K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

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

(Accredited by NBA, New Delhi)

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

This book contains the following:

1. Vision and Mission of the College and Department, Program Educational Objectives, Program Specific Outcomes, Program Outcomes.
2. Outcome Based Education, Benefits and Significance of accreditation, Blooms Taxonomy.
3. Engineering Ethics.
4. Academic Calendar – 2015 – 2016 (Even semester).
5. Class Time Table.
6. B.E. – EEE – Syllabus – IV Semester.
7. Lecture Schedule,Tutorial, Assignment questions, Seminar, Self-study topics.
8. Anna University question papers (Previous years).
9. Reminders on Placement and Career Guidance.
10. General Reminders
11. Skill Development and Entrepreneurship Programs – Advanced Training Institute – Guindy Industrial Estate – Chennai
12. General tips for effective communication and Leadership skills.
13. TANCET Question Paper
14. Mapractices and Punishment in AU Examinations.
15. Bonafide Certificate, Leave Letter Format

K.L.N. COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Vision and Mission of the College

VISION

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

MISSION

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

Vision and Mission of the Department

VISION

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

MISSION

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

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

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

PEO1: to excel in industrial or graduate work in Electrical and Electronics Engineering and allied fields
PEO2: to practice their Professions conforming to Ethical Values and Environmentally friendly policies
PEO3: to work in international and multi-disciplinary Environments
PEO4: to successfully adapt to evolving Technologies and stay current with their Professions

PROGRAM SPECIFIC OUTCOMES (PSOs)

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

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

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

PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

OUTCOME BASED EDUCATION (OBE)

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

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

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

BENEFITS AND SIGNIFICANCE OF ACCREDITATION

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

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

Accreditation signifies different things to different stakeholders. These are:

Benefits to Institutions

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

national level. This leads to a widespread recognition and greater appreciation of the brand name of Institutions and motivates the Institutions to strive for more.

Benefits to Students

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

Benefits to Employers

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

Benefits to the Public

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

Catalyst for International Accreditations

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

Benefits to Industry and Infrastructure Providers

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

Benefits to Parents

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

Benefits to Alumni

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

Benefits to Country

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

BLOOM'S TAXONOMY

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

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

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

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

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

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

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

List of Action Words Related to Critical Thinking Skills

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

ENGINEERING ETHICS

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

The National Society of Professional Engineers (NSPE) decides the overall standards and codes of ethics for all the engineering professions. The Preamble of the NSPE *Code of Conduct for Engineers* (2007) states:

"*Engineers shall at all times recognize that their primary obligation is to protect the safety, health, property, and welfare of the public. If their professional judgment is overruled under circumstances where the safety, health, property, or welfare of the public are endangered, they shall notify their employer or client and such other authority as may be appropriate.*"

Electrical Engineering Ethics

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

IEEE code of ethics

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

1. to accept responsibility in making decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology; its appropriate application, and potential consequences;

6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons and to not engage in acts of discrimination based on race, religion, gender, disability, age, national origin, sexual orientation, gender identity, or gender expression;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Engineering Ethics in College/Education

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

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

Engineering Ethics in the Professional World

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

Engineering Ethics in Companies

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

Date: 08.01.2016

ANNA UNIVERSITY: : CHENNAI – 600 025

ACADEMIC SCHEDULE

for the

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

ACADEMIC YEAR 2015 – 2016

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

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

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

NOTE:

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

DIRECTOR
ACADEMIC COURSES

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

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

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

With effect from: 28.01.2016

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

Department of Electrical and Electronics Engineering

CLASS WISE TIME TABLE -2015-2016 (EVEN)

Year/Sem/Sec : II / IV / A — Faculty In-charge : P.Loganthurai

TIME / DAY	09.00 – 09.50	09.50 – 10.40		10.55–11.45	11.45–12.35		01.15–02.05	02.05–02.55	02.55–03.45
MON	OOP/M&I AMJ/MB	T&D APSR	BREAK	NM PDP	DTSSP EJ	LUNCH	OOP LAB / EM LAB-I AMJ, NEG / PLT, MB		
TUE	NM PDP	OOP AMJ		M&I MB	T&D APSR		EM-I PLT	EM-I PLT	OOP AMJ
WED	T&D APSR	NM PDP		EM-I(T) PLT,CMS	DTSSP EJ		OOP LAB / EM LAB-I AMJ, NEG / PLT, MB		
THU	DTSSP EJ	M&I MB		DTSSP EJ	T&D APSR		OOP AMJ	EM-I PLT	NM PDP
FRI	EM-I PLT	T&D APSR		DTSSP EJ	OOP AMJ		M&I MB	NM PDP	M&I MB

Year/Sem/Sec : II / IV / B — Faculty In-charge : A.P.S. Ramalakshmi

TIME / DAY	09.00 – 09.50	09.50 – 10.40		10.55–11.45	11.45–12.35		01.15–02.05	02.05–02.55	02.55–03.45
MON	EM-I PLT	OOP NEG	BREAK	DTSSP SR	DTSSP SR	LUNCH	M&I RSD	NM RSR	T&D APSR
TUE	T&D APSR	EM-I(T) PLT,VS		OOP/M&I NEG/RSD	NM RSR		OOP LAB / EM LAB-I NEG,JM / APSR, SPRR		
WED	OOP NEG	DTSSP SR		DTSSP SR	M&I RSD		T&D APSR	NM RSR	M&I RSD
THU	M&I RSD	T&D APSR		NM RSR	EM-I PLT		OOP LAB / EM LAB-I NEG,JM / APSR, SPRR		
FRI	DTSSP SR	NM RSR		EM-I PLT	T&D APSR		OOP NEG	EM-I PLT	OOP NEG

Year/Sem/Sec : II / IV / C — Faculty In-charge : A.Manoj

TIME / DAY	09.00 – 09.50	09.50 – 10.40		10.55–11.45	11.45–12.35		01.15–02.05	02.05–02.55	02.55–03.45
MON	T&D MBL	DTSSP RD	BREAK	NM VL	T&D MBL	LUNCH	M&I MJM	DTSSP RD	EM-I(T) SPRR,SR
TUE	M&I MJM	EM-I SPRR		NM VL	DTSSP RD		OOP AMJ	T&D MBL	DTSSP RD
WED	OOP AMJ	OOP LAB AMJ, NEG		/ EM LAB-I / SPRR, APSR			EM-I SPRR	NM VL	M&I MJM
THU	EM-I SPRR	OOP/M&I AMJ/MJM		EM-I SPRR	T&D MBL		NM VL	T&D MBL	OOP AMJ
FRI	DTSSP RD	OOP AMJ		NM VL	M&I MJM		OOP LAB / EM LAB-I AMJ,JM / SPRR, APSR		

SUB CODE	SUBJECT NAME	ABBREVIATION	STAFF NAME		
			A – Sec	B – sec	C- Sec
MA6459	Numerical Methods	NM	P. Dhanapriya	R. Selvarani	V. Vijayalakshmi
EE6401	Electrical Machines - I	EM-I	P.Loganthurai	P.Loganthurai	S.P.Rajaram
CS6456	Object Oriented Programming	OOP	A.Manoj	N.E.Ganga	A.Manoj
EE6402	Transmission and Distribution	T&D	A.P.S. Ramalakshmi	A.P.S. Ramalakshmi	M. Bharani lakshmi
EE6403	Discrete Time Systems and Signal Processing	DTSSP	E.Jeyasri	S.Rajalingam	R. Divya
EE6404	Measurements and Instrumentation	M&I	M.Balamurugan	R. Sridevi	M.Jeyamurugan
CS6461	Object Oriented Programming Laboratory	OOP LAB	A.Manoj	N.E.Ganga	A.Manoj
EE6411	Electrical Machines Laboratory - I	EM LAB-I	P.Loganthurai	A.P.S. Ramalakshmi	S.P.Rajaram

FACULTY INCHARGE

HOD/EEE 23/1/2016

MA6459 NUMERICAL METHODS L T P C
3 1 0 4

OBJECTIVES:

This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 10+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method - Eigen values of a matrix by Power method.

UNIT II INTERPOLATION AND APPROXIMATION 8+3

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single Step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods - Milne's and Adams-Bash forth predictor corrector methods for solving first order equations.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9+3

Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

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

OUTCOMES:

The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

TEXT BOOKS:

1. Grewal. B.S., and Grewal. J.S.,"Numerical methods in Engineering and Science", Khanna Publishers, 9th Edition, New Delhi, 2007.
2. Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi, 2006.

REFERENCES:

1. Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Hill, 5th Edition, New Delhi, 2007.
2. Brian Bradie. "A friendly introduction to Numerical analysis", Pearson Education, Asia, New Delhi, 2007.
3. Sankara Rao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Private, 3rd Edition, New Delhi, 2007.

EE6401 ELECTRICAL MACHINES – I L T P C

3 1 0 4

OBJECTIVES:

To introduce techniques of magnetic-circuit analysis and introduce magnetic materials

To familiarize the constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.

To study the working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.

To study the working principles of DC machines as Generator types, determination of their no-load/load characteristics, starting and methods of speed control of motors.

To estimate the various losses taking place in D.C. Motor and to study the different testing methods to arrive at their performance.

UNIT I MAGNETIC CIRCUITS AND MAGNETIC MATERIALS 9

Magnetic circuits –Laws governing magnetic circuits - Flux linkage, Inductance and energy – Statically and Dynamically induced EMF - Torque – Properties of magnetic materials, Hysterisis and Eddy Current losses - AC excitation, introduction to permanent magnets-Transformer as a magnetically coupled circuit.

UNIT II TRANSFORMERS 9

Construction – principle of operation – equivalent circuit parameters – phasor diagrams, losses – testing – efficiency and voltage regulation-all day efficiency-Sumpner's test, per unit representation – inrush current - three phase transformers-connections – Scott Connection – Phasing of transformer– parallel operation of three phase transformers-auto transformer – tap changing transformers- tertiary winding.

UNIT III ELECTROMECHANICAL ENERGY CONVERSION AND CONCEPTS N ROTATING MACHINES 9

Energy in magnetic system – Field energy and coenergy-force and torque equations – singly and multiply excited magnetic field systems-mmf of distributed windings – Winding Inductances-, magnetic fields in rotating machines – rotating mmf waves – magnetic saturation and leakage fluxes.

UNIT IV DC GENERATORS 9

Construction and components of DC Machine – Principle of operation - Lap and wave windings-EMF equations– circuit model – armature reaction –methods of excitation-commutation and interpoles - compensating winding –characteristics of DC generators.

UNIT V DC MOTORS 9

Principle and operations - types of DC Motors – Speed Torque Characteristics of DC Motors-starting and speed control of DC motors –Plugging, dynamic and regenerative braking- testing and efficiency– Retardation test- Swinburne's test and Hopkinson's test - Permanent magnet dc motors(PMDC)-DC Motor applications. **TOTAL (L:45+T:15): 60 PERIODS**

OUTCOMES:

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

TEXT BOOKS:

1. Nagrath I. J and Kothari D. P. 'Electric Machines', Fourth Edition, Tata McGraw Hill Publishing Company Ltd, 2010.
2. M.N.Bandyopadhyay, Electrical Machines Theory and Practice, PHI Learning PVT LTD., New Delhi, 2009.
3. Fitzgerald. A.E., Charles Kingsely Jr, Stephen D.Umans, 'Electric Machinery', Sixth edition, Tata McGraw Hill Books Company, 2003.

REFERENCES:

1. P. C. Sen., 'Principles of Electrical Machines and Power Electronics', John Wiley & Sons, 1997.
2. Syed A. Nasar, Electric Machines and Power Systems: Volume I, Mcgraw-Hill College; International Edition, January 1995.
3. Deshpande M. V., "Electrical Machines" PHI Learning Pvt. Ltd., New Delhi, 2011.
4. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
5. S.Sarma & K.Pathak "Electric Machines", Cengage Learning India (P) Ltd., Delhi, 2011.

CS6456 OBJECT ORIENTED PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:
- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++.

UNIT I OVERVIEW 9
Why Object-Oriented Programming in C++ - Native Types and Statements –Functions and Pointers- Implementing ADTs in the Base Language.

UNIT II BASIC CHARACTERISTICS OF OOP 9
Data Hiding and Member Functions- Object Creation and Destruction- Polymorphism data abstraction: Iterators and Containers.

UNIT III ADVANCED PROGRAMMING 9
Templates, Generic Programming, and STL-Inheritance-Exceptions-OOP Using C++.

UNIT IV OVERVIEW OF JAVA 9
Data types, variables and arrays, operators, control statements, classes, objects, methods – Inheritance

UNIT V EXCEPTION HANDLING 9
Packages and Interfaces, Exception handling, Multithreaded programming, Strings, Input/Output
TOTAL : 45 PERIODS
OUTCOMES:
• Gain the basic knowledge on Object Oriented concepts.
• Ability to develop applications using Object Oriented Programming Concepts.
• Ability to implement features of object oriented programming to solve real world problems.
TEXT BOOKS:
1. Ira Pohl, “Object-Oriented Programming Using C++”, Pearson Education Asia, 2003.
2. H.M.Deitel, P.J.Deitel, "Java : how to program", Fifth edition, Prentice Hall of India private limited, 2003.

REFERENCES:
1. Herbert Schildt, "The Java 2: Complete Reference", Fourth edition, TMH, 2002
2. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, 2004.
3. Stanley B. Lippman and Josee Lajoie , “C++ Primer”, Pearson Education, 2003.
4. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003.

EE6402 TRANSMISSION AND DISTRIBUTION L T P C
3 0 0 3

OBJECTIVES:
To develop expressions for the computation of transmission line parameters.
To obtain the equivalent circuits for the transmission lines based on distance and operating voltage for determining voltage regulation and efficiency. Also to improve the voltage profile of the transmission system.
To analyses the voltage distribution in insulator strings and cables and methods to improve the same.
To understand the operation of the different distribution schemes.

UNIT I STRUCTURE OF POWER SYSTEM 9
Structure of electric power system: generation, transmission and distribution; Types of AC and DC distributors – distributed and concentrated loads – interconnection – EHVAC and HVDC transmission - Introduction to FACTS.

UNIT II TRANSMISSION LINE PARAMETERS 9
Parameters of single and three phase transmission lines with single and double circuits - Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and

unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects - interference with neighboring communication circuits - Typical configurations, conductor types and electrical parameters of EHV lines, corona discharges.

UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9

Classification of lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance; transmission efficiency and voltage regulation, real and reactive power flow in lines, Power - circle diagrams, surge impedance loading, methods of voltage control; Ferranti effect.

UNIT IV INSULATORS AND CABLES 9

Insulators - Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators. Underground cables - Types of cables, Capacitance of Single-core cable, Grading of cables, Power factor and heating of cables, Capacitance of 3- core belted cable, D.C cables.

UNIT V MECHANICAL DESIGN OF LINES AND GROUNDING 9

Mechanical design of transmission line – sag and tension calculations for different weather conditions, Tower spotting, Types of towers, Substation Layout (AIS, GIS), Methods of grounding.

TOTAL : 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:

1. D.P.Kothari , I.J. Nagarath, 'Power System Engineering', Tata McGraw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.
2. C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2009.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

REFERENCES:

1. B.R.Gupta, , S.Chand, 'Power System Analysis and Design'New Delhi, Fifth Edition, 2008.
2. Luces M.Fualken berry ,Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.
3. Hadi Saadat, 'Power System Analysis,' PSA Publishing; Third Edition, 2010.
4. J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2012.
5. G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, 2013.

EE6403 DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING L T P C

3 0 0 3

OBJECTIVES:

To classify signals and systems & their mathematical representation. To analyse 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.

UNIT I INTRODUCTION 9

Classification of systems: Continuous, discrete, linear, causal, stable, 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 9

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

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION 9

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 9

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 - mWarping, pre warping.

UNIT V DIGITAL SIGNAL PROCESSORS 9

Introduction – Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial DSProcessors. **TOTAL : 45 PERIODS**

OUTCOMES:

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

TEXT BOOKS:

1. 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. Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab", Cengage Learning,2014.

REFERENCES:

1. Poorna Chandra S, Sasikala. B ,Digital Signal Processing, Vijay Nicole/TMH,2013.
2. 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. Sen M.kuo, woonseng…s.gan, "Digital Signal Processors, Architecture, Implementations & Applications, Pearson,2013
5. Dimitris G.Manolakis, Vinay K. Ingle, applied Digital Signal Processing,Cambridge,2012
6. Lonnie C.Ludeman ,"Fundamentals of Digital Signal Processing",Wiley,2013

EE6404 MEASUREMENTS AND INSTRUMENTATION L T P C

3 0 0 3

OBJECTIVES:

To introduce the basic functional elements of instrumentation

To introduce the fundamentals of electrical and electronic instruments

To educate on the comparison between various measurement techniques

To introduce various storage and display devices

To introduce various transducers and the data acquisition systems

UNIT I INTRODUCTION 9

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration.

UNIT II ELECTRICAL AND ELECTRONICS INSTRUMENTS 9

Principle and types of analog and digital voltmeters, ammeters, multimeters – Single and three phase wattmeters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

UNIT III COMPARISON METHODS OF MEASUREMENTS 9

D.C & A.C potentiometers, D.C & A.C bridges, transformer ratio bridges, self-balancing bridges. Interference & screening – Multiple earth and earth loops - Electrostatic and electromagnetic interference – Grounding techniques.

UNIT IV STORAGE AND DISPLAY DEVICES 9

Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & dot matrix display – Data Loggers.

UNIT V TRANSDUCERS AND DATA ACQUISITION SYSTEMS 9

Classification of transducers – Selection of transducers – Resistive, capacitive & inductive transducers – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition

system – A/D, D/A converters – Smart sensors. **TOTAL :45 PERIODS**

OUTCOMES:

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

TEXT BOOKS:

1. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2004.
2. J. B. Gupta, 'A Course in Electronic and Electrical Measurements', S. K. Kataria & Sons, Delhi, 2003.
3. Doebelin E.O. and Manik D.N., Measurement Systems – Applications and Design, Special Indian Edition, Tata McGraw Hill Education Pvt. Ltd., 2007.

REFERENCES:

1. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw Hill, II Edition 2004.
2. D.V.S. Moorthy, 'Transducers and Instrumentation', Prentice Hall of India Pvt Ltd, 2007.
3. A.J. Bouwens, 'Digital Instrumentation', Tata McGraw Hill, 1997.
4. Martin Reissland, 'Electrical Measurements', New Age International (P) Ltd., Delhi, 2001.
5. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hall of India, 2003.

CS6461 OBJECT ORIENTED PROGRAMMING LABORATORY L T P C

0 0 3 2

OBJECTIVES:

- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++ & JAVA.

LIST OF EXPERIMENTS:

C++:

1. program using functions
   functions with default arguments
   implementation of call by value, address, reference
2. simple classes for understanding objects, member functions & constructors classes with primitive data members,
   classes with arrays as data members
   classes with pointers as data members
   classes with constant data members
   classes with static member functions
3. compiletime Polymorphism
   operator overloading
   function overloading
4. runtime Polymorphism
   inheritance
   virtual functions
   virtual base
   classes templates
5. file handling
   sequential acess
   random access

JAVA:

6. simple java applications for understanding references to an instant of a class handling strings in JAVA
7. simple package creation
   developing user defined packages in java
8. interfaces
   developing user defined interfaces
   use predefined interfaces
9. threading

creation of threading in java applications
multi threading
10. exception handling mecanism in
10. Exception handling mecanism in java
Handling predefined exceptions
handling user defined exceptions **TOTAL :45 PERIODS**

OUTCOMES:

• Gain the basic knowledge on Object Oriented concepts.
• Ability to develop applications using Object Oriented Programming Concepts.
• Ability to implement features of object oriented programming to solve real world problems.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C++ complier 30 Nos.
(or)
Server with C++ compiler supporting 30 terminals or more.

EE6411 ELECTRICAL MACHINES LABORATORY – I L T P C
0 0 3 2

OBJECTIVES :

To expose the students to the operation of D.C. machines and transformers and give them experimental skill.

LIST OF EXPERIMENTS:

1. Open circuit and load characteristics of DC shunt generator- critical resistance and critical speed.
2. Load characteristics of DC compound generator with differential and cumulative connections.
3. Load test on DC shunt and compound motor.
4. Load test on DC series motor.
5. Swinburne's test and speed control of DC shunt motor.
6. Hopkinson's test on DC motor – generator set.
7. Load test on single-phase transformer and three phase transformers.
8. Open circuit and short circuit tests on single phase transformer.
9. Polarity Test and Sumpner's test on single phase transformers.
10. Separation of no-load losses in single phase transformer.
11. Study of starters and 3-phase transformers connections **TOTAL: 45 PERIODS**

OUTCOMES:

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

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. DC Shunt Motor with Loading Arrangement – 3 nos
2. DC Shunt Motor Coupled With Three phase Alternator – 1 No.
3. Single Phase Transformer – 4 nos
4. DC Series Motor with Loading Arrangement – 1 No.
5. DC compound Motor with Loading Arrangement – 1 No.
6. Three Phase Induction Motor with Loading Arrangement – 2 nos
7. Single Phase Induction Motor with Loading Arrangement – 1 No.
8. DC Shunt Motor Coupled With DC Compound Generator – 2 nos
9. DC Shunt Motor Coupled With DC Shunt Motor – 1 No.
10. Tachometer -Digital/Analog – 8 nos
11. Single Phase Auto Transformer – 2 nos
12. Three Phase Auto Transformer – 1 No.
13. Single Phase Resistive Loading Bank – 2 nos
14. Three Phase Resistive Loading Bank. – 2 nos
15. SPST switch – 2 nos

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

Lecture Schedule[Mon:;Tue:;Wed:;Thu:;Fri:]

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

Course code &Name: **MA6459-Numerical Methods** Duration: **Jan -Apr 2015**

Semester: **IV** Section: **B** Staff :**Mrs.P.Dhanapriya** Regulation : **2013/AUC**

AIM: With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES

At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:

- The roots of nonlinear(algebraic and transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail togive solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.

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

CO	Course Outcomes	POs	Skill
CO.I	Determine the solution of algebraic and transcendal system of linear equations	**a,b,e,h,j**	**Apply**
CO.II	To interpolate the values of unknown functions using Newton's Formula	**a,b,e,h,j**	**Apply**
CO.III	Estimate the numerical values of the derivatives and integrals of unknown function	**a,b,e,h,j**	**Apply**
CO.IV	Solve first and second order initial value problem	**a,b,e,h,j**	**Apply**
CO.V	Solve Numerically boundary value problem	**a,b,e,h,j**	**Apply**

S.No.	Date	Period	Topics to be covered	Book No(Page No)
Unit: I–Solution of Equations & Eigen ValueProblem Target Periods: 11+3= 14				
1			Numerical Methods - Introduction	T1: ---- T2: 8
2			Iterative method	T1: 3.3 T2: 12-15 R1: 81 – 88
3			Iterative method	T1: 3.2 T2: 15-17 R1: 75 – 81
4			Newton Raphson method for single variable	T1: 3.4 T2: 17-22 R1: 89 – 97
5			Tutorial-I	
6			Introduction to linear algebraic equations - Gauss Elimination method	T1: 4.1-4.2 T2: 38-43 R1: 112 – 114
7			Gauss - Jordan method	T1: 4.1-4.2 T2: 43-44 R1: 114 – 115
8			Gauss - Jacobi's method	T1: 4.5 T2: 48-50 R1: 145
9			Gauss - Seidel method	T1: 4.5 T2: 50-52 R1: 147
10			Tutorial-II	
11			Inverse of a matrix by Gauss Jordan method	T1: ----- T2: 57-59 R1: 3 – 7 (suppl.)
12			Eigen value of a matrix - power method	T1: 4.7 T2: 63-66 R1: 468 – 475
13			Problem solving session	T1: 4.8 T2: 66-72 R1: 475 – 488
14			Tutorial-III	
Total Periods : 14			(CT 1 :)	

Unit-II: InterpolationTarget Periods: 11+3= 14				
15			Finite Difference Operators	T1: 5.1-5.3 T2: 94-104 R1: 170 – 183
16			Problem solving session	
17			Newton's Forward Difference Formula	T1: 5.1 T2: 104-108 R1: 211 - 213
18.			Problem solving session	
19.			Tutorial –I	
20			Newton's Backward Difference Formula	T1: 5.2 T2: 108-110 R1: 213 - 215
21			Problem solving session	
22			Lagrange's Interpolation Formula	T1: 7.6 T2: 110-113 R1: 271 – 275
23			Tutorial-II	
24			Problem solving session	
25			Divided Differences	T1: 7.1-7.3 T2: 113-120 R1: 251- 262
26			Problem solving session	
27			Interpolation with cubic spline	T1: 7.10 T2: 122-128 R1: 251- 262
28.			Tutorial- III	
Total Periods : 14			CIT 1: Assignment 1 : Date of announcement: - Date of Submission:	
Unit-III : Numerical Differentiation & IntegrationTarget Periods: 11+3= 14				
29.			Numerical Differentiation based on Interpolation formulae	T1:8.1-8.2 T2:145-147 R1: 281 - 296
30.			Numerical Integration - Trapezoidal Rule	T1: 8.28-8.32 T2:150-154 R1: 299 – 301
31			Tutorial-I	
32			Problem solving session	
33			Simpson's $1/3^{rd}$ rule	T1: 8.28-8.32 T2:155-159 R1: 303 - 304
34			Simpson's $1/3^{rd}$ rule	T1: 8.28-8.32 T2: ----- R1: 303 - 304
35			Romberg's method	T1: 8.33-8.34 T2:159-161 R1: 302
36			Seminar	
37			Tutorial-II	
38			Two and Three point Gaussian quadrature formulas	T1: T2:164-167 R1:
39			Numerical Double Integration - Trapezoidal Rule	T1:8.46-8.48 T2:161-163
40			Numerical Double Integration - Simpson's Rule	T1:8.46-8.48 R1: 315
41			Problem solving session	
42			Tutorial-III	
Total Periods : 14			(CT 2: Assignmen:2 Date of announcement:09.03.15Date of Submission:	

Unit-IV : Initial Value Problems for ODE'sTarget Periods: 11+3= 14				
43			Taylor's Series Method	T1:10.2-10.10 T2:177-179 R1 : 352 – 361
44			Problem solving session	
45			Euler's Method	T1:10.18-10.26 T2:179-181 R1: 369 - 377
46			Modified Euler's Method	T1:10.18-10.26 T2:181-183 R1: 369 - 377
47			Tutorial-I	
48			RungeKutta Method – I order ODE	T1:10.18-10.26 T2:183-190 R1 : 379 - 393
49			Problem solving session	
50			RungeKuttaMethid - II order ODE	T1:10.18-10.26 T2:183-190 R1 : 392 – 394
51			Tutorial-II	
52			Milne's Method	T1:10.35-10.39 T2:192-196 R1 : 395 - 400
53			Adam's Bashforth P – C Method	T1:10.40-10.41 T2:196-199 R1 : 404 - 408
54			Adam's Bashforth P – C Method	T1:10.40-10.41 T2:196-199 R1 : 404 - 408
55			Seminar	
56			Tutorial-III	
Total Periods : 14				CIT 2 :
Unit-V : Boundary Value problems for ODE's & PDE Target Periods: 12+3= 14				
57			Finite Difference solution for 2nd order ODE	T1: 10.60 T2:240-247 R1: 413 – 417
58			Problem solving session	
59			Tutorial-I	
60			Elliptic Equations (Laplace)	T1:11.1-11.9 T2:247-254 R1 : 419 - 434
61			Problem solving session	
62			Poisson's Equation	T1:11.10-11.16 T2:247-254 R1 : 435 - 440
63			Tutorial-II	
64			Parabolic Equation	T1: 11.22-11.39T2:216-227 R1 : 441 - 450
65			Problem solving session	
66			Hyperbolic Equation	T1: 11.22-11.39T2:257-261 R1 : 452 - 458
67			Problem solving session	
68			Tutorial-III	
69			Revision	
70			Revision	
Total Periods : 14			Model Theory Examinations :	

Text Books/ Reference Books

S.no	Title of the Book	Author	Publisher	Year
1.	NUMERICAL METHODS with programming in 'C'	Veerarajan.T and Ramachandran.T (T1)	Tata MC Graw Hill Publishers, 4th Edition	2007
2.	NUMERICAL METHODS FOR SCIENTISTS AND ENGINEERS	Shankar Rao.K (T2)	Princtice Hall of India Pvt. New Delhi, 3rd Edition	2007
3.	Numerical Methods	P. Kandasamy , K. Thilagavathy and K. Gunavathy (R1)	S Chand & Co.,	2003
4.	Applied Numerical Analysis	Gerald .C.F and Wheatley .P.O	Pearson Education Asia	2002

PROGRAM OUTCOMES:

The students in the Electrical and Electronic Engineering Program should attain the following outcomes:

a) an ability to apply knowledge of Mathematics, Science and Engineering
b) an ability to design and conduct experiments, as well as to analyze and interpret data
c) an ability to design a system, component, or process to meet desired needs
d) an ability to function on multi-disciplinary teams
e) an ability to identify, formulate, and solve complex Engineering problems
f) an understanding of professional and ethical responsibility
g) an ability to communicate effectively
h) the broad education necessary to understand the impact of Engineering solutions in a global and societal context
i) a recognition of the need for, and an ability to engage in life-long learning
j) an ability to use the techniques, skills, and modern Engineering tools necessary for Engineering practice
k) an ability to demonstrate and apply the knowledge of Engineering and Management principles to their own work
l) an ability to understand the impact of professional Engineering solutions in environmental context for sustainable development

STAFF INCHARGE HOD/Mathematics

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM 630 611

Lecture Schedule

BATCH: 2013-2017 Academic Years: 2015-2016/even semester
Branch : EEE Subject: Electrical Machines-I
Duration : Jan '16 to April '16 Subject Code : EE6401
Semester : IV Section: B Staff Handling: P.Loganthurai
Regulation : **2013**

AIM

To expose the students to principle of operation and performance of electrical machines

OBJECTIVES

To impart knowledge on

(i) To introduce techniques of magnetic-circuit analysis and introduce magnetic materials

(ii)To familiarize the constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections

(iii)To study the working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines

(iv) To study the working principles of DC machines as Generator types, determination of their no-load/load characteristics, starting and methods of speed control of motors.

