the mmf of airgap of a machine with slotted armature and ventilating ducts. (8)

ii) A 15 kW, 230 V, 4 pole DC machine has the following data : Armature diameter = 0.25 m; armature core length = 0.125 m ; length of airgap at pole centre = 2.5 mm; flux per pole = 11.7×10^{-3} wb ; Pole arc to pole pitch ratio = 0.66. Calculate the mmf required for the airgap i) if the armature surface is treated as smooth ii) if the armature is slotted and the gap contraction factor is 1.18. (8)

(OR)

b) Determine the diameter and length of armature core for a 55 kW, 110 V, 1000 RPM, 4 pole shunt generator assuming specific electric and magnetic loading of 26000 ampere conductor per metre and 0.5 wb/m^2 respectively. The pole arc should be about 70% of pole pitch and length of core about 1.1 times the pole arc. Allow 10 ampere for the field current and assume a voltage drop of 4 V for the armature circuit. Specify the winding used and also determine the values of the number of armature conductors and number of armature slots. (16)

13. a) Estimate the main dimensions including winding conductor area of a 3ϕ delta star core type transformer rated at 300 KVA, 6600/440 V, 50 Hz. A suitable core with three steps having a circumscribing circle of 0.25 m diameter and a leg spacing of 0.4 m is available. The emf per turn is 8.5 V. Assume a current density of 2.5 A/mm^2, a window space factor of 0.28 and a stacking factor of 0.9. (16)

(OR)

b) A 1000 KVA 6600/440 V, 50 Hz,3ϕ, delta star core type oil immersed natural cooled (ON) transformer has the following design data : Distance between centres of adjacent limbs = 0.47 m ; Outer diameter of HV winding = 0.44 m ; Height of frame = 1.24 m; Core loss = 3.7 kW and I^2R loss = 10.5 kW. Design a suitable tank for the transformer. The average temperature rise of the oil should not exceed 35°C. The specific heat dissipation for the tank walls is 6 W/m^2 – °C and 6.5 W/m^2 – °C due to radiation and convection respectively. Assume that the convection is improved by 35% due to the provision to tubes. (16)

14. a) Determine the stator bore and core length of a 70 HP, 415 V, 3ϕ, 50 Hz star connected, 6 pole induction motor for which the specific electric and magnetic loading are 32000 A/m and 0.51 wb/m^2 respectively. Take the efficiency as 90% and power factor as 0.91. Assume pole pitch = core length. Estimate the number of stator conductors required for a winding in which the conductors are connected in two parallel paths. Choose a suitable number of conductors per slot so that the slot loading does not exceed 750 ampere conductors. **(16)**

(OR)

b) Estimate the main dimensions, air gap length, stator slots, stator turns per phase and cross sectional area of stator and rotor conductors for a 3 phase, 15 HP, 400 V, 6 pole, 50 Hz, 975 RPM, induction motor. The motor is suitable for star delta starting, Bav = 0.45 wb/m^2, ac = 20000 ampere conductors per meter. L/T ratio = 0.85, efficiency = 0.9 and power factor = 0.85. **(16)**

15. a) Determine the main dimensions of a 75000 KVA, 13.8 KV, 50 Hz, 62.5 RPM, 3ϕ, star connected alternator, also find the number of stator slots, conductors per slot, conductor area and work out winding details. The peripheral speed is about 40 m/s. Assume average gap density = 0.65 wb/m^2, ampere conductor/ metre = 40000 and current density 4 A/mm^2. **(16)**

(OR)

b) Explain the design procedure for stator and rotor of turbo alternators. **(16)**

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

Question Paper Code : 52965

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Electrical and Electronics Engineering

EE 6702 – PROTECTION AND SWITCHGEAR

(Regulation 2013)

(Common to PTEE 6702 – Protection and Switch Gear for B.E. (Part-Time) Sixth Semester – Electrical and Electronics Engineering – Regulations–2014)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give the consequences of short circuit.
2. Define protected zone.
3. Draw the R-X diagram for the reactance and mho relay.
4. What is an under frequency relay?
5. What are the errors in CT?
6. Why busbar protection is needed?
7. What is static relay?
8. List the merits of Numerical relays.
9. What do you mean by current chopping?
10. What are the advantages of oil as arc quenching medium?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Describe the different faults occurring in power system. Which of these are more frequent?

(ii) Formulate an expression for the reactance of the Peterson coil in terms of capacitance of the protected line.

Or

(b) (i) Explain the overlapping of protective zones with neat sketch.

(ii) Describe the essential qualities of a protective relay.

12. (a) Describe the construction and principle of operation of an induction type directional over current relay.

Or

(b) With neat diagram, describe the construction and principle of operation of Negative sequence relay.

13. (a) Describe the various methods of transformer protection.

Or

(b) Discuss the different methods employed for the protection of Transmission Lines.

14. (a) Draw the schematic block diagram of a Static over current relay and explain the operation.

Or

(b) Explain the operation of distance protection of transmission lines using static comparators with neat diagram.

15. (a) (i) Explain the Various arc interruption methods.

(ii) Describe the operating principle of DC circuit breaker.

Or

(b) With neat diagram, explain the construction and principle of operation of Air blast circuit breaker.

PART C — (1 × 15 = 15 marks)

16. (a) Discuss the different types of Lightning arresters with neat diagram. (15)

Or

(b) (i) With a neat sketch, explain the differential system of protection applied to star delta connected transformer. (8)

(ii) What are the problems arising in differential protection in power transformer and how are they overcome? (7)

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

Question Paper Code : 20467

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Seventh Semester

Electrical and Electronics Engineering

EE 6702 – PROTECTION AND SWITCHGEAR

(Regulations 2013)

(Common to PTEE 6702 – Protection and Switch Gear for B.E (Part – Time) Sixth Semester – Electrical and Electronics Engineering – Regulations 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the effects of short circuit faults on power system, if the fault remain uncleared?

2. How protective relays are classified based on their functions?

3. Differentiate time graded system and current graded system used in overcurrent protection.

4. What are the factors affecting the performance of differential relays?

5. In the event of faults in generator windings, field excitation is to be suppressed as early as possible. Why?

6. Which type of protection scheme is preferred for EHV and UHV power lines?

7. In what way the static relays are meritorious than electromagnetic relays?

8. List the electronic circuits commonly used in static relays.

9. Why the rate of rise of restriking voltage plays important role in circuit breaker operation?

10. Why oil circuit breakers are not suitable for heavy current interruption at low voltages?

PART B — (5 × 13 = 65 marks)

11. (a) (i) What are the essential requirements of protective relaying? Justify. (7)

(ii) Discuss briefly about primary protection and back-up protection. (6)

Or

(b) Discuss the following neutral grounding schemes. Illustrate your answers with appropriate phasor diagrams, benefits and recommendations.

(i) Resistance earthing (5)

(ii) Reactance earthing (3)

(iii) Arc suppression coil (5)

12. (a) Explain various time-current characteristics of an overcurrent relay with relevant applications. Also comment about the technique to realize those time–current characteristics using electromagnetic relays.

Or

(b) Discuss with relevant connection diagram and phasor diagram, the directional overcurrent relay.

13. (a) An alternator rated at 10 kV protected by the balanced circulating current system has its neutral grounded through a resistance of 10 ohms. The protective relay is set to operate when there is an out of balance current of 1.8 A in the pilot wires which are connected to the secondary windings of 1000/5 CT ratio. Determine the percentage of winding which remains unprotected and minimum value of earthing resistance required to protect 80% of the winding.

Or

(b) Explain how a transformer can be protected against magnetizing inrush current. Illustrate with suitable diagram.

14. (a) Discuss in detail, the integrating type and instantaneous type static amplitude comparators. Illustrate your answer with appropriate circuits and waveforms.

Or

(b) How static overcurrent relays are different from electromechanical overcurrent relays?. Explain how the operation of instantaneous overcurrent relay is achieved using electronic circuits.

15. (a) Describe the constructional and operational aspects of cross blast and axial blast air circuit breakers (ACB). Also discuss the meritorious features of ACB over Oil circuit breakers.

Or

(b) Derive the expression to find the critical value of resistance to be connected across the circuit breaker contacts.

PART C — (1 × 15 = 15 marks)

16. (a) In a 132 kV, 50 Hz system, the inductance and capacitance up to the location of the circuit breaker is and 0.02 μF respectively. A resistance of 600 Ω is connected across the contacts of the circuit breaker. Determine

(i) Natural frequency of oscillations.

(ii) Damped frequency if oscillations and

(iii) Critical value of resistance which will give no transient oscillations.

Or

(b) Consider a ring main feeder with one infeed bus and three outgoing bus. Design a overcurrent protection scheme for a short circuit fault at the middle of the feeder connecting two outgoing buses. Represent the given case as single line diagram and illustrate your answer by indicating the location of circuit breakers, operating time of each circuit breaker for the given fault. Also mention which relay should be with directional feature.

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

Question Paper Code : 41012

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh Semester
Electrical and Electronics Engineering
EE6702 – PROTECTION AND SWITCHGEAR
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. Why protection scheme is needed for power system ?
2. Write down the importance of symmetrical components for fault current calculation.
3. Mention the principle of operation of distance relay.
4. Determine plug setting multiplier of a 5 ampere, 3 second over current relay having a current setting of 125% and a time setting multiplier of 0.6 connected to supply circuit through a 400/5 current transformer when the circuit carries a fault current of 4000 A.
5. What is the cause of over speed and how alternators are protected from it ?
6. What are the protection methods used for transmission line ?
7. List out the general characteristics of numerical protection.
8. What are the basic circuits used in static relays ?
9. What are the factors responsible for the increase of arc resistance ?
10. A circuit breaker is rated as 1500 A, 1000 MVA, 3 second, 3 phase oil circuit breaker. Find rated making current.

