Display of Department of CS& E Sample POs, PSOs & COs

Department of Computer Science & Engineering

PROGRAM OUTCOMES (PO's)

PO 1: Apply the knowledge of Mathematics, Science and Computer Engineering to identify, formulate and solve any engineering problems with varied complexity.

PO 2: Design and develop a system, component or process to meet the desired needs within the realistic constraints to solve the real-time problems for betterment of society.

PO 3: Design and conduct experiments as well as analyze and interprot data.

PO 4: Communicate and Present the information effectively.

PO 5: Use the techniques, skills and modern engineering tools necessary for engineering practice.

PO 6: Handle various technical, administrative and managerial responsibilities successfully in any organizations globally.

PO 7: Get Recognize as successful Entrepreneur globally.

PO 8: Demonstrate commitment in handling any responsibilities with professional, ethical and social importance.

PO 9:Engage in lifelong learning to upgrade their engineering skills consistently.

PO 10: Adapt to any working environment of heterogeneous and multidisciplinary teams with good sustainability and high performance.

PO 11: Clear successfully the competitive exams for placement, higher studies and government services.

PO 12: Understand and demonstrate the impact of engineering solutions in a global , economic , environmental and societal context.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: An ability to design and develop hardware and software in emerging technology environments like cloud computing embedded products and real-time systems. (Orientation towards Systems Programming)

PSO 2: Knowledge of data management system like data acquisition, big data so as to enable students in solving problems using the techniques of data analytics like pattern recognition and knowledge discovery. (Orientation towards Data Sciences)

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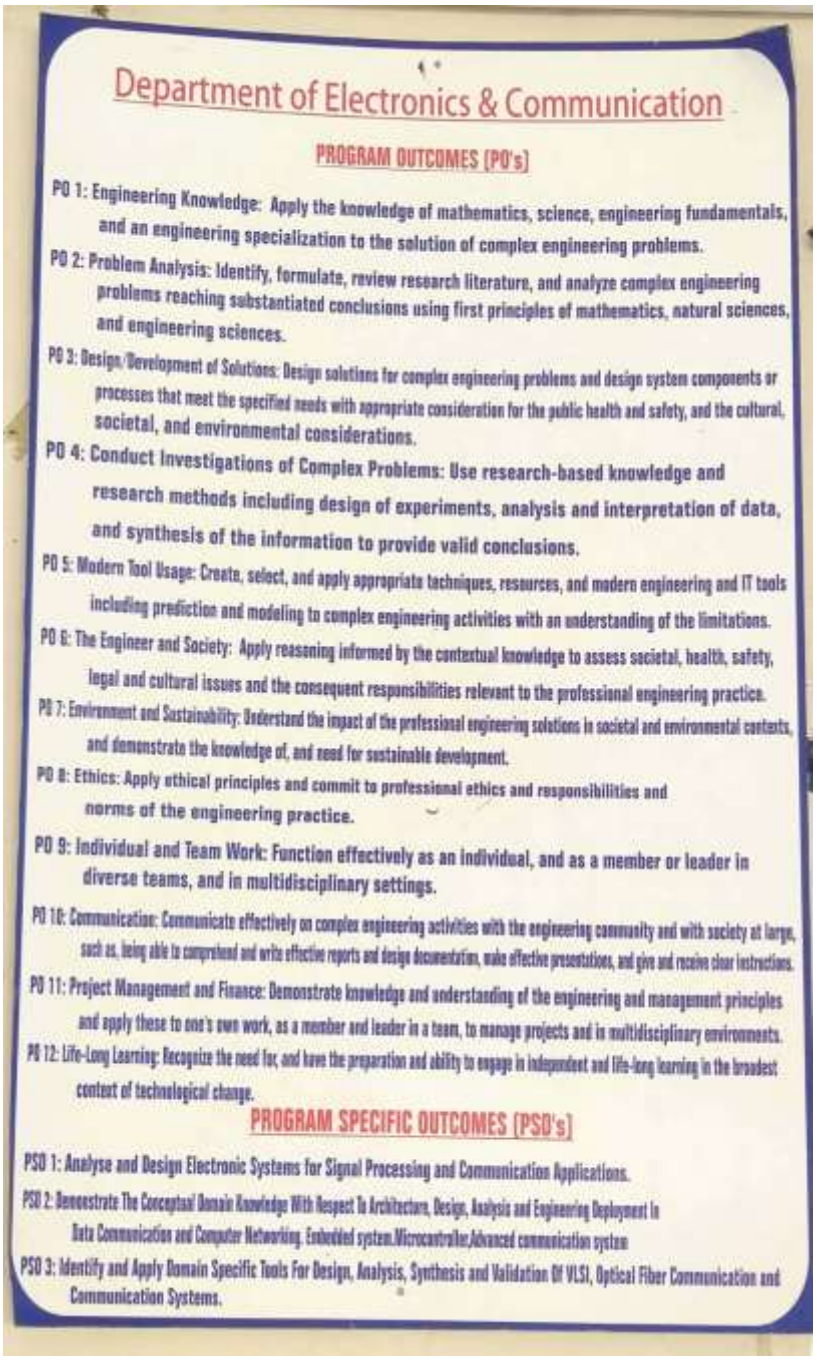
Display of Department of E& C Sample POs, PSOs & COs



Department of Electronics & Communication

PROGRAM OUTCOMES (PO's)

PO 1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: 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.