(v) To estimate the various losses taking place in D.C. Motor and to study the different testing methods to arrive at their performance.

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

CO	Course Outcomes	POs	PSOs
C210.1	Describe the coupled coil calculate the self and mutually induced emf	**1,2,5**	**1**
C210.2	Analyze the operation of transformer in different loading condition	**1,2,4,5**	**1**
C210.3	Explain the concept of field energy and co-energy in single and multiple excited systems	**1,2,5**	**1**
C210.4	Demonstrate the construction of D.C machines and operation of DC Generator	**1,2,5**	**1**
C210.5	Derive the performance equation of D.C motor under various load condition and analyze the braking system	**1,2,4,5**	**1**

S.No	Date	Period	Topics to be Covered	Book No [Page No]
UNIT I - MAGNETIC CIRCUITS AND MAGNETIC MATERIALS **Target periods : 12**				
1			Magnetic circuits –Laws governing magnetic circuits	1(12-16)
2			Flux linkage, Inductance and energy	1(17-20)
3			Statically and Dynamically induced EMF and Torque	1(30-34)
4				
5			Properties of magnetic materials	1(25-27)
6			AC operation of magnetic circuits	1(31-32)
7			Hysteresis and Eddy Current losses	1(33-35)
8			Introduction to permanent magnets	1(35-36)
9			Transformer as a magnetically coupled circuit	1(38-39)
10			Tutorial_1	
11			Tutorial_2	
12			Tutorial_3	

Total period		12	Assignment – 1 Date of Submission :	
UNIT II - TRANSFORMERS				**Target periods : 12**
13			Construction – principle of operation phasor diagrams.	1(54-62)2(2-4)
14			Equivalent circuit parameters	1(62-71) 2(20-28)
15			Losses –O.C&SC test – efficiency Sumpner's test- test voltage regulation per unit representation – inrush current	1(71-91) 2(29-34,66-70)
16				
17			Three phase transformer connections	1(101-106)
18			Scott Connection – Phasing of transformer	1(124-125)
19			Parallel operation of transformers	1(116-120)
20			Tap changing on transformers	1(127-131)
21			Auto transformer	1(94-97)
22			Student seminar-I-Protective system in transformer	
23			Quiz-I	
24			Tutorial_1	
25			Tutorial_2	
26			Tutorial_3	
Total period		14	Assignment – 2 Date of Submission :	
Test-II-CIT-I-[12-18 Feb 2015]				
UNIT III ELECTROMECHANICAL ENERGY CONVERSION AND CONCEPTS IN ROTATING MACHINES				**Target periods : 12**
27			Energy in magnetic system	1(158-160) 2(161-164)
28			Field energy and co energy-force and torque equations.	1(161-172)
29				
30			Singly excited systems.	1(173-176) 2(164-184)
31			Multiply excited systems.	1(176-178) 2(185-202)
32				
33			MMF of distributed windings– Winding Inductances	1(216-223) 2(285-293)
34			Magnetic fields in rotating machines, Rotating MMF waves	2(223-229), 1(223-239)
35			Magnetic saturation and leakage fluxes	1(247-249)
36			Tutorial_1	
37			Tutorial_2	
38			Tutorial_3	
Total period		12	Assignment – 3 Date of Submission :	
UNIT IV - DC GENERATORS				Target periods : 12
39			Construction and Principle of operation of D.C.Generator	1(285-287) 2(360-365)
40				
41			Lap and wave windings-EMF equations	1(287-302)
42			Circuit model	1(305-307)
43			Armature reaction, methods of excitation- Commutation	1(310-315,318-324)
44				
45			interlopes -compensating winding	1(316-318)
46			Characteristics of DC generators	1(326-329) 2(429-435)
47				
48			Student seminar-II	
49			Quiz-II	
50			Tutorial_1	
51			Tutorial_2	

52			Tutorial_3	
Total period		14	Assignment – 4	Date of Submission :
UNIT V – DC MOTORS				**Target periods : 12**
53			Principle and operations - types of DC Motors	1(285-287)
54			Characteristics of Motors	1(361-367)
55			Starting and speed control DC motors	1(381-405)
56			Plugging, dynamic and regenerative braking	1(408-410)
57			Methods of excitation	1(337-340)
58			Retardation test- Swinburne‘s test	1(412-415)
59			Hopkinson‘s test	1(419-421)
60			Permanent magnet dc motors(PMDC)-	1(426-429)
61			DC Motor applications	1(430)
62			Student seminar-III	
63			Quiz-III	
64			Tutorial_1	
65			Tutorial_2	
66			Tutorial_3	
Total period		14	Assignment – 5	Date of Submission :

Book Reference - Text Books

Sl.	Title of the Book	Author	Publisher	Year
1.	Electric Machines	Nagrath, I.J. and Kothari, D.P	Tata McGraw Hill, Fourth Edition	2010.
2.	Electrical Machines Theory and Practice	M.N.Bandyopadhyay.	PHI Learning PVT LTD., New Delhi	2009.
3	Electric Machinery	Fitzgerald. A.E., Charles Kingsely Jr, Stephen D.Umans	Tata McGraw Hill Books Company, Sixth edition	2003

Book Reference – References

Sl	Title of the Book	Author	Publisher	Year
1.	Principles of Electrical Machines and Power Electronics	Sen, P.C.,	John Wiley and Sons,	1997.
2.	Electric Machines and Power Systems: Volume I	Syed A. Nasar	Mcgraw-Hill College; International Edition,	1995
3.	Electrical Machines	Deshpande M. V	PHI Learning Pvt. Ltd., New Delhi	2011
4	Electrical Machinery	P.S. Bimbhra	Khanna Publishers,	2003.
5	Electric Machines	S.Sarma & K.Pathak	Cengage Learning India (P) Ltd., Delhi	2011

Net Reference

http://nptel.iitm.ac.in/courses.php?branch=Electrical

www.freebookspot.com

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

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C210.1	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
C210.2	3	2	-	2	1	-	-	-	-	-	-	-	2	-	-
C210.3	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
C210.4	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
C210.5	3	2	-	2	1	-	-	-	-	-	-	-	2	-	-
C210	3	2	-	1	1	-	-	-	-	-	-	-	1	-	-

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Assembling and testing of transformer	PO6,PO7 (vacant filled)PSO2(1) PO4 &PO5(strengthened)	C210.2/II C210.3 / III

PROGRAM OUTCOMES

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.

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.

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

Strength of correlation: 1(Weak), 2(Medium), 3(Strong)

STAFF INCHARGE HOD/EEE

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

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

Course/Branch : **B.E./EEE**
Duration : **Jan'16 to April'16**
Year/Semester : **II/IV** Sec: **A,B,C**
Regulation: **2013**

Subject : **OBJECT ORIENTED PROGRAMMING**
Subject Code : **CS6456**
Staff Handling: **Mr.A.Manoj, Ms.N.E.Ganga**
AUC/AUT/AUM: **AUC**

AIM :

1) To get a clear understanding of object-oriented concepts. 2) To understand object oriented programming through C++

OBJECTIVE:

1. To study the fundamentals of object oriented programming approach
2. To study the concept of polymorphism and inheritance and programming the same
3. Understanding the concept of templates, generic programming and STL etc.
4. To study the fundamentals of Java and virtual machines, JDK, Javadoc and packages.
5. Understanding the OOP concept like inheritance and multithreaded programming the same in Java.

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

C211.1	Explain the key attributes of C++ like native types and statements and implement ADT.	**POs**	**PSOs**
C211.2	Develop object oriented programs using polymorphism and data abstraction concepts.	**1,2,3,4,5**	**1 -**
C211.3	Design templates, construct generics and to handle exceptions.		**2 1**
C211.4	Develop the concept of java in creating classes, objects using arrays and control statements.		**2 1**
C211.5	Create packages, handle exceptions and develop multi-threaded programs.		**2 1**
			2 1

S. No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I : OVERVIEW				**Target periods : 9+3**
1.			Introduction of object oriented programming in C++	R1(19-40)
2.			Native types	R1(41-62)
3.			Statements	R1(62-71)
4.			Functions	R1(79-95)
5.			Pointers	R1(96-115)
6.			Implementing ADTs in the Base Language	R1(125-148)
Assignment - I				
Class Test I: ()				
UNIT II : BASIC CHARACTERISTICS OF OOP				**Target periods : 9+4**
7.			Data Hiding and Member Functions	R1(155-178)
8.			Object Creation and Destruction	R1(185-220)
9.			Polymorphism	R1(229-264)
10.			Iterators and Containers	R1(273-290)
11.			Runtime polymorphism.	R1(229-263)
12.			Seminar / Quiz-1	
CIT – I : ()				
UNIT III : ADVANCED PROGRAMMING				**Target Periods : 9**
13.			Templates	R1(295-303)
14.			Generic Programming	R1(303-312)
15.			Standard Template Library(STL)	R1(313-334)
16.			Inheritance	R1(339-368)
17.			Exceptions	R1(375-396)
18.			OOP using C++	R1(399-416)
Assignment : 2 Class Test II: ()				

UNIT IV : OVERVIEW OF JAVA				Target Periods: 9+6
19.			Introduction to Java	R2(1-41)
20.			Data types, Variables	R2(43-59)
21.			Arrays	R2(153-161)
22.			Operators	R2(60-77)
23.			Control Statements	R2(81-121)
24.			Classes, objects, methods	R2(126-137)
25.			Inheritance	R2(137-142)
CIT – II: () ***Assignment :3 DOS :***				
UNIT V : EXCEPTION HANDLING				**Target Periods: 9+5**
26.			Packages and Interfaces	R2(181-204)
27.			Exception Handling	R2(230-241)
28.			Multithreaded Programming	R2(207-226)
29.			Strings	R2(162-165)
30.			Input / Output	R2(287-295)
31.			Seminar / Quiz-2	
32.			**NPTEL Hour -1 – Unit-1**	
33.			**NPTEL Hour -2 – Unit-2**	
34.			**NPTEL Hour -3 – Unit-3**	
35.			**NPTEL Hour -4 – Unit-4 & 5**	
Content beyond syllabus				
CIT – III : ()				

Book References:

Book No	Title of the Book	Author	Publisher	Year
R1.	Object Oriented Programming Using C++	Ira Pohl	Pearson Education, second edition	2008
R2.	Programming with Java – a Primer	E Balagurusamy	The McGraw Hill Companies Third edition	2007
R3.	Programming with ANSI C++	Trivedi.B	Oxford University Press	2007
R4.	Object Oriented Programming	A.A.Puntambekar	Technical Publications	2013
R5.	"Java: how to program"	H.M.Deital, P.J.Deital	Prentice Hall of India Private Ltd, fifth edition	2003

Website Reference

1. **http://www.tutorialspoint.com/cplusplus/cpp_quick_guide.htm**
2. **http://www.nptelvideos.com/programming/c_programming_tutorials.php**
3. **http://www.nptelvideos.com/java/java_video_lectures_tutorials.php**

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C211.1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
C211.2	2	1	2	3	2	-	-	-	-	-	-	-	2	1	-
C211.3	2	1	2	3	2	-	-	-	-	-	-	-	2	1	-
C211.4	2	1	2	3	2	-	-	-	-	-	-	-	2	1	-
C211.5	2	1	2	3	2	-	-	-	-	-	-	-	2	1	-
C211	2	1	2	2	2	-	-	-	-	-	-	-	2	1	-

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Orientation Program in JAVA (backend and graphics)	PO2(2)(Strengthened)	C211.5/ V

STAFF IN-CHARGE **HOD/EEE**

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

Lecture Schedule

Course/Branch : **B.E / EEE** Subject: **Transmission & Distribution** Duration: **Jan-Apr 2016**

Subject Code : **EE6402** Semester : **IV** Section: **A,B&C** Regulation: **2013**

Staff Handling: **A.P.S. RAMALAKSHMI, M.BHARANI LAKSHMI**

AIM

To understand the importance and the functioning of transmission and distribution of the electric power in an electrical utility (or) a power system.

OBJECTIVES

1. ***To develop expressions for the computation of transmission line parameters.***
2. ***To obtain the equivalent circuits for the transmission lines based on distance and operating voltage for determining voltage regulation and efficiency. Also to improve the voltage profile of the transmission system.***
3. ***To analyses the voltage distribution in insulator strings and cables and methods to improve the same.***
4. ***To understand the operation of the different distribution schemes.***

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

Course	Course Outcome	POs	PSOs
C212.1	List the basic elements of the electric power system, generation, transmission, distribution and describe the role played by each element	1,2	1
C212.2	Determine the losses, efficiency and parameters of the Transmission line.	1,2,4,6,7	1,3
C212.3	Analyze the Performance of Transmission Lines.	1,2,4,6,7	1,3
C212.4	Solve the voltage distribution in insulator strings, cables and methods to improve the same.	1,2,6,7,8	1,3
C212.5	Design overhead lines both Mechanical and electrical aspects using Sag calculation.	1,2,4,6,7	1,3

S.No	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I: STRUCTURE OF POWER SYSTEM				**Target Periods : 9**
1			Structure of electric power system	2 (3-5) 3 (1.1-1.3)
2			Different operating voltages of generation, transmission and distribution	2 (3-5) 3 (1.1-1.3)
3			Types of AC distributors and concentrated loads	2 (375-380)
4			Tutorial -1	-
5			Tutorial -2	-
6			Types of DC distributors and Concentrated loads.	2 (342-375)
7			Tutorial -3	-
8			Interconnection of EHVAC Transmission	3(1.8-1.15)
9			Interconnection of HVDC transmission	3(1.15-1.23)
10			An introduction to FACTS	3(1.23-1.27)
11			Static Var Compensator, Thyristor controlled series capacitor,	3(1.28-1.29)
12			STATCOM,UPFC	3(1.29-1.31)
Test-I-Class test – I				**Total Periods: 12**
UNIT II: TRANSMISSION LINE PARAMETERS				**Target Periods : 9**
13			Parameters of single and three phase transmission lines with single and double circuits	2(146-161)
14			Resistance, inductance and capacitance of solid conductor	2(159-166)
15			Stranded And Bundled Conductors	2(166-182)
16			Tutorial-1	-
17			Symmetrical spacing – transposition of lines	2(176-192)
18			Unsymmetrical spacing – transposition of lines	2(176-192)
19			Tutorial-2	-
20			Tutorial-3	-
21			Concepts of GMR and GMD - Skin and Proximity effects	2(166-192)
22			Interference with neighbouring communication circuits.	3 (2.91-2.94)
23			Corona discharge characteristics, critical voltage and loss. (Simple diagrams of typical towers and conductors for 400, 220 and 110 kV operations)	3 (3.118-3.123)
24			Quiz-1	-
Assignment 1		*Date of Announcement(DOA) :*	*Date Of Submission(DOS) :*	

			Test-II- CIT-I	**Total Periods: 12**
UNIT III: MODELLING AND PERFORMANCE OF TRANSMISSION LINES				**Target Periods : 9**
25			Classification of Transmission lines Short, medium and long line	3 (3.1-3.3) 2 (194-212)
26			Equivalent circuits – Ferranti effect- phasor diagram	
27			Attenuation constant, phase constant, surge impedance	
28			Transmission Efficiency and Voltage regulation	3 (3.1-3.24)
29			Tutorial-1	-
30			Tutorial-2	-
31			Real and Reactive power flow in lines	3 (3.74-3.78)
32			Power-circle diagrams	3 (3.75-3.83) 3 (212)
33			Tutorial-3	-
34			Surge impedance loading, Methods of voltage control	3 (3.71-3.74)
Assignment - 2	*DOA:*		*DOS:* *Test-III-Class test II*	**Total Periods: 12**
UNIT IV: INSULATORS AND CABLES				**Target Periods : 9**
35			Classification of insulators for transmission and distribution purpose	2 (235-237) 3(5.1-5.7)
36			Voltage distribution in insulator string	2 (237-240) 3(5.7-5.20)
37			Tutorial-1	-
38			Improvement of string efficiency, Testing of insulators	3(5.20-5.22)
39			Tutorial-2	-
40			Seminar –1	-
41			Quiz –2	-
42			Underground cables ,Types of cables	2 (274-283) 3(4.1-4.12)
43			Capacitance of single core cable, Grading of cables	2 (290-294) 3(4.12-4.19)
44			Tutorial-3	-
45			Power factor and heating of cables,	2 (274-290) 3(4.20-4.47)
46			Capacitance of 3-core belted cable, DC cable.	3(8.43-8.47)
Assignment - 3			*Date of Announcement :* *Date Of Submission:*	
			Test-IV-CIT – II	**Total Periods: 12**
UNIT V: MECHANICAL DESIGN OF LINES AND GROUNDING				**Target Periods : 9**
47			Mechanical design of transmission line	2 (383-393)
48			Sag and Tension calculations for different weather conditions	1(141-145) 2(246-258)
49			Tutorial-1	-
50			Tutorial-2	-
51			Tutorial-3	-
52			Tower spotting, Types of towers	1(291-292)
53			Seminar-2	-
54			Substation Layout of AIS	1(391-392)
55			Substation Layout of GIS	1(393-394)
56			Methods of grounding	3(10.2-10.10)
57			***Content beyond Syllabus:*** Safety Precautions in Transmission Lines	**-**
			Test-V-Class test III	**Total Periods: 12**

Books: Text/Reference

S. No	Title of the Book	Author	Publisher	Year
1	Power System Analysis and Design	B.R.Gupta	S.Chand ,New Delhi	2003
2	Electric Power Generation, Transmission and Distribution	S.N. Singh	PHI, New Delhi	2002
3	Transmission and Distribution	Jeraldin Akila	Lakshmi Publications	2010
4	Electrical Power Distribution and Transmission	Luces M.Fualkenberry, Walter Coffer	Pearson Education	1996
5	Power System Analysis	Hadi Saadat	Tata McGraw Hill	2003
6	Guidelines for Transmission System Planning	-	Central Electricity Authority (CEA)	-
7	Tamil Nadu Electricity Board Handbook	-	-	2003

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C212.1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
C212.2	3	3	-	1	-	2	3	-	-	-	-	-	2	-	1
C212.3	3	3	-	1	-	2	3	-	-	-	-	-	2	-	1
C212.4	3	3	-	-	-	3	3	1	-	-	-	-	2	-	1
C212.5	3	3	-	1	-	2	3	-	-	-	-	-	2	-	1
C212	3	3	-	1	-	2	2	-	-	-	-	-	2	-	1

Content Beyond Syllabus Added(CBS)	POs strengthened / vacant filled	CO / Unit
Safety Precautions in Transmission Lines	PO6(3) strengthened/ PO8(1) (Vacant filled)	C212.4/IV

WEB REFERENCE:

1. http://nptel.ac.in/video.php?subjectId=108102047
2. http://nptel.ac.in/courses/108102047

PROGRAM OUTCOMES

Electrical and Electronics Engineering Graduates will be able to:

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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.

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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 multidisciplinary environments.

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

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

STAFF INCHARGE **HOD/EEE**

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

Course/Branch : **B.E / EEE** Subject: **Discrete Time Systems & Signal Processing** Duration: **Jan-Apr 2016**
Subject Code : **EE6403** Semester: **IV** Section: **A, B & C** Regulation: **2013 (AUC)**
Staff Handling: **S. RAJALINGAM. E. JEYASRI & R. DIVYA**

AIM

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

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	POs	PSOs
C213.1	Classify the different types of signals and systems and Explain the sampling process of continuous time signal.	1,2,3,5,12	1,2
C213.2	Apply z-transform and inverse Z transform and analyze discrete time systems.	1,2,3,5,12	1,2
C213.3	Apply Radix-2 Decimation in Time (DIT) and Decimation in Frequency (DIF) FFT Algorithm to Compute Discrete Fourier Transform.	1,2,3,5,12	1,2
C213.4	Explain different types of Infinite Impulse Response (IIR) filters and Finite Impulse Response (FIR) filters.	1,2,3,5,12	1,2
C213.5	Explain various architectures of Digital signal processors.	1,2,3,5,12	1,2

S. No.	Date	Period Number	Topics to be Covered	Book No [Page No]
UNIT I - INTRODUCTION				**Target periods :9+3**
1.			Introduction	T1[1-5], R2[1.1]
2.			Classification of Systems: Continuous, Discrete, Linear, Causal, Stable	R2[1.52], T2[100]
3.			Classification of Systems: Dynamic, Recursive, Time variance	R2[1.52]
4.			Classification of Signals: Continuous and Discrete	T1[6-11], R2[1.3]
5.			Classification of Signals: Energy & Power signals	T1[6-11], R2[1.33]
6.			Mathematical Representation of Signals	R2[1.28]
7.			Spectral Density, Sampling Techniques, Quantization, Quantization Error	T1[21], T1[31-35], R2[1.173]
8.			Nyquist Rate, Aliasing effect	T1[28], T1[20], R2[1.170]
9.			Digital Signal representation	R2[1.29]
10.			Tutorial 1	-
11.			Tutorial 2	-
12.			Tutorial 3	-
ASSIGNMENT - I				
UNIT II - DISCRETE TIME SYSTEM ANALYSIS				**Target periods :9+3**
13.			Introduction to Z Transform	T1[147], R2[2.1]
14.			Properties of Z Transform	T1[157], R2[2.8]
15.			Inverse Z Transform: Long Division & Partial Fraction method	T1[157], R2[2.30]
16.			Inverse Z Transform: Residue & Convolution method	T1[156] R2[2.40]
17.			Solution to Difference equation using Z Transform, Application to discrete systems	R2[2.52]
18.			Stability Analysis	R2[2.7]
19.			Frequency Response	T2[146] R2[1.129]
20.			Convolution	T1[69] R2[1.60]
21.			Discrete Time Fourier Transform, Magnitude & Phase representation	R2[3.5] R2[3.1]
22.			Tutorial 1	-

23.			Tutorial 2	-
24.			Tutorial 3	-
			ASSIGNMENT – II	
			CENTRALIZED INTERNAL TEST - I	
UNIT III - DISCRETE FOURIER TRANSFORM &COMPUTATION				**Target Periods :9+3+2**
25.			Properties of Discrete Fourier Transform	T1[464] R2[3.25]
26.			Magnitude & Phase representation of Discrete Fourier Transform	R2[3.9]
27.			Introduction to FFT Algorithm	T1[519] R2[4.1]
28.			Introduction to Butterfly Structure	R2[4.5]
29.			Introduction to Radix 2 Decimation in Time (DIT) Algorithm	R2[4.3]
30.			Computation of DFT using Radix 2 DIT Algorithm	R2[4.11]
31.			Computation of DFT using Radix 2 DIT Algorithm	R2[4.11]
32.			Introduction to Radix 2 Decimation in Frequency (DIF) Algorithm	R2[4.21]
33.			Computation of DFT using Radix 2 DIF Algorithm	R2[4.27]
34.			Tutorial 1	-
35.			Tutorial 2	-
36.			Tutorial 3	-
37.			Quiz-1	-
38.			Seminar – 1	-
UNIT IV - DESIGN OF DIGITAL FILTERS				**Target Periods :9+3+1**
39.			Realization of IIR Filters – Direct form I, II, Parallel & Cascaded form	R2[5.54]
40.			Realization of FIR Filters – Parallel & Cascaded form	T1[567] R2[6.102]
41.			Introduction to Windowing Technique – Need & Choice	R2[6.29]
42.			Design of FIR Filters Using Windowing Technique.	R2[6.29]
43.			Linear phase characteristics of FIR Filters	R2[6.1]
44.			Design of Analog IIR Filter by Butterworth & Chebyshev Approximations	R2[5.6] R2[5.17]
45.			Design of Digital IIR Filter by Impulse Invariant	R2[5.33]
46.			Design of Digital IIR Filter by Bilinear Transformation	R2[5.33]
47.			Warping & Pre-warping effect	R2[5.29]R2[5.52]
48.			Tutorial 1	-
49.			Tutorial 2	-
50.			Tutorial 3	-
51.			Content beyond Syllabus	T2[631]
			ASSIGNMENT - III	
			CENTRALIZED INTERNAL TEST - II	
UNIT V – DIGITAL SIGNAL PROCESSORS				**Target Periods :9+2**
52.			Introduction to Digital Signal Processors	R2[11.1]
53.			Features of Digital Signal Processors	R2[11.5]
54.			Von Neumann Architecture	R2[11.8]
55.			Harvard Architecture	R2[11.9]
56.			VLIW Architecture	R2[11.10]
57.			Addressing Formats of Digital Signal Processors	R2[11.25]
58.			Addressing Formats of Digital Signal Processors	R2[11.25]
59.			Functional modes of Digital Signal Processors	R2[11.25]
60.			Introduction to Commercial processors	R2[11.1]
61.			Quiz-2	-
62.			Seminar-2	-
			CENTRALIZED INTERNAL TEST - III	

Books: Text/Reference

Book No	Title of the Book	Author	Publisher	Year
T1	Digital Signal Processing Principles, Algorithms and Applications.	J.G. Proakis and D.G. Manolakis	Pearson Education, New Delhi	2003
T2	Digital Signal Processing – A Computer Based Approach	S.K. Mitra	Tata McGraw Hill, 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
C213.1	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213.2	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213.3	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213.4	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213.5	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213	3	2	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-Verification.	PO5 (Strengthened)	IV

PROGRAM OUTCOMES

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.

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.

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

Strength of correlation:1(Weak),2(Medium),3(Strong)

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 : **IV** Section : **C**

Course code & Name : **EE6404 & Measurements and Instrumentation**

Duration : **Jan-Apr 2016.** Regulation : **2013/AUC** Staff : **M. Jeyamurugan**

AIM: To provide adequate knowledge in electrical instruments and measurements techniques.