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PART – B (5×16=80 Marks)

11. a) i) Explain clearly about the zones of protection in power system. (8)

ii) Briefly discuss about nature and causes of faults. (8)

(OR)

b) Explain in detail about the need and different methods for neutral grounding with suitable diagram. (16)

12. a) i) With neat sketch explain negative sequence relay. (8)

ii) Explain clearly about current balance differential relays. (8)

(OR)

b) Explain impedance relay with suitable R-X diagrams. (16)

13. a) i) Explain clearly about Buchholz relay for the protection of incipient faults in transformers. (10)

ii) A star connected, 3 phase, 10 MVA, 6.6 KV alternator has a per phase reactance of 10%. It is protected by Merz-price circulating-current principle which is set to operate for fault currents not less than 175 A. Calculate the value of earthing resistance to be provided in order to ensure that only 10% of the alternator winding remains unprotected. (6)

(OR)

b) i) With neat sketch explain the protection schemes for motors. (8)

ii) With suitable diagrams explain bus bar protection. (8)

14. a) Describe the construction, working principle and operation of static over current relay. (16)

(OR)

b) i) Compare static relays with electromagnetic relays. (8)

ii) Explain the advantages of Numerical relays. (8)

15. a) i) With neat sketch explain resistance switching. (8)

ii) Explain current chopping with suitable diagrams. (8)

(OR)

b) Explain the construction, working principle, operation and application of Vacuum circuit breakers. (16)

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

Question Paper Code : 50494

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Seventh Semester

Electrical and Electronics Engineering

EE6702 – PROTECTION AND SWITCHGEAR

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. What is primary protection ?
2. Give the types faults.
3. Write the torque equation of the universal relay.
4. Give the principle of negative sequence relay.
5. Why secondary of transformer should not be opened ?
6. List the types of busbar protection.
7. Define static relay.
8. What is phase comparator ?
9. State the slepian theory for arc interruption.
10. Define symmetrical breaking capacity.

PART – B (5×16=80 Marks)

11. a) Explain the various methods of neutral grounding.

(OR)

b) What are the essential qualities of protective relay ? Explain in detail.

12. a) With neat diagram explain the various types of electromagnetic relays.

(OR)

b) Describe the construction and principle of operation of non-directional Induction type over current Relay.

13. a) Give a brief account on the protection of generator using differential and biased differential protection scheme.

(OR)

b) Give a brief account on the faults and protection of transformers.

14. a) Explain with neat block diagram the operation of static relay and list the advantages and disadvantages.

(OR)

b) Describe the operation of static over current relay with neat diagram.

15. a) Write short notes on :

i) Current chopping

ii) Resistance switching

(OR)

b) Describe the construction and principle of operation of Air blast circuit breaker.

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

Question Paper Code : 52935

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Electrical and Electronics Engineering

EE 6005 — POWER QUALITY

(Regulation 2013)

(Common to PTEE 6005 – Power Quality – for B.E. (Part – Time) Sixth Semester – Electrical and Electronics Engineering (Regulation – 2014))

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define voltage sag.

2. What is voltage imbalance in power quality?

3. What are the causes of voltage sags?

4. What are the mitigation techniques used for voltage sag compensation?

5. Define ferro resonance.

6. How to model a surge arrester in PSCAD?

7. Differentiate between harmonics and transients.

8. Give atleast two IEEE standards for harmonics.

9. What are the steps involved in power quality monitoring?

10. List some of the major power quality monitoring equipments.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss the following characteristics of power quality issue.

(i) Short duration variations (4)

(ii) Long duration variations (4)

(iii) Impulsive and oscillatory transients (5)

Or

(b) Draw and explain the CBEMA Curve in determining power quality.

12. (a) Illustrate the procedure for estimating voltage–sag performance.

Or

(b) Explain the role of Active series compensators and static transfer switches in mitigation of voltage sags with neat diagram.

13. (a) Discuss the various sources of over voltages that produce power quality problem.

Or

(b) Discuss the different methods of protection of transformers and cables against voltage transients.

14. (a) Describe the harmonic sources from commercial and industrial loads in detail.

Or

(b) Briefly discuss about the devices for controlling harmonic distortion that occur in power system.

15. (a) Describe briefly the various monitoring considerations to be adopted in power quality problems.

Or

(b) Explain in detail with necessary diagram the working principle and functioning of harmonic spectrum analyzer.

PART C — (1 × 15 = 15 marks)

16. (a) Write short notes on (3 + 3 + 3 + 3 + 3)

(i) DC offset

(ii) Harmonics

(iii) Inter harmonics

(iv) Notching

(v) Noise

Or

(b) Explain the working principle and functioning of Flicker meter with its functional block diagram.

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

Question Paper Code : 20436

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Seventh Semester

Electrical and Electronics Engineering

EE 6005 — POWER QUALITY

(Regulations 2013)

(Common to: PTEE 6005 – Power Quality for B.E. (Part-Time) – Sixth Semester – Electrical and Electronics Engineering)

Time : Three hours | Maximum : 100 marks

(Codes/ Tables/ Charts to be permitted, if any, may be indicated)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What do you mean by voltage sag and voltage swell?
2. Define power frequency variation.
3. What are the sources of short interruption?
4. Write the use of static transfer switch.
5. Define the term ferro resonance.
6. What is the need of low pass filter in transient protection?
7. What are the sources of harmonic distortion?
8. Write the IEEE standard for harmonic level in distribution system.
9. What is the need for power quality monitoring?
10. List out few quality measurement equipment's.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss about any four power quality issues, indicating more attention in power system. (13)

Or

(b) Explain the sources of power quality problems and mention the international standards used for monitoring. (13)

12. (a) Explain how voltage sag performance is estimated in power system network. (13)

Or

(b) Explain the causes of long interruptions and the principle of regulating the voltage. (13)

13. (a) Explain the methods used for protection of transformers and cables against over voltage. (13)

Or

(b) What are the types and causes of transients? Explain the principle of over voltage protection. (13)

14. (a) Explain briefly about sources of harmonics generation and waveform distortion. (13)

Or

(b) Write the principle of controlling harmonics and explain the devices used for it. (13)

15. (a) Explain different types of monitoring and diagnostic techniques for various power quality problems. (13)

Or

(b) Discuss the applications of expert systems for power quality monitoring with a block diagram. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Draw the CBEMA Curve and explain the significance of the terms used in it. (15)

Or

(b) Discuss the standard measuring instruments used for Power Quality Survey. (15)

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

Question Paper Code : 40980

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh Semester
Electrical and Electronics Engineering
EE6005 – POWER QUALITY
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Sketch the CBEMA curve.
2. Define DC offset. Mention its sources in power system.
3. List the international organization involved in framing PQ standards.
4. Name any four sag mitigation devices.
5. List out the sources of over voltages.
6. What is the need for EMTP studies ?
7. Mention any two harmonic sources from industrial loads.
8. Find the THD of the voltage waveform with the following harmonic frequency make up. Fundamental : 114 V; 3^{rd} harmonic : 4 V; 5gh harmonic : 2 V; 7^{th} harmonic 1 V.
9. What is harmonic analyser ?
10. What do you mean by PQ monitoring ?

PART – B **(5×16=80 Marks)**

11. a) Classify the power quality events. Explain in detail about various power quality issues with neat sketch. **(16)**

(OR)

b) What are the objectives of power quality standards ? Discuss about IEEE and IEC standards used for power quality issues. **(16)**

12. a) i) Explain the working of ferroresonant transformer with neat diagram. **(10)**

ii) Discuss about motor starting sag. **(6)**

(OR)

b) i) Explain how voltage sag performance is estimated. **(6)**

ii) Explain the role of UPS and SMES in mitigation of sag with neat diagram. **(10)**

13. a) What is the need for protection against over voltage ? Explain the basic principle of over voltage protection of load equipments. **(16)**

(OR)

b) Explain the phenomenon of ferroresonace with necessary sketch. What are the indicators of ferroresonance ? **(16)**

14. a) i) Discuss about the effects of harmonics. **(8)**

ii) In a single phase system, a sinusoidal source is connected to Non linear load. Explain the following terms for above operating condition with necessary equation. **(8)**

Real power
Reactive power
True power factor
Distortion factor
Displacement power factor.

(OR)

b) Discuss the role of passive and active filters in controlling harmonics distortion in power system. **(16)**

15. a) Explain IEC flicker meter with necessary block diagram. **(16)**

(OR)

b) i) Discuss about Disturbance analyzers and Harmonic analyzers. **(8)**

ii) Discuss about important Power Quality monitoring objectives. **(8)**

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

Question Paper Code : 50462

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Seventh Semester

Electrical and Electronics Engineering

EE 6005 – POWER QUALITY

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL the questions

PART – A **(10×2=20 Marks)**

1. Define under voltage.
2. What do you mean by power frequency variation ?
3. What is depth of the voltage dip ?
4. Define active series compensator.
5. What do you mean by capacitor switching ?
6. List the protection methods of cables against over voltages.
7. What is the significance of power quality indices ?
8. What is voltage and current distortion ?
9. Define power quality monitoring.
10. What is flicker meter ?

PART – B **(5×16=80 Marks)**

11. a) Discuss the following characteristics of power quality events.
    i) Short duration variations **(4)**
    ii) Long duration variations **(4)**
    iii) Discuss in detail about transients. **(8)**

    (OR)

    b) Discuss about the Computer Business Equipment Manufactures Associations (CBEMA). Explain about the events described in the curve. **(16)**

12. a) What is the need of estimating sag performance ? Explain the different methods of estimating voltage sag performance. **(16)**

(OR)

b) What are the different voltage sag mitigation techniques ? Explain in details. **(16)**

13. a) Write short notes on :
    i) Ferro Resonance **(8)**
    ii) Low pass filter. **(8)**

(OR)

b) Explain the various methods of protection against lighting. **(16)**

14. a) i) Explain the process of locating harmonic sources. **(8)**
    ii) Explain the harmonic sources from commercial and industrial loads. **(8)**

(OR)

b) What are the devices used for controlling harmonic distortion and explain their functions ? **(16)**

15. a) Give a brief account on disturbance analyser for power quality monitoring. **(16)**

(OR)

b) Explain briefly the application of expert system for power quality monitoring. **(16)**

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

Question Paper Code : 52966

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Electrical and Electronics Engineering

EE 6703 — SPECIAL ELECTRICAL MACHINES

(Regulation 2013)

(Common to PTEE 6703 – Special Electrical Machines for B.E. (Part-Time) – Sixth Semester – Electrical and Electronics Engineering – Regulation 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention some applications of synchronous reluctance motor.
2. Compare SyRM and Induction motor.
3. Draw the block diagram of the drive system of a stepping motor.
4. State some applications of stepper motor.
5. State the principle of operation of switched reluctance motor.
6. What are the types of power controllers used for SRM?
7. What are the advantages of brushless dc motor drives?
8. List the permanent magnet materials used in PMBLDC motors.
9. What are the types of PMSM?
10. Why PMSM operating in self controlled mode is known commutatorless dc motor?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the construction and principle of working of a universal motor and mention its applications.