PO 3: 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.

PO 4: 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.

PO 5: 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.

PO 6: 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.

PO 7: 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.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: 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.

PO 11: 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.

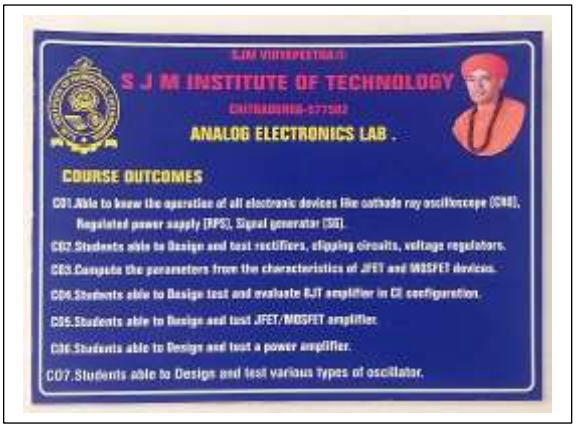
PO 12: Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: Analyse and Design Electronic Systems for Signal Processing and Communication Applications.

PSO 2: Demonstrate The Conceptual Domain Knowledge With Respect To Architecture, Design, Analysis and Engineering Deployment In Data Communication and Computer Networking, Embedded system,Microcontroller,Advanced communication system

PSO 3: Identify and Apply Domain Specific Tools For Design, Analysis, Synthesis and Validation Of VLSI, Optical Fiber Communication and Communication Systems.



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ANALOG ELECTRONICS LAB .

COURSE OUTCOMES

CO1.Able to know the operation of all electronic devices like cathode ray oscilloscope (CRO), Regulated power supply (RPS), Signal generator (SG).

CO2.Students able to Design and test rectifiers, clipping circuits, voltage regulators.

CO3.Compute the parameters from the characteristics of JFET and MOSFET devices.

CO4.Students able to Design test and evaluate BJT amplifier in CE configuration.

CO5.Students able to Design and test JFET/MOSFET amplifier.

CO6.Students able to Design and test a power amplifier.

CO7.Students able to Design and test various types of oscillator.

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Department of Electrical &Electronics

PROGRAM OUTCOMES (PO's)

Po 1:Engineering Knowledge: Apply Knowledge Of Differential Equations, Vector Calculus, Complex Variables, Matrix Theory, Probability Theory, Physics And Chemistry, Electrical And Electronic Engineering Fundamentals.

PO 2:Problem Analysis: Graduates will Identify, formulate and solve complex electrical and electronics engineering problems using the first principles of mathematics natural sciences and engineering science

PO 3:Design: Graduates will design Electrical and Electronics systems meeting the given specifications for different problems taking safety and precautions into consideration.

PO 4:Investigations: Graduates will Perform investigations, design and conduct experiments, analyze and interpret the results to provide valid conclusions.

PO 5:Tool Usage: Graduates will use modern software tools to model and analyze problems, apply appropriate techniques and IT tools for the design & analysis of the systems keeping in view their limitations.

PO 6:The Engineer and Society: Graduates will understand the impact of local and global issues / happenings and assess societal, health, legal and cultural issues with competency in professional engineering practice on Electrical Engineers.

PO 7: Environment and Sustainability: Graduates will Demonstrate professional skills and contextual reasoning and provide sustainable solutions for problems related to Electrical and Electronics Engineering and also will understand their impact on environment.

PO 8:Ethics: Graduates will have knowledge of professional ethics and code of conduct as applied to Electrical Engineers.

PO 9:Individual and Team work:Graduates will work effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.

PO 10:Communication: Graduates will communicate effectively in both verbal and written form among engineering community, being able to comprehend and write reports, presentation and give / receive clear instructions.