OBJECTIVE:

- To introduce the basic functional elements of instrumentation
- To introduce the fundamentals of electrical and electronic instruments
- To educate on the comparison between various measurement techniques
- To introduce various storage and display devices
- To introduce various transducers and the data acquisition systems

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	POs	PSOs
C214.1	Describe the basic functional block elements in Different measuring Instruments and the errors in the measurement system	1,2	1
C214.2	Select the suitable instrument for measuring different electrical and magnetic parameters	1,2,3	1
C214.3	Design a suitable Bridge circuit to determine the values of various resistor, inductor and capacitor	1,2,3,4	1
C214.4	Explain the construction and working principle of various types of storage and display devices and compare them	1,7	-
C214.5	Compare the various types of transducers and explain the function of different blocks involved in data acquisition systems	1,5	2

Total : 45 Periods

S. No	Date	Period Number	Topics to be Covered	Book No [Page No]	
UNIT-I: INTRODUCTION					**Target periods : 9**
1			Introduction	T1[1]	R6[1.2,43]
2			Functional elements of an instrument	T1[9]	R6[1.3]
3			Static characteristics	T1[24]	R6[1.7]
4			Static characteristics	T1[32]	R6[1.8]
5			Dynamic characteristics	T1[102]	R6[1.21]
6			Errors in measurement	T1[60]	R6[1.54]
7			Statistical evaluation of measurement data	T1[70]	R6[1.58]
8			Standards	T1[181]	R6[1.52]
9			Calibration	T1[182]	R6[1.50]
Total Periods:		**9**	***Assignment - I***	*Date of Submission :*	
			Test – I: Class Test-I	***Portion :*** *Unit – 1*	
UNIT-II: ELECTRICAL AND ELECTRONICS INSTRUMENTS					**Target periods : 9**
10			Principle and Types of analog and digital voltmeter	T1[1303]	R6[2.3,63]
11			Principle and Types of analog and digital ammeter	T1[292,301]	R6[2.23]
12			Principle and Types of analog and digital multimeter	T1[367]	R6[2.8]
13			Single and three phase watt meter	T1[431,451]	R6[2.58]
14			Single and three phase energy meter	T1[466]	R6[2.47]
15			Magnetic measurements	T1[660]	R6[2.93]
16			Determination of B-H curve and measurements of iron loss	T1[663,677]	R6[2.94]
17			Instrument transformers	T1[384,405]	R6[2.118]
18			Instruments for measurement of Frequency	T1[500]	R6[2.129]
19			Instruments for measurement of phase	T2[364]	R6[2.144]
Total Periods:		**10**	***Assignment - II***	*Date of Submission :*	
		1,2	***Test – II: CIT-I***	***Portion :*** *Unit – 1,II*	
UNIT-III: COMPARISON METHODS OF MEASUREMENTS					**Target Periods : 9**
20			D.C Potentiometers	T1[558]	R6[3.2]
21			A.C Potentiometers	T1[573]	R6[3.30]
22			D.C Bridges	T1[1171]	R6[4.2]
23			A.C Bridges	T1[1171]	R6[4.34]

24			Transformer ratio bridge & Self- balancing bridge	T1[614]	R6[4.72]
25			Interference and Screening	T10[3.61,73]	R6[4.80]
26			Multiple earth and earth loops	T1[546]	R6[4.88]
27			Electrostatic and electromagnetic interference	T10[3.75]	R6[4.85]
28			Grounding techniques	-	R6[4.92]
29			*Quiz-1*		-
Total Periods:		**9+1 = 10**	***Assignment - III***	*Date of Submission :*	
		1	***Test – III : Class Test-II***	***Portion :*** *Unit – III*	
UNIT-IV: STORAGE AND DISPLAY DEVICES					**Target Periods: 9**
30			Magnetic disk and tape – Recorders	T1[1309,1317]	R6[5.6]
31			Digital plotters	R1[352]	R6[5.5]
32			Digital Printers	R1[52]	R6[5.21]
33			CRT display	T1[785]	R6[5.27]
34			Digital CRO	R1[193]	R6[5.57]
35			LED	T1[1284]	R6[5.73]
36			LCD	T1[1284]	R6[5.80]
37			Dot matrix display	T1[1284]	R6[5.84]
38			Data loggers	-	R6[7.12]
39			*Seminar – I*		-
40			*Quiz-II*		-
Total Periods:		**9+2 = 11**	***Test – IV: CIT-II***	***Portion :*** *Unit – III, IV*	
UNIT-V: TRANSDUCERS AND DATA ACQUISITION SYSTEMS					**Target Periods: 9**
41			Classification of transducers, Selection of transducers	T1[936,949]	R6[6.2]
42			Resistive transducers	T1[950]	R6[6.11]
43			Capacitive transducers	T1[1014]	R6[6.38]
44			Inductive transducers	T1[998]	R6[6.32]
45			Piezoelectric transducers, Hall effect transducers	T1[1028]	R6[6.51]
46			Optical transducer	T1[1040]	R6[6.59]
47			Digital transducers		R6[6.55]
48			Elements of data acquisition system, Smart sensors	T1[1521]	R6[7.2]
49			A/D and D/A converters		R6[7.17]
50			*Seminar – II*		-
Total Periods:		**9+1 = 10**	***Test – V: Class Test-III***	***Portion :*** *Unit – V*	
51			**Content beyond Syllabus**		
52			**NPTEL**		

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

S. No		Title of the Book	Author	Publisher	Year
1	T1	A Course in Electrical & Electronic Measurements & Instrumentation	Sawhney.A.K	Dhanpat Rai and Co	2004
2	T2	A Course in Electronic and Electrical Measurements	J. B. Gupta	S. K. Kataria & Sons, Delhi	2003
3	T3	Measurement Systems – Application and Design	Doebelin.E.O and D.N.Manik	Special Indian Edition, Tata McGraw Hill Education Pvt. Ltd.	2007
4	R1	Electronic Instrumentation, II Edition	Kalsi.H.S	Tata McGraw Hill	2004
5	R2	Transducers and Instrumentation	Moorthy.D.V.S	Prentice Hall of India Pvt Ltd	2007
6	R3	Digital Instrumentation	Bouwens.A.J	Tata McGraw Hill	1997
7	R4	Electrical Measurements	Martin Reissland	New Age International (P) Ltd., Delhi	2001
8	R5	Principles of Measurements and Instrumentation	Alan.S.Morris	2nd edition Prentice hall of india	2003
9	R6	Measurements & Instrumentation	U.A.Bakshi	Technical Publications	2014
10	R7	Measurements and instrumentation	Gnanavadivel	Anuradha	2014

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C214.1	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-
C214.2	2	1	2	-	-	-	-	-	-	-	-	-	1	-	-
C214.3	2	2	3	2	-	-	-	-	-	-	-	-	2	-	-
C214.4	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
C214.5	1	-	-	-	2	-	-	-	-	-	-	-	-	1	-
C214	2	1	1			-	-	-	-	-	-	-	1	-	-

Content Beyond Syllabus Added (CBS)	POs strengthened / vacant filled	CO / Unit
Modern measuring Equipment's in Electricity Board.	PO5(2)(vacant filled)	C214.2/II

PROGRAM OUTCOMES

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.

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PROGRAM SPECIFIC OUTCOMES (PSOs)

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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.

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

Strength of correlation:1(Weak),2(Medium),3(Strong)

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

MA6459 - NUMERICAL METHODS-[C209]

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

1. Course Outcomes

	Course Outcomes-MA6459
C209.1	Determine the solution of algebraic and transcentendal system of linear equations
C209.2	To interpolate the values of unknown functions using Newton's Formula
C209.3	Estimate the numerical values of the derivatives and integrals of unknown function
C209.4	Solve first and second order initial value problem
C209.5	Solve Numerically boundary value problem

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

Course Outcomes (CO)	Program Outcome (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
C209.1	3	3	-	2	3	2	-	-	-	-	-	-	2	1	1
C209.2	3	3	-	2	3	2	-	-	-	-	-	-	2	1	1
C209.3	3	3	-	2	3	2	-	-	-	-	-	-	2	1	1
C209.4	3	3	-	2	3	2	-	-	-	-	-	-	2	1	1
C209.5	3	3	-	2	3	2	-	-	-	-	-	-	2	1	1
C209	3	3	-	2	3	2	-	-	-	-	-	-	2	1	1

PROGRAM OUTCOMES (POs)

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.

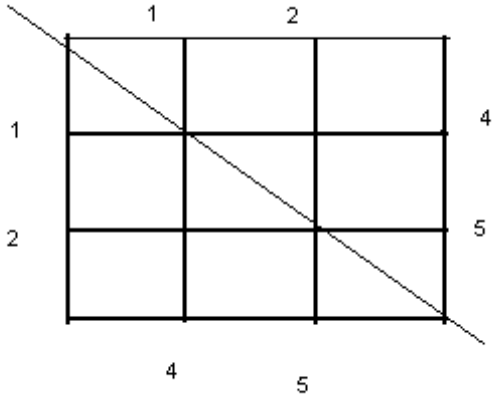
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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.

S.No.	**4. Important Questions.**	COs	POs
Q.1.1.	Solve the equation$x^2 - 2x - 3 = 0$ for the positive root by iteration method	C209.1	2,3
Q.1.2.	Find the real root of the equation $cosx = 3x - 1$,using iteration method.	C209.1	2.3
Q.1.3.	Evaluate $\sqrt{12}$ to four decimal places by Newton's-Raphson Method.	C209.1	1
Q.1.4.	Find the root of $xe^x = 3$ by Regular falsi Methods to three decimal places.	C209.1	2
Q.1.5.	Solve the system of equations by Gauss-elimination method. 10x-2y+3z=23, 2x+10y-5z=-33,3x-4y+10z=41	C209.1	1,2
Q.1.6.	Using the Gauss-Jordan method solve the following equations. 10x+y+z=12, 2x+10y+z =13, x+y+5z =7.	C209.1	1,2
Q.1.7.	Solve the system of equations x+y+54z=110, 27x+6y-z=85, 6x+15y+2z=72 using Gauss-Seidel iteration method.	C209.1	1,2
Q.1.8.	Find the inverse of the matrix $\begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$ using Gauss-Jordan method.	C209.1	1,2,3
Q.1.9.	Using power method to find the dominant eigen value and the eigen vector of A=$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$	C209.1	1,2,3
Q.1.10.	Determine by power method the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$	C209.1	1,2,3
Q2.1	Write a polynomial to calculate the value of x when x 3 5 7 9 y 6 2 5 10 4 8 8	C209.2	2
Q2.2.	Find the divided difference table for the following: x 1 1 4 5 F(x) 8 1 7 12 1 8 3	C209.2	2,3
Q.2.3.	Obtain the interpolation quadratic polynomial for the given data by using Newton's forward difference formula. x 0 2 4 6 y - 3 5 2 1 4 5	C209.2	2,3
Q2.4.	A third degree polynomial passes through (0,1),(1,-1), (2,-1) and (3,2). Find its value at x=4.	C209.2	2,3
Q.2.5.	Using Lagrange's interpolation formula, find the value of 'x' corresponding to y=13.5 from the following table: x 93.0 96.2 100.0 104.2 108.7 y 11.38 12.80 14.70 17.07 19.91	C209.2	1,2
Q.2.6.	Find the cubic function from the following table. x 0 1 3 4 F(x) 1 4 4 8 0 5	C209.2	1,2,3
Q2.7.	Fit the cubic spline for the data. x 0 1 2 3 F(x) 1 2 9 28	C209.2	1,2,3
Q.2.8.	From the given table , the values of y are consecutive terms of a series of which 23.6 is	C209.	1,2

	the 6^{th} term. Find the first and tenth term of the series. x 3 4 5 6 7 8 9 y 4.8 8.4 14.5 23.6 36.2 52.8 73.9	2	,3
Q.3.1.	For the given data x 1.0 1.1 1.2 1.3 1.4 1.5 1.6 f(x) 7.98 8.409 8.781 9.129 9.451 9.750 10.031 Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ $at\ x = 1.1$	C209.3	1,2
Q.3.2.	The table given below reveals the velocity v of a body during the time 't' specified. Find its acceleration at t=1.1 x 1.0 1.1 1.2 1.3 1.4 y 43.1 47.7 52.1 56.4 60.8	C209.3	1,2
Q.3.3.	Compute the value of the definite integral $\int_4^{5.2} log_e x\ dx$ using Simpson's rule.	C209.3	1,2.,3
Q.3.4.	Evaluate $\int_0^2 \frac{dx}{x^2+4}$ using Romberg's method. Hence obtain an approximate value of π	C209.3	1,2.,3
Q.3.5.	Find the value of the following integral using Gaussian quadrature technique $\int_3^5 \frac{4}{2x^2}\ dx$.	C209.3	1,2
Q.3.6.	Evaluate $\int_0^1 \frac{dx}{1+x^2}$, using Gauss 3 point formula	C209.3	1,2
Q.3.7.	Evaluate the integral=$\int_1^2 \int_1^2 \frac{dxdy}{x+y}$ using the trapezoidal rule with (i)h=k=0.5, and (ii)h=k=0.25	C209.3	1,2,3
Q.4.1.	By Taylor's series method, find y(1.1) given $y' = x + y$, $y(1) = 0$.	C209.4	1,2,3
Q.4.2.	Solve $\frac{dy}{dx} = 1 - y$, y(0)=0 for x=0.1 by Euler's method.	C209.4	1,2,3.
Q.4.3.	Using Improved Euler's method, find y(0.1) if $\frac{dy}{dx} = x^2 + y^2$, y(0)=1.	C209.4	1,2
Q.4.4.	Runge-Kutta method to approximate y, when x=0.1,0.2,0.3, h=0.1 given x=0 when y=1 and $\frac{dy}{dx} = x + y$	C209.4	1,2,3.
Q.4.5.	Using Runge-Kutta of fourth order solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with y(0)=1 at x=0.2, 0.4.	C209.4	1,2,3
Q.4.6.	The differential equation $\frac{dy}{dx} = y - x^2$ is satisfied by y(0)=1, y(0.2)=1.12186, y(0.4)=1.46820, y(0.6)=1.7379. Compute the value of y(0.8) by Milne's Predictor-Corrector formula	C209.4	2,3
Q4.7	Using Adam's method find y(0.4) given $y' = \frac{xy}{2}$. y(0)=1, y(0.1)=1.01, y(0.2)=1.022, y(0.3)=1.023.	C209.4	2,3
Q.5.1.	Solve the differential equation $\frac{d^2y}{dx^2}$ -y =x with y(0)=0, y(1)=0 with h=$\frac{1}{4}$	C209.5	1.
Q5.2.	Solve the equation$\frac{\partial u}{\partial t} = \frac{1}{2}\frac{\partial^2 u}{\partial t^2}$, $0 \le x \le 12$,$0 \le t \le 12$ with boundary and initial conditions u(x,0)=$\frac{x(15-x)}{4}$ $0 \le x \le 12, u(0,t) = 0, u(12,t) = 9, 0 \le t \le 12$. Using Schmidt relation.	C209.5	1,2,3.
Q.5.3.	Solve $U_{tt} = 4U_{xx}$ with boundary conditions u(0,t)=0=u(4,t) , $u_t(x,0) = 0\ and$ u(x,0)=x(4-x).	C209.5	1,2,3
Q.5.4.	Solve $u_{xx} + u_{yy} = 0$ in $0 \le x \le 4, 0 \le y \le 4$. Given that u(0,y)=0,u(4,y)=8+2y, u(x,0)=$\frac{x^2}{2}$ and u(x,4)=2 taking h=k=1. Obtain the result correct to one decimal.	C209.5	1,2,3
Q.5.5.	Using Leibmann's method, solve the equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown in the figure. Iterate until the maximum difference between successive values at any point is less than 0.001	C209.5	1,2,3



	5.Assignments/Seminar/Self study topics.		
A.1.1.	Find an iterative formula to find $\sqrt{N}$,where N is a positive number and hence find $\sqrt{5}$	C209.1	1
A.1.2.	Solve for a positive root of the equation $x^4 - x - 1 = 0$ using Newton _Raphson method	C209.1	2,3
A.1.3.	Solve $y = 3e^x - 3x = 0$ by the method of fixed point iteration.	C209.1	2,3
A.1.4.	Solve the system of equation by Gauss-Jordan method $5x_1 - x_2 = 9$, $-x_1 + 5x_2 - x_3 = 4$, $-x_2 + 5x_3 = -6$.	C209.1	1,2
A.1.5.	Apply Gauss-Elimination method to find the solution of the following system$2x + 3y - z = 5$, $4x + 4y - 3z = 3, 2x - 3y + 2z = 2$.	C209.1	1,2
A.1.6.	Using Gauss-Jordan method, find A^{-1} if $A = \begin{bmatrix} 1 & 2 & 6 \\ 2 & 5 & 15 \\ 6 & 15 & 46 \end{bmatrix}$	C209.1	1,2,3
A.1.7	Determine the largest eigen value of the matrix using power method given $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$	C209.1	1,2,3
A.1.8	Using Gauss-Seidel method, to solve the following system of linear equation $4x + 2y + z = 14$, $x + 5y - z = 10$, $x + y + 8z = 20$.	C209.1	1,2
A.2.1	Find the polynomial f(x) by using Lagrange's formula and hence find f(3) for the following values of x and y. X 0 1 2 5 Y 2 3 12 147	C209.2	2,3
A.2.2.	Determine f(x) as a polynomial in x for the following data, using Newton's Divided Difference formula. Also find f(2). X -4 -1 0 2 5 F(x) 1245 33 5 9 1335	C209.2	2,3
A.2.3.	By using Newton's Divided difference formula find the function X 0 1 2 4 5 7	C209.2	2,3

	F(x) 0 0 -12 0 600 7308		
A.2.4.	Find the cubical polynomial which takes the following values X 0 1 2 3 Y 1 2 1 10	C209.2	1,2,3
A.2.5.	The population of a town is as follows X (in Year) 1941 1951 1961 1971 1981 1991 Y (Population in 1000) 20 24 29 36 46 51 Estimate the population increase during the period 1946 to 1976.	C209.2	1,2,3
A.2.6.	Given the following table, find the number of students whose weight is between 60 and 70 lbs. Weight X (lbs) 0-40 40-60 60-80 80-100 100-120 No. of students 250 120 100 70 50	C209.2	1,2,3
A.2.7.	Find the cubic Spline for the following data X 1 2 3 4 5 Y 1 0 1 0 1	C209.2	1,2,3
A.2.8	If f(0)=1, f(1)=2, f(2)=33 and f(3)=244. Find a cubic Spline approximately assuming M(0)=M(3)=0. Also, find f(2.5).	C209.2	2,3
A.3.1.	Find the first three derivative of f(x) at x=1.5 by Newton's Forward Interpolation formula to the data given below. X 1.5 2.0 2.5 3.0 3.5 4.0 Y 3.375 7 13.625 24.0 38.875 59	C209.3	1,2,3
A.3.2.	The velocities of a car running on a straight road at intervals of 2 minutes are given below. Time (in Minutes) 0 2 4 6 8 10 12 Velocity (in Km/Hr.) 0 22 30 27 18 7 0 Using Simpson's 1/3 rd rule, find the distance covered by the car	C209.3	1,2,3
A.3.3.	Taking h=0.05, evaluate $\int_1^{1.3} \sqrt{x}\, dx$ using Trapezoidal and Simpson's 1/3 rd rule	C209.3	1,2,3
A.3.4.	Using Romberg's integration to evaluate $\int_0^1 \frac{dx}{1+x^2}$	C209.3	1,2,3
A.3.5.	Apply three point Gaussian Quadrature formula to evaluate $\int_0^1 \frac{sinx}{x}\, dx$.	C209.	1,2

		3	,3
A.3.6	Evaluate $\int_0^6 dx/(1+x)$ using Trapezoidal rule and check by direct integration.	C209.3	1,2
A.3.7	The population of a certain town is given below.Find the rate of a growth of the population is 1931. Year x: 1931 1941 1951 1961 1971 Population in thousands y: 40.62 60.80 79.95 103.56 132.65	C209.3	2,3
A.3.8	Using Gaussian three point formula, evaluate $\int_{-1}^{1}(3x^2+5x^4)dx$	C209.3	1,2,3
A.4.1.	Given y'=-y and y(0)=1, determine the values of y at x=0.001, 0.02, 0.03 by Euler method.	C209.4	1,2
A.4.2.	Find y(0.4) given $\frac{dx}{dy}=\frac{xy}{2}$, y(0) =1, y(0.1) =1.01, Y(0.2) = 1.022, y(0.3) = 1.023 by Adam's method.	C209.4	2,3
A.4.3.	Using Runge-kutta method of fourth order, find y(0,7) correct to 3 decimal places if $y'=y-x^2$,y(0.6)=1.7379.	C209.4	1,2,3
A.4.4.	Using Taylor series method, find y(1.1) correct to four decimal places given$\frac{dy}{dx}=xy^{1/3}$ and y(1) =1.	C209.4	1,2
A.5.1.	1. Solve upto 2 decimals $u_{xx}+u_{yy}=0$ over the square mesh of side 4 units satisfying the following boundary conditions. i) u (0,y)=0 ,for $0 \le y \le 4$ ii.) u (4,y)=12+y for $0 \le y \le 4$ iii.)u(x,0) = 3x for $0 \le y \le 4$ iv.) $u(x,4)=x^2$ for $0 \le y \le 4$	C209.5	1,2,3
A.5.2.	Using Crank – Nicholson's implicit scheme,solve the heat equation uxx=ut,t≥0 , 0≤x≤1 subject to the conditions u(x,0)=0 ,u(0,t) =0 u(1,t) =t for two time steps	C209.5	1,2,3
A.5.3	Solve the Poission Equation $\nabla^2 u = -10(x^2+y^2+10)$ over the square with sides x=0, y = 0, x=3,y=3 with u = 0 on the boundary taking h = 1.	C209.5	1,2,3
A.5.4	Use Crank – Nicholson's scheme to solve $\frac{\partial^2 u}{\partial x^2}=16\frac{\partial u}{\partial t}$, 0 < x < 1 and t > 0 given u(x, 0) = 0, u(0, t)=0and u(1, t) = 100t. Compute u(x, t) for one time step taking $\Delta x=\frac{1}{4}$	C209.5	1,2,3
A.5.5	Solve y'' – y = x, x∈ (0, 1) given y(0)= y(1) = 0 using finite differences dividing the interval into 4 equal parts.	C209.5	1,2,3
	6.Tutorial		
T.1.1.	Solve the system of equations x+y+54z=110, 27x+6y-z=85, 6x+15y+2z=72 using Gauss-Seidel iteration method	C209.1	1,2,
T.1.2.	Determine by power method the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix}1 & 3 & -1\\ 3 & 2 & 4\\ -1 & 4 & 10\end{bmatrix}$	C209.1	1,2,3
T.1.3.	Using the Gauss-Jordan method solve the following equations. 10x+y+z=12, 2x+10y+z =13, x+y+5z =7.	C209.1	1,2

T.2.1.	Using Lagrange's interpolation formula, find the value of 'x' corresponding to y=13.5 from the following table: x 93.0 96.2 100.0 104.2 108.7 y 11.38 12.80 14.70 17.07 19.91	C20 9.2	1,2
T.2.2.	From the given table , the values of y are consecutive terms of a series of which 23.6 is the 6^{th} term. Find the first and tenth term of the series. x 3 4 5 6 7 8 9 y 4.8 8.4 14.5 23.6 36.2 52.8 73.9	C20 9.2	1,2 ,3
T.2.3	Find the cubic function from the following table. x 0 1 3 4 F(x) 1 4 40 85	C20 9.2	1,2 ,3
T.3.1.	The table given below reveals the velocity v of a body during the time 't' specified. Find its acceleration at t=1.1 x 1.0 1.1 1.2 1.3 1.4 y 43.1 47.7 52.1 56.4 60.8	C20 9.3	1,2 ,3
T.3.2	Evaluate $\int_0^2 \frac{dx}{x^2+4}$ using Romberg's method. Hence obtain an approximate value of π	C20 9.3	1,2
T.3.3	Evaluate the integral=$\int_1^2 \int_1^2 \frac{dxdy}{x+y}$ using the trapezoidal rule with (i)h=k=0.5, and (ii)h=k=0.25	C20 9.3	1,2
T.4.1	Runge-Kutta method to approximate y, when x=0.1,0.2,0.3, h=0.1 given x=0 when y=1 and $\frac{dy}{dx} = x + y$	C20 9.4	1,2 ,3
T.4.2	Using Improved Euler's method, find y(0.1) if $\frac{dy}{dx} = x^2 + y^2$, y(0)=1.	C20 9.4	1,2
T.4.3	Using Adam's method find y(0.4) given $y' = \frac{xy}{2}$. y(0)=1, y(0.1)=1.01, y(0.2)=1.022, y(0.3)=1.023	C20 9.4	2,3
T.5.1	Solve the differential equation $\frac{d^2y}{dx^2}$ -y =x with y(0)=0, y(1)=0 with h=$\frac{1}{4}$	C20 9.5	1,2 ,3
T.5.2	Solve the equation$\frac{\partial u}{\partial t} = \frac{1}{2}\frac{\partial^2 u}{\partial t^2}$, $0 \le x \le 12$,$0 \le t \le 12$ with boundary and initial conditions u(x,0)=$\frac{x(15-x)}{4}$ $0 \le x \le 12, u(0,t) = 0, u(12,t) = 9, 0 \le t \le 12$. Using Schmidt relation.	C20 9.5	1,2 ,3
T.5.3	Solve $u_{xx} + u_{yy} = 0$ in $0 \le x \le 4, 0 \le y \le 4$. Given that u(0,y)=0,u(4,y)=8+2y, u(x,0)=$\frac{x^2}{2}$ and u(x,4)=2 taking h=k=1. Obtain the result correct to one decimal.	C20 9.5	1,2 ,3

K.L.N. College of Engineering
Department of Electrical and Electronics Engineering
EE6401- Electrical Machines-I [C210]
Important Questions /Tutorials /Assignments /Self study /Seminar topics.

1. Course outcomes

Course	Course outcomes	POs
C210.1	Describe the coupled coil calculate the self and mutually induced emf	1,2,5
C210.2	Analyze the operation of transformer in different loading condition	1,2,4,5
C210.3	Explain the concept of field energy and co-energy in single and multiple excited systems	1,2,5
C210.4	Demonstrate the construction of D.C machines and operation of DC Generator	1,2,5
C210.5	Derive the performance equation of D.C motor under various load condition and analyze the braking system	1,2,4,5

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C210.1	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
C210.2	3	2	-	2	1	-	-	-	-	-	-	-	2	-	-
C210.3	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
C210.4	3	2	-	-	1	-	-	-	-	-	-	-	1	-	-
C210.5	3	2	-	2	1	-	-	-	-	-	-	-	2	-	-
C210	3	2	-	1	1	-	-	-	-	-	-	-	1	-	-

3. PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

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

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

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.

Sl. No.	**4. Important Questions.**	COs	Pos
Q.1.1.	Classify the various types of material based on relative permeability μ_r	C210.1	1
Q.1.2.	Describe the various types of induced emf and compare these induced emfs	C210.1	1,2
Q.1.3.	Explain the various core loss occurs in magnetic circuits	C210.1	1
Q.1.4.	Compare the self and mutual inductance and induced emf in a coupled coils	C210.1	1,2
Q.1.5.	Explain the ac operation of magnetic circuits	C210.1	1
Q.1.6.	A coil 1500 turns carrying a current of 5 Amps produces a flux of .5 m Wb. Find the self inductance of the coil	C210.1	1,2
Q.1.7.	Derive the necessary expression to separate core loss components based on frequency variation	C210.1	1,2
Q.2.1.	Compare the core and shell type transformers	C210.2	1
Q2.2.	Describe the construction and principle of operation of single phase transformer	C210.2	1,2
Q.2.3.	Derive the expression for maximum efficiency of transformer and find current at maximum efficiency	C210.2	1,2
Q.2.4.	Explain how the efficiency of a single phase transformer is estimated from the open circuit and short circuit test	C210.2	1,2
Q.2.5.	Derive the expression for copper saving in auto transformer while comparing with a two winding transformer	C210.2	1,2

Q.3.1.	Consider an attracted armature relay is exited by an electric source. Explain about the mechanical force developed and the mechanical energy output with necessary equations	C210.3	1,2
Q.3.2.	Derive the expression for peak value of the fundamental mmf space wave of single phase distributed winding	C210.31,2	1,2
Q.3.3.	Derive the expression for torque in a singly excited system	C210.3	1,2
Q.3.4.	Derive the expression for field energy and co energy in a doubly excited system assuming constant voltage system	C210.3	1,2
Q.3.5.	Derive the expression for torque in rotating machine and list out what are the assumptions to be made.	C210.3	1,2
Q.4.1.	Draw the internal and External Characteristics of D.C.Series generator	C210.4	
Q.4.2.	Derive the EMF equation of wave wound DC generator	C210.4	1,2
Q.4.3.	Explain the process of commutation in a DC machine	C210.4	1
Q.4.4.	Define armature reaction in a DC shunt generator	C210.4	1
Q.4.5.	What are the conditions to be satisfied before connecting two DC generators in parallel	C210.4	1
Q.5.1.	Why starting current of DC motors is higher than rated current	C210.5	1
Q.5.2.	Explain the operation of three point starter with a neat sketch	C210.5	1,2
Q.5.3.	Compare different method of speed control in DC motors	C210.5	1
Q.5.4.	Explain the Hopkinson's test for determining efficiency of two similar DC shunt machines	C210.5	1,2
Q.5.5.	Derive the expression to predetermine the constant loss and efficiency by Swinburne's test method.	C210.5	1,2
T.1.1.	A wire of length 80cm moves at right angles to its length at 30 m/s in a uniform field of flux density 1.2 wb/m^2. Calculate the electromotive force induced in the conductor when the direction of motion is inclined at 45^0 to the direction of field	C210.1	1,2
T.1.2.	A coil consisting of 120 turns is placed in the magnetic field of 0.8 mwb. Calculate the average emf induced in the coil when it is moved in 0.08 sec from the given field to the field of 0.3 mwb. If the resistance of the coil is 200 ohm, find the induced current in the coil	C210.1	1,2
T.1.3.	An iron core has a mean length of 80cm and cross sectional area of 10cm^2 the value of permeability is 1000 and ring is wound with 5000 turns. it is required to produce a flux of 30 m wb in the ring than calculate i) reluctance of the ring ii) flux density iii) current in the coil.	C210.1	1,2
T.1.4.	The core–loss (hysteresis -eddy-current loss)for a give specimen of magnetic material is found to be 2000 W at 50Hz .Keeping the flux density constant ,the frequency of the supply is raised to 75 Hz resulting in a core of 3200 W .Compute separately hysteresis and eddy current losses at both the frequencies	C210.1	1,2
T.1.5.	A ring composed of three sections. The cross section area is 0.001m2 for each section. The mean arc length are l_a = 0.3 m, l_b,= 0.2m, l_c =0.1 m. an air gap length of 0.1 mm is cut in the ring. μr for sections a,, b and c are 5000, 1000 and 10000 respectively. Flux in the air gap is 7.5 × 10–4 Wb. Find (i) mmf (ii) exciting current if the coil has 100turns (iii) reluctance of the sections	C210.1	1,2
T.2.1.	A 40KVA transformer has iron loss of 450 W and full load copper loss of 850W.If the power factor of the load is 0.8 lagging, calculate (i) full load efficiency (ii) the load at which maximum efficiency occurs(iii)the maximum efficiency	C210.2	1,2
T.2.2.	A 120kVA, 6000/400V, Y/Y, 3-phase, 50Hz transformer has a iron loss of 1800W.The maximum efficiency occurs at ¾ full loads. Find the efficiency of the transformer At (i) full load and 0.8 pf (iii) the maximum efficiency at unity pf	C210.2	1,2
T.2.3.	Obtain equivalent circuit of a 200/400V,50Hz,1-phase transformer from the following test data: O.C.test:200 v,0.7A,70W-on L.V side; S.C.test:15V,10A,85W-on H.V.side. Calculate the secondary voltage when delivering 5 kW at 0.8pf lagging the primary voltage being 200V.II) Explain the various types of 3-phase transformer connection in detail	C210.2	1,2
T.2.4.	A 200 kVA distribution transformer has core loss of 2000 watts and full load copper loss of 3000watts.In a day it is loaded as follows: 8 hours-200 kVA at UPF 4 hours -150 kVA at 0.6 pf lag 4 hours – 100 kVA at 0.8 pf lag.	C210.2	1,2