Or

(b) Draw the phasor diagram and explain the performance characteristics of repulsion motor.

12. (a) Explain the operating principles, constructional features of three different types of stepper motor.

Or

(b) Explain the various modes of excitation of PM stepper motor with a bridge driver scheme.

13. (a) Describe the various power controller circuits applicable to switched reluctance motor and explain the operation of any one scheme with suitable circuit diagram.

Or

(b) Draw a schematic diagram and explain the operation of a "C"-dump converter used for the control of SRM.

14. (a) With relevant waveforms, derive the expression for torque and emf of PM brushless DC motor.

Or

(b) Describe the operation of power controllers for PMBLDC motor with neat diagram.

15. (a) Enumerate the design considerations of permanent magnet synchronous motor.

Or

(b) With necessary phasor diagram and circle diagram, describe torque speed characteristics of PMSM.

PART C — ($1 \times 15 = 15$ marks)

16. (a) A brushless PM sinewave motor has an open circuit voltage of 173V at its corner point speed of 3000 rpm. It is supplied from a p.w.m. converter whose maximum voltage is 200V rms. Neglecting resistance and all other losses, estimate the maximum speed at which maximum current can be supplied to the motor.

Or

(b) Derive the relationship between magnetic field intensity and flux density by performing the magnetic circuit analysis of a brushless dc motor on open circuit.

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

Question Paper Code : 20468

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Seventh Semester

Electrical and Electronics Engineering

EE 6703 — SPECIAL ELECTRICAL MACHINES

(Regulations 2013)

(Common to PTEE 6703 – Special Electrical Machines for B.E. (Part-Time) Sixth Semester – Electrical and Electronics Engineering – Regulations 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the torque-angle characteristics of synchronous reluctance motor.

2. What is reluctance torque in synchronous reluctance motor?

3. Classify the different types of stepping motors.

4. Define detente torque.

5. What are the types of rotor position sensors in switched reluctance motor?

6. What are the advantages of switched reluctance motor?

7. Why is the PMBLDC motor called electronically commutated motor?

8. Compare conventional DC motor and PMBLDC motor.

9. What are the features of permanent magnet synchronous motor?

10. Draw the phasor diagram of a permanent magnet synchronous motor.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Draw the steady state phasor diagram of synchronous reluctance motor. (6)

(ii) Draw and explain the speed-torque characteristics of synchronous reluctance motor. (7)

Or

(b) Describe the constructional details and working principle of synchronous reluctance motor. (13)

12. (a) Describe the static and dynamic characteristics of stepper motor. (13)

Or

(b) Explain the modes of operation of variable reluctance stepper motor. (13)

13. (a) Explain with a neat sketch, construction and working principle of SRM. (13)

Or

(b) What are the different types of power controllers used for SRM and explain the operation of any two scheme with suitable circuit diagram. (13)

14. (a) Sketch the structure of controller for PMBLDC motor and explain the functions of various blocks. (13)

Or

(b) Derive EMF equation for PMBL square wave DC motor. (13)

15. (a) Explain about self controlled PMSM drive by employing load commutated thyristor inverter. (13)

Or

(b) Explain the microprocessor based control of PMSM with a neat block diagram. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Discuss the applications areas of different special electrical machines? (15)

Or

(b) A stepper motor driven by a bipolar drive circuit has the following parameters:

Winding inductance = 30 mH, rated current = 3A, DC supply = 45 V, total resistance in each phase = 15Ω. When the transistors are turned off, determine (i) the time taken by the phase current to delay to zero and (ii) the proportion of the stored inductive energy returned to the supply. (15)

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

Question Paper Code : 41013

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh Semester
Electrical and Electronics Engineering
EE6703 – SPECIAL ELECTRICAL MACHINES
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. Mention any two advantages of synchronous reluctance motors.
2. Define 'Reluctance Torque' with reference to synchronous reluctance motor.
3. What are the different modes of excitation in a stepper motor ?
4. What is meant by Lead angle in stepper motors ?
5. What is the need for shaft position sensor for Switched Reluctance Motor ?
6. Draw the speed-torque characteristics of Switched Reluctance Motor.
7. List any four permanent magnet materials.
8. State some important applications of Permanent Magnet Brushless DC Motors.
9. Write the important features of Permanent Magnet Synchronous Motor.
10. State the types of power controllers for Permanent Magnet Synchronous Motor.

PART – B (5×16=80 Marks)

11. a) Explain the constructional details and working principle of synchronous reluctance motor with neat diagrams. (10+6)

(OR)

b) Explain the phasor diagram and characteristics of synchronous reluctance motor. (10+6)

12. a) i) Describe the principle of operation of hybrid stepper motor. **(8)**

ii) Explain briefly a closed-loop operation system using a microprocessor for a hybrid stepping motor. **(8)**

(OR)

b) i) Explain the mechanism of static torque production in a variable reluctance stepping motor. **(10)**

ii) Describe the dynamic characteristics of a variable reluctance stepper motor. **(6)**

13. a) Draw the cross sectional view of switched reluctance motor and explain the principle of operation. State the advantages of switched reluctance motor. **(10+6)**

(OR)

b) Draw and explain four converter topologies for a 3-phase SRM. Write the merits and demerits of each topology. **(16)**

14. a) i) Explain the magnetic circuit analysis of permanent magnet brushless DC motor on open-circuit. **(10)**

ii) Derive the EMF equation of permanent magnet brush less DC motor. **(6)**

(OR)

b) i) Draw and explain the general structure of a controller for a permanent magnet brush less DC motor. **(8)**

ii) Describe the torque/speed curve of the ideal burshless DC motor. **(8)**

15. a) For an ideal sine wave permanent magnet motor, derive the EMF and Torque equations. **(8+8)**

(OR)

b) i) Describe the construction of phasor diagram of surface-magnet sine wave motor. **(8)**

ii) Explain the torque/speed characteristic of sine wave motor. **(8)**

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

Question Paper Code : 50495

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Seventh Semester
Electrical and Electronics Engineering
EE 6703 – SPECIAL ELECTRICAL MACHINES
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. Compare synchronous reluctance motor and induction motor.
2. Classify the different types of synchronous reluctance motor.
3. Name the various modes of excitation in stepper motor.
4. Distinguish the half step and full step operations of a stepper motor.
5. Illustrate the different modes of operation of switched reluctance motor.
6. Give the advantages of sensorless operation of switched reluctance motor.
7. What is the principle of operation of PMBLDC motor.
8. Write down the torque equation of PMBLDC motor.
9. What are the types of PMSM ?
10. State the power controllers for PM synchronous machines.

PART – B (5×16=80 Marks)

11. a) i) Discuss in detail about the construction and working of synchronous reluctance motor with neat diagrams. (8)

    ii) Draw and explain phasor diagram with characteristics of synchronous reluctance motor. (8)

(OR)

b) Describe the constructional features and operation of variable reluctance synchronous reluctance motor. (16)

12. a) Draw and explain the drive circuits and their performance characteristics for stepper motor. **(16)**

(OR)

b) With a neat block diagram explain microprocessor control of stepper motor. **(16)**

13. a) Explain with a neat circuit any two configuration of power converters used for the control of switched reluctance motor. **(16)**

(OR)

b) Explain with a neat diagram the constructional details and working of rotary switched reluctance motor. **(16)**

14. a) Discuss in detail about magnetic circuit analysis of PMBLDC motor. Also draw its characteristics. **(16)**

(OR)

b) Prove that the torque equation in BLDC motor is similar to that of conventional DC motor. **(16)**

15. a) Derive the expression for power input and torque of a PMSM. Explain how its torque speed characteristics is obtained. **(16)**

(OR)

b) Explain the construction and working principle of operation of PMSM. **(16)**

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 mechanicalblock. 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-eastern 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 is within the campus.

HISTORY OF THE DEPARTMENT

<table>
<tr><th colspan="2">B.E. - Electrical and Electronics Engineering</th><th colspan="2">M.E. - Power Systems Engineering</th><th colspan="2">Ph.D.</th></tr>
<tr><td rowspan="4">Year of start & History of Intake</td><td>1994, with an intake of 40</td><td rowspan="4">Year of start & History of Intake</td><td>2004, with an intake of 18</td><td>Year of Recognition as Research Centre</td><td>December 2012</td></tr>
<tr><td>1996, with an intake of 60</td><td rowspan="3">2012, with an intake of 24</td><td rowspan="2">First Renewal</td><td rowspan="2">December 2015, December 2018</td></tr>
<tr><td>2002, with an intake of 90</td></tr>
<tr><td>2011, with an intake of 120</td><td>Second Renewal</td><td>December2018, upto December 2021</td></tr>
<tr><td colspan="5">Both UG & PG programs are permanently affiliated to Anna University, Chennai.</td><td></td></tr>
<tr><th colspan="5">Accreditation status</th><td></td></tr>
<tr><td>First Accreditation</td><td>Second Accreditation</td><td>Third Accreditation</td><td>Fourth Accreditation</td><td>Fifth Accreditation</td></tr>
<tr><td>3 YEARS W.E.F. 19-3-2004</td><td>3 YEARS W.E.F. 19-7-2008</td><td>2 YEARS W.E.F. 05-08-2013</td><td>Academic Year 2016-17,2017-18 and 2018-19, i.e., upto 30-06-2019</td><td>Academic year 2019 -2020 , 2020-2021, 2021-2022 i.e., upto 30.06.2022</td></tr>
</table>

FACULTY PROFILE as on July 2019

Ph.D's	Doing Ph.D	M.E.
9	3	9
Professors	**Associate Professor**	**Assistant Professor**
5	4	12

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), an intake of 60 in 1996, an intake of 90 in 2002 (F.No:730-52-227(E)/ET/97 dated 19.06.2002), 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), Re-accredited (Third time - For 2 years w.e.f. 28-08-2012), Re-accredited (Fourth time - For 3 years w.e.f. July 2016, upto 30.06.2019, F.No. 33-01/2010-NBA, dated 04.02.2017), Re-accredited (Fifth time - For 3 years w.e.f. July 2018, upto 30.06.2022, F.No. 33-01/2010-NBA, dated 22.03.2019) 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) (Renewed upto December 2018, Lr.No. 4904/IR/EEE/AR1 dated 18.02.2016) , (Renewed upto December 2021, Lr.No. 4904/IR/EEE/AR2 dated 29.01.2019).
- 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).
- Department of Science and Technology (DST), sanctioned financial assistance of Rs.19,75,800-/- for the project entitled '**Smart Meter for measuring Power Quality Disturbances using GSM Technology**', Dr.K.Gnanambal, Professor/EEE is the Principal Investigator (Ref. No. IDP/IND/4/2015 dated 03.08.2016).
- Department of Science & Technology (DST) sanctioned financial assistance of Rs. 36.5 lakhs for the project entitled " **Design & Development of Sensor based Sewage Block Remover & Management System**" - **Dr. S. Parthasarathy, Prof/EEE** is the Principal Investigator. (D.O. No. DST/TDT/ EAG/DDP- 03/2018 dated 11.06.2018.
- TUV SUD South Asia Private Limited, Chennai sanctioned a financial assistance of Rs.31.7 lakhs for the project **entitled " Investment Grade Energy Audit in street lighting system and preparing detailed project report for implementing Energy Saving mechanism in street lighting system in the 19 Designated Municipalities in Madurai Region"** -Dr. S. Venkatanarayanan, Prof/ EEE is the Principal Investigator. (PO No. 2800003104, version 5 dated 19.12.2017

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 25 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.
- Consultancy work on 'Industrial Harmonic Study' and 'Energy Audit' is being carried out regularly by the experienced professors.

5.STUDENTS

- Students secured 108 University Ranks in B.E.-EEE (1998 to 2018) and 18 University Ranks in M.E.-Power Systems Engineering (2007 to 2018) with **Gold medal** in 2000 (UG - EEE) and in 2011 (PG - Power Systems Engineering). Sweety Jain of 2005-2009 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. The college received appreciation award for IEEE Student Chapter Activities from IEEE, Madras Section for the year 2015 and 2016. The EEE department recognized as IEI Best Division Award for the Academic year 2016-2017.
- 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.	Dr. P.Loganthurai	Associate Professor	9952112115	loganthurai@yahoo.co.in
8.	Dr. M.Jegadeesan	Associate Professor	9524499063	m_jegadeesan07@rocketmail.co
9.	Dr. C.Vimala Rani	Associate Professor	-	jaysanjayvim@gmail.com
10.	S.Manoharan	AP(Sr.Gr.)	9715585524	sharpmano@yahoo.com
11.	M.Ganesh Kumari	AP(Sr.Gr.)	-	gnshkumari@gmail.com
12.	M.Jeyamurugan	AP(Sr.Gr.)	9600637578	jeyam3182@gmail.com
13.	Dr.A.P.S.Ramalakshmi	Assistant Professor	-	ramalakshmi.aps@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.	R.Jeyapandiprathap	Assistant Professor	9788671119	jprathap03@gmail.com
18.	N.Vimal Radha Vignesh	Assistant Professor	9894965475	nvimalvignesh@gmail.com
19.	A.Manoj	Assistant Professor	9487526428	manojhails@gmail.com
20.	V.Sindhu	Assistant Professor	-	savisindhu@yahoo.co.in
21.	R.Sridevi	Assistant Professor	-	sridevirs87@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 / Python 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							
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, 10th ,+2 mark sheets, 10th /+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 6th 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.

7. Share only legal, ethical, non-political, educational value based information/ photos/videos with your friends or any others through social media. Posting of illegal/political/unethical/ information/comments will spoil your career. Remember that all such communications in social media/mails are continuously monitored and recorded by intelligent agencies in the country and abroad, due to security threats.

8. Don't involve teasing of students of your class, juniors or seniors in the classrooms, laboratories or in hostels. Don't loan the cell phone to anyone. Also don't keep your cell phone easily accessible by anyone.

9. Don't send obscene messages or pictures through cell phones/ internet to anyone. Defaulters will be easily tracked by Cyber Crime Agencies. Don't purchase/loan someone's laptop/mobile phone, due to theft complaints.

10. Avoid two wheeler riding for long travelling, and night travelling. Wear helmet. Follow traffic rules. Lot of accidental deaths reported due to negligence of traffic rules. About 1.5lakhs of people lost their life in accidents in our country every year.

11. For any transaction of money, use cheques or bank accounts(for more than Rs. 10,000/-) because finding fake notes is difficult.

12. Always keep 10 passport and stamp size photographs, 10 no.s of revenue stamps, all ID proofs whenever going for banks/pass port office.

13. Keep at least email ids and good friendship of 25 students of your branch who have been placed in different companies. Collect background information on core/IT companies(minimum 25)

14. Develop good reading habit/read News papers daily/watch news channel daily/Watch films nominated for Oscar award.Watch channels like Discovery/Nat Geo/History/ any other news channels.(not more than an hour)

15. Speak in English only. Develop good writing skills by reading books.

16. Have a Desk top/Laptop, Printer before entering 5th semester.

17. Have internet facility in home for educational purpose. Keep all NPTEL material.

18. Keep all kind of stationary in your table for use at any time [pencil, sharpener, eraser, ball point pen of different colours, sketches, bell clip, stapler, single punch, tag, gum, knife,scissors,A4 paper, cello tap, emergency lamp, scale, protractor, compass, pen drive, CD,

whitener, calculator, diary, stapler pin box]

19. Never transfer/ deposit money to any unknown mail. Beware of fraud/cheating by any one.

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 6th 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 (walkable 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.

Developing Leadership Skills

No one is a born leader; everyone can develop leadership skills and everyone can benefit from using them. First, take time to honestly analyze yourself. Learn to understand yourself. It's the first step to understanding others. Consider these important questions:

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

Ask yourself these questions:

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

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

1) Communicate effectively:

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

Try these steps to effective communication:

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

• Thank people for their openness -- stress how much you value it -- even if you don't like specifically what is being said.
• Point to areas of agreement before jumping on areas of disagreement - this reduces defensiveness; members wont fear being "attacked."
• Set aside your authority to create an atmosphere of partnership to reduce fear in group members.
• Promote a culture of constructive dissent - though not to the point of paralysis.
• Portray disagreement as simply a difference of opinion. Get rid of the "I'm right, you're wrong" attitude.

2) Encourage enthusiasm and a sense of belonging. Show:
• Friendliness: others will be more willing to share ideas if you're interested in them as people too.
• Understanding: everyone makes mistakes. Try to be constructive, tolerant and tactful when offering criticism.
• Fairness: equal treatment and equal opportunity lead to an equally good effort from all group members.
• Integrity: members will take tasks more seriously if you show that you're more interested in group goals than your own personal gain.

3) Keep everyone working toward agreed upon goals:
• Remind everyone of the group's purposes from time to time. It's easy to become too narrowly focused and lose sight of the larger goals.
• Provide encouragement and motivation, by showing your appreciation for good ideas and extra effort.
• Harmonize differences and disagreements between group members by stressing compromise and cooperation.
• Involve everyone in discussions and decisions, even if asking for opinions and ideas means a longer discussion.

4) Get to know the people around you Everyone has different abilities, wants, needs, and purpose in life.
To get along with others and get results, you need to get to know them.
• Interact with group members as often as possible. The only way to get to know someone is through direct personal contact.
• Become familiar with every member of your group. Take note of each person's unique qualities and characteristics.

5) Treat others as individuals
Put your knowledge and understanding of each group member to work!
• Be aware of expectations. Everyone expects something different: recognition, a chance to learn, a chance to work with other people, etc.
• Be creative. A repetitious routine can cause boredom. A successful leader thinks of new and better approaches to old ways of doing things.
• Provide rewards. Recognition by the group is a source of personal satisfaction and positive reinforcement for a job well done.
• Delegate responsibilities. If everyone shares the work, everyone can share pride in the group's accomplishments. Let each member know what's expected of him/her, available resources, deadlines, etc.

6) Accept responsibility for getting things done
• Take the initiative. Why stand around and wait for someone else to get things started? Set an example.
• Offer help and information. Your unique knowledge and skills may be just what's needed.

• Seek help and information. Ask for advice if you need it. This will encourage group involvement and help accomplish group goals.
• Make things happen. By being decisive, energetic, and enthusiastic, you can and will help get things done!
• Know when and how to say “no.” If your time and resources are already committed, turn down extra tasks, but do it nicely.

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

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

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

Tips for Effective Communication

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

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

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

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

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

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

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

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

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

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

All India Installed Capacity (in MW) of Power Stations

This is a **list of states and territories of India by installed capacity of power utilities** with electricity generation mode break-up as on **31 January 2019** with figures in Megawatts.