	Find the all day efficiency		
T.2.5.	A 500KVA transformer has 95%efficiency at full load and also at 60% of full load both at UPF.a)Separate out the transformer losses.b) Determine the transformer efficiency at 75%full load, UPF.=0.387+j0.29. Solve the exact equivalent circuit across the prim	C210.2	1,2
T.3.1.	The field winding of dc electromagnets is wound with 800 turns and has a resistance of 40Ω when exciting voltage is 230 volt; magnetic flux around the coil is 0.04 Wb. Calculate self-inductance and energy stored in magnetic field	C210.3	1,2
T.3.2.	Two coupled coils have self and mutual inductance of L11 = 3+0.5 x ; L22 = 2+0.5x ; L12= L21=0.3x Over a certain range of linear displacement x. The first coil is excited by a constant current of 15A and the second by a constant current of -8A.(i)Mechanical work done if x changes from 0.6 to1m.(ii)Energy supplied by each electrical source in part 1	C210.3	1,2
T.3.3.	In the electromagnetic relay , L11 = k1/x, L22 = k2/x, L12 = k3/x Find the expression for the force on the armature, if i1 = I1 sin w1t, i2 = I2 sin w2twrite an expression for the average force. For what relationship between w1 and w2, the average force is (i) maximum (ii) minimum.	C210.3	1,2
T.4.1.	A 400V DC shunt generator has a full load current of 200 A. The resistance of the armature and field windings are 0.06 Ω and 100 Ω respectively. The stray losses are 2000 W.Find the Kw output of prime mover when it is delivering full load and find the load for which the efficiency of the generator is maximum	C210.4	1,2
T.4.2.	Two DC shunt generators are connected in parallel to supply a load of 5000 A. Each machine has an armature resistance of 0.03 Ω and field resistance of 60 Ω but the emf of one machine is 600V and that of the other machine is 640 V. What power does each machine supply?	C210.4	1,2
T.4.3.	A 100 kW DC hunt generator driven by a belt from an engine runs at 750 rpm and is connected to 230 V dc mains. When the belt breaks, it continues to run as a motor drawing 9kW from the mains. At what speed would it run? Given: Armature resistance= 0.018 Ω and field resistance=115Ω	C210.4	1,2
T.4.4.	In a 110 V compound generator, the resistance of the armature, shunt and series windings are 0.06, 25 and 0.05 W respectively, The load consists of 200 lamps each rated at 55 W,100 V. Find the emf and armature current, when the machine is connected for (a) long shunt (b) short shunt (c) How will the ampere turns of the series windings be changed, if in (a) a diverter of resistance 0.1 W is connected across the series field? Ignore armature reaction and brush voltage drop	C210.4	1,2
T.4.5.	Hopkinson's test on two machines gave the following results for full load; line voltage 230 V, line current excluding field current 50 A; motor armature current 380 A; field currents 5 and 4.2 A. Calculate the efficiency of each machine. The armature resistance of each machine = 0.02 W. State the assumptions made.	C210.4	1,2
T.5.1.	A 500V dc shunt motor running at 700 rpm takes an armature current of 50A.Its effective armature resistance is 0.4Ω. What resistance must be placed in series with the armature to reduce the speed to 600 rpm, the torque remaining constant?	C210.5	1,2
T.5.2.	A DC series motor runs at 500 rpm on 220 V supply drawing a current of 50 A. The total resistance of the machine is 0.15Ω, Calculate the value of the extra resistance to be connected in series with the motor circuit that will reduce the speed to 300 rpm. The load torque being then half of the previous to the current.	C210.5	1,2
T.5.3.	A 250 V dc shunt motor runs at 1000 rpm on no load and takes 5A.The armature and shunt field resistance are 0.2Ω and 250Ω respectively. Calculate the speed when loaded and taking a current of 50A.Due to armature reaction the field weakens by 3%	C210.5	1,2
T.5.4.	A 250V DC shunt motor has R_f=150Ω and R_a=0.6Ω.The motor operates on no-load with a full field flux at its base speed of 1000 rpm with Ia=50A.If the machine drives a load requiring a torque of 100 Nm, Calculate armature current and speed of motor. If the motor is required to develop 12 kW at 1200 rpm. What is the required value of the external series resistance in the field circuit? Assume linear magnetization. Neglect saturation and armature reaction	C210.5	1,2

T.5.5.	A dc shunt motor is being operated from 300 V mains. Its no-load speed is 1200 rpm. When fully loaded, it delivers a torque of 400 Nm and its speed drops to 1100 rpm. Find its speed and power output when delivering the same torque; if operated with an armature voltage of 600 V. Excitation is assumed unchanged, i.e. the motor field is still excited at 300 V. State any assumption you are required to make	C210.5	1,2
	6. Assignments/Seminar/Self study topics.		
A.1.1.	In a magnetic circuit made of mild steel, the central limb is wound with 500 turns and has a cross-sectional area of 800 mm^2. Each of the outer limbs has a cross-sectional area of 500 mm^2. The air-gap has a length of 1 mm. Calculate the current required to set up a flux of 1.3 m Wb in the central limb assuming no magnetic leakage and fringing. Mild steel required 3800 AT/m to produce flux density of 1.625 T and 850 AT/m to produce flux density of 1.3 T	C210.1	1,2,4
A.1.2.	An iron rod 1.8 cm diameter is bent to form a ring of mean diameter 25cm and wound with 250 turns of wire. A gap of 1mm exists in between the end faces. Calculate the current required to produce a flux of 0.6mWb. Take relative permeability of iron as 1200	C210.1	1,2
A.1.3.	Two coils A and B are wound on same iron core. There are 600 turns on A, and 3600 turns on B. The current of 4 Amps flows through the coil and produces a flux of $500x10^{-6}$Wb in the core. If this current is reversed in 0.02 second .Calculate average emf induced in coils A and	C210.1	1,2
S.S.1.1	Write a matlab code to find self and mutual inductance of coupled colis	C210.1	5
A.1.4	A steel ring has a mean diameter of 20 cm, a cross section of 25 cm^2 and a radial air-gap of 0.8 mm cut across it. When excited by a current of 1A through a coil of 1000 turns wound on the ring core, it produces an air-gap flux on 1 mWb. Neglecting leakage and fringing. Calculate(i) relative permeability of steel (ii)total reluctance of the magnetic circuit	C210.1	1,2
A.2.1.	The O.C and S.C tests on a 5kVA, 230/110V, and 50Hz transformer gave the following Data: O.C test (h.v side):230V, 0.6A, 80W, S.C test (l.v side):6V, 15A, 20W. Calculate the percentage efficiency and the regulation of the transformer on full load at 0.8 p.f lagging	C210.2	1,2
A.2.2.	A 200 kVA distribution transformer has core loss of 2000 watts and full load copper loss of 3000watts.In a day it is loaded as follows: 8 hours-200 kVA at UPF 4 hours -150 kVA at 0.6 pf lag 4 hours – 100 kVA at 0.8 pf lag. Find the all day efficiency	C210.2	1,2
A.2.3.	The maximum efficiency of a single phase 250kVA, 2000/250 V transformer occurs at 80% of full load and is equal to 97.5% at 0.8 pf .Determine the efficiency and regulation on full load at 0.8pf lagging if the impedance of the transformer is 9 %	C210.2	1,2
A.2.4.	A 50KVA ,4400/220V transformer has R1=3.45 ΩR2=0.009 Ω. The values of the reactance are x1=5.2 Ω and x2=0.015 Ω. Calculate equivalent resistance as referred to primary, equivalent resistance as referred to secondary, equivalent reactance referred to both primary and secondary, equivalent impedance referred to both primary and secondary, total cu loss first using individual resistances of the two windings and secondly using equivalent resistances as referred to each side load	C210.2	1,2
S.S.2.1	Write a matlab code to find Equivalent circuit parameters from O.C and S.C test data	C210.2	4,5
A.3.1.	Two coupled coils have self and mutual inductance of L11=2+1/(2x); L22=1+1/(2x): L12= L21=1/(2x). Over a certain range of linear displacement x. The first coil is excited by a constant current of 20A and the second by a constant current of -10A. 2000 Mechanical work done if x changes from 0.5to1m (ii) Energy supplied by each electrical source Hence verify that the energy supplied by the sources is equal to the increase in Field energy plus the mechanical work done	C210.3	1,2
A.3.2.	The self and mutual inductance of a double exited system is L11=4+cos2θ, L12=L21=0.15cosθ. L22=2+5cos2θ.Find the torque developed in it.	C210.3	1,2
A.3.3.	Two coils have a self and mutual inductances of L11 = L22 = 2 / (1+2x) and	C210.3	1,2

	L12= 2 / (1+2x) calculate the time average force and coil current at x-0.5m if. 1. Both are connected in parallel across cos314t voltage source. 2. Both are connected in series across the same voltage source of 100cos314t V. 3. Coil 1 is connected across the voltage source of 100cos314t and coil 2 is shorted		
S.S.3.1	Write a matlab code to find Mechanical work done in double excited system	C210.3	5
A.4.1.	A 100 Kw DC hunt generator driven by a belt from an engine runs at 750 rpm and is connected to 230 V dc mains. When the belt breaks, it continues to run as a motor drawing 9Kw from the mains. At what speed would it run? Given: Armature resistance= 0.018 Ω and field resistance=115Ω	C210.4	1,2
A.4.2.	In a 110 V compound generator, the resistance of the armature, shunt and series windings are 0.06, 25 and 0.05 W respectively, The load consists of 200 lamps each rated at 55 W,100 V. Find the emf and armature current, when the machine is connected for (a) long shunt (b) short shunt (c) How will the ampere turns of the series windings be changed, if in (a) a diverter of resistance 0.1 W is connected across the series field? Ignore armature reaction and brush voltage drop	C210.4	1,2
A.4.3.	A 400V DC shunt generator has a full load current of 200 A. The resistance of the armature and field windings are 0.06 Ω and 100 Ω respectively. The stray losses are 2000 W.Find the Kw output of prime mover when it is delivering full load and find the load for which the efficiency of the generator is maximum	C210.4	1,2
SE.4.1	Analysis for Minimising armature reaction effects in dc generator and improving commutation	C210.4	5
A.5.1.	A 50 kW, 230 V dc shunt motor has an armature resistance of 0.1 W and a field resistance of 200 W. It runs on no-load at a speed of 1400 rpm, drawing a current of 10 A from the mains.When delivering a certain load, the motor draws a current of 200 A from the mains.Find the speed at which it will run at this load and the torque developed. Assume that the armature reaction causes a reduction in the flux/pole of 4% of its no-load value.	C210.5	1,2
A.5.2.	A 200 V shunt motor takes 10 A when running on no-load. At higher loads the brush drop is 2 V and at light loads it is negligible. The strayload loss at a line current of 100 A is 50% of the no-load loss. Calculate the efficiency at a line current of 100 A if armature and field resistances are 0.2 and 100 W respectively	C210.5	1,2
A.5.3.	A 250V DC shunt motor has R_f=150Ω and R_a=0.6Ω.The motor operates on no-load with a full field flux at its base speed of 1000 rpm with Ia=50A.If the machine drives a load requiring a torque of 100 Nm, Calculate armature current and speed of motor. If the motor is required to develop 12 kW at 1200 rpm. What is the required value of the external series resistance in the field circuit? Assume linear magnetization. Neglect saturation and armature reaction	C210.5	1,2
SE.5.1	Analysis of different methods of speed control and braking using solid state devices	C210.5	4,5

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

CS 6456 - OBJECT ORIENTED PROGRAMMING [C211]

Important Questions/Assignments/Self study /Seminar topics.

1.Course outcomes

Course	Course outcomes	POs
C211.1	Explain the key attributes of C++ like native types and statements and implement ADT.	1
C211.2	Develop object oriented programs using polymorphism and data abstraction concepts.	2
C211.3	Design templates, construct generics and to handle exceptions.	3
C211.4	Develop the concept of java in creating classes, objects using arrays and control statements.	4
C211.5	Create packages, handle exceptions and develop multi-threaded programs.	5

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
C211.1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
C211.2	2	1	2	3	2	-	-	-	-	-	-	-	2	1	-
C211.3	2	1	2	3	2	-	-	-	-	-	-	-	2	1	-
C211.4	2	1	2	3	2	-	-	-	-	-	-	-	2	1	-
C211.5	2	1	2	3	2	-	-	-	-	-	-	-	2	1	-
C211	2	1	2	2	2	-	-	-	-	-	-	-	2	1	-

3. PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

PO1: Engineering knowledge:

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

PO2: Problem analysis:

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

PO3: Design/development of solutions:

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

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.

S.No.	**4. Important Questions.**	COs	POs
Q.1.1.	What is object oriented programming? How is it different from structured programming? Explain the features of OOPS.	C211.1	2
Q.1.2.	Explain about inline function?	C211.1	2
Q.1.3.	What are the needs of object oriented paradigm.	C211.1	2
Q.1.4.	Explain the use of constant pointers and pointers to constant with an example.	C211.1	2
Q.1.5.	Write a C++ program for loop control statements and explain the same .	C211.1	2
Q.2.1.	Explain the constructors and destructors in detail with example program	C211.2	2,3,4
Q2.2.	Explain friend function with example.	C211.2	3
Q.2.3.	Explain operator overloading and function overloading supporting compile time polymorphism with suitable program.	C211.2	3
Q2.4.	Explain copy constructor with suitable example.	C211.2	2
Q.2.5.	Construct a C++ program for friend function with two class names also list out the characteristics of friend function.	C211.2	3,4,5
Q.3.1.	Explain the types of inheritance with an example program.	C211.3	2
Q.3.2.	Construct a template function to sort an array by bubble sort.	C211.3	3,4

Q.3.3.	Explain the components of Standard Template Library (STL) in detail.	C211.3	2
Q.3.4.	Explain IO streams used for file operation.	C211.3	2,5
Q.3.5.	Write a C++ program to generate user defined exception whenever user inputs odd numbers and also explain function templates with an example.	C211.3	2,3,4
Q.4.1.	Write short notes on the following in Java. (a) String (b) Java virtual machines	C211.4	2
Q.4.2.	Explain method overriding with suitable example.	C211.4	2,3
Q.4.3.	Write a Java program for alphabetical ordering of strings.	C211.4	3,4,5
Q.4.4.	Write a JAVA program to create two single dimensional arrays, initialize them and add them; store the result in another array.	C211.4	1,3,4
Q.4.5.	Explain about Inheritance in Java with suitable example program	C211.4	2,3
Q.5.1.	Write a Java program to implement nested packages.	C211.5	3,4
Q5.2.	Explain about Thread lifecycle?	C211.5	2
Q.5.3.	Write a Java program to throw user defined exceptions.	C211.5	2
Q.5.4.	Write a JAVA program to get and display the details of staff name and designation in a class, department, salary in another class and awards in the third class using interfaces and Inheritance	C211.5	1,3,4,5
Q.5.5.	Explain the streams and IO and java threads in Java with suitable examples.	C211.5	5
	6.Assignments/Seminar/Self study topics.		
A.1.1.	Write a C++ program to find the biggest of two numbers by use of Classes & objects	C211.1	2
A.1.2.	Write a C++ program to find total numbers of even numbers from 1 to 100 with the help of class and object.	C211.1	2
A.1.3.	Construct a C++ program to read the height of 2 persons and find its sum. Use constructors with arguments.	C211.1	2
A.1.4.	Create a class called STRING and implement the following operations. Display the results after every operation by overloading the operator <<. (I) STRING s1="Anna" (II)STRING s2="University" (III)STRING s3=s1+s2 (Use copy constructor)	C211.1	2
A.1.5.	Declare a class name of employee to get the basic pay of an employee and to calculate his commission. *Salary* — *Commission* >5000 — 1000 2000 – 5000 — 500 <2000 — 200 Calculate the net pay and print the same. Use functions get_input, calculate and print output.	C211.1	2
A.2.1.	Explain briefly about iterators and containers in detail. (Seminar)	C211.2	2,3,4
A.3.1.	Write a C++ program using class template for finding the scalar product for integer type and floating type vector	C211.3	3,4,5
A.3.2.	Develop a C++ program to implement linear search of an array.	C211.3	3,4,5
A.4.1.	Construct a Java program and create class Box and Box3d. Box3d is an extended class of box. The above two classes has to fulfill the following requirement. (i)Include constructor (ii) Set value of length, breadth, height (iii) Find out area and volume.	C211.4	2,3,4,5
A.4.2.	Write a Java program to check whether the given number is an Armstrong number or not	C211.4	4,5
A.4.3.	Write a Java program to transpose the given matrix.	C211.4	4,5
A.5.1.	Explain about strings in Java. (Self study)	C211.5	1,2,3
A.5.2.	Explain in detail about Input / Output. (Seminar)	C211.5	2,3

K.L.N. College of Engineering

Department of Electrical and Electronics Engineering

EE6402- Transmission and Distribution [C212]

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

1.Course outcomes

Course	Course outcomes	POs
C212.1	List the basic elements of the electric power system, generation, transmission, distribution and describe the role played by each element	1,2
C212.2	Determine the losses, efficiency and parameters of the Transmission line.	1,2,4,6,7
C212.3	Analyze the Performance of Transmission Lines.	1,2,4,6,7
C212.4	Solve the voltage distribution in insulator strings, cables and methods to improve the same.	1,2,6,7,8
C212.5	Design overhead lines both Mechanical and electrical aspects using Sag calculation.	1,2,4,6,7

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C212.1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
C212.2	3	3	-	1	-	2	3	-	-	-	-	-	2	-	1
C212.3	3	3	-	1	-	2	3	-	-	-	-	-	2	-	1
C212.4	3	3	-	-	-	3	3	1	-	-	-	-	2	-	1
C212.5	3	3	-	1	-	2	3	-	-	-	-	-	2	-	1
C212	3	3	-	1	-	2	2	-	-	-	-	-	2	-	1

3.PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

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

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

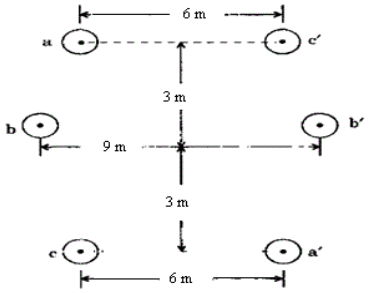
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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.

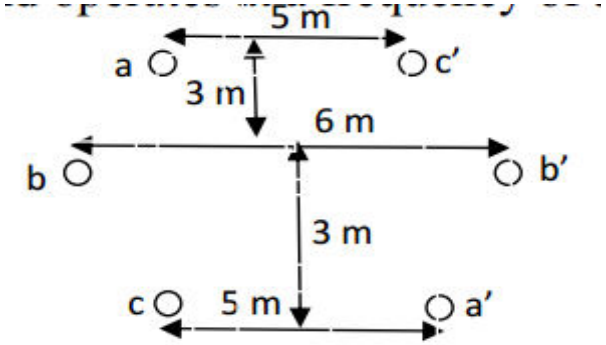
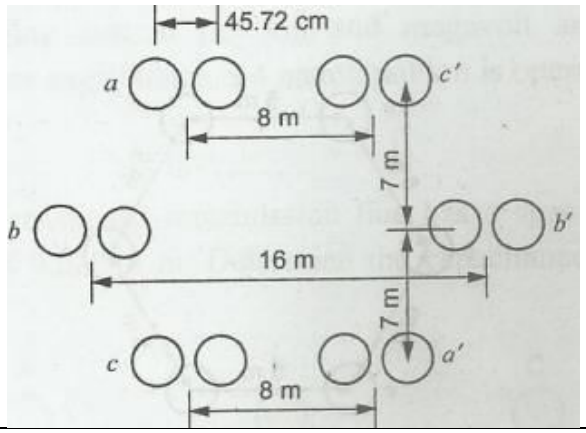
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

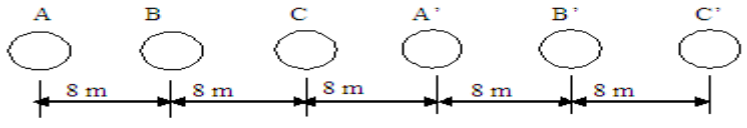
S.No.	**4. Important Questions**	COs	POs
Q.1.1.	Draw and explain the structure of typical electric power system with various voltage levels. (16)	C212.1	1
Q.1.2.	Explain ring main distributor system. State its advantages. (8)	C212.1	1
Q.1.3.	Explain why EHVAC transmission is preferred? What are the problems involved in EHVAC transmission? (8)	C212.1	1

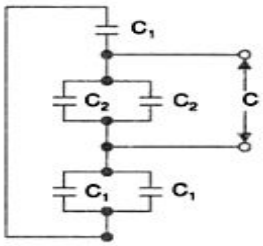
Q.1.4.	With a neat schematic diagram, explain the principle of HVDC system operation? Write any two advantages and disadvantages of HVDC system. (8)	C212.1	1
Q.1.5.	Explain the effect of high voltage on volume of copper and efficiency (8)	C212.1	1
Q.1.6.	A 50 km long transmission line supplies a load of 5 MVA at 0.8 p.f. lagging at 33KV. The efficiency of transmission is 90%. Calculate the volume of aluminium conductor required for the line when (i) single phase, 2-wire system is used (ii) 3-phase, 3 wire system is used. The specific resistance of aluminium is $2.85*10^{-8}$ohm-m. (16)	C212.1	1,2
Q.1.7.	(i) Write short notes on distributed and concentrated loads? (8) (ii) What are distributors? Explain it types in detail. (8)	C212.1	1
Q.1.8.	Explain in detail about various types of FACTS controllers. (16)	C212.1	1
Q.2.1.	(i) Distinguish between GMD and GMR. (8) (ii) Explain the following with respect to corona (a) Corona effects (b) Disruptive critical voltage (c) Visual critical voltage (d) Corona Power loss (8)	C212.2	1,6,7
Q2.2.	A three phase circuit line consists of 7/4.5 mm hard drawn copper conductors. The arrangement of the conductors is shown in below figure. The line is completely transposed. Calculate inductive reactance per phase per km of the system. (16) 	C212.2	1,2,4
Q.2.3.	(i) Deduce an expression for Inductance of three phase transmission line with unsymmetrical spacing (10) (ii) Explain about interference between power and communication circuits. (6)	C212.2	1,6,7
Q2.4.	(i)Deduce an expression for capacitance of three phase transmission line with unsymmetrical spacing. (10) (ii) Explain briefly about types of conductors (6)	C212.2	1,6,7
Q.2.5.	i) What are the advantages of bundled conductors? (4) ii) Derive the expression for capacitance of a double circuit line for hexagonal spacing. (8) iii) Why is the concept of self GMD is not applicable for capacitance? (4)	C212.2	1,6,7
Q.3.1.	i) Explain the classification of lines based on their length of transmission. (6) ii) What are ABCD constants. (10)	C212.3	1,6,7
Q.3.2.	A balanced three phase load of 30MW is supplied at 132KV, 50Hz and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor is (20+j52) Ω and the total phase-neutral admittance is $315*10^{-6}$ Siemen. Using nominal T method, Determine (i) A, B, C and D constants of the line (ii) sending end voltage (iii) regulation of the line. (16)	C212.3	1,2,4
Q.3.3.	Explain the real and reactive power flow in lines. Also explain the methods of voltage control. (16)	C212.3	1,6,7
Q.3.4.	A 3-phase, 50Hz, 40 km long overhead line has the following line constants: resistance per conductor=2.5 ohm, inductance per conductor=0.1H, capacitance per conductor=0.25 μF. The line supplies a load of 36 MW at 0.8 power factor lagging at a voltage of 60 kV(phase) at the receiving end. Use nominal π representation, calculate sending end voltage, sending end current, sending end power factor, regulation and efficiency and active and reactive volt amperes. (16)	C212.3	1,2,4
Q.3.5.	Explain the Ferranti effect with a phasor diagram and its causes. (16)	C212.3	1,6,7
Q.4.1.	In a 3-unit insulator, the joint to tower capacitance is 20% of the capacitance of each	C212.4	1,2

	unit. By how much should the capacitance of the lowest unit be increased to get a string efficiency of 90%? The remaining two units are left unchanged. (16)		
Q.4.2.	What are the various properties of insulators? Also briefly explain about suspension type and pin type insulators. Draw the schematic diagram. (16)	C212.4	6,7,8
Q.4.3.	i) Derive the expression for insulator resistance, capacitance and electric stress in a single core cable. Where is the stress maximum and minimum? (8) ii) A single core 66kv cable working on 3-phase system has a conductor diameter of 2cm and sheath of inside diameter 5.3cm. If two inner sheaths are introduced in such a way that the stress varies between the same maximum and minimum in the three layers find: a) position of inner sheaths b) voltage on the linear sheaths c) maximum and minimum stress (8)	C212.4	1,2,6, 7,8
Q.4.4.	i) Give any six properties of a good insulator. (4) ii) With a neat diagram, explain the strain and stay insulators. (4) iii) A cable is graded with three dielectrics of permittivities 4, 3 and 2. The maximum permissible potential gradient for all dielectrics is same and equal to 30 kV/cm. The core diameter is 1.5cm and sheath diameter is 5.5cm. (8)	C212.4	1,2,6, 7,8
Q.4.5.	i) Explain the constructional features of one LT and HT cable (8) ii) Compare and contrast overhead lines and underground cables. (8)	C212.4	6,7,8
Q.5.1.	Write short notes on: (i) Sub mains (ii) Stepped and tapered mains (iii) Grounding grids (5+5+6)	C212.5	1,6,7
Q.5.2.	Explain the following: (i) Neutral grounding (ii) Resistance grounding (8+8)	C212.5	1,6,7
Q.5.3.	Calculate the horizontal component of tension and maximum sag for a span of 300 m if the maximum tension in the conductor be 3500 kg and weight of conductor is 700 kg/km. Determine also the location of the points on the conductor at which the sag will be half of the above value. (16)	C212.5	1,2,4
Q.5.4.	Derive the expressions for sag and conductor length under bad weather conditions. Assume Shape of overhead line is a parabola. (16)	C212.5	1,6,7
Q.5.5.	a) Derive expressions for sag and tension in a power conductor strung between to supports at equal heights taking into account the wind and ice loading also. (8) b) An overhead line has a span of 300m. The conductor diameter is 1.953 cm and the conductor weight is 0.844 kg/m. calculate the vertical sag when a wind pressure is 736 N/sq.m of projected area acts on conductor. The breaking strength of conductor is 77990 N and the conductor should not exceed half the breaking strength.(8)	C212.5	1,2,4
	5. Tutorial Questions		
T.1.1.	A DC ring main distributor is fed at A and the load is tapped at points B,C and D. The distributor length is 400 m long and points B, C and D are at 150 m, 250 m and 375 m from A. Loads are at 150A,40A and 200A respectively. If resistance per 100 m of single conductor is 0.04Ω and V_A = 220V. Calculate (i) Current in each distributor. (ii) voltage at points B,C and D.	C212.1	1,2
T.1.2.	A two wire DC distributor of 1 km long and it supplied a load of 90A, 70A, 50A and 40A at a distance of 200 m, 600 m, 900 m and 1000 m from feeding point A. the resistance of the distributor is 0.003Ω per 100 m length. Determine the voltage at each load point when the voltage at point A is 220V.	C212.1	1,2
T.1.3.	A 2 wire distributor is uniformly loaded at the rate 1.2 A/m and is fed at both the ends. The point minimum potential occurs at 575 m from end A and the minimum potential is 225V. if length of the distributor is 1 km, calculate the voltages at the feeding ends A and B. the resistance of each conductor is 0.04 Ω/km.	C212.1	1,2
T.1.4.	A 3 wire dc system takes a current of 50 A on positive sides and 45 A on negative sides. The resistance of each outer is 0.0004 Ω per metre while the cross section of wire is half of that of each outer. If the voltage between each outer and middle wire is maintained at 220 V at the feeding end, calculate the voltage at the distant load end between each outer	C212.1	1,2

	and middle wire. The 3 wires are of 100 m length.		
T.1.5.	A single phase AC distributor is fed from end A and has a total impedance of (0.2+j0.3) Ω. At the far end the voltage V_B = 220V and the current is 80A at a Power factor of 0.8 lagging. At the midpoint M, a current of 100A is tapped at a Power factor of 0.6 lagging with respect to V_M at the midpoint. Calculate the supply voltage V_A and the phase angle between V_A and V_B.	C212.1	1,2
T.1.6.	A 3 phase 4 wire distributor supplies a balanced voltage of 400/230V to a load consisting of 50 A at 0.8 power factor lagging for R phase, 50 A at 0.866 power factor lagging for Y phase and 50 A at unity power factor for B phase. The resistance of each line conductor is 0.2Ω. Calculate the supply end voltage for R phase. The resistance of neutral is 0.4Ω.	C212.1	1,2
T.2.1.	A three phase conductors of a three phase line are arranged at the corners of a triangle of sides 2m, 2.5m and 4.5m. Calculate the inductance per km of the line when the conductors are regularly transposed. The diameter of each conductor is 1.24cm.	C212.2	1,2,4
T.2.2.	A single phase transmission line has two parallel conductors 3 m apart, the radius of each conductor being 1 cm. Calculate the loop inductance per km length of the line if the material of the conductors is (i) copper (ii) steel with relative permeability of 100.	C212.2	1,2,4
T.2.3.	Find the inductance /phase /km of double circuit 3phase line shown in fig. the line is completely Transposed and operates at a frequency of 50Hz. Radius r = 6mm 	C212.2	1,2,4
T.2.4.	Determine the capacitance of 3 Phase double circuit line with two conductors having bundled spacing of 45.72 cm and having hexagonal spacing as shown in figure, operating at 50 Hz. The diameter of the conductor is 2.068 cm 	C212.2	1,2,4
T.2.5.	A 3 phase, 50 Hz, 132 kV overhead lie has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. if the line length is 100 km, Calculate the charging current per phase assuming complete transposition.	C212.2	1,2,4
T.2.6.	Estimate the corona loss for a three phase, 110 kV, 50 Hz, 150 km long transmission line consisting of three conductors each of 10 mm diameter and spaced 2.5 m apart in an equilateral triangle formation. The temperature of air is 30°C and the atmospheric pressure is 750 mm of mercury. Take the irregularity factor as 0.85. Ionization of air may be assumed to take place at a maximum voltage gradient of 30 kV/cm.	C212.2	1,2,4