ALL INDIA INSTALLED CAPACITY (IN MW) OF POWER STATIONS

(As on 31.03.2019)
(UTILITIES)

Region	Ownership/ Sector	Modewise breakup								
		Thermal					Nuclear	Hydro	RES * (MNRE)	Grand Total
		Coal	Lignite	Gas	Diesel	Total				
Northern Region	State	16344.00	250.00	2879.20	0.00	19473.20	0.00	8697.55	699.56	28870.31
	Private	21680.83	1080.00	558.00	0.00	23318.83	0.00	2514.00	13120.46	38953.29
	Central	12335.37	250.00	2344.06	0.00	14929.43	1620.00	8496.22	379.00	25424.65
	Sub Total	**50360.20**	**1580.00**	**5781.26**	**0.00**	**57721.46**	**1620.00**	**19707.77**	**14199.02**	**93248.25**
Western Region	State	21560.00	1040.00	2849.82	0.00	25449.82	0.00	5446.50	547.89	31444.21
	Private	34745.67	500.00	4676.00	0.00	39921.67	0.00	481.00	21864.76	62267.43
	Central	16502.95	0.00	3280.67	0.00	19783.62	1840.00	1620.00	666.30	23909.92
	Sub Total	**72808.62**	**1540.00**	**10806.49**	**0.00**	**85155.11**	**1840.00**	**7547.50**	**23078.94**	**117621.55**
Southern Region	State	19932.50	0.00	791.98	287.88	21012.36	0.00	11774.83	586.88	33374.07
	Private	11874.50	250.00	5322.10	273.70	17720.30	0.00	0.00	37491.40	55211.70
	Central	11235.02	2890.00	359.58	0.00	14484.60	3320.00	0.00	541.90	18346.50
	Sub Total	**43042.02**	**3140.00**	**6473.66**	**561.58**	**53217.26**	**3320.00**	**11774.83**	**38620.18**	**106932.27**
Eastern Region	State	6240.00	0.00	100.00	0.00	6340.00	0.00	3537.92	275.11	10153.03
	Private	6387.00	0.00	0.00	0.00	6387.00	0.00	399.00	1116.37	7902.37
	Central	14836.64	0.00	0.00	0.00	14836.64	0.00	1005.20	10.00	15851.84
	Sub Total	**27463.64**	**0.00**	**100.00**	**0.00**	**27563.64**	**0.00**	**4942.12**	**1401.48**	**33907.24**
North Eastern Region	State	0.00	0.00	497.71	36.00	533.71	0.00	422.00	233.25	1188.95
	Private	0.00	0.00	24.50	0.00	24.50	0.00	0.00	61.04	85.54
	Central	770.02	0.00	1253.60	0.00	2023.62	0.00	1005.00	30.00	3058.62
	Sub Total	**770.02**	**0.00**	**1775.81**	**36.00**	**2581.83**	**0.00**	**1427.00**	**324.29**	**4333.11**
Islands	State	0.00	0.00	0.00	40.05	40.05	0.00	0.00	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.38	7.38
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	Sub Total	**0.00**	**0.00**	**0.00**	**40.05**	**40.05**	**0.00**	**0.00**	**17.73**	**57.78**
ALL INDIA	State	64076.50	1290.00	7118.71	363.93	72849.13	0.00	29878.80	2347.93	105075.86
	Private	74688.00	1830.00	10580.60	273.70	87372.30	0.00	3394.00	73661.40	164427.70
	Central	55680.00	3140.00	7237.91	0.00	66057.91	6780.00	12126.42	1632.30	86596.63
	Total	**194444.50**	**6260.00**	**24937.22**	**637.63**	**226279.34**	**6780.00**	**45399.22**	**77641.63**	**356100.19**

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GOVERNMENT OF INDIA

MINISTRY OF SKILL DEVELOPMENT AND ENTERPRENEURSHIP

DIRECTORATE GENERAL OF TRAINING

ADVANCED TRAINING INSTITUTE

(AN ISO 29990 : CERTIFIED)

Guindy, CHENNAI, Tamilnadu

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ATI Chennai : Regular Course Training Schedule

Advanced Vocational Training Scheme (AVTS) - Short Term Programme

Annual Training calendar April 2018 – March 2019

(Short Term Skill Training Programme)

		GOVENMENT OF INDIA ,MINISTRY OF SKILL DEVELOPMENT ENTREPRENEURSHIP			
		NATIONAL SKILL TRAINING INSTITUTE(NSTI/ATI) ,CHENNAI-32			
		TRAINING CALENDER FOR 2019-2020			
		ELECTRICAL CONTROL MAINTENANCE			
Sl.No	Course Code	Name of the Course	Duration	From	To
1	10101	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	01.04.2019	05.04.2019
2	10103	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	10.06.2019	14.06.2019
3	10104	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	15.07.2019	19.07.2019
4	10105	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	19.08.2019	23.08.2019
5	10106	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	23.09.2019	27.09.2019
6	10107	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	21.10.2019	25.10.2019
7	10108	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	11.11.2019	15.11.2019
8	10109	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	09.12.2019	13.12.2019
9	10110	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	30.12.2019	03.01.2020
10	10111	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	03.02.2020	07.02.2020
11	10112	PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCHGEAR PROTECTION	1	09.03.2020	13.03.2020
12	10201	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	08.04.2019	12.04.2019
13	10203	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	17.06.2019	21.06.2019
14	10204	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	22.07.2019	26.07.2019
15	10205	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	26.08.2019	30.08.2019
16	10206	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	28.10.2019	01.11.2019
17	10207	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	02.12.2019	06.12.2019
18	10208	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	06.01.2020	10.01.2020
19	10209	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	10.02.2020	14.02.2020
20	10210	OPERATION & MAINTENANCE OF POWER TRANSFORMER	1	16.03.2020	20.03.2020
21	10301	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	22.04.2019	26.04.2019
22	10303	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	24.06.2019	28.06.2019
23	10304	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	29.07.2019	02.08.2019
24	10305	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	09.09.2019	13.09.2019
25	10306	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	30.09.2019	04.10.2019
26	10307	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	04.11.2019	08.11.2019
27	10308	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	25.11.2019	29.11.2019
28	10309	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	13.01.2020	17.01.2020

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Advanced Vocational Training Scheme (AVTS) - Short Term Programme

Annual Training calendar April 2018 – March 2019

(Short Term Skill Training Programme)

29	10310	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	17.02.2020	21.02.2020
30	10311	OPERATION & CONTROL OF INDUSTRIAL AC/DC MOTORS AND ITS DRIVES	1	23.03.2020	27.03.2020
31	10401	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	29.04.2019	03.05.2019
32	10402	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	27.05.2019	31.05.2019
33	10403	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	01.07.2019	05.07.2019
34	10404	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	05.08.2019	09.08.2019
35	10405	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	16.09.2019	20.09.2019
36	10406	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	14.10.2019	18.10.2019
37	10407	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	16.12.2019	20.12.2019
38	10408	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	20.01.2020	24.01.2020
39	10409	IMPORTANCE & APPLICATION OF ELECTRICAL SAFETY AT WORKPLACE & FIRST AID	1	24.02.2020	28.02.2020
		ELECTRONIC CONTROL MAINTENANCE			
40	20101	SIEMENS S7-400 PLC PROGRAMMING (TIA PORTAL) LEVEL- 1	1	01.04.2019	05.04.2019
41	20102	SIEMENS S7-400 PLC PROGRAMMING (TIA PORTAL) LEVEL- 1	1	10.06.2019	14.06.2019
42	20103	SIEMENS S7-400 PLC PROGRAMMING (TIA PORTAL) LEVEL- 1	1	15.07.2019	19.07.2019
43	20104	SIEMENS S7-400 PLC PROGRAMMING (TIA PORTAL) LEVEL- 1	1	14.10.2019	18.10.2019
44	20105	SIEMENS S7-400 PLC PROGRAMMING (TIA PORTAL) LEVEL- 1	1	04.11.2019	08.11.2019
45	20106	SIEMENS S7-400 PLC PROGRAMMING (TIA PORTAL) LEVEL- 1	1	30.12.2019	03.01.2020
46	20107	SIEMENS S7-400 PLC PROGRAMMING (TIA PORTAL) LEVEL- 1	1	03.02.2020	07.02.2020
47	20201	8051 PROGRAMMING AND APPLICATIONS	1	08.04.2019	12.04.2019
48	20202	8051 PROGRAMMING AND APPLICATIONS	1	06.05.2019	10.05.2019
49	20203	8051 PROGRAMMING AND APPLICATIONS	1	17.06.2019	21.06.2019
50	20204	8051 PROGRAMMING AND APPLICATIONS	1	01.07.2019	05.07.2019
51	20205	8051 PROGRAMMING AND APPLICATIONS	1	05.08.2019	09.08.2019
52	20206	8051 PROGRAMMING AND APPLICATIONS	1	28.10.2019	01.11.2019
53	20207	8051 PROGRAMMING AND APPLICATIONS	1	18.11.2019	22.11.2019
54	20208	8051 PROGRAMMING AND APPLICATIONS	1	17.02.2020	21.02.2020
55	20301	DIGITAL ELECTRONICS & THEIR APPLICATIONS	1	22.04.2019	26.04.2019
56	20302	DIGITAL ELECTRONICS & THEIR APPLICATIONS	1	24.06.2019	28.06.2019
57	20303	DIGITAL ELECTRONICS & THEIR APPLICATIONS	1	29.07.2019	02.08.2019
58	20304	DIGITAL ELECTRONICS & THEIR APPLICATIONS	1	20.01.2020	24.01.2020
59	20305	DIGITAL ELECTRONICS & THEIR APPLICATIONS	1	24.02.2020	28.02.2020
60	20306	DIGITAL ELECTRONICS & THEIR APPLICATIONS	1	23.03.2020	27.03.2020
61	20401	PIC MICROCONTROLLER PROGRAMMING AND APPLICATIONS	1	29.04.2019	03.05.2019