T.3.1.	A 3 phase 5 km long transmission line, having resistance of 0.50 Ω/km and inductance of 1.76 mH/km, is delivering power at 0.8 p.f lagging. The receiving end voltage is 33 kV. If the sending end voltage is 33 kV, 50 Hz find (i) line current (ii) Regulation (iii) efficiency of the transmission line.	C212.3	1,2,4
T.3.2.	Determine the efficiency and regulation of a 3phase, 100 km, 50 Hz transmission line delivering 20 MW at a power factor of 0.8 lagging and 66 kV to a balanced load. The conductors are of copper, each having resistance 0.1 Ω/ km, 1.5 cm outside diameter, spaced equilaterally 2 metres between centres. Use nominal T method.	C212.3	1,2,4
T.3.3.	A 220 kV, 3Φ transmission line has impedance per phase of (40+j200) Ω and an admittance of (0+j0.0015) mho. Determine the sending end voltage and sending end current when the receiving end current is 200 A at 0.95 p.f lagging. Use nominal π method.	C212.3	1,2,4
T.3.4.	A three phase 50 Hz transmission line, 40 km long delivers 36 MW at 0.8 power factor lagging at 60 kV(phase). The line constant per conductors are R=2.5Ω, L=0.1H, C=0.25μF. Shunt leakage may be neglected. Determine the voltage, current, power factor, active power and reactive volt-amperes at the sending and. Also determine the efficiency and regulation of the line using nominal π method.	C212.3	1,2,4
T.3.5.	A 300 km 132 kV 3 phase over head line has a total series impedance of 52+200j Ω per phase and a total shunt admittance of $j1.5*10^{-3}$ Siemens per phase to neutral. The line is supplying 40 MVA at 0.8 p.f lagging at 132 kV. Find sending end voltage, current, power factor and power use (a) nominal π circuit and also. Find A, B, C and D constants of line.	C212.3	1,2,4
T.3.6.	The constants 3 phase line are A=0.9∠2° and B=140∠70° ohms per phase. The line delivers 60 MVA at 132 kV and 0.8 p.f lagging. Draw circle diagrams and find (a) sending end voltage and power angle (b) the maximum power which the line can deliver with the above values of sending and receiving end voltages (c) the sending end power and power factor (d) Line losses	C212.3	1,2,4
T.4.1.	In a 3-unit insulator, the joint to tower capacitance is 20% of the capacitance of each unit. By how much should the capacitance of the lowest unit be increased to get a string efficiency of 90%. The remaining two units are left unchanged.	C212.4	1,2
T.4.2.	A single core 66 KV cable working on 3-phase system has a conductor diameter of 2cm and sheath of inside diameter 5.3cm. If two inner sheaths are introduced in such a way that the stress varies between the same maximum and minimum in the three layers find: a) position of inner sheaths b) voltage on the linear sheaths c) maximum and minimum stress.	C212.4	1,2
T.4.3.	A 3 phase overhead transmission line is being supported by three disc insulators. The potential across top unit (i.e. near the tower) and the middle unit are 8kV and 11kV respectively. Calculate (a) The ratio of capacitance between pin and earth to the self-capacitance of each unit (b) Line Voltage (c) String Efficiency.	C212.4	1,2
T.4.4.	An insulator string has three units each having a safe working voltage of 15 kV. The ratio of unit self capacitance to stray capacitance of earth is 10:1. Calculate string efficiency.	C212.4	1,2
T.4.5.	Calculate the capacitance, charging current and the insulation resistance of a single core cable 33 kV, 50 Hz and 2 km long having a core diameter of 2 cm and the sheath diameter of 7 cm. the relative permittivity of the insulation is 3.5 and the resistivity of the insulation is $4.5*10^{14}$ Ω cm.	C212.4	1,2
T.4.6.	A single core cable of conductor diameter 2 cm and lead sheath of diameter 5.3 cm is to be used on a 66 kV, 3 phase system. Two inter sheaths of diameter 3.1 cm and 4.2 cm are introduced between the core and lead sheath. If the maximum stress in the layers is the same, find the voltages on the inter sheath.	C212.4	1,2
T.5.1.	An overhead line has a span of 336 m. The line is supported, at water crossing from two	C212.5	1,2,4

	towers whose heights are 33.6 m and 29 m above water level. The weight of conductor is 8.33 N/m and tension in the conductor is not to exceed 3.34×10^4 N. Find (i) Clearance between the lowest point on the conductor and water (ii) horizontal distance of this point from the lower support.		
T.5.2.	A transmission line conductor at a river crossing is supported from two towers at a height of 50 and 80 m above water level. The horizontal distance between the towers is 300 m. if the tension in the conductor is 2000 kg find the clearance between the conductor and water at a point midway between the towers. Weight of conductor/m = 0.844 kg. Derive the formula used.	C212.5	1,2,4
T.5.3.	A transmission line has a span of 275 m between level supports. The conductor has an effective diameter 1.96 cm and weighs 0.865 kg/m. Its ultimate strength is 8060 kg. If the conductor has ice coating of radial thickness 1.27 cm and is subjected to a wind pressure of 3.9 gm/cm^2 of projected area, Calculate sag for a safety factor of 2. Weight of 1cc of ice is 0.919 m.	C212.5	1,2,4
T.5.4.	For river crossing tower, the heights of the supports of the transmission line from the water level are 60 m and 90 m at the two ends of the river respectively. The tension in the conductor and water at a point mid-way between the towers. Weight of the conductor per metre is 0.844 kg. Consider the span of the river 350 cm.	C212.5	1,2,4
T.5.5.	A transmission line conductor is supported on the towers of unequal heights. The first tower has a height of 30 m and the second tower has a height of 50 m. The distance between the towers is 150 m. Tension in the conductor is 2200 kg and cross section of the conductor is 2 cm^2. The specific gravity of the conductor material is 9.5 gm/cm^3 and the wind pressure is 150 kg/m^2. Calculate the sag.	C212.5	1,2,4
T.5.6.	Determine the inductance of Peterson coil to be connected between the neutral and ground to neutralize the charging current of overhead line having the line to ground capacitance of 0.15 μF. If the supply frequency is 50 Hz and the operating voltage is 132kV, Find the kVA rating of the coil.	C212.5	1,2,4
	6. Assignments/Seminar/Self study topics		
A.2.1	For a 3 phase transmission line of two bundled conductors (horizontal configuration) has 8 m spacing between the conductors. The diameter of the conductor is given as 2.0680 cm. Calculate the inductance per phase. D_{AB} = 8 m, D_{BC} = 8 m, D_{CA} = 16 m. Bundle spacing = 45.72 cm **(Ans.1.0225 mH/km)**	C212.2	1,2,4
A.2.2.	For a 3 phase transmission line of three bundled conductors (horizontal configuration) has 8 m spacing between the conductors. The diameter of the conductor is given as 2.0680 cm. Calculate the inductance per phase. D_{AB} = 8 m, D_{BC} = 8 m, D_{CA} = 16 m. Bundle spacing = 45.72 cm **(Ans.0.8879 mH/km)**	C212.2	1,2,4
A.2.3.	Determine the inductance per phase for a three phase double circuit line whose phase conductors have a radius of 5.3 cm with the horizontal conductor arrangement as shown in figure. **(Ans: L = $5.36*10^{-7}$ H/ m)** 	C212.2	1,2,4
A.3.1.	A 3- phase, 100 km transmission line, delivering 50 MW, 0.8 power factor lagging at 132 KV. Each conductor is having resistance 0.1 ohm/km, reactance 0.3 ohm/km and admittance 3×10^{-6} mho/km. If the load is balanced and leakage is neglected. Find the sending end voltage, sending end power factor, efficiency and regulation of the line using (i) Nominal –T and (ii) Nominal π representations. **(Ans: 143.95 kV, (ii) 0.807, (iii) 95.92%, (iv) 9.55%)**	C212.3	1,2,4
A.3.2.	A 3ϕ OH line has a impedance of 200⌊80∘ Ω, admittance of 0.0013 ⌊90∘ υ/ph. The line delivers a load of 80 MW at 0.8 pf (lag) and 220 KV between Lines calculate ABCD constants, Sending end voltage and power factor and transmission η.	C212.3	1,2,4

	(Ans: A = D 0/872⌊1.50 Ω, B = 187.2 ⌊80.690Ω, C = 0.0013⌊900∘, VSL = 261 KV , Is = 189.43⌊9.92 A , Cos ϕs = 0.9972 (lag),ηT = 93.68%)		
A.3.3.	A 1ϕ line is transmitting 1100 KW power to a Factory at 11 KV and at 0.8 pf (lag). It has a total resistance of 2 Ω and loop reactance of 3 Ω determine (i) the voltage at sending end (ii) % regulation (iii) transmission efficiency **(AnsV_s = 11,426V, % Regulation = 3.873 %, η_T = 97.24%)**	C212.3	1,2,4
A.4.1.	The self capacitance of each unit in a string of three suspension insulators is C. the shunting Capacitance of the connecting metal work of each insulator to earth is 0.15C while for line it is 0.1C. Calculate (i) the voltage across the each insulator as the percentage of the line voltage to earth and (ii) string efficiency. **(Ans: top unit= 32.6%, second unit=30.7%, third unit = 36.4%, string efficiency=91.5%)**	C212.4	1,2
A.4.2.	A 3-phase, 3-core, metal sheathed cable gave the following results on test for capacitance: (i) Capacitance between two conductors bunched with the sheath and the third conductor 0.4μF per km. (ii) Capacitance between bunched conductors and sheath 0.625 μF /km.  Determine the capacitance (a) between any two conductors, and (b) between any two bunched conductors and the third conductor if the sheath is insulated. (c) Also calculate the charging current per phase per km. When it is connected to 10kv, 50Hz supply. **(Ans: a)C=0.248 μF /km b) C=0.33 μF /km c) Current= 0.899A)**	C212.4	1,2
A.4.3.	Find the minimum internal sheath diameter of a single core lead covered cable designed for 66 kV to earth. Its conductor diameter is 1.5 cm and three insulating materials x, y and z having relative permitivities of 3.5, 3 and 3.5 and peak permissible stress of 70.3, 55.5 and 61 kV/cm, respectively are used. **(Ans: D= 4.64 cm)**	C212.4	1,2

K.L.N. COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
EE6403 – Discrete Time Systems & Signal Processing
Important Questions/Tutorials/Assignments/Self study/Seminar topics

1. Course Outcomes

Course	Course Outcome	POs	PSOs
C213.1	Classify the different types of signals and systems and Explain the sampling process of continuous time signal.	1,2,3,5,12	1,2
C213.2	Apply z-transform and inverse Z transform and analyze discrete time systems.	1,2,3,5,12	1,2
C213.3	Apply Radix-2 Decimation in Time (DIT) and Decimation in Frequency (DIF) FFT Algorithm to Compute Discrete Fourier Transform.	1,2,3,5,12	1,2
C213.4	Explain different types of Infinite Impulse Response (IIR) filters and Finite Impulse Response (FIR) filters.	1,2,3,5,12	1,2
C213.5	Explain various architectures of Digital signal processors.	1,2,3,5,12	1,2

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
C213.1	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213.2	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213.3	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213.4	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213.5	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-
C213	3	2	2	-	1	-	-	-	-	-	-	1	2	1	-

3. PROGRAM OUTCOMES (POs)

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

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

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

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.

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.

4. IMPORTANT QUESTIONS

S. No.	Questions	COs	POs
	UNIT I - INTRODUCTION		
Q.1.1	Test the causality and stability of the given system: y(n)=x(-n)+x(n-2)+x(2n-1)	C213.1	1,2
Q.1.2	Test the system for linearity and time invariance: $y(n)=(n-1)x^2(n)+c$	C213.1	1,2
Q.1.3	Determine whether the following is an energy signal or power signal. (i) $x_1(n)=6\cos(\pi/2\, n)$	C213.1	1,2

	(ii) $x_2(n)=3(0.5)^n$ x(n)		
Q.1.4	State and explain sampling theorem both in time domain and in frequency domain.	C213.1	1,2
Q.1.5	Classify the types of elementary continuous & discrete time signals.	C213.1	1,2
UNIT II - DISCRETE TIME SYSTEM ANALYSIS			
Q.2.1	Determine the z-transform and ROC of $x(n)=r^n\cos(n\theta)u(n)$	C213.2	1,2
Q.2.2	Determine inverse z-transform of $x(z)=z/(3z^2-4z+1)$, Roc: lzl>1	C213.2	1,2
Q.2.3	Determine the impulse response h(n) for which z-transform is given by H(z) $=\frac{2+3z^{-1}}{[1+z^{-1}]\left(1+\frac{1}{2}z^{-1}\right)\left(1-\frac{1}{4}z^{-1}\right)}$.	C213.2	1,2
Q.2.4	Perform circular convolution of two sequences, x1(n)={2,1,2,1} and x2(n)={1,2,3,4}	C213.2	1,2
Q.2.5	Using z transform, determine the response y(n) for $n\geq 0$ if $y(n)=\frac{1}{2}y(n-1)x(n)$, $x(n)=\left(\frac{1^n}{3}\right)y(n)$; y(-1)=1	C213.2	1,2
UNIT III - DISCRETE FOURIER TRANSFORM &COMPUTATION			
Q.3.1	An 8 point sequence is given by x(n)={2,2,2,2,1,1,1,1} , compute DFT of x(n) using radix-2 DIT-FFT.	C213.3	1,2
Q.3.2	Determine 8 point DFT of the sequence x(n)={1,1,1,1,1,1,0,0}	C213.3	1,2
Q.3.3	State and Prove the differentiation and convolution properties of DFT.	C213.3	1,2
Q.3.4	Analyze butterfly operation in DIT and DIF algorithm.	C213.3	1,2
Q.3.5	Determine the DFT of a sequence x(n)={1,2,3,4,4,3,2,1} using DIT algorithm.	C213.3	1,2
UNIT IV - DESIGN OF DIGITAL FILTERS			
Q.4.1	Using a rectangular window technique design a LPF with pass band gain of unity, cut off frequency of 1000hz and working sampling frequency of 5 kHz the length of impulse is 7.	C213.4	1,2,3
Q.4.2	Design a chebyshev filter for the following specification using bilinear transformation $0.8\leq \lvert H(ejw)\rvert \leq 1$ $0\leq w \leq 0.2\pi$ $\lvert H(ejw)\rvert \leq 0.2$ $0.6\pi\leq w \leq \pi$	C213.4	1,2,3
Q.4.3	Design a Low pass Filter using rectangular window by taking a 9 samples of w(n) and with a cut off frequency of 1.2 rad/sec.	C213.4	1,2,3
Q.4.4	Design and realize a digital filter using Bilinear transformation for the following specification: Monotonic pass band and stop band -3.01 db cut off at 0.5π rad magnitude down at least 15dB at $\omega = 0.5\pi$ rad.	C213.4	1,2,3
Q.4.5	Compare and analyze Hanning and Hamming windowing technique of filter design.	C213.4	1,2,3
UNIT V – DIGITAL SIGNAL PROCESSORS			
Q.5.1	Explain in detail about MAC unit and pipelining.	C213.5	
Q.5.2	Draw the functional block diagram of a digital signal processing processor and explain.	C213.5	
Q.5.3	Compare the general purpose processor and DSP processor.	C213.5	
Q.5.4	Explain various addressing modes of a digital signal processor.	C213.5	
Q.5.5	Draw & explain different types of DSP architecture.	C213.5	
5. TUTORIAL QUESTIONS			
T.1.1	(i) Test the causality and stability of the system, $y(n) = x(-n) + x(n-2) + x(2n-1)$ **ANS: Noncausal and stable** (ii) Test the linearity and time invariance of the system, $y(n) = (n-1)x^2(n) + C$ **ANS: Nonlinear and Time variant**	C213.1	1,2,3

T.1.2	(i) The Nyquist rate of sampling of an analog signal s(t) for alias free reconstruction is 5000 samples/s. For a signal x(t)=[s(t)]^2 , determine the corresponding Nyquist sampling rate in sample/s. **[GATE 2010] ANS: 10000** (ii) Determine the Nyquist rate and Nyquist interval for following signals. (a) $m(t) = \frac{1}{2\pi}\cos(4000\pi t)\cos(1000\pi t)$ **ANS: 5000Hz, 0.2 msec** (b) $m(t) = \frac{sin500\pi t}{\pi t}$ **ANS: 500 Hz, 2 msec**	C213.1	1,2,3
T.1.3	Determine whether the following discrete time systems are stable or not. (i) $y(n) = x(n) + x(n-1) + y(n-1)$ **ANS: Stable** (ii) $y(n) = r^n x(n), r > 1$ **ANS: Unstable**	C213.1	1,2,3
T.1.4	Determine whether the following DT signals are periodic or not. If periodic determine fundamental period. (i) $\cos\left(\frac{n}{8}\right)\cos(\frac{n\pi}{8})$ **ANS: Non-periodic** (ii) $e^{\left(j\frac{\pi}{4}\right)n}$ **ANS: Periodic with N=8**	C213.1	1,2,3
T.1.5	Determine whether the following signals are energy signals or power signals and calculate their energy and power. (i) $x(n) = sin\left(\frac{\pi n}{6}\right)$ **ANS: ½, Power signal** (ii) (ii) $x(n) = e^{j\left(\frac{\pi n}{3}+\frac{\pi}{6}\right)}$ **ANS: 1, Power signal**	C213.1	1,2,3
T.1.6	(i) Determine the total energy of the discrete time signal x(n) which takes the value of unity at n=-1, 0, 1? **ANS: 3 J** (ii) Determine the system described by input-output equation is linear or non-linear. y(n)=nx(n) **ANS: Linear**	C213.1	1,2,3
UNIT II - DISCRETE TIME SYSTEM ANALYSIS			
T.2.1	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) **ANS: H(z) =** $\frac{z(z-1)}{(z-\frac{1}{4})(z-\frac{1}{2})}$	C213.2	1,2,3
T.2.2	Choose partial fraction expansion method to solve inverse Z transform for the signal x(z) = $\frac{1}{2Z^{-2}+2Z^{-1}+1}$ **ANS:** $2^{\frac{(n+1)}{2}}$ **(cos (3n+1)**$\frac{\pi}{4}$**)**	C213.2	1,2,3
T.2.3	A difference equation of the system is given below: $y(n) = 0.5y(n-1) + x(n)$ Determine (i) System function **ANS:** $\boldsymbol{H(z) = \frac{1}{1-0.5z^{-1}}}$ (ii) Pole zero plot of the system function **ANS: z_1=0 and p_1=0.5** (iii) Unit sample response of the system **ANS:** $\boldsymbol{h(n) = (0.5)^n u(n)}$	C213.2	1,2,3
T.2.4	A system is described by the difference equation $y(n) - \left(\frac{1}{2}\right)y(n-1) = 5x(n)$. Determine the solution, when the input $x(n) = \left(\frac{1}{5}\right)^n u(n)$ and the initial condition is given by $y(-1) = 1$, using z transform. **ANS:** $\boldsymbol{y(n) = \frac{-10}{3}\left(\frac{1}{5}\right)^n u(n) + \frac{53}{6}\left(\frac{1}{2}\right)^n u(n)}$	C213.2	1,2,3
T.2.5	Find the impulse response, frequency response of the second order system $y(n) - y(n-1) + \frac{3}{16}y(n-2) = x(n) - \frac{1}{2}x(n-1)$ **ANS:** $\boldsymbol{h(n) = 0.5\left\{\left(\frac{3}{4}\right)^n + \left(\frac{1}{4}\right)^n\right\}u(n)}$ **and** $\boldsymbol{H(\omega) = \frac{0.5}{1-\frac{3}{4}e^{-j\omega}} + \frac{0.5}{1-\frac{1}{4}e^{-j\omega}}}$	C213.2	1,2,3
T.2.6	Apply differentiation property and find the z transform for the signal, x(n) = n(-1)^n u(n) **ANS:** $\frac{-z}{(Z+1)^2}$	C213.2	1,2,3
UNIT III - DISCRETE FOURIER TRANSFORM &COMPUTATION			

T.3.1	Find the DFT of a sequence $x(n) = \{1,1,0,0\}$ and find the IDFT of $y(k) = \{1,0,1,0\}$ **ANS:** $\boldsymbol{X(k) = \{2, 1-j, 0, 1+j\}; y(n) = \{0.5, 0, 0.5, 0\}}$	C213.3	
T.3.2	**Let** $\boldsymbol{X(k)}$ be a 14-point DFT of a length 14 real sequence $x(n)$. The first 8 samples of $X(k)$ are given by $X(0) = 12;\ X(1) = -1 + j3;\ X(2) = 3 + j4;\ X(3) = 1 - j5;\ X(4) = -2 + j2;\ X(5) = 6 + j3;\ X(6) = -2 - j3;\ X(7) = 10$. Determine the remaining samples of $X(k)$. **ANS: X(8)=-2+j3; X(9)=6-j3; X(10)=-2-j2; X(11)=1+j5; X(12)=3-j4; X(13)=-1-j3**	C213.3	
T.3.3	Prove the following properties of DFT when $X(k)$ is the DFT of an N-point sequence $h(n)$. (i) $X(k)$ is real and even when $x(n)$ is real and even. **(ii)** $X(k)$ is imaginary and odd when $x(n)$ is real and odd.	C213.3	
T.3.4	Determine the circular convolution of two finite duration sequences $x_1(n) = \{1,-1,-2,3,-1\}; x_2(n) = \{1,2,3\}$ **ANS:** $\boldsymbol{y(n) = \{8, -2, -1, 4, -1\}}$	C213.3	
T.3.5	Perform the circular convolution of the following sequences $x(n) = \{1,1,2,1\}$ $h(n) = \{1,2,3,4\}$ using DFT and IDFT method. **ANS:** $\boldsymbol{X_3(k) = \{50, 2-j2, -2, 2+j2\}}$ **and** $\boldsymbol{x_3(n) = \{13, 14, 11, 12\}}$	C213.3	
	UNIT IV - DESIGN OF DIGITAL FILTERS		
T.4.1	Design a Chebyshev low pass filter with the specifications α_p=1dB ripple in the passband $0 \leq \omega \leq 0.2\pi$, α_s = 15dB ripple in the stop band $0.3\pi \leq \omega \leq \pi$ using bilinear transformation.**ANS: H(z) =** $\frac{0.001836(1+Z^{-1})^4}{(1-1.499Z^{-1}+0.8482Z^{-2})(1-1.5548Z^{-1}+0.6493Z^{-2})}$	C213.4	
T.4.2	Apply cascade and parallel form realization for the system y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2) **ANS: Cascade: H(z) =$H_1(z)$ + $H_2(z)$, Parallel: H(Z)=C+ $H_1(z)$ + $H_2(z)$**	C213.4	
T.4.3	Design an FIR filter approximating the ideal frequency response: Hd($e^{j\omega}$) = $e^{-j\alpha\omega}$ for $\lvert\omega\rvert \leq \frac{\pi}{6}$ = 0 for $\frac{\pi}{6} \lvert\omega\rvert \leq \pi$ Determine the filter coefficients for N=13 using Hamming window. **ANS: h(0)=h(12)=0; h(1)=h(11)=0.0045; h(2)=h(10)=0.02136; h(3)=h(9)=0.05724; h(4)=(h(8)=0.1061; h(5)=h(7)=0.149; h(6)=0.167**	C213.4	
T.4.4	Apply bilinear transformation to $H(s) = \frac{2}{(s+1)(s+2)}$ with T=1 sec and find H(z).	C213.4	
	6. ASSIGNMENT QUESTIONS		
	UNIT I - INTRODUCTION		
A.1.1	Determine whether the following signal is energy or power signal. $x(n) = Ae^{jw_0 n}$ **Ans: A², Power signal**	C213.1	1,2,3
A.1.2	Analyze whether the following discrete time systems are: (i) Static or dynamic (ii) Linear or non-linear (iii) Shift invariant or shift variant (iv) Causal or non-causal (v) Stable or unstable. (a) $y(n) = \cos[x(n)]$ **Ans: static, non-linear, shift invariant, causal and stable.** (b) $y(n) = x(-n+2)$ **Ans: dynamic, linear, shift invariant, non-causal and stable.** (c) $y(n) = x(n) + nx(n+1)$ **Ans: dynamic, linear, shift variant, non-causal and unstable.**	C213.1	1,2,3
A.1.3	Determine the Nyquist rate for the signal, $x(t) = 3\cos(50\pi t) + 10\sin(300\pi t) - \cos(100\pi t)$ **Ans: 100 Hz**	C213.1	1,2,3
A.1.4	Generate and analyze different type of signals like unit step sequence, sinusoidal sequence, exponential sequence and add two sinusoidal sequences using MATLAB program. [Refer Pg.No.1.266, 'Discrete Time Systems & Signal Processing' by	C213.1	5,12

	P.Ramesh Babu]		
UNIT II - DISCRETE TIME SYSTEM ANALYSIS			
A.2.1	Determine z-transform of following sequences. (i) $\propto^{\lvert n\rvert}, 0 < \lvert \propto \rvert < 1$ **Ans:** $\mathbf{X(z) = \frac{1}{1-\propto z^{-1}} - \frac{1}{1-\frac{1}{\alpha}z^{-1}}, ROC: \alpha < |z| < \frac{1}{\propto}}$ (ii) $Ar^n \cos(\Omega_0 n + \phi)\, u(n), 0 < r < 1$ **Ans:** $\boldsymbol{X(z) = A\frac{cos\phi - r\cos(\Omega_0 - \phi)z^{-1}}{1-2r\, cos\Omega_0 z^{-1} + r^2 z^{-2}}}$, $\boldsymbol{ROC}: \lvert z\rvert > r$ (iii) $\propto^{\lvert -n\rvert}, 0 < \lvert \propto \rvert < 1$ **Ans:** $\boldsymbol{X(z) = \frac{\left(\frac{1}{\propto} - \propto\right)z^{-1}}{1-\left(\frac{1}{\propto} + \propto\right)z^{-1} + z^{-2}}}$, $\boldsymbol{ROC}: \frac{1}{\propto} < \lvert z\rvert < \propto$	C213.2	1,2
A.2.2	Determine the linear convolution of $x(n) = \{2,4,6,8,10\}$ with $h(n) = \{1,3,5,7,9\}$. **Ans:** $\mathbf{x(n) * h(n) = \{2, 10, 28, 60, 110, 148, 160, 142, 90\}}$	C213.2	1,2
A.2.3	Determine the impulse response of the system described by the difference equation $y(n) = y(n-1) - \left(\frac{1}{2}\right)y(n-2) + x(n) - \frac{1}{2}x(n-1)$ using z transform and discuss its stability. **Ans:** $\mathbf{h(n) = \left(\frac{1}{\sqrt{2}}\right)^n \cos\left(\frac{\pi}{4}\, n\right) u(n)}$	C213.2	1,2,3
A.2.4	Plot and analyze the pole-zero pattern using MATLAB program. [Refer Pg.No.2.90, 'Discrete Time Systems & Signal Processing' by P.Ramesh Babu]	C213.2	5
UNIT IV - DESIGN OF DIGITAL FILTERS			
A.4.1	Using hanning window technique design a LPF with a passband gain of unity cutoff frequency 1000Hz and working sampling frequency of 5kHz. The length of the filter should be 7. **Ans: Linear phase filter**	C213.4	1,2,3
A.4.2	Design a Butterworth bandpass filter and analyze using MATLAB program.[Refer Pg.No.5.129, 'Discrete Time Systems & Signal Processing' by P.Ramesh Babu]	C213.4	5,12

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Department of Electrical and Electronics Engineering

EE6404 & MEASUREMENTS AND INSTRUMENTATION [C214]

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

1. Course outcomes

COs	Course Outcomes	POs	PSOs
C214.1	Describe the basic functional block elements in Different measuring Instruments and the errors in the measurement system	1,2	1
C214.2	Select the suitable instrument for measuring different electrical and magnetic parameters	1,2,3	1
C214.3	Design a suitable Bridge circuit to determine the values of various resistor, inductor and capacitor	1,2,3,4	1
C214.4	Explain the construction and working principle of various types of storage and display devices and compare them	1,7	-
C214.5	Compare the various types of transducers and explain the function of different blocks involved in data acquisition systems	1,5	2

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C214.1	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-
C214.2	2	1	2	-	-	-	-	-	-	-	-	-	1	-	-
C214.3	2	2	3	2	-	-	-	-	-	-	-	-	2	-	-
C214.4	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
C214.5	1	-	-	-	2	-	-	-	-	-	-	-	-	1	-
C214	2	1	1			-	-	-	-	-	-	-	1	-	-

3. PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

PO1: Engineering knowledge:

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

PO2: Problem analysis:

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

PO3: Design/development of solutions:

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

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.

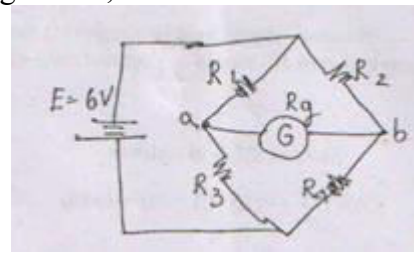
PO5: Modern tool usage:

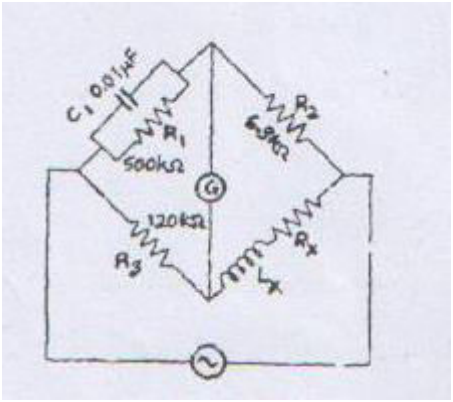
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO7:Environment and sustainability:

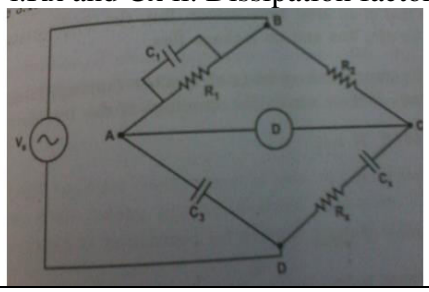
Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

S.No.	**4. Important Questions.**	COs	Pos
	Unit-1		
Q.1.1.	What are the various important functional elements of a typical instrument system? What is the function of primary sensing element? Give the examples for data presentation elements.	C214.1	1
Q.1.2.	Explain the block diagram and functional elements of measurement system with neat diagram. Give the examples for primary sensing elements. What is the function of variable conversion element?	C214.1	1
Q.1.3.	Differentiate between Accuracy and Precision. Define measuring lag and fidelity of dynamic characteristics of instrument. Define the term 'sensitivity of an instrument. The true value of a voltage is 100V. The values indicated by a measuring instrument are 104,103,105,103 and 105 Volts. Find the accuracy and precision of the measurement.	C214.1	1,2
Q.1.4.	Write a technical note on static and dynamic characteristics of instrumentation systems Give the name for some dynamic characteristics of an instrument. A (0-25)A ammeter has a guaranteed accuracy of 1 percent of full scale reading. The current measured by this instrument is 10A. Calculate the limiting error in percentage.	C214.1	1,2
Q.1.5.	For the given data calculate any three statically analyzed values x_1=49.7; x_2=50.1; x_3=50.2; x_4=49.6; x_5=49.7.Give the statistical analysis measurement data values. If the RMS value of reading in volts are observed in a digital CRO were 3.5, 3.452, 3.620, 3.523. Determine i. Arithmetic mean ii. Average deviation and iii. Standard deviation.	C214.1	1,2
Q.1.6.	How would you classify standards of instruments? Why standard is need for instrumentation system? Identify the ISO code for Electrical and magnetic measurements.	C214.1	1
Q.1.7.	Discuss in detail, about calibration. What is the need of calibration for measuring instruments? With a suitable illustration elaborate the significance of calibrations. What is known as calibration?	C214.1	1,2
Q.1.8.	Mention the different calibration methodology. If calibration improve the quality of the measuring system? Justify your result.	C214.1	1,2
Q.1.9.	What could be done to diminish gross error? How would you categorize the systematic error? The expected value of the voltage across a resistor is 40V. However the measurement gives a value of 39V.Calculate the absolute error .	C214.1	1,2
Q.1.10.	How could be done to minimize random errors? A 500v voltmeter is specified to be accurate within ± 1.5% at full scale. Calculate the limiting error when the instrument is used to measure a voltage of 200V.	C214.1	2
	Unit-2		
Q.2.1.	Draw the circuit of a basic DC voltmeter. List any two disadvantages of PMMC instruments. How are basic instruments converted into higher range ammeter? Why MI instruments are used for both AC and DC measurements? The coil of instrument has 42.5 turns. The mean width of the coil is 2.5cm and the axial length of the coil is 2cm. if the flux density is 0.1wb/m^2. Calculate the torque on the moving coil in NM. How would you classify digital voltmeters? A PMMC ammeter gives reading of 40 mA when connected across two opposite corners of a bridge rectifier. The other two corners of which are connected in series with a capacitor to 100k, 50Hz supply. Determine the capacitance. What is a multimeter?	C214.2	1,2
Q.2.2.	Discuss the working principle of operation of PMMC instrument. Mention various types of digital voltmeters. Describe any one type of a digital voltmeter explain their working principle. A permanent magnet moving coil instrument has a coil of dimensions 18mm×12mm. The flux density in the airgap is 1.7×10^{-3} wb/m^2 and the spring constant is 0.12×10^{-6} Nm/rad. Determine the number of turns required to produce an angular deflection of 90^0 degrees when a current of 5	C214.2	1

	mA is flowing through the coil.		
Q.2.3.	Draw the different types of wattmeter connections. Describe the working of electrodynamometer type instrument with necessary diagram and equations. Explain the working of single phase wattmeter with neat sketch and necessary equations.	C214.2	1
Q.2.4.	Which principle is used for the working of domestic and industrial energy meters? What is meant by creeping in energy meters and how could be done to rectify them? Draw and Explain the working of single phase energy meter with neat sketch and necessary torque equations and also phasor diagram .	C214.2	1,2
Q.2.5.	List the various types of magnetic measurements. Mention the various tests for magnetic measurements.	C214.2	1,2
Q.2.6.	Draw the B-H curve by using Method of reversal and step by step method. Describe the measurement of iron loss in ferromagnetic material by i. watt meter method ii. Bridge method and iii. Potentiometer method.	C214.2	1,2
Q.2.7.	What is meant by instrument transformer? List the applications of current transformer and potential transformer. Mention the need of instrument transformer. Describe the errors involved in instrument transformers	C214.2	1,2,3
Q.2.8.	Describe the measurement of current using current transformer with neat sketch and equations. Describe the measurement of voltage using potential transformer with neat sketch and equations. Describe the measurement of power using current and potential transformers with neat sketch and equations. A 100/5A current transformer having a rated burden of 25VA has an iron loss of 0.4W and a magnetizing current of 2A. Calculate its ratio error and phase angle error when supplying rated output current to a meter having a ratio of resistance to reactance 5.	C214.2	1,2,3
Q.2.9.	What are the different types of frequency meters? Explain any one type frequency meter with neat diagram and give necessary equations if need. Describe basic electronic frequency meter with neat diagram	C214.2	1,2,3
Q.2.10.	What is meant by phase meter? List the different types of phase meters. Explain analog phase meter with neat sketch and equations. Describe the digital phase meter with neat diagram and equations.	C214.2	1,2
	Unit-3		
Q.3.1.	Draw a neat sketch of a modern D.C potentiometer and discuss how the potentiometer is standardized. Draw the circuit diagram of a crompton's potentiometer and explain its working. Also describe the steps used when measuring an unknown resistance.	C214.3	1,4
Q.3.2.	State the applications of self balancing potentiometers. Define the term " Standardisation of potentiometer. Describe the construction and working of a co-ordinate type a.c.potentiometer. How is it standardized? List the sources and errors in the instrument.	C214.3	1,3,4
Q.3.3.	State the principle of wheatstone bridge. Explain Kelvin's double bridge method for the measurement of low resistance. Give the relationship between the bridge balance equation of DC bridge and AC bridge Draw and explain the balance conditions of a Wheatstone bridge. An unbalanced wheatstone bridge is given below fig. Calculate the current through the galvanometer R1=1kΩ, R2=2.5kΩ, R3=3.5kΩ, R4=10kΩ, Rg=300Ω, E= 6V  Draw the circuit diagram of a crompton's potentiometer and explain its working. Also describe the steps used when measuring an unknown resistance.	C214.3	1,2,4

Q.3.4.	With the help of circuit diagram explain how capacitance can be measured by the use of a Schering bridge. Describe the working of a schering bridge. Derive the derivations for capacitance and dissipation factor. Draw the phasor diagram of the bridge under balanced condition. Explain how wein bridge used for frequency measurement with neat circuit diagram. Also derive the suitable expression. List out a few sources and detectors used in A.C. Brideges. Describe the general equations for balance for an a.c. bridge. Prove the two conditions have to be satisfied for ac bridge balancing. A Maxwell's bridge used for measurement of inductive impedance consists of following components as shown in fig .  find the series equivalent of unknown impedance (Rx,Lx). Explain the construction of a Anderson's bridge and derive its balance conditions. In a balanced network, AB is a resistance of 500Ω in series with an inductor of 0.18H,BC and DA are non-inductive resistances of 1k Ω each and CD consists of a resistance R in series with a capacitor C.A potential difference of 5V at a frequency of 5000/2π is applied between points A and C. Determine the value of R and C.	C214.3	1,2,4
Q.3.5.	Explain the working of transformer ratio bridge. What is the need of transformer ratio bridge? List the applications of ratio transformer. What are the features of ratio transformer?	C214.3	1
Q.3.6.	What is meant by self balancing bridges? Give two examples.	C214.3	1
Q.3.7.	Briefly discuss about "Interference and screening".	C214.3	3,4
Q.3.8.	Briefly discuss about multiple earth and earth loops. What is the use of earth loop? How a ground loop is formed? Why grounding is essential in any electrical system? Give the function of Wagner Earth Device.	C214.3	3,4
Q.3.9.	Discuss the effect of electrostatic and electromagnetic interference in instruments. How the effect of stray capacitances could be reduced?	C214.3	2,4
Q.3.10.	Discuss the grounding techniques in detail with a neat diagram. Write short notes on grounding techniques. Describe in detail about the various grounding techniques.	C214.3	3,4
	Unit-4		
Q.4.1.	What are the various components of a recording instrument? Explain the necessity of recorders in instrumentation system. Describe the working of any one type of recorder (analog type) with a neat diagram.	C214.4	1,7
Q.4.2.	What is the advantage of using a magnetic tape recorder? Explain how the tape recorder works with suitable diagrams. Describe the basic components of a magnetic tape recorder used for instrumentation application. State its advantages and disadvantages.	C214.4	7
Q.4.3.	Explain the working of digital plotter with neat sketch?	C214.4	7
Q.4.4.	What is the principle of operation of an ink-jet printer?	C214.4	7
Q.4.5.	What are the major components in a cathode ray tube(CRT)?	C214.4	7
Q.4.6.	Discuss the working of digital CRO. With a neat block diagram explain the operation and constructional aspects of a digital CRO.	C214.4	1,7
Q.4.7.	Reason out why today's commercial LED monitors have become more popular	C214.4	1,7

	than their LCD counter parts. What is a LED? Compare LED and LCD displays.		
Q.4.8.	Compare and contrast the working, advantages and disadvantages of LED and LCD. List the merits and demerits of LCD. Explain the theory and working of LCD's. Describe the difference between light scattering and field effect types of LCDs	C214.4	1,7
Q.4.9.	Write a detailed technical note on dot matrix display.	C214.4	1,7
Q.4.10.	Bring out how data loggers measure and record data effortlessly, accurately and quickly explaining the working of them. What is data logger?	C214.4	1
	Unit-5		
Q.5.1.	Explain the classification of transducers and discuss about the selection criteria for them.	C214.5	1
Q.5.2.	How transducers are classified? What is the difference between active and passive transducer?	C214.5	1
Q.5.3.	What is known as thermocouple effect and how do you use it in a transducer? Name some of the active transducers which are used in the measurement of temperature.	C214.5	1
Q.5.4.	Explain the different principles of working of capacitive transducers with relevant diagrams. Write examples for capacitive transducers.	C214.5	5
Q.5.5	A 5-plate transducer has plates of dimensions 20mm×20mm and separated 0.25 mm apart. The arrangement is to be used for measuring displacement. Determine the sensitivity of the arrangement. Assume air is medium. Describe the principle of operation of LVDT and its characteristics.	C214.5	1,5
Q.5.6	Explain the piezoelectric transducers**.** What is the basic operating principle of piezo electric transducer? Write example for piezo electric transducers.	C214.5	1
Q.5.7	Write short note on digital transducers**.** Give examples for optical transducer.	C214.5	5
Q.5.8	What is meant by data acquisition system? Explain the multichannel data acquisition system in detail.	C214.5	1,5
Q.5.9	Explain the successive approximation type ADC with its characteristics. Write short note on Digital to analog converters. Explain the A/D and D/A conversion methods.	C214.5	1
Q.5.10	When do you call an instrument to be intelligent? Explain the smart sensors. What is the difference between sensor and transducer?	C214.5	1,5
	5.Assignments		
Assignment : I	**Date of submission:**	**Max. Marks: 10**	
A.1.1.	0-50V Voltmeter is specified to be accurate within $\pm$1% of full Scale. Calculate the Limiting Error when the instrument is reading is 15V. [Ans:3.33%]	C214.1	1,2
A.1.2.	An ammeter reads 8.3 A and the true value of the current is 8.5 A. Determine the absolute error and relative percentage error. [Ans:2.35%]	C214.1	1,2
A.1.3.	A Voltmeter reads 111.5 V. The error taken from an error curve is 5.3%. Find the true of the voltage. [Ans:117.74v]	C214.1	1,2
A.1.4.	The expected value of the voltage across a resistor is 80V. However the measurement gives a value of 79 V. Calculate (i) absolute error, (ii) % error, (iii) relative accuracy (iv) % of accuracy. [Ans:1.25%,0.9875,98.75%]	C214.1	1,2
A.1.5.	If a set of six observations are 1.5V, 3V, 1V, 5V, 2V, 4V. Calculate the arithmetic mean, average deviation and standard deviation. [Ans: 2.75V, 1.25V, 1.5411]	C214.1	1,2
Assignment : II	**Date of submission:**	**Max. Marks: 10**	
A.2.1.	A permanent magnet moving coil instrument has a coil of dimensions 15mm×12mm. The flux density in the air gap is $1.8x10^{-3}$ wb/m^2 and the spring constant is $0.14x10^{-6}$ Nm/rad. Determine the no of turns required to produce an angular deflection of 90 degrees when a current of 5mA is flowing through the	C214.2	1,2

	coil. [Ans: 136]		
A.2.2.	Design an Ayrton shunt provides an ammeter with current ranges of 1A, 5A, 10A. A basic meter with internal resistance of 50Ω and a full scale deflection current of 1mA is to be used. [Ans 0.04Ω, 0.005Ω, 0.005Ω]	C214.2	1,2,3
A.2.3.	A wattmeter has a current coil of 0.03Ω resistance and a pressure coil of 6000Ω resistance. Calculate the percentage error if the wattmeter is so connected that: i. The current coil is on the load side ii. The pressure coil on the load side a. if the load takes 20A at a voltage of 220V and 0.6 pf in each case. b. what load current give equal errors with the two connections? [Ans. a. 45%, 31% b. I=16.4A]	C214.2	1,2
A.2.4.	What are the essential torques required for operating an instrument? What is the importance of deflection torque of 1Ø electrodynamometer type wattmeter and derive its torque equation.	C214.2	1,2
Assignment : III	**Date of submission:**	**Max. Marks: 10**	
A.3.1.	A Wheatstone bridge is used for measuring the change of resistance of a strain gauge which forms one of the arms of bridge. All the arms of the bridge including the strain gauge have a resistance of 100Ω each. The maximum allowable power dissipation from the strain gauge is 250mW. Determine the value of maximum permissible current through the strain gauge and maximum allowable bridge supply voltage. Suppose a source of 20V is available, find the series resistance to be connected between the source and the bridge to limit the input voltage of bridge to permissible level.[Ans. 100Ω]	C214.3	1,2
A.3.2.	A current transformer has a single turn primary and a 200 turns secondary winding. The secondary winding supplies a current of 5A to a non-inductive burden of 1Ω resistance. The requisite flux is set up in the core by an mmf of 80A. The frequency is 50Hz and the net cross-section of the core is 1000mm^2. Calculate the ratio and phase angle of the transformer. Also find the flux density in the core. Neglect the effects of magnetic leakage, iron losses and I^2R losses.	C214.3	1,2,3
A.3.3.	The schering bridge has the following constants. Arm AB- capacitor of 0.5µf in parallel with 2kΩ resistor. Arm BC- resistance of 2.5kΩ. Arm CD-unknown capacitor Cx and Rx in series.Arm DA- capacitance of 0.3 µf. Frequency -1KHz. Determine the following i.Rx and Cx ii. Dissipation factor. 	C214.3	1,4
A.3.4.	Design a simple bridge experiment to determine the unknown resistance (or) Inductance (or) Capacitance using any one modern tool and to provide the valid conclusions.	C214.3	1,2,4
	6.Seminar topics.		
Seminar : I	**Date of Presentation:**	**Max. Marks: 10**	
S.4.1	Industrial metering from different types of consumers &list some of the industrial tariffs	C214.4	1,7
S.4.2	Working of Beat frequency oscillator	C214.4	1,7,6
S.4.3	HV measurements & Testing	C214.4	6

S.4.4	Opto electronic measurements	C214.4	11
S.4.5	Potentiometers	C214.4	4
S.4.6	Ohmmeters	C214.4	1,4
S.4.7	Galvanometers	C214.4	1,4
S.5.1	Signal analysers	C214.5	1,5
S.5.2	High frequency measurements	C214.5	7,11
S.5.3	Q-meter	C214.5	2
S.5.4	Instrumentation amplifier	C214.5	3
S.5.5	Chemical sensors	C214.5	6,7
S.5.6	Fibre optic measurements	C214.5	5
S.5.7	Microprocessor based measurements	C214.5	5
S.5.8	Units, Systems and Dimensions	C214.5	1,11
S.5.9	IEEE488 standard	C214.5	6
	7.Self Study topics		
SS.5.1	Various measurements and measuring instruments in petroleum industry and cement factory.	C214.5	1,4,7,8

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

Question Paper Code : 77197

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

Fourth Semester

Civil Engineering

MA 6459 — NUMERICAL METHODS

(Common to Aeronautical Engineering, Electrical and Electronics Engineering, Instrumentation and Control Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Geoinformatics Engineering, Petrochemical Engineering, Production Engineering, Chemical and Electrochemical Engineering, Textile Chemistry and Textile Technology)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Interpret Newton Raphson method geometrically.

2. Which of the iterative methods for solving linear system of equations converge faster? Why?

3. Given $y_0 = 3$, $y_1 = 12$, $y_2 = 81$, $y_3 = 200$, $y_4 = 100$. Find $\Delta^4 y_0$.

4. Distinguish between Newton divided difference interpolation and Lagrange's interpolation.

5. Find $y'(0)$ from the following table.

x:	0	1	2	3	4	5
y:	4	8	15	7	6	2

6. Using two point Gaussian quadrature formula evaluate $I = \frac{\pi}{4}\int_{-1}^{1} \sin\left(\frac{\pi t + \pi}{4}\right) dt$.

7. Find by Taylor's series method, the value of y at $x = 0.1$ from $\frac{dy}{dx} = y^2 + x$, $y(0) = 1$.

8. Distinguish between single step methods and multi-step methods.

9. Classify the following equation : $\frac{\partial^2 u}{\partial x^2} + 4\frac{\partial^2 u}{\partial x \partial y} + 4\frac{\partial^2 u}{\partial y^2} - \frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$.

10. Express $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ in terms of difference approximation.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Using Newton Raphson method find the real root of $f(x) = 3x + \sin(x) - e^x = 0$ by choosing initial approximation $x_0 = 0.5$. (8)

(ii) Determine the largest eigen value and the corresponding eigen vector of the matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$. (8)

Or

(b) (i) Apply Graeffe's method to find all the roots of the equation $x^3 - 2x^2 - 5x + 6 = 0$ by squaring thrice. (8)

(ii) Solve the following system of equations, starting with the initial vector of [0, 0, 0] using Gauss-Seidel method. (8)

$$6x_1 - 2x_2 + x_3 = 11$$
$$-2x_1 + 7x_2 + 2x_3 = 5$$
$$x_1 + 2x_2 - 5x_3 = -1$$

12. (a) (i) Using Lagrange's interpolation find the interpolated value for $x = 3$ of the table. (8)

x :	3.2	2.7	1.0	4.8
$f(x)$:	22.0	17.8	14.2	38.3

(ii) The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface.

x = height :	100	150	200	250	300	350	400
y = distance :	10.63	13.03	15.04	16.81	18.42	19.9	21.27

Find the values of y when $x = 218$ ft using Newton's forward interpolation formula. (8)

Or

(b) (i) Employ a third order Newton polynomial to estimate l_{n2} with the four points given in table. (8)

x :	1	4	6	5
$f(x)$:	0	1.386294	1.791759	1.609438

(ii) The following values of x and y are given in table : (8)

x :	1	2	3	4
y :	1	2	5	11

Find the cubic splines and evaluate $y(1.5)$.

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

t :	0	2	4	6	8	10	12
v :	0	10	18	25	29	32	20

(i) Estimate approximately the distance covered in 12 minutes, by Simpson's 1/3rd rule. (8)

(ii) Estimate the acceleration at $t = 2$ seconds. (8)

Or

(b) (i) Given that :

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y :	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ at $x = 1.1$. (8)

(ii) Use the Romberg method to get an improved estimate of the integral from $x = 1.8$ to $x = 3.4$ from the data in table with $h = 0.4$ (8)

x :	1.6	1.8	2.0	2.2	2.4	2.6
$f(x)$:	4.953	6.050	7.389	9.025	11.023	13.464
x :	2.8	3	3.2	3.4	3.6	3.8
$f(x)$:	16.445	20.056	24.533	29.964	36.598	44.701

14. (a) Solve the initial value problem $\frac{dy}{dx} = x - y^2$, $y(0) = 1$ to find $y(0.4)$ by Adam's Bashforth predictor corrector method and for starting solutions, use the information below.

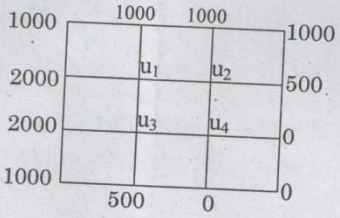
$y(0.1) = 0.9117$, $y(0.2) = 0.8494$. Compute $y(0.3)$ using Runge Kutta method of fourth order. (16)

Or

(b) (i) Employ the classical fourth order Runge-Kutta method to integrate $y' = 4e^{0.8t} - 0.5y$ from $t = 0$ to $t = 1$ using a stepsize of 1 with $y(0) = 2$. (8)

(ii) Given $\frac{dy}{dx} = xy + y^2$ and $y(0) = 1$, $y(0.1) = 1.1169$, $y(0.2) = 1.2773$, $y(0.3) = 0.2267$, evaluate $y(0.4)$ by Milne's predictor corrector method. (8)

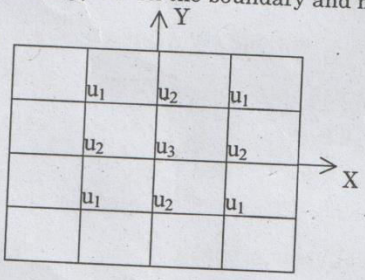
15. (a) (i) Given the values of $u(x, y)$ on the boundary of the square in fig. evaluate the function $u(x, y)$ satisfying the Laplace equation $\nabla^2 u = 0$ at the pivotal points of this fig. by Gauss Seidel method. (8)



(ii) Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the condition $u(x, 0) = \sin \pi x$, $0 \le x < 1$; $u(0, t) = u(1, t) = 0$ using Crank-Nicolson method. (8)

Or

(b) (i) Solve the Poisson's equation $\nabla^2 u = 8x^2y^2$ for the square mesh of fig. with $u(x, y) = 0$ on the boundary and mesh length = 1. (8)



(ii) Evaluate the Pivotal values of the equation $u_{tt} = 16u_{xx}$ taking $\Delta x = 1$ upto $t = 1.25$. The boundary conditions are $u(0, t) = u(5, t) = u_t(x, 0) = 0$ and $u(x, 0) = x^2(5 - x)$. (8)

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Question Paper Code : 77134

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

Fourth Semester

Electrical and Electronics Engineering

EE 6404 — MEASUREMENTS AND INSTRUMENTATION

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Gross and random errors.
2. Illustrate the difference between accuracy and precision.
3. State the purpose of shunts in the Voltmeter.
4. A basic D'Arsonval movement with a full deflection of $50\mu A$ and internal resistance of 500 Ω is used as voltmeter. Determine the value of the multiplier resistance needed to measure a voltage range of 0 – 10V.
5. What is a potentiometer? List its applications?
6. Mention the grounding techniques available in measurements.
7. What is the technique used in strip chart recorders?
8. Compare plotters and printers.
9. Write the desired properties of thermocouple metals.
10. What are the two ways, that the DAS are used to measure and record analog signals?

PART B — (5 × 16 = 80 marks)

11. (a) By using a micrometer screw, the following readings were taken of a certain length :

1.34, 1.38, 1.56,1.47, 1.42, 1.44,1.53, 1.48, 1.40, 1.59 mm. Calculate the following :

(i) Arithmetic mean
(ii) Average deviation
(iii) Standard deviation and
(iv) Variance. (16)

Or

(b) (i) Discuss the different types of standards of measurement. (8)

(ii) Describe the static and dynamic characteristics of measuring instruments. (8)

12. (a) (i) Describe the basic magnetic measurement using B-H curve. (8)

(ii) Explain the operating principle of instrument transformer. (8)

Or

(b) (i) Explain the methods of turns compensation used in Current transformers to reduce ratio error. (8)

(ii) Explain the term 'loading' in voltmeter and give the method to remove the adverse effect of the same. (8)

13. (a) Explain the procedure of measuring a low resistance with help of Kelvin's double bridge. Derive the relation to finding unknown resistance. (16)

Or

(b) Describe in detail about :

(i) Interference and screening. (8)

(ii) Multiple earth and earth loops. (8)

14. (a) (i) Explain the segmental display and dot matrices display for numeric and alpha numeric displays. (12)

(ii) Write short notes on data logging. (4)

Or

(b) (i) Draw and explain the Block diagram of digital CRO. (12)

(ii) Describe different types of sweeps used in CRO. (4)

15. (a) Write short notes on the following :

(i) Seeback effect.

(ii) Piezo electric transducer.

(iii) Resistance thermometers. (16)

Or

(b) (i) Explain the basic operation of A/D converter utilizing D/A Converter. (8)

(ii) Explain the concept of Smart sensors. (8)

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Question Paper Code : 77131

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

Fourth Semester

Electrical and Electronics Engineering

EE 6401 — ELECTRICAL MACHINES – I

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by statically induced EMF?

2. Mention the materials suitable for fabrication of Permanent Magnets.

3. Specify the applications of autotransformer?

4. Mention the role of tertiary winding in Transformer.

5. Why do all practical energy conversion devices make use of the magnetic field as a coupling medium rather than an electric field?