62	20402	PIC MICROCONTROLLER PROGRAMMING AND APPLICATIONS	1	13.05.2019	17.05.2019
63	20403	PIC MICROCONTROLLER PROGRAMMING AND APPLICATIONS	1	08.07.2019	12.07.2019
64	20404	PIC MICROCONTROLLER PROGRAMMING AND APPLICATIONS	1	16.09.2019	20.09.2019
65	20405	PIC MICROCONTROLLER PROGRAMMING AND APPLICATIONS	1	09.12.2019	13.12.2019
66	20406	PIC MICROCONTROLLER PROGRAMMING AND APPLICATIONS	1	27.01.2020	31.01.2020
67	20407	PIC MICROCONTROLLER PROGRAMMING AND APPLICATIONS	1	02.03.2020	06.03.2020
68	20501	COMPUTER HARDWARE MAINTENANCE AND NETWORKING	1	20.05.2019	24.05.2019
69	20502	COMPUTER HARDWARE MAINTENANCE AND NETWORKING	1	22.07.2019	26.07.2019
70	20503	COMPUTER HARDWARE MAINTENANCE AND NETWORKING	1	21.10.2019	25.10.2019
71	20504	COMPUTER HARDWARE MAINTENANCE AND NETWORKING	1	06.01.2020	10.01.2020
72	20505	COMPUTER HARDWARE MAINTENANCE AND NETWORKING	1	10.02.2020	14.02.2020
73	20601	BASICS OF COMPUTER & MS OFFICE	1	27.05.2019	31.05.2019
74	20602	BASICS OF COMPUTER & MS OFFICE	1	26.08.2019	30.08.2019
75	20603	BASICS OF COMPUTER & MS OFFICE	1	25.11.2019	29.11.2019
76	20604	BASICS OF COMPUTER & MS OFFICE	1	16.12.2019	20.12.2019
77	20605	BASICS OF COMPUTER & MS OFFICE	1	16.03.2020	20.03.2020
78	20701	PCB DESIGNING AND REWORKING	1	03.06.2019	07.06.2019
79	20702	PCB DESIGNING AND REWORKING	1	23.09.2019	27.09.2019
80	20703	PCB DESIGNING AND REWORKING	1	02.12.2019	06.12.2019
81	20704	PCB DESIGNING AND REWORKING	1	09.03.2020	13.03.2020

List of PSUs through GATE Exam

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

Lists of TOP 10 software companies to offer jobs in India

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

Lists of TOP 10 core companies to offer Electrical jobs

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

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

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

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

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

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

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

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

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

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

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

Bajaj Electricals is a leader in the field of electrical equipment and headquartered in Mumbai. It is one of the top 5 electrical companies in India having 19 branch offices across India. Bajaj Electricals provides

complete range of consumer durable such as fan, electrical appliances, lighting which includes tubes, lamps etc.

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

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

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

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

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

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

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

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

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Lists of core companies to offer Electrical jobs in India

Types of Electrical Core Companies

Electrical motors and Generators

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

Consultancy (Electrical Engineering)

1. APJ Projects http://www.apjprojects.com
2. Consolidated Consultants and Engineers Pvt. Ltd http://www.consolidatedconsultants.com
3. DSON Enterprises http://www.dsonenterprises.com
4. Eltech Engineers http://www.eltechindia.com/
5. John Mech-El Technologies (P) Ltd http://www.johnmech-el.com/
6. Mandvi Electric Works http://www.bicserve.com/

7. Miraj Instrumentation Services http://www.mirajinstrumentation.com
8. PG Associates http://www.engineeringconsultant.in
9. Power Gem Engineers - Consultants in Power Generation. http://www.powergem.com/
10. Secon Engineers http://www.seconindia.com
11. Shanti Enterprises Electricals Limited http://www.shantielectricals.com
12. Shashi Electricals http://www.shashielectricals.com
13. SK Systems http://www.sksystem.com
14. Tata Consulting Engineers http://www.tce.co.in
15. Nutronics India http://www.nutronicsindia.com/

Electrical appliances

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

1. Ace Bimetalliks India Pvt. Ltd. http:// www.aceelectricals.com
2. Aditron India Pvt. Ltd. (Engineering Division) http://www.aiplen.com
3. Admir Ovens http://www.admir.com
4. Arvind Anticor Ltd http://www.picklingplant.com
5. Asiatic Electronic Industries. http://www.asiatic-india.com/
6. Axis Electrical Components India Pvt. Ltd. http://www.axis-india.com
7. Balar Marketing Pvt. Ltd http://www.allelectricalproducts.com/
8. Bhartia Industries Limited http://www.bchindia.com
9. Brass Copper & Alloy (I) Ltd. http://www.hexworldwide.com
10. Brightech Valves and Controls Pvt. Ltd. http://www.brightechvalves.com
11. Caltech Engineering Services http://www.caltechindia.com
12. Color Design India http://www.colordesigntech.com/
13. Consult Techniques (I) Pvt. Ltd http://www.consulttechnique.com/

14. Deki Electronics Ltd. http://www.dekielectronics.com
15. Elpro International Limited http://www.elproindia.com/

16. Elymer http://www.elymer.com
17. E S Electronics (India) Pvt. Ltd http://www.energysaversindia.com/
18. Finetech Engineering Corporation http://www.finetechindia.com
19. Gayatri Control, Ahmedabad http://www.gayatricontrol.com/
20. Gemscab Industries Ltd http://www.gemscab.com/
21. Hallmark Electronics http://www.hallmarkelect.com/
22. India International House Ltd http://www.builderhardware.com/
23. Jaykrishna magnetics pvt.ltd http://www.jkmagnetics.com
24. Leotech Group http://www.leotechindia.com/
25. Maxx Mobile Phone Accessories Pvt. Ltd http://www.maxmobile.co.in
26. Mehta Engineering Enterprise http://www.mehtaswitch.com
27. Mehta Tubes Ltd http://www.mehta-group.com/
28. Mellcon Engineers http://www.mellcon.com
29. Micromot Controls http://www.micromotcontrols.com
30. Muskaan Engineers http://www.electricitysaver.com/
31. Neelam Import Pvt. Ltd. http://www.cellking.org
32. Onload Gears http://www.onloadgears.com/
33. Orton Engineering Pvt. Ltd, Thane http://www.ortonengineering.com/
34. Persang Alloy Industries http://www.webmasterindia.com/persangalloy
35. PMT Engineers http://www.pmtengineers.com
36. Powercap Systems (Madras) Pvt. Ltd http://www.transformersindia.com/
37. Powertek Equipment Company http://www.powertekindia.com/
38. Pragati Electrocom Pvt. Ltd http://www.pragatielectrocom.com/
39. Pran Electronics Pvt. Ltd. http://www.pranelectronics.com
40. Precicraft Components India Pvt. Ltd http://www.precicraft.com/
41. Prima Automation India Pvt. Ltd http://www.prima-automation.com/
42. Rittal India Pvt Ltd http://www.rittal-india.com
43. Sanghi Yantra Udyog http://www.skyuindia.com/
44. SKN - Bentex Group of Companies. http://www.sknbentex.com/
45. South India Industrial Suppliers http://siis-india.com/bus_bar_support.html
46. Square Automation Pvt. Ltd http://www.squareautomation.com/
47. Sudhir Switchgears http://www.sudhirswitchgears.com
48. Syntron Controls http://www.syntron-controls.com
49. Torque Master Tools Pvt. Ltd http://www.torquemasterindia.com/
50. United Core http://www.unitedcores.com/
51. Utiliti Controls http://www.utiliticontrols.com/
52. valrack modular systems pvt.ltd http://www.valrack.com
53. Wavetronics http://www.wavetronicsindia.com
54. Rane Holdings Limited http://www.rane.co.in

Lighting & luminaries

1. A.K. Electricals http://www.akelectricals.com/
2. APCO India http://www.indiabizclub.net/Electrical/APCO_INDIA.html
3. Aquascape engineers http://www.fountainsnozzles.com
4. Arihant Enterprises : http://www.arihantsecurityindia.com/
5. Atlas Electricals www.indiabizclub.net/Electrical/ATLAS_ELECTRICALS.html
6. Baliga Lighting http://www.baliga.com/
7. Crompton Greaves Limited. http://www.cglonline.com/
8. Decon Lighting http://deconlighting.com

9. GE Lighting India http://www.gelighting.com/india/index.html
10. Jain Industrial Lighting Corporation http://www.indiamart.com/jilco/
11. Jayanta Lamp Industries Pvt.Ltd : http://www.jayantagroup.com
12. Kuber Lighting Pvt Ltd http://www.kuber.biz
13. Litray Lighting : http://www.litraylighting.com/
14. Mindscreen Pvt. Ltd. http://www.mindscreenfilms.com/
15. Peralites http://www.indiabizclub.net/Electrical/PEARLITES.html
16. Sam International http://www.indiamart.com/
17. Shyam Electricals - http://www.shyamelectricals.com/
18. Hpl Electric & Power Pvt.Ltd http://www.hplindia.com

Power Generation

1. Advance Engineering Company - http://www.advanceengineering.com/
2. APGENCO http://www.apgenco.com/
3. Birla Power Solutions Limited http://www.birlapower.com
4. Dyna Hitech Power Systems Ltd http://www.dynahitech.com
5. Essar Group http://www.essar.com/Group/group.asp
6. Essar Power Ltd. http://www.essar.com/
7. Jindal Steel & Power Ltd. http://www.jindalsteelpower.com
8. Kaiga Atomic Power Station http://www.npcil.org/docs/kaigaps.htm
9. Kakrapar Atomic Power Station http://www.npcil.org/docs/kaps.htm
10. Kirloskar Electric Co http://www.kirloskar-electric.com/
11. Lanco Industries http://www.lancogroup.com/groups/kpower/kpower.html
12. Madras Atomic Power Station (MAPS) http://www.npcil.org/
13. Magnum Power Generation Ltd http://www.magnumgrouponline.com/power/
14. Narora Atomic Power Station http://www.npcil.org/docs/naps.htm
15. National Thermal Power Corporation (NTPC) http://www.ntpc.co.in
16. NEPC India Ltd http://www.nepcindia.com
17. PTC India http://www.ptcindia.com
18. Rajasthan Atomic Power Station (RAPS) http://www.npcilraps.com/
19. Rajasthan Renewable Energy Corporation Limited (RRECL) http://www.rrecl.com/
20. Reliance Energy http://www.rel.co.in
21. Tarapur Atomic Power Station http://www.npcil.org/docs/taps.htm
22. Tata Electric Companies http://www.tata.com
23. Tata Power http://www.tatapower.com/
24. Techno Instrument India Pvt.Ltd web site url: http://www.tiiindia.com/
25. Torrent Power web site url: http://www.torrentpower.com/
26. Uttar Pradesh Power Corporation Ltd http://www.uppcl.org/
27. ABB Ltd www.abb.co.in/
28. Adani Power Ltd www.adanipower.com/
29. Aplab Ltd www.aplab.com/
30. BF Utilities Ltd www.bfutilities.com/
31. CESC Ltd. www.cescltd.com/