6. Write the equation, which relates rotor speed in electrical and mechanical radian/second.

7. Specify the role of Interpoles in DC Machine?

8. What is meant by residual emf in DC generator?

9. Specify the techniques used to control the speed of DC shunt motor for below and above the rated speed?

10. Why DC series motor is suited for traction applications?

PART B — (5 × 16 = 80 marks)

11. (a) Explain the methods of energy conversion via Electric Field, with examples of Electrical Machines. (16)

Or

(b) (i) Specify the causes for Hysteresis and Eddy current losses in Electrical Machines. Also suggest the methods in construction to minimize the above losses. (8)

(ii) State properties of magnetic material suitable for fabrication Permanent Magnet and Electromagnet. (8)

12. (a) (i) What is meant by Inrush Current in Transformer? Specify the nature of Inrush currents and its problem during Transformer Charging. (6)

(ii) A 500 KVA Transformer has a core loss of 2200 watts and a full load copper loss of 7500 watts. If the power factor of the load is 0.90 lagging, calculate the full load efficiency and the KVA load at which maximum efficiency occurs. (10)

Or

(b) (i) Specify the conditions for parallel operation of Transformer. Also explain the effect of load sharing due to impedance variation between transformers during parallel operation. (6)

(ii) A 100 KVA, 3300 V/240 V, 50 Hz, Single phase transformer has 990 turns on the primary. Calculate the number of turns on secondary and the approximate value of primary & secondary full load currents. (10)

13. (a) With neat sketch explain the multiple excited magnetic field system in electromechanical energy conversion systems. Also obtain the expression for filed energy in the system. (16)

Or

(b) Derive the torque equation of a round rotor machine. Also clearly state the assumptions made. (16)

14. (a) (i) Draw and explain the load characteristics of Differentially and Cumulatively compound DC generator. (6)

(ii) A 4 pole DC shunt generator with lap connected armature supplies 5 kilowatt at 230 Volts. The armature and filed copper losses are 360 Watts and 200 Watts respectively. Calculate the armature current and generated EMF? (10)

Or

(b) (i) Derive the EMF equation of DC generator. (6)

(ii) In a 400 volts, DC compound generator, the resistance of the armature, series and shunt windings are 0.10 ohm, 0.05 ohm and 100 ohms respectively. The machines supplies power to 20 Nos. resistive heaters, each rated 500 watts, 400 Volts. Calculate the induced emf and armature currents when the generator is connected in (1) Short Shunt (2) Long Shunt. Allow brush contact drop of 2 volts per brush. (10)

15. (a) (i) Why starting current is high at the moment of starting a DC Motor? Explain the method of limiting the starting current in DC motors. (6)

(ii) A 400 Volts DC Shunt motor has a no load speed of 1450 RPM, the line current being 9 Amperes. At full loaded condition, the Line current is 75 Amperes. If the shunt field resistance is 200 Ohms and armature resistance is 0.5 Ohm. Calculate the full load speed. (10)

Or

(b) (i) Draw the speed Torque characteristics of DC Shunt and Series motor. Also from the characteristics specify the applications for each motor. (6)

(ii) A 230 Volts DC Shunt motor on no-load runs at a speed of 1200 RPM and draws a current of 4.5 Amperes. The armature and shunt field resistances are 0.3 ohm and 230 ohms respectively. Calculate the back EMF induced and speed, when loaded and drawing a current of 36 Amperes. (10)

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Question Paper Code : 77132

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

Fourth Semester

Electrical and Electronics Engineering

EE 6402 — TRANSMISSION AND DISTRIBUTION

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between a feeder and a distributor.
2. Why is electrical power preferably to be transmitted at a high voltage?
3. Define proximity effect on conductors.
4. A three phase transmission line has its conductor at the corners of an equilateral triangle with side 3 m. The diameter of each conductor is 1.63 cm. Find the inductance per km per phase of the line.
5. What is the importance of voltage control?
6. What is Ferranti effect?
7. What is the purpose of insulator?
8. What is the main purpose of armouring?
9. What are the materials mainly used in bus bars?
10. What are the classifications of substation according to service?

PART B — (5 × 16 = 80 marks)

11. (a) Discuss in detail the advantages, disadvantages and applications of HVDC transmission. (16)

Or

(b) Explain with a neat layout the modern EHV system. What is the highest voltage level available in India for EHV transmission? (16)

12. (a) Explain the following with respect to corona (i) corona (ii) effects of corona (iii) disruptive critical voltage (iv) visual critical voltage (v) corona power loss. Also explain the interference with neighbouring communication circuits. (16)

Or

(b) A three phase circuit line consists of 7/4.5 mm hard drawn copper conductors. The arrangement of the conductors is shown in Figure.12.b. The line is completely transposed. Calculate inductive reactance per phase per km of the system. (16)

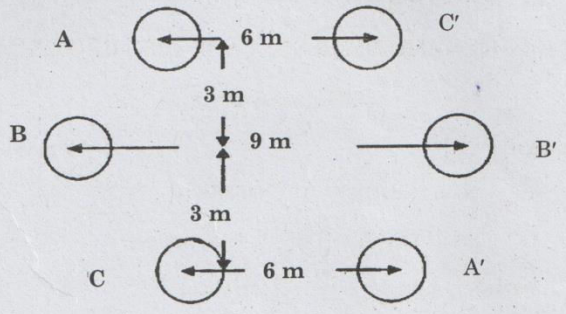

Figure. 12.b

13. (a) A balanced three phase load of 30 MW is supplied at 132 kV, 50 Hz and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor is (20+j52) Ω and the total phase-neutral admittance is 315×10^{-6} Siemen. Using nominal T method, Determine (i) A, B, C and D constants of the line (ii) sending end voltage (iii) regulation of the line. (16)

Or

(b) Explain the real and reactive power flow in lines. Also explain the methods of voltage control. (16)

14. (a) In a 3-unit insulator, the joint to tower capacitance is 20% of the capacitance of each unit. By how much should the capacitance of the lowest unit be increased to get a string efficiency of 90%? The remaining two units are left unchanged. (16)

Or

(b) What are the various properties of insulators? Also briefly explain about suspension type and pin type insulators. Draw the schematic diagram. (16)

15. (a) Write short notes on :

(i) Sub mains

(ii) Stepped and tapered mains

(iii) Grounding grids (16)

Or

(b) Explain the following:

(i) Neutral grounding

(ii) Resistance grounding (16)

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Question Paper Code : 77101

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

Fourth Semester

Electrical and Electronic Engineering

CS 6456 — OBJECT ORIENTED PROGRAMMING

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

(Regulation 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of object oriented programming over structured programming?
2. What is the advantage of an inline function?
3. What is meant by data abstraction?
4. What is a destructor? Illustrate with an example
5. What is a template?
6. What is an exception?
7. What is a byte code?
8. What is JVM?
9. What is an interface?
10. Write short notes on throw( ).

PART B — (5 × 16 = 80 marks)

11. (a) Explain the major principles of object oriented programming with illustrations and neat diagram. (16)

Or

(b) Explain the various operators that are available in C++ with neat illustration for each it. (16)

12. (a) Explain the various types of constructors that are available in C++ with suitable examples (16)

Or

(b) What is meant by polymorphism? Explain the various types of polymorphism in C++ with suitable examples. (16)

13. (a) What is a function template? Write a template function to sort arrays of float and int using bubble sort. (16)

Or

(b) What is inheritance? Discuss the various types of inheritance that are available in C++ with neat diagram (16)

14. (a) Discuss the various types of operators in Java and explain with suitable examples (16)

Or

(b) What is an access modifier? Differentiate between private, protected and public access modifiers with examples (16)

15. (a) Illustrate the use of try-catch clauses by sample statements of rare type of runtime error. (16)

Or

(b) What is multi threading? Write a multithreaded program in java and explain. (16)

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Question Paper Code : 77133

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

Fourth Semester

Electrical and Electronics Engineering

EE 6403 — DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

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

(Regulation 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Check if the system described by the difference equation $y(n) = ay(n-1) + x(n)$ with $y(0) = 1$ is stable.
2. Differentiate between Energy and Power singals.
3. Determine the Z-transform of $x(n) = a^n$.
4. Find the DFT of the sequence $x(n) = \{1,1,0,0\}$.
5. Determine the Fourier Transform of the signal $x(t) = \sin w_0 t$.
6. Draw the basic butterfly flow graph for the computation in the DIT FFT Algorithm.
7. Comment on the passband and stop band characteristics of butter worth filter.
8. Realize the following causal linear phase FIR system function $H(z) = \frac{2}{3} + z^{-1} + \frac{2}{3}z^{-2}$.
9. How do a digital signal processor differ from other processors.
10. State any two application of DSP.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find the impulse response of a discrete time invariant system whose difference equation is given by

$$y(n) = y(n-1) + 0.5y(n-2) + x(n) + x(n-1). \quad (12)$$

(ii) Explain the properties of discrete time system. (4)

Or

(b) (i) A discrete time system is represented by the following difference equation in which $x(n)$ is input and $y(n)$ is output

$y(n) = 3y(n-1) - nx(n) + 4x(n-1) + 2x(n+1)$; and $n \geq 0$. Is this system linear? Shift invariant? Causal? In each case, justify your answer. (12)

(ii) What is meant by quantization and quantization error? (4)

12. (a) (i) Find the Z transform of $x(n) = n^2 u(n)$. (8)

(ii) Find the inverse $Z-$transform of $X(Z) = \dfrac{Z}{3Z^2 - 4Z + 1}$ for Region of convergence (1) $|Z| > 1$, (2) $|Z| < \frac{1}{3}$ (3) $\frac{1}{3} < |Z| < 1$. (8)

Or

(b) (i) Convolute the following two sequences $x_1(n) = \{0,1,4,-2\}$ and $x_2(n) = \{1,2,2,2\}$. (8)

(ii) Find the frequency response of the LTI system governed by the equation $y(n) = a_1 y(n-1) - a_2 y(n-2) - x(n)$. (8)

13. (a) (i) Determine the DFT of the sequence $x(n) = \begin{cases} \frac{1}{4}, & \text{for } 0 \leq n \leq 2 \\ 0, & \text{otherwise} \end{cases}$. (8)

(ii) Draw the flow graph of an 8–point DIF – FFT algorithm and explain. (8)

Or

(b) (i) Given $x(n) = n+1$, and $N = 8$, find $X(K)$ using DIT, FFT algorithm. (8)

(ii) Use 4 – point inverse FFT for the DFT result $\{6, -2+j2, -2, -2-j2\}$ and determine the input sequence. (8)

14. (a) A low pass filter is to be designed with the following desired frequency response. $H_d(e^{j\omega}) = \begin{cases} e^{-j2\omega}, & \frac{-\pi}{4} \leq |\omega| \leq \frac{\pi}{4} \\ 0, & \frac{\pi}{4} < |\omega| \leq \pi \end{cases}$.

Determine the filter coefficients $h_d(n)$ if the window function is defined as $\omega(n) = \begin{cases} 1, & 0 \leq n \leq 4 \\ 0, & \text{otherwise} \end{cases}$. (16)

Or

(b) Determine $H(z)$ for a Butter worth filter satisfying the following constraints.

$$\sqrt{0.5} \leq |H(e^{jw})| \leq 1 \; ; \; 0 \leq w \leq \frac{\pi}{2}$$

$$|H(e^{jw})| \leq 0.2 \; ; \; \frac{3\pi}{4} \leq w \leq \pi$$

with $T = 1$ s. Apply impulse invariant transformation. (16)

15. (a) Draw the architecture of a DSP processor for implementing a DSP algorithm. Explain its features. (16)

Or

(b) (i) Name the different addressing modes of a DSP processor. Explain them with an example. (10)

(ii) Write a note on commercial DSP processor. (6)

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Question Paper Code : 27335

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

Fourth Semester

Civil Engineering

MA 6459 — NUMERICAL METHODS

(Common to Aeronautical Engineering, Electrical and Electronics Engineering, Instrumentation and Control Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Geoinformatics Engineering, Petrochemical Engineering, Production Engineering, Chemical and Electrochemical Engineering, Textile Chemistry and Textile Technology)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the criterion for the convergence of Newton-Raphson method?

2. Give two direct methods to solve a system of linear equations.

3. For cubic splines, what are the 4n conditions required to evaluate the unknowns.

4. Construct the divided difference table for the data $(0, 1), (1, 4), (3, 40)$ and $(4, 85)$.

5. Apply two point Gaussian quadrature formula to evaluate $\int_0^2 e^{-x^2} dx$.

6. Under what condition Simpson's $\frac{3}{8}$ rule can be applied and state the formula.

7. Using Euler's method, find $y(0.1)$ given that $\frac{dy}{dx} = x + y$, $y(0) = 1$.

8. State Adam's Predictor–Corrector formulae.

9. What is the central difference approximation for y''?

10. Write down the difference scheme for solving the equation $y_{tt} = \alpha^2 y_{xx}$.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find the largest eigenvalue and the corresponding eigenvector of a matrix $\begin{pmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$. (8)

(ii) Using Gauss Jordan method find the inverse of a matrix $\begin{pmatrix} 4 & 1 & 2 \\ 2 & 3 & -1 \\ 1 & -2 & 2 \end{pmatrix}$. (8)

Or

(b) (i) Apply Gauss-Seidal method to solve the equations (8)

$$28x + 4y - z = 32$$
$$x + 3y + 10z = 24$$
$$2x + 17y + 4z = 35.$$

(ii) Find the root of $4x - e^x = 0$ that lies between 2 and 3 by Newton-Raphson method. (8)

12. (a) (i) Using Lagrange's interpolation formula calculate the profit in the year 2000 from the following data : (8)

Year:	1997	1999	2001	2002
Profit in lakhs of Rs. :	43	65	159	248

(ii) Using Newton's forward interpolation formula, find the cubic polynomial which takes the following values : (8)

x:	0	1	2	3
y:	1	2	1	10

Or

(b) The following values of x and y are given: (16)

x:	1	2	3	4
y:	1	2	5	11

Find the cubic splines and evaluate $y(1.5)$.

13. (a) (i) Using Trapezoidal rule evaluate $\int_0^1 \int_0^1 \frac{dxdy}{x+y+1}$ with $h = 0.5$ along x - direction and $k = 0.25$ along y - direction. (8)

(ii) Find $f'(10)$ from the following data : (8)

x:	3	5	11	27	34
y:	−13	23	899	17315	35606

Or

(b) Use Romberg's method to evaluate $\int_0^1 \frac{dx}{1+x^2}$ correct to 4 decimal places. Also compute the same integral using three point Gaussian quadrature formula. Comment on the obtained values by comparing with the exact values of the integral which is equal to $\frac{\pi}{4}$. (16)

14. (a) Determine the value of $y(0.4)$ using Milne's method given $y' = xy + y^2$, $y(0) = 1$. Use Taylor's series method to get the values of $y(0.1)$, $y(0.2)$ and $y(0.3)$. (16)

Or

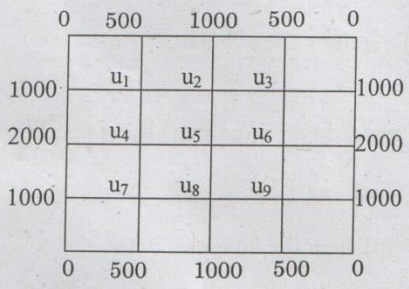
(b) Find $y(0.1)$, $y(0.2)$ and $y(0.3)$ from $y' = x + y^2$, $y(0) = 1$ by using Runge-Kutta method of Fourth order and then find $y(0.4)$ by Adam's method. (16)

15. (a) (i) Solve $y'' = x + y$ with the boundary conditions $y(0) = y(1) = 0$. (6)

(ii) Solve the equation $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$ subject to the conditions $u(x, 0) = \sin \pi x$, $0 < x < 1$ $u(0, t) = u(1, t) = 0$ using Bender Schemidt method. (10)

Or

(b) Solve the elliptic equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown. (16)



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

Question Paper Code : 27214

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

Fourth Semester

Electrical and Electronics Engineering

EE 6401 — ELECTRICAL MACHINES — I

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Stacking factor.
2. What are quasi static fields?
3. Why transformer rating is in KVA?
4. What happen when a DC supply is applied to a Transformer?
5. What are the requirements of Excitation system?
6. What do you meant by SPP? What is its significant?
7. Why fractional Pitched Winding is required than full pitched winding?
8. Define Winding factor?
9. State Fleming's Left hand rule?
10. Why DC Series motor is called as Variable speed motor?

PART B — (5 × 16 = 80 marks)

11. (a) Explain clearly the statically and dynamically induced EMF. (16)

Or

(b) (i) Derive an expression for an energy density in a magnetic circuits. (6)

(ii) Explain in detail "Eddy current loss". (4)

(iii) The total core loss of a specimen of Silicon Steel is found to be 1500W at 50HZ keeping the flux density constant the loss become 3000W when the frequency is raised to 75HZ. Calculate separately the hysteresis and eddy current losses for each of these frequencies. (6)

12. (a) (i) Derive the expression for saving of copper in autotransformer. (6)

(ii) Calculate the efficiency for half, full load of a 100 KVA transformer for the P.F of unity and 0.8 the copper loss at full load is 1000 W and iron loss is 1000 W. (10)

Or

(b) The primary of the transformer is rated at 10 A and 1000 V. The open circuit reading are V_1 = 1000V, V_2 = 500V, I = 0.42A, Pac = 100W. The short circuit readings are I_1 – 10A, V_1 – 125V and Pac = 400 W. Draw the equivalent circuit for the Transformer. Predict the output voltage for the load impedance ZL = 19 + j12 ohms and draw the phasor diagram.(16)

13. (a) Two windings, one mounted in stator and other at rotor have self and mutual inductance of $L_{11} = 4.5$ and $L_{22} = 2.5$, $L_{12} = 2.8\cos\theta$ H, where θ is the angle between axes of winding. Winding 2 is short circuited and current in winding as a function of time is $i_1 = 10\sin\omega t$A

(i) Determine the expression for numerical value in Newton-meter for the instantaneous value of torque in terms of θ. (8)

(ii) Compute the time average torque in Newton-meter when $\theta = 45°$. (4)

(iii) If the rotor is allowed to move, will it continuously rotate or it will come to rest? If later at which value of θ_0. (4)

Or

(b) (i) In an electromagnetic relay, functional relation between the current i in the excitation coil, the position of armature is x and the flux linkage ψ is given by $i = 2\psi^3 + 3\psi\left(1 - x + x^2\right)$, $x > 0.5$. Find force on the armature as a function of ψ. (8)

(ii) Show that the torque developed in a doubly excited magnetic system is equal to the rate of increase of field energy with respect to displacement at constant current. (8)

14. (a) (i) Explain the armature reaction and Commutation in detail for a Dc machine. (10)

(ii) Two Shunt generators are connected in parallel to supply a load of 5000 A each machine has a armature resistance of 0.03 Ω and field resistance of 60 Ω. EMF on one machine is 600V and in other machine is 640V.What power does each machine supply? (6)

Or

(b) (i) Draw and explain the load characteristics of DC Compound generators in detail. (8)

(ii) A long Shunt Compound generator has a shunt field winding of 1,000 turns per pole and series field winding of 4 turns per pole and a resistance of 0.05Ω. In order to obtain the speed voltage both at load and full load for operating as shunt generator. It is necessary to increase the field current by 0.2A.The full load armature current of the compound generator is 80A. Ca1culate the diverter resistance connected in parallel of series field to obtain flat compound operation? (8)

15. (a) Why starters are necessary? Explain in detail the construction and working operation of 4 point starter. (16)

Or

(b) (i) Explain in detail the construction and working operation of Retardation test on DC Motor. (10)

(ii) Derive in detail the condition for maximum efficiency of DC Machine. (6)

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

Question Paper Code : 27170

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

Fourth Semester

Electrical and Electronic 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. Differentiate a Constant Pointer and a Pointer to a Constant with an example.
2. Illustrate the usage of this pointer in C++.
3. When do you call an Object destructor?
4. What is a pure virtual function?
5. What is an Iterator? List out the characteristics of an Iterator.
6. What do you mean by the term 'Generic Programming'?
7. Define the keyword 'static' in java.
8. Write the output produced by the following Code Fragments.

   System.out.printin ("Result : "+ 40 + 30);

   System.out.printin ("Result : "+(40 + 30));
9. Differentiate Checked and Unchecked exceptions.
10. How do you compare two strings by ignoring the case? Give an example.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Write a C++ program to implement a Binary Search Procedure to find whether the given element is present in the array or not using Objects and Classes. (6)

(ii) Write short notes on casting primitive data types to Object type and vice versa with an example for each. (6)

(iii) What is a namespace? How do you resolve the name conflicts using namespaces? Explain with an example. (4)

Or

(b) (i) Write a C++ program to find maximum of two numbers using inline functions. (4)

(ii) Write a C++ program to find the area of the square, rectangle, circle using function overloading. (8)

(iii) Briefly describe on the objected oriented features supported by C++. (4)

12. (a) Develop a class Polynomial whose internal representation is a term consisting of a coefficient and an exponent. Develop a complete class containing proper constructor and destructor functions as well as set and get functions. Overload the addition and subtraction operator to add and subtract two polynomials and display the results. Overload the assignment operator to assign one polynomial to another using friend function. (16)

Or

(b) (i) Develop an abstract Class Polygon from which **Triangle** and Rectangle are derived. Each Polygon should contain the function Area( ) to calculate the area of them. Invoke appropriate Area( ) function to calculate the area using pointer to base class and pointers to derived classes. (12)

(ii) Create a 'Vector' named Student to add the names of the students in a class. Also display the contents of the vector after adding necessary elements. (4)

13. (a) (i) Implement a Dictionary named "Index" which consists of *Key Terms* and its *Descriptions* using MAP STL. Try to display all the terms and descriptions present in the dictionary and if a key term has been provided as an input, the corresponding description should get displayed as an output to the user by searching the entire dictionary. (8)

(ii) Implement a Circular Queue with proper insertion and deletion operations using Class Templates. (8)

Or

(b) (i) Write a C++ program to accept integer or string values from the user within a specified range. (Range has to be specified with minimum and maximum by the user). If the input violates the range, appropriate exception needs to be raised. (6)

(ii) Write a C++ program to sort a list of integers, floating point numbers and Characters by Quick Sort mechanism using function templates. (6)

(iii) Write short notes on the storage structures available with Standard Template Libraries. (4)

14. (a) (i) What are Packages? How are they created and used? Illustrate it with an example. (8)

(ii) How do you implement multiple inheritance in Java? Explain. (4)

(iii) Why java has been called as "Write Once and Run Anywhere"? Explain. (4)

Or

(b) Write a Java application to implement Mark Processing system for a University consisting of various disciplines such as Engineering, Science and Arts. Grade calculation for the students differs across the disciplines.

(i) Grade calculation for Undergraduate Engineering students requires the involvement of technical events apart from the marks obtained in their subjects and Post graduate Engineering students require research project as an additional component.

(ii) For Post graduate Science students, involvement of paper presentation is required whereas assignment weightage is mandatory for Post graduate Arts students.

(iii) Grades for Research scholars would be computed based on the number of research articles published and number of research projects done. Try to implement the above system polymorphically. (16)

15. (a) (i) Create an application that executes two threads. First thread displays the alphabets A to Z at every one second. The second thread will display the alphabets Z to A at every two seconds. Both the threads need to synchronize with each other for printing alphabets. The Second thread has to wait until the first thread finishes its execution. The application waits for all the threads to finish the execution. (10)

(ii) What is an interface? How do you achieve multiple inheritance through interfaces? Explain with an example. (6)

Or

(b) (i) Write a Java program to accept a string from user and check whether it is a file or directory. If it is a directory, count the number of files in that directory. If it is a file, count the number of consonants and display the contents of the file in a reverse order. (6)

(ii) Write a Java program that enters an 8-digit string for a birthdate. The first two digits in the string are the month of birth, the next two are the day and the remaining four are the year. The Java program should squeeze out these substrings and calculate the current age (**Hint**: Approximately print the difference in years). Raise a **NegativeAgeException** if the calculated age is negative. (10)

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

Question Paper Code : 27215

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

Fourth Semester

Electrical and Electronics Engineering

EE 6402 — TRANSMISSION AND DISTRIBUTION

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why is power transmitted at high voltage?
2. What is meant by feeder?
3. Distinguish between self and mutual GMD.
4. Mention the advantages of transposition of conductors
5. Define transmission efficiency.
6. Write the formula for finding surge impedance of transmission line.
7. A single core cable, 1.7 km long, has a conductor radius of 13mm and an insulation thickness of 5.8mm. The dielectric has a relative permittivity of 2.8. Find the capacitance per meter length of cable.
8. Define string efficiency.
9. What is meant by tower spotting?
10. What is meant by sag template?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive suitable expressions, draw current loading diagram and voltage drop diagram for uniformly loaded distributor of length 'f' fed at one end. How is power loss in the whole distributor computed? (8)

(ii) A uniform two wire DC distributor 250m long is loaded with 0.4 A/m and is fed at one end. If the maximum permissible voltage drop is not to exceed 10V, find the cross sectional area of the distributor conductor. Take $\rho = 1.78 \times 10^{-8}$ Ω m. (8)

Or

(b) (i) Consider a distributor loaded with uniform loading of i ampere per meter run and are fed from two end feeding points at different voltages. Find the point of minimum potential occurrence in the distributor. (8)

(ii) A 800m long, two wire DC distributor fed from both ends, is loaded uniformly at the rate of 1.2 A/m run. If the resistance of the distributor is 0.1 Ω/km (go and return) and feed points are maintained at 245V and 240V respectively, calculate the minimum voltage, its point of occurrence and current supplied from two feeding points. (8)

12. (a) Derive an expression for loop inductance of a single phase transmission system. (16)

Or

(b) Derive from first principles the capacitance per km to neutral of a three phase overhead transmission line with unsymmetrical spacing of conductors assuming transposition. (16)

13. (a) Draw the nominal T circuit of a medium length transmission line and derive expressions for sending end voltage and current. Also draw the respective phasor diagram. (16)

Or

(b) Show that the real power transferred is dependent on the power angle and the reactive power transferred is dependent on the voltage drop in the line. (16)

14. (a) (i) Explain the role of static shielding in insulators. (6)

(ii) A string of eight suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If the capacitance of the top unit is 10 times the capacitance to ground of each unit, determine the capacitance of the remaining seven units. (10)

Or

(b) (i) Explain any four insulating materials used in manufacturing of cables. (6)

(ii) Find the economic size of a single core cable working on a 132 kV three phase system, if a dielectric stress of 60 kV/cm can be allowed. (10)

15. (a) Assuming that the shape of an overhead line can be approximated by a parabola, deduce expressions for calculating sag and conductor length. How can the effect of wind and ice loadings be taken into account? (16)

Or

(b) Describe any four methods of power system grounding. (16)

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Question Paper Code : 27216

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

Fourth Semester

Electrical and Electronics Engineering

EE 6403 — DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

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

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Given a continuous signal $x(t) = 2\cos 300\pi t$. What is the nyquist rate and fundamental frequency of the signal.
2. Determine $x(n) = u(n)$ is a power signal or an energy signal
3. What is ROC of Z transform? State its properties.
4. State initial and final value theorem of Z transform.
5. Calculate the percentage saving in calculation in a 256 point radix-2 FFT when Compared to direct FFT.
6. State circular frequency shift property of DFT.
7. Define pre-wraping effect? Why it is employed?
8. The impulse response of analog filter is given in figure 1. Let $h(n)=h_a(nT)$ where T=1. Determine the system function

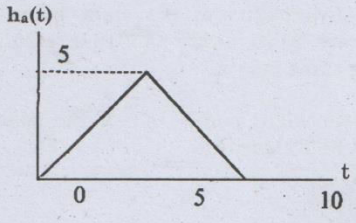

Fig. 1

9. What is the advantage of Harvard Architecture in a DS Processor?

10. How is a DS Processor applicable for motor control applications?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Check the causality and stability of the systems $y(n) = x(-n) + x(n-2) + x(2n-1)$. (8)

(ii) Check the system for linearity and time variance $y(n) = (n-1)x(n) + C$. (8)

Or

(b) (i) What is meant by energy and power signal? Determine whether the following signal are energy or power or neither energy nor power signals.

(1) $x_1(n) = \left(\frac{1}{2}\right)^n u(n)$. (4)

(2) $x_2(n) = \sin\left(\frac{\pi}{6}n\right)$. (4)

(ii) State and prove the Sampling theorem (8)

12. (a) (i) Find the Z transform and ROC of $x(n) = r^n con(n\theta)u(n)$. (8)

(ii) Find the inverse Z transform of $X(z) = \frac{z}{3z2-4z+1}$ ROC$|Z| > 1$. (8)

Or

(b) Using z-transform determine the response y(n) for $n \geq 0$ if $y(n) = \left(\frac{1}{2}\right)y(n-1) + x(n), x(n) = \left(\frac{1}{3}\right)^n u(n)y(-1)$. (16)

13. (a) (i) The first five points of the eight point DFT of a real valued sequence are (0.25, 0,125-j0.3018,0,0.125-j0.0518. Determine the remaining three points (4)

(ii) Compute the eight point DFT of the sequence x={0,1,2,3,4,5,6,7} using DIF FFT algorithm (12)

Or

(b) (i) Find the inverse DFT of
$X(K) = \{7, -\sqrt{2} - j\sqrt{2}, -j, \sqrt{2} - j\sqrt{2}, 1, \sqrt{2} + j\sqrt{2}, j, -\sqrt{2} + j\sqrt{2}\}$. (12)

(ii) Using FFT algorithm compute the DFT of $x(n) = \{2,2,2,2\}$ (4)

14. (a) Design a Butterworth filter using the Impulse invariance method for the following specifications. (16)

$0.8 \le |H(e^{jw})| \le 1 \qquad 0 \le \omega \le 0.2\pi$

$|H(e^{jw})| \le 0.2 \qquad 0.6\pi \le \omega \le \pi$

Or

(b) Design a filter with desired frequency response.

$Hd(e^{jw}) = e^{-j3w} \quad for \quad \frac{-3\pi}{4} \le \omega \le \frac{3\pi}{4}$

$= 0 \qquad for \quad \frac{3\pi}{4} \le |\omega| \le \pi$

Using a Hanning window for N=7. (16)

15. (a) Explain the various addressing modes of a commercial DSP processor. (16)

Or

(b) With Suitable block diagram explain in detail about TMS320C54 DSP Processor and of its memory architecture. (8+8)

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Question Paper Code : 27217

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

Fourth Semester

Electrical and Electronics Engineering

EE 6404 – MEASUREMENTS AND INSTRUMENTATION

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define resolution and precision.
2. What is meant by calibration of an instrument?
3. Define creeping in energy meter.
4. State any two applications of CT and of PT.
5. List the various detectors used for AC bridges.
6. What is called a volt-ratio box?
7. What is the principal of operation of an ink-jet printer?
8. What are the functions of data logger?
9. What is a transducer? Give an example.
10. What is meant by resolution for Analog Digital Convener?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the functional elements of an instrument with a neat block diagram. (10)

(ii) In a test, temperature is measured 100 times with variations in apparatus and procedures. After applying the corrections, the results are :

Temp°C	397	398	399	400	401	402	403	404	405
Frequency of occurrence	1	3	12	23	37	16	4	2	2

Calculate.

(1) Arithmetic mean

(2) Mean deviation

(3) Standard deviation. (6)

Or

(b) (i) Explain the static characteristics of an instrument. (10)

(ii) Explain in detail systematic error. (6)

12. (a) With circuit and phasor diagram, explain the working of single phase ac energy meter.

Or

(b) Write a short notes on :

(i) Current Transformer (8)

(ii) Weston frequency meter (8)

13. (a) Draw the diagram of Co-ordinate type A.C. potentiometer and explain its working principle.

Or

(b) Explain about

(i) Electrostatic and electromagnetic interference.

(ii) Need for Grounding for measuring instruments.

14. (a) With neat diagram, explain the basic components and working principle of magnetic tape recorders.

Or

(b) With neat figure explain the working principle of a digital CRO. What are its advantages over analog CRO?

15. (a) Explain in detail about construction and working of LVDT.

Or

(b) Explain successive approximation type ADC with its characteristics.

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K.L.N.College of Engineering

Department of Electrical and Electronics Engineering.

Placement Activity – Reminder

1. In the month of October every first year students must fill forms online in TATA CONSULTANCY SERVICES (TCS) campus recruitment using **nextsteptcs.com** website and must submit the following documents in the department.
    a. SSLC and HSC mark sheet photo copy at least 5.
    b. Latest passport size Photo at least 5.
    c. Current address proof with parent contact cell numbers.
    d. Create your own two E-mail id using Gmail.
    e. Resume with Scanned copy of passport size Photo.
    f. CT number registered in the TCS website.
2. Every semester end update CGPA in your resume and TCS profile.
3. An Engineering student from Electrical and Electronics Engineering should complete the following courses in order to enhance their software skills. This will be most helpful during their successful completion in Curriculum during 4th Semester and in the software company campus recruitment.
    a. Should complete **C Programming** before joining **2nd Semester**.
    b. Should complete **C++ Programming** before joining **3rd Semester**.
    c. Should complete **JAVA Programming** before joining **4th Semester**. (for the successful completion of object oriented Programming theory paper and laboratory during 4th Semester)
4. An Engineering student from Electrical and Electronics Engineering should complete the **Micro Processor, Micro Controller and Embedded Systems** courses before joining **5th Semester** in order to enhance their Hardware skills. This will be most helpful during their successful completion in Curriculum from 5th to 6th Semester and in the Core company campus recruitment. (for the successful completion of Micro Processor and Micro Controller theory as well as laboratory during 5th Semester and Embedded Systems during 6th Semester)
5. From 6th Semester Summer vacation onwards all should prepare for GATE Examination because all Engineering students from Electrical and Electronics

Engineering should appear GATE Examination in order to settle in their life by pursuing higher education in the reputed colleges like IIT, NIT and Anna University or else to join as a Graduate Engineer trainee in a public sector companies like IOC, BHEL, PGCI etc.,

6. Before joining 7th Semester all should get any international certification programme course like OCJP, CCNA, etc., and upload the certification details in TCS campus commune website. This will be most helpful during the TCS campus and other MNC company recruitment.

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

K.L.N.College of Engineering

Department of Electrical and Electronics Engineering.

Reminders/Remember these for peaceful career.

I. General

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

10. Avoid two wheeler riding for long travelling, and night travelling. Wear helmet. Follow traffic rules. Lot of accidental deaths reported due to negligence of traffic rules. About 1.5lakhs of people lost their life in accidents in our country every year.
11. For any transaction of money, use cheques or bank accounts(for more than Rs. 10,000/-) because finding fake notes is difficult.
12. Always keep 10 passport and stamp size photographs, 10 no.s of revenue stamps, all ID proofs whenever going for banks/pass port office.
13. Keep at least email ids and good friendship of 25 students of your branch who have been placed in different companies. Collect background information on core/IT companies(minimum 25)
14. Develop good reading habit/read News papers daily/watch news channel daily/Watch films nominated for Oscar award.Watch channels like Discovery/Nat Geo/History/ any other news channels.(not more than an hour)
15. Speak in English only. Develop good writing skills by reading books.
16. Have a Desk top/Laptop, Printer before entering 5th semester.
17. Have internet facility in home for educational purpose.Keep all NPTEL material.
18. Keep all kind of stationary in your table for use at any time[pencil, sharpener, eraser, ball point pen of different colours, sketches, bell clip, stapler, single punch, tag, gum, knilfe,scissors,A4 paper, cello tap, emergency lamp, scale, protractor, compass, pen drive, CD, whitener, calculator, diary, stapler pin box]

II. Education:

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

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

22. Discrepancy in mark sheets such as Name, Date of Birth, CGPA awarded, register number should be corrected immediately.
23. Always keep Rs 5,000/- in a semester for the payment of Book fee/AU exam fee/Training fee/purchase of competitive exam books/Educational tour/seminar/additional course/ certification course etc. Educate your parents for the above. This may be required in a particular month or in several months spread in a semester.

24. Enroll in IEEE membership during first/second year. Attend at least one programme at Chennai.
25. Collect 5 sets of AU question papers, subject wise, in a semester(within 10 days)
26. Prepare good quality Resume. Consult TPO, placed final year students. Resume preparation is an art that ensures your quality and getting jobs in reputed concern. Update your resume, monthly (by attending value added courses, online courses, co-curricular and extracurricular activities, publishing articles in conferences, symposium, technical events, journals,News papers, inplant training, internship, new languages learnt, project developed, industrial visits, social services participated etc.)
27. Attend any courses after consulting with HOD/senior staff to avoid courses not suited to your branch.
28. Purchase text/reference books every semester.
29. Purchase competitive exam books , like Objective type QB,GATE/TANCET/IES/IAS and prepare for the exams from second year onwards.
30. Collect aptitude/reasoning/analytical/numerical/verbal/test questions from the placed students or download from the website. For successful placement, preparation from the first year in the above topics is required.
31. Collect information like Product, clients, branches, head office, annual turnover, GM,CEO, etc of 25 core companies, and 25 software companies.
32. Attend atleast one seminar/workshop/ paper presentation contest per semester, applicable to your branch of study.
33. Plan your study for current subject/assignment work/observation work/record work/aptitude training for technical /non-technical daily/weekly/monthly.
34. Decide & justify clearly, your objective before 6^{th} semester and plan accordingly. Options are placement(ON/OFF) in core/IT companies, higher studies/ civil services , parents business , start your own business. Confused mind never take a decision.
35. Attend inplant training(Min:one week,Max:One month) during semester holidays. Avoid industrial visit (Energy waste) and educational tour (Money waste).
36. Do mini project in second, third year of your study .Update these in final year.Project should be based on the need of the society/industry.

III. Health

37. Health is wealth. Read Dalailama statement on life of a man. We work hard , earn and save money sacrificing our health. Later we spent lot of money for medical treatment due to poor healthcare.
38. Have regular exercise either in the forenoon/evening. (an hour walk is must everyday).
39. Your food habits decides what you are and how long you will live with peace. Avoid junk foods/road side eatery. Use hot water for drinking.
40. Consult doctors in case of health problems. Periodical medical checkup, once in 6 months, is necessary for health and dental care. This may require Rs.2,000/- per year. Otherwise you need to pay a lot. It is advisable to stay in a house, within 500 metre (walk able distance) from a multispecialty hospital, otherwise 250 meters from any hospital. This is required to tackle emergency situations and also to avoid paying more for transport.
41. Avoid roaming/walking during summer/rainy season.
42. Attend yoga classes/ do meditation.
43. Apply group insurance medical policy at the age of 20.
44. Follow ethics and be Nationalistic.

Advanced Training Institute

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

GROUP – I
ELECTRICAL CONTROL & MAINTENANCE

Course Coordinator

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

Course Code	Course Title	Duration weeks	Date	
			From	To
01.01	Protective Relays, Circuit Breakers, & Switch Gear Protection	01	13.04.2015	17.04.2015
			18.05.2015	22.05.2015
			22.06.2015	26.06.2015
			27.07.2015	31.07.2015
			24.08.2015	28.08.2015
			21.09.2015	25.09.2015
			12.10.2015	16.10.2015
			07.12.2015	11.12.2015
			15.02.2016	19.02.2016
			21.03.2016	24.03.2016
01.02	Operation & Maintenance of Power Transformers	01	06.04.2015	10.04.2015
			11.05.2015	15.05.2015
			15.06.2015	19.06.2015
			20.07.2015	24.07.2015
			14.09.2015	18.09.2015
			30.11.2015	04.12.2015
			08.02.2016	12.02.2016
			07.03.2016	11.03.2016
			21.03.2016	24.03.2016
01.03	Trouble Shooting & Maintenance of Electric Motors	01	20.04.2015	24.04.2015
			08.06.2015	12.06.2015
			29.06.2015	03.07.2015
			03.08.2015	07.08.2015
			07.09.2015	11.09.2015
			23.11.2015	27.11.2015
			01.02.2016	05.02.2016
			29.02.2016	04.03.2016
01.04	Operation and Control of Industrial AC / DC Motors	01	25.05.2015	29.05.2015
			13.07.2015	17.07.2015
			17.08.2015	21.08.2015
			26.10.2015	30.10.2015
			18.01.2016	22.01.2016
			14.03.2016	18.03.2016
01.05	Electrical Safety at work place and first aid Practices	01	27.04.2015	01.05.2015
			01.06.2015	05.06.2015
			06.07.2015	10.07.2015
			10.08.2018	14.08.2015
			28.09.2015	01.10.2015
			14.12.2015	18.12.2015
			04.01.2016	08.01.2016
			22.02.2016	26.02.2016

GROUP – I
ELECTRONIC CONTROL & MAINTENANCE

Course Coordinator

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

Course Code	Course Title	Duration weeks	Date	
			From	To
02.01	Siemens S7 400 PLC & win CC SCADA / HMI – Programming (TIA portal)	02	13.04.2015	24.04.2015
			06.07.2015	17.07.2015
			14.09.2015	25.09.2015
			16.11.2015	27.11.2015
			01.02.2016	12.02.2016
02.00.2	PLC Siemens S7 400 Programming with step 7	01	15.06.2015	19.06.2015
			26.10.2015	30.10.2015
			04.01.2016	08.01.2016
			07.03.2016	11.03.2016
02.03	Maintenance & Servicing of SMPS and UPS	02	27.04.2015	08.05.2015
			20.07.2015	31.07.2015
			30.11.2015	11.12.2015
			15.02.2016	26.02.2016
02.04	Industrial Drives & Automation using Siemens PLC	02	15.06.2015	26.06.2015
			31.08.2015	11.09.2015
			18.01.2016	29.01.2016
02.05	Installation, Commissioning & Trouble Shooting of AC / DC Drives	01	18.05.2015	22.05.2015
			03.08.2015	07.08.2015
			18.01.2016	22.01.2016
02.06	PLC Siemens S7 400 Maintenance and Trouble Shooting	01	25.05.2015	29.05.2015
			10.08.2015	14.08.2015
			02.11.2015	06.11.2015
			21.03.2016	24.03.2016
02.07	Embedded System Programming & Applications (PIC 16F 877)	01	01.06.2015	05.06.2015
			24.08.2015	28.08.2015
			05.10.2015	09.10.2015
			14.12.2015	18.12.2015
02.08	Embedded Systems Programming & Applications (ARM 7 PLC 2378)	01	08.06.2015	12.06.2015
			28.12.2015	01.01.2016
02.09	Power Electronics and its Industrial Applications	02	20.07.2015	31.07.2015
			30.11.2015	11.12.2015

GROUP – I

PROCESS CONTROL INSTRUMENTATION

Course Coordinator

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

Course Code	Course Title	Duration weeks	Date	
			From	To
03.01	Agilent Veepro Graphical Programming for Industrial Instrumentation	01	13.04.2015	17.04.2015
			07.09.2015	11.09.2015
			23.11.2015	27.11.2015
03.02	Embedded System and its Application using P89C551rd2	01	20.04.2015	24.04.2015
			29.06.2015	03.07.2015
			05.10.2015	09.10.2015
			07.12.2015	11.12.2015
03.03	Industrial Automation using GE-GANUC PLC	01	18.05.2015	22.05.2015
			10.08.2015	14.08.2015
			28.12.2015	01.01.2016
			29.02.2016	04.03.2016
03.04	PLC Allen Bradley SLC 500 Programming & Applications	01	27.04.2015	01.05.2015
			13.07.2015	17.07.2015
			24.08.2015	28.08.2015
			26.10.2015	30.10.2015
			04.01.2016	08.01.2016
			15.02.2016	19.02.2016
03.05	Mixed Signal VLSI Design using PSOC	01	11.05.2015	15.05.2015
			07.09.2015	11.09.2015
			16.11.2015	20.11.2015
03.06	Configuration Networking & Troubleshooting of PLC	01	25.05.2015	29.05.2015
			17.08.2015	21.08.2015
			28.09.2015	01.10.2015
			18.01.2016	22.01.2016
			07.03.2016	11.03.2016
03.07	Testing and Calibration of Industrial Instruments (Pressure and Temperature)	01	01.06.2015	05.06.2015
			06.07.2015	10.07.2015
			07.09.2015	11.09.2015
			12.10.2015	16.10.2015
			30.11.2015	04.12.2015
			25.01.2016	29.01.2016
03.08	PLC & SCADA Based Industrial Automation using AB PLC	02	08.06.2015	19.06.2015
			14.09.2015	25.09.2015
			14.12.2015	24.12.2015
			01.02.2016	12.02.2016
03.09	Basic Industrial Instrumentation & Automation	02	06.04.2015	17.04.2015
			20.07.2015	31.07.2015
			02.11.2015	13.11.2015
			14.03.2016	24.03.2016

Tips for Effective Communication (KG)

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

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

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

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

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

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

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

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

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

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

Developing Leadership Skills

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

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

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

Ask yourself these questions:

1. Do I try to be aware of how others think and feel?

2.Do I try to help others perform to the best of their abilities?

3.Am I willing to accept responsibility?

4.Am I willing to try new ideas and new waysof 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?

Thenafter 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 peoplefor their openness--stress how much you value it--even if you don't like specifically what is being said.

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

•Set aside your authorityto 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 fromall 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 everyoneof the group's purposes from time to time. It's easy to become too narrowly focused and lose sight of the larger goals.

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

•Harmonize differencesand disagreements between group members by stressingcompromise and cooperation.

•Involve everyonein 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 membersas often as possible. The only way to get to know someone is through direct personal contact.

•Become familiar with every memberof 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 chanceto 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 thingsstarted? 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 andresources 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 ideaor 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.

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PART 01 - MATHEMATICS

(Common to all candidates)

(Answer ALL questions)

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

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

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

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

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

1. 0
2. –3
3. 3
4. 1

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

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

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

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

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

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

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

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

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

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

1. <2
2. $=2$
3. >2
4. anything

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

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

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

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

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

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

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

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

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

1. $m_1m_2=0$
2. $m_1m_2=-\pi$
3. $m_1m_2=\frac{-\pi}{2}$
4. $m_1m_2=-1$

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

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

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

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

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

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

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

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

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

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

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

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

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

19. For the following data :

x:	0	2	4	6
y:	−1	3	7	11

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

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

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

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

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

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

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

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

Then f (4) is

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

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

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

is

1. 2
2. –2
3. –1
4. 1

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

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

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

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

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

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

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

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

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

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

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

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

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

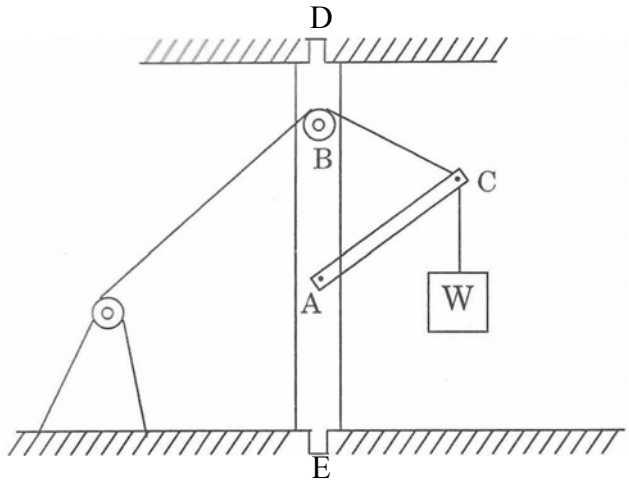
28. A discrete random variable X takes the values $a, ar, ar^2, \cdots, ar^{n-1}$ with equal probability. Then Arithmetic Mean (A.M) is

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

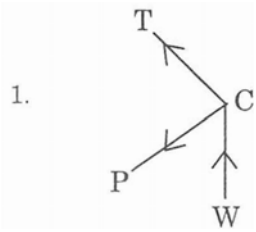
PART 02 — BASIC ENGINEERING AND SCIENCE

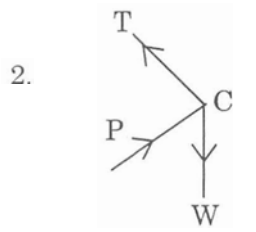
(Common to all candidates)

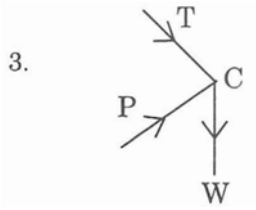
31. Free body diagram of point C of the Derrick shown below is

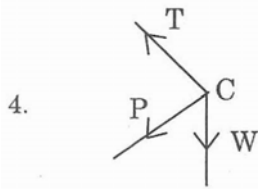


Derrick

1. 

2. 

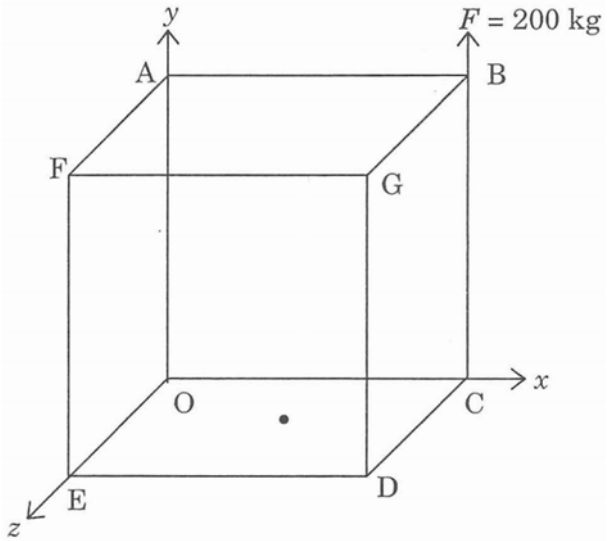
3. 

4. 

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

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

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



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

34. The motion of a particle is given by $a = 6v^{1/2}$ where a is in m/sec^2 and v is in m/sec, when $t = 0$, $v = 0$. Find the relation between v and t

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

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

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

36. The packing factor for y - iron is

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

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

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

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

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

39. Domain structure is exhibited by

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

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

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

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

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

42. Density index of a material is

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

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

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

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

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

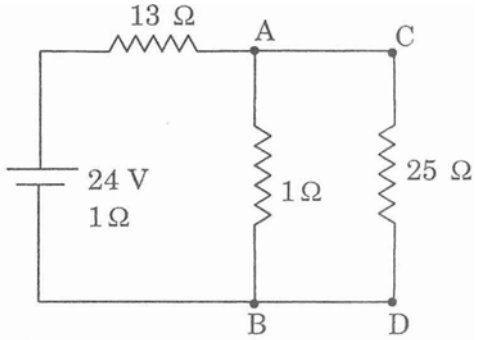
45. According to the United States Bureau of soil classification, the soil is designated as 'coarse clay' if the particle size varies from

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

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

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

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



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

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

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

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

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

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

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

51. The percentage of carbon in eutectoid steel is

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

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

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

53. Temporary metal forming process is

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

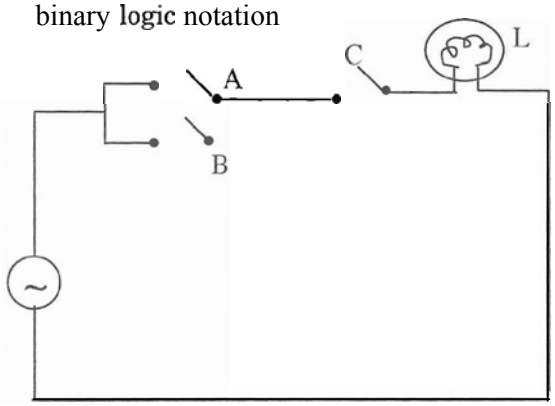
54. Under isobaric conditions, the Gibb's phase rule takes the form

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

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

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

56. Express the following switching circuit in binary logic notation



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

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

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

58. LAN stands for

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

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

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

60. Which of the following are the system directories in Unix?

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

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

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

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

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

63. The value of the determinant given below is

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

1. a^9
2. α^{13}
3. $2\alpha^2$
4. 0

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

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

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

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

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

1. 954 Ω
2. 549 Ω
3. 1094 Ω
4. 850 Ω

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

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

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

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

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

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

70. Current carriers in an electrolyte are

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

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

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

72. Boron trifluoride (BF_3) will act as

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

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

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

74. The element of highest electronegativity is

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

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

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

(Answer ALL questions)

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

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

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

2.

B – N – 1

4. $(B+N)-1$

78.

the current

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

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

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

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

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

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

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

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

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

83. D.C. motors are widely used in

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

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

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

85. An over-excited synchronous motor takes

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

86. In open loop the control action

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

87. A controller is essentially a

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

88. A signal flow graph is a

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

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

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

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

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

91. A Norton's equivalent is

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

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

1.
2. A
3. 5 A
4. less than 5 A

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

value of the resistor

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

94. In a network the number of tree branches

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

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95. For a voltage source

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

96. Kirchoffs voltage law states that the

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

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

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

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

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

99. Inverter gain is given by the ratio

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

100. A diode works on the principle of

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

101. The major application of chopper drive is in

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

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

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

103. Computer cannot do anything without a

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

104. The first computer made available for use was

1. Mark–I
2. ENIAC
3.
4. UNIVAC

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

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

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

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

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

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

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

(a) Circular potentiometer

LVDT

E-Pick off

Synchro

Select the correct answer using the codes given below :

1. and (d)
2. (a) and
3. and (d)
4. and

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

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

110. LVDT is a

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

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

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

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

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

113. The purpose of duplexer is

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

NG 27

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

1. rate of frequency variations
2. amount of frequency shift
3. total balance of transmission
4. distance of broadcast

115. The highest harmonic generated in human voice is

1 kHz
2.
3. 3kHz
4.

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

1. Infinite line
2. Open-circuited
3. Short-circuited
4. Very short line

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

1. turnstile antenna
2. dipole antenna
3. antenna
4. antenna

118. Generally the aircraft electrical system uses supply frequency of

1.
2. 60 Hz
3. 400 Hz
4. 115 Hz

119. In GPS Navigation, there can be integration between

1. GPS and INS
2. GPS and LORAN C
3. GPS and ILS
4. GPS and DME

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

1. sea level
2. any altitude
3. a particular altitude
4. all altitudes

ANNA UNIVERSITY : CHENNAI 600 025

OFFICE OF THE ADDITIONAL CONTROLLER OF EXAMINATIONS

(UNIVERSITY DEPARTMENTS)

GUIDELINES FOR AWARDING PUNISHMENTS TO MALPRACTICE CASES OF STUDENTS

Sl.No.	Nature of Malpractice	Maximum Punishment
1.	Appeal by the candidate in the answer script to show mercy by way of awarding more than deserving marks	I. - Fine of Rs.1000/- per subject.
2.	The candidate writing his/her name in the answer script.	
3.	The candidate writing his/her registration number/college name in places other than specified in the answer script.	
4.	Any special marking in the answer script by the candidate.	
5.	The candidate communicating with neighbouring candidate orally or non-verbally; the candidate causing suspicious movement of his/her body.	
6.	Irrelevant writing by the candidate in the answer script.	
7.	The candidate either possessing the question paper of another candidate or passing his question paper to another candidate with the question paper containing no additional writing on it.	
8.	The candidate possessing cell phones/programmable calculator(s)/any other electronic storage device(s) containing no incriminating materials.	II. - Fine of Rs.2000/- per subject.
9.	The candidate facilitating the other candidate(s) to copy from his/her answer script.	IIIA. – Invalidating the examination of the particular subject written by the candidate.
10.	The candidate possessing any incriminating material(s) (whether used or not). For example:- Written or printed materials, bits of papers containing written information, writings on scale, calculator, handkerchief, dress, part of the body, Hall Ticket, etc.	IIIA, IIIB or IIIC IIIA – If the quantum of the incriminating material is less than that could normally be printed in two lines of A5 size paper, then punishment is restricted to the subject concerned only. IIIB – If the quantum is equal to or more than that could normally be printed in two lines and less than that could normally be printed in the full page of the A5 size paper then the punishment is invalidating the examination of the subject concerned and further the candidate is not considered for any moderation and revaluation in the current semester for any subject (including arrear subjects) IIIC – When the quantum is equal to or more than that could normally be printed in full page of A5 size paper, then the punishment would be invalidating the examinations of the subject concerned and all the theory and the practical subjects of the current semester registered by the candidate. Further the candidate is not considered for revaluation of answer scripts of the arrear subjects. If the candidate has registered for the arrear subjects only, invalidating the examinations of all the arrear-subjects registered by the candidate. The punishment does not include project work and the subjects with 100% internal evaluation.
11.	The candidate possessing cell phone(s)/programmable calculator(s)/any other electronic storage device(s) and containing incriminating materials (whether used or not)	
12.	The candidate possessing the question paper of another candidate with additional writing on it.	
13.	The candidate passing his/her question paper to another candidate with additional writing on it.	
14.	The candidate passing incriminating materials brought into the examination hall in any medium (hard/soft) to other candidate(s).	
15.	The candidate copying from neighbouring candidate.	

Contd 2..

Sl.No.	Nature of Malpractice	Maximum Punishment
16.	Vulgar/offensive writings by the candidate in the answer script.	IV. – Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears subjects registered by the candidate.
17.	The candidate possessing the answer script of another candidate.	
18.	The candidate passing his/her answer script to another candidate.	
19.	Appeal by the candidate in the answer script coupled with a promise of any form of consideration.	
20.	The candidate misbehaving in the examination hall.	<u>Va. – For candidates who have not completed the programme:</u> The examinations of all the theory and the practical subjects of the current semester and all the arrear subjects registered by the candidate are invalidated. Further, the candidate is debarred from continuing his/her studies for one year i.e for two subsequent semesters. However, the student is permitted to appear for the examination in all the arrear subjects upto the last semester during the debarred period. <u>Vb. – For candidates who have completed the programme:</u> The examinations of all the arrear subjects registered by the candidate are invalidated. Further, the candidate is prevented from writing the examinations of the arrear subjects for the two subsequent semesters.
21	Involved in any one or more of the malpractices of serial no.10 to 19 for the second or subsequent times.	
22.	Cases of Impersonation.	<u>For both the impersonator and the bonafide student for whom the impersonation was done.</u> VI. – The examinations of all the subjects registered by the candidate are invalidated and further the student is debarred from continuing his/her studies and debarred from writing the examinations permanently. He/She is not eligible for any further admission to any programme of the University.

Additional Controller of Examinations
University Departments

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

STUDENTS LEAVE APPLICATION FORM

Department of Electrical and Electronics Engineering

Date:

Name of the Student :

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

No. of days, leave, already availed :

%of Attendance as on : _____ is _____

Date & Day :

Reason for Leave :

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

Recommended / Not Recommended

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

TO Date

The Principal

KLNCE

Pottapalayam

Sub: Requisition for Bonafide Certificate

****

Dear Sir,

Kindly issue Bonafide Certificate to me

Purpose :

Venue :

Name :

Father's Name :

Roll No. :

Department :

Year & Sem :

Thanking You,

Yours Sincerely

Date :

Station :

Recommended by :

Received :