32. CMI Ltd. www.cmilimited.com.au/
33. DLF Power Limited www.eipowertech.com/dlf_power_limited.htm
34. DPSC Ltd www.dpscl.com/
35. Energy Development Company Ltd www.energy.com.ph/
36. Entegra Ltd www.entegra.co.in/
37. GMR Infrastructure Ltd www.gmrgroup.in/
38. Gujarat Industries Power Company Ltd www.gipcl.com/
39. GVK Power & Infrastructure Ltd www.gvk.com/
40. HBL Power Systems Ltd www.hbl.in/
41. Indowind Energy Ltd www.indowind.com/
42. Indo power projects Ltd www.indopowerprojects.in/
43. Jaiprakash Power Ventures Ltd www.jppowerventures.com/
44. Kalpataru Power Transmission Ltd www.kalpatarupower.com/
45. KSK Energy Ventures Ltd www.ksk.co.in/
46. National Wind & Power Corpn. Ltd www.nationalwind.com/
47. Neyveli Lignite Corpn. Ltd www.nlcindia.com/
48. NHPC Ltd. www.nhpcindia.com/
49. NTPC Limited www.ntpc.co.in/
50. Power Grid Corpn. Of India Ltd www.powergridindia.com/
51. PTC India Ltd www.ptcindia.com/
52. Reliance Power Ltd www.reliancepower.co.in/
53. Savant Infocomm Ltd www.savant-infocomm.com/
54. Sun Source (India) Ltd www.sunsource.in/about_us.htm
55. Suryachakra Power Corpn. Ltd www.suryachakra.in/
56. Suzlon Energy Limited www.suzlon.com/

Electric wires & Cables

1. Aksh Optifibre Limited http://www.akshoptifibre.com/
2. Anant Distributors Private Ltd. http://www.proflexcable.com/
3. Brimson Cables Private Ltd http://www.brimsoncable.com/
4. Capital Cables India Limited - http://www.indiantrade.com/cci/
5. Colt Cables Private Limited http://www.coltcables.com/
6. Cords Cable Industries Ltd http://www.cordscable.com/
7. Delton Cables Limited - http://www.deltoncables.com/
8. Fort Gloster Industries Limited http://www.glostercables.com/
9. Kaydour Cables India http://www.kaydourcables.com
10. KEI Industries Limited http://www.kei-ind.com/
11. Lapp India http://www.lappindia.com/
12. National Cable Industries http://www.nationalcables.com/
13. Navinbhai Cables Private Ltd http://www.ncplindia.com/
14. Neolex Cables http://www.neolexcable.com/
15. North Eastern Cables Private Ltd //www.khetangroup.com/
16. Novoflex Marketing Private Limited. http://www.novoflexgroup.com/
17. Polycab Wires Private Limited http://www.polycab.com/
18. Q-Flex Cables Limited http://www.qflexcable.com/
19. Ravin Cables limited - Primecab brand of cables. http://www.primecab.com/
20. Relemac India http://www.relemacindia.com

21. RollRing Industries - Calicut, Kerala. http://www.rollring.com/
22. Samdaria Electricals http://www.samdariaelectricals.co.in/
23. Satish Enterprises http://www.satishenterprise.com/
24. Shree Nakoda Cables Private Limited. http://www.nakodacables.com/
25. Skytone Electricals (India) http://www.skytonecables.com/
26. Surbhi Cables Industries Private Limited. http://www.indiamart.com/surbhi/
27. Surbhi Telelink Pvt. Ltd http://www.surbhiindia.com/
28. Torrent Cables Ltd http://www.torrentcables.com/
29. Universal Cables http://www.universalcablesltd.com
30. Usha Martin http://www.ushamartin.com
31. Weather Crafts Ltd http://www.weathercraft.com/
32. Finolex Cables Limited http://www.finolex.com

Electrical exporters

1. Arbariya steels http://www.arbariya.com/
2. Bajaj International Pvt. Ltd. http://www.bajajinternational.com/
3. Biax http://www.biaxmetals.com/
4. Brightech Valves and Controls Pvt Ltd http://www.brightechvalves.com
5. Dynamic Scaffolding & Equipment Co http://www.dynamicscaffolding.com/
6. Excel Metal And Engg. Industries http://www.excelmetal.net
7. Impex Trading Company http://www.impextradingco.com
8. Miltop Trading Company http://www.miltop.com/
9. Om(India)Exports http://omindiaexpo.com
10. Oriental Export Corporation http://www.indialinks.com/oriental/
11. Sevana Electrical Group http://www.sevana.com/
12. Veejay Lakshmi Engineering Works Limited http://www.veejaylakshmi.com
13. Vishal Electromag Industries http://www.vishalmotor.com
14. Vaibhav Electricals http://www.vaibhavelectricals.com
15. Industrial Forging Industries http://www.ifi-india.net/
16. Imperial Brass Component http://electronics-electrical.exportersindia.com
17. M/s Horizon Exports http://www.horizonexport.net
18. Golden Crest Marketing Network Pvt. Ltd. http://www.aceenergy.co.in/
19. Shree Krishna Enterprises http://www.shreekrishnaenterprises.co.in/
20. Sahiba International Trading Company http://www.sahibainternational.com
21. Pushpak Metals web site url: http://www.pushpakmetals.com/
22. IEEMA http://www.ieema.org
23. ELSTER METERING (P) LTD http://www.elstermetering.com/
24. Shivam Electronics http://www.shivamelectronics.com
25. SUBRTO http://www.subrtoburnishing.com/
26. Unitek Engineers http://www.unitekengineers.com
27. Euro Technologies http://www.eurotapes.in/

1. Active Control Pvt Ltd http://www.indiamart.com/activecontrols/
2. Autometers Alliance Limited. http://www.autometers.com/
3. EIP Bulk Control Pvt Ltd http://www.eipbulkcontrols.com/
4. IMP Power Limited http://www.imp-power.com/
5. Instruments International http://www.indorecity.com/ii/index.html

6. Kanji Precision Works http://www.kanjimeters.com
7. Mittal Enterprises http://www.indiamart.com/mittalenterprises/
8. Modsonic http://www.modsonic.com/
9. Nippon Instruments http://www.nipponinstruments.com/
10. Poonawala Electro Weigh http://www.peweigh.com
11. Prok Devices http://www.prokdvs.com
12. Shanti Instruments http://www.shanti-instruments.com
13. Texlab Industries http://www.texlabindia.com
14. Vasavi Electronics http://www.vasavi.com
15. VPL Infotech http://vplinf.com

Power Distribution

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

Transformers

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

Green Energy Companies in India

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

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

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

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

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

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

5. **NEPC India:** This is a Public Limited Company promoted by the Khemka Group with the primary objective of promoting wind energy. This successful Group has a multi crore turnover from

diversified activities in the field of Power Generation from Wind Energy and manufacture and marketing of Wind Turbine Generator (a renewable energy device).

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

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

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

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

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

Internationally renowned MNC's to offer electrical jobs

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

Top core companies in India to offer electrical jobs

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

Exclusive Government jobs for Electrical Engineers

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

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

ANNA UNIVERSITY

CENTRE FOR UNIVERSITY INDUSTRY COLLABORATION (CUIC)

A READY RECKONER FOR ENHANCING PLACEMENT ACTIVITIES

Dr. T .Thyagarajan, Director- CUIC

ROLES AND RESPONSIBILITIES OF PLACEMENT REPRESENTATIVES

- Collect list of HR contact details through your friends/ relatives/ Newspaper/ Faculty members/ Seniors /Alumni
- Pass on the HR Contact details to Placement Officer for sending official invitations
- Ensure Placement Officer contact details in all the Department Brochures, to have single point contact
- Keep the hard and soft copies of Curriculum and Syllabus
- Keep the contact details (Email, Landline No. & Mobile No.) of all your classmates
- Keepthecompletedetailsabouteachstudent(SSLC,HSC,SemesterwiseGPA,CGPA,DOB, Community, History & Current Arrears)
- Keep the contact details of other Placement Representatives
- Generate comprehensive Question Bank (Both Technical and Non-Technical)
- CollectAptitudeQuestions/GDTopics/InterviewQuestionstocreateQuestionBank
- Give training to the needy students
- Avoid spreading Rumors / False / Assumed information (This will lead to blacklisting)
- Avoid accepting false information / Track records from students (This will lead to rejection of offer)
- Avoid arguing with company HRs about previous year's branch preferences

TIPS TO FACE INTERVIEWS

- Maintain Professional Ethics and Moral Standards
- Read Frequently Asked Questions by interviewers and prepare the answers and practice them
- Prepare a Comprehensive Resume
- Practice with Mock Aptitude Test / Mock GD / Mock Interview etc.,
- Prepare well in fundamental & core subjects of respective branches
- Update database after declaration of revaluation / Arrear result
- View the placement Notice Board regularly
- As for as possible change of contact details should be avoided
- Visitthecompany'swebsitebeforeattendingthePrePlacementTalk(PPT)togetclearidea
- Avoid Wearing Jeans / T-shirts/ Cheppal / Half sleeves
- Be punctual for PPT as well as for Test /Interview
- Avoid standing outside or near the PPT hall
- Occupy first benches also, during the PPT
- Maintain Gender separation during the PPT
- Maintain discipline during PPT
- Avoid coming late to the PPT/test/interview
- Ask only relevant / valid questions during the PPT
- Carry Pen, Pencil, Eraser, Passport Size Photograph etc., for the test

- Avoid contacting the HR directly. It should be through CUIC only.
- Carry Resume / Copy of Mark Sheets / Community / Co-curricular / Extra-curricular Certificate etc for the interview
- Bring OBC Certificate for PSU interview
- Bring doctor certificate for differently abled physique
- Informatthebeginningitselfaboutcolourblindness,hearingdisordertoavoiddisqualificationatthe end.
- Attend the interview with clean dress (tucked-in) and neatly shaved to maintain dignity and decorum
- Wishtheinterviewerwhileenteringtheroom.Thanktheinterviewerbeforeleavingtheroom
- During the interview, relax and avoid showing your nervousness obvious
- Speak loudly, clearly; sit up straight; try to look at the interviewer's eyes when you speak to him/her
- Be honest in your approach
- Keep your answers brief and to the point.
- Do not give 'YES' or 'NO' replies.
- Don't discuss your personal difficulties
- Show your enthusiasm and willingness
- Exhibit your skills and abilities.
- AvoidpassingbadcommentsRemarksabouttheCollege/University/Staffduringtheinterview
- Prepare in advance, the questions you want to ask about the job and company
- Be available till the announcement of results
- Maintain silence during announcements of results
- Do not exhibit bad mannerism during the placement activity

FREQUENTLY ASKED QUESTIONS (FAQ)

- Tell me about yourself
- What are your long range goals, ambitions, future plans?
- What do you want to be doing 5 or 10 years from now?
- How do you feel that you can contribute to this job?
- What are your hobbies?
- What are your strengths? Your weaknesses?
- What are your big accomplishments?
- What are your special abilities?
- Why you think that you are suitable for this kind of job?
- What is your career goal?
- What do you know about our company?
- Why are you applying for a job with us?
- What salary do you expect?
- Do you have any plans to go back to school?
- What kind of job profile you enjoy the most, the least and why?
- I have interviewed others for this job, why should I give you the job?
- Would you be willing to take an aptitude test?
- Can you tell me any thing about yourself that you think I might want to know?
- What is the lowest salary you would accept?
- Can you handle criticism? How do you deal with it?
- Do you have any questions?

H.R. EXPECTATIONS

- Sincerity and honesty in the answers
- Attentiveness in listening to the questions
- Body language: gesture, posture, eye contact and confidence level
- Stress handling capability

- Positive approach in answering the questions
- Exhibition of skills, accomplishments and talents
- Enthusiasm and motivation level
- Command over communication skills
- Willingness and positive approach
- Exhibition of talents and accomplishments

POINTS DECIDED BY THE ORGANISATION

- Interview time and venue
- Decision on allowing identical branches
- Execution of Bond
- Change in eligibility criteria
- Place of work
- Percentage cut-off/ history of arrears / standing arrears
- Postponement of dates/cancellation
- The number of recruits, on-board date

USEFUL WEBSITES FOR APTITUDE, GD, TECHNICAL & HR INTERVIEW

http://www.indiabix.com
http://www.fresher world.com
http://www.placementpapers.net
http://www.allinterview.com
http://www.geekinterview.com
http://www.careersvalley.com
http://www.sampleplacementpapers.com
http://www.chetanasinterview.com
http://www.ittestpapers.com
http://www.indianfresher.com
http://www.freeplacementpapers.com
http://www.educationindiaworld.com
http://www.jobsnresults.com
http://www.psychometric-success.com
http://testfunda.com
http:/www.test4free.com
http://www.placementexpress.com

TECHNICAL
http://www. mechanicalengineeringblog.com
http://www.indiabix.com

USEFUL WEBSITES FOR ENGLISH COMMUNICATION

http://www.nonstopenglish.com
http://www.talkenglish.com
http://www.freeenglishnow.com
http://www.ego4u.com
http://www.focusenglish.com
http://www.bbc.co.uk/worldservice/learningenglish
http:/www.englishclub.com
http://www.easyenglish.com

http://learnenglish.britishcouncil.org
englishbee.net
http://www.english4today.com/free_content.cfm
http://www.english-the-international-language.com
http://www.teachingengtish.org.uk
http://esl.about.com
http://www.learnenglish.de
http://www.busuu.com
http://free-esl.com

'FACTS' TO PERFORM WELL IN THE PLACEMENTS

F -Clear the subjects in **F**irst attempt

-Learn **F**oreign Language (German, Japanese, French, Chinese)

A -Have right **A**ttitude

C -Have good **C**ommunication Skills

S -Be **S**agacious. Express your wisdom and Exhibit your Talents

K.L.N. College of Engineering.

How to prepare for Anna University Examinations.

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

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

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

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

right answers mostly (but many of them actually wrong) and few examiners assumed certain answers by students are wrong (but many of them are actually correct). It is 70% true that students are not presenting the answers well and it is 30% true that the valuation is not fair. But it is 95% true that the deserved students are getting expected results in most of the papers. This is because of good presentation. Good presentation involves many factors such as legible writing, good handwriting. answering correctly (100% correct),all answers with mathematical modeling/pictorial representation/drawing/layout/sketches with different colors, writing 7 pages for 16 mark questions with valid points and sketches, 4 pages for 8 marks with valid points and sketches/drawings/equations, characterizes,. Such students will solve problems correctly without any overwriting/ strikeouts. Simply, they do not cheat. These are the in-born qualities or developed over the years due to good habits, friendship, good character, obedience, hard work, well brought up by parents and blessing by God. Everyone can become like them if their attitude is good. Fear of God is the beginning of Wisdom. The examiners will know about your quality, just by referring the way you have answered Part-A- questions. A well prepared student would get a maximum of 18 out of 20. This impresses the examiner so that they will award a maximum of 14-16 for each part-B-question. 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.

Know well about Why one should apply for revaluation without /with Photocopy, schedule and fees to be paid. Sometimes 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 “O”grade in the REVIEW, shows some hope in the examination system and the better prospect of the students.

Need to maintain high CGPA in every semester. This is possible only when one gets “O” 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 to get more marks. This will reflect in internal assessment marks also. Classification of degree- First class with distinction- More than 8.5 CGPA (passed all subjects in first attempt), First class- More than 7.0 CGPA at the end of eighth semester, less than this would be second class.

K.L.N. COLLEGE OF ENGINEEING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
Skills / Do you know

S.No.	Skill / Reminders	Priority	S.No.	Skill / Reminders	Priority
1.	Advanced Training Institute	Medium	51	Internshala	Medium
2.	Alumni	Medium	52	Internship	Medium
3.	Android Developer	Medium	53	IoT	High
4.	Anna University regulations	High	54	IVTL	Medium
5.	Aptitude Test	High	55	Jasmine	High
6.	Artificial Intelligence	High	56	JAVA	Medium
7.	Battery Technology	High	57	Journal Publications	Medium
8.	BEC	Medium	58	Judgment and Decision Making	Medium
9.	Big Data	Medium	59	Linear Integrated Circuits	High
10.	Block chain	Low	60	Mind Tree	Medium
11.	Board of Apprenticeship Training	Medium	61	Mobile Applications	Low
12.	Bond rules	Low	62	National Instruments	Medium
13.	BPO	Low	63	Negotiation	Medium
14.	BSNL	Medium	64	Networking	Medium
15.	C, C++	High	65	NPTEL	High
16.	Cadence	High	66	NSIC	Medium
17.	CAT	Low	67	Open source	Low
18.	CCNA	Medium	68	Passport	High
19.	Cloud computing	Medium	69	People Management	High
20.	Code vita	High	70	Power System Analysis	High
21.	Cognitive Flexibility	Medium	71	Programming Logic	Medium
22.	Complex Problem Solving	High	72	Project contest	High
23.	Conference Publications	High	73	Python Programming	High
24.	Co-ordinating with others	High	74	References	Medium
25.	Core companies	High	75	Resume	High
26.	Creativity	High	76	Robotics	Medium
27.	Critical Thinking	Medium	77	Second class	Medium
28.	Cyber security	Medium	78	Service orientation	Medium
29.	Data Mining	Medium	79	Skill rack	High
30.	Data pattern	High	80	Smart India Hackathon	High
31.	Data Science	Medium	81	Software companies	Medium
32.	Data Structure	Medium	82	Software Developer	Medium
33.	Digital Logic Circuits	High	83	Start up companies	Medium
34.	Driving License	High	84	STEP	Medium
35.	E mail writing	High	85	Symposium	Medium
36.	Electric Vehicle	High	86	TANCET	Medium
37.	Electrical Machines	High	87	TANGEDCO	Medium
38.	Electronic Devices & Circuits	High	88	TCS Ninja	High
39.	Embedded systems	High	89	Technical Aptitude	High
40.	Emotional Intelligence	Medium	90	Tell about yourself	High
41.	First class	High	91	Tessolve	High
42.	First class with Distinction	High	92	Texas Instruments	High
43.	GATE	High	93	TOFEL	Low
44.	GMAT	Low	94	Unmanned Aerial Vehicle	Medium
45.	GRE	Low	95	Unmanned Under water vehicle	Medium
46.	Hacker Rank	Medium	96	Very Large Scale Integrated circuits	Medium

47.	IEEE	High	97	Vocabulary Test	High
48.	IEI	Medium	98	Web Applications	Low
49.	Industrial Automation	Medium	99	Wireless communication	Low
50.	Inplant Training	High	100	Zoho	Medium

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

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An ISO 9001:2015 Certified Institution. – A Sourashtra Linguistic Minority Institution

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

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.

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 (Accredited by NBA)
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
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)