PO 11:Project Management and Finance:Graduates will plan, demonstrate and execute engineering & management principles in their own / team projects in multidisciplinary environment

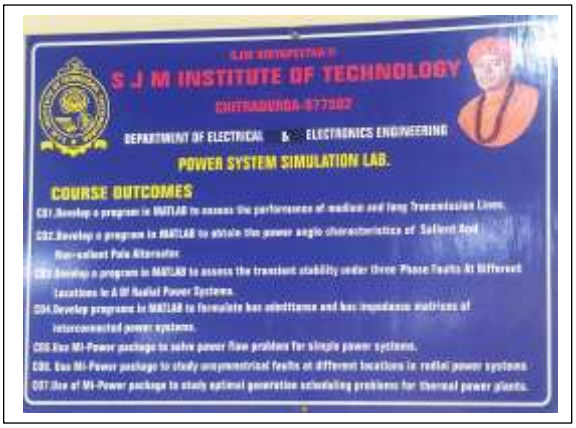
PO 12:Life-long learning: Graduates will have the ability for self- education, recognize the need for and have the ability to engage in independent and lifelong learning.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: Ability to specify architect, design and analyze systems that efficiency generate, transmit, distribute and utilize electrical power.

PSO 2: Ability to specify design, prototype and test modern electronic systems that perform analog and digital processing function.

PSO 3: Ability to use software for design, simulation and analysis of electrical system.



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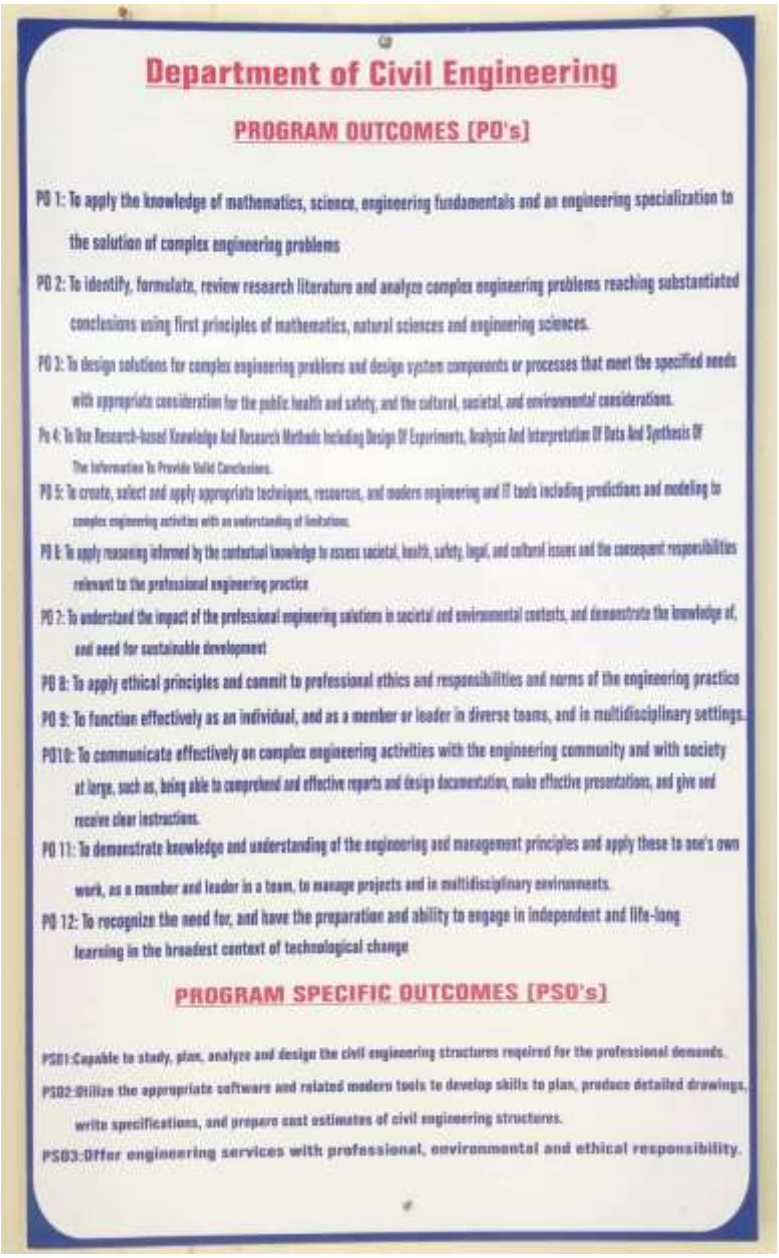
Display of Department of Civil Engineering Sample POs, PSOs & COs



Department of Civil Engineering

PROGRAM OUTCOMES (PO's)

PO 1: To apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems

PO 2: To identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO 3: To 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.

Po 4: To 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.

PO 5: To create, select and apply appropriate techniques, resources, and modern engineering and IT tools including predictions and modeling to complex engineering activities with an understanding of limitations.

PO 6: To 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

PO 7: To understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO 8: To apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

PO 9: To function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

PO 11: To 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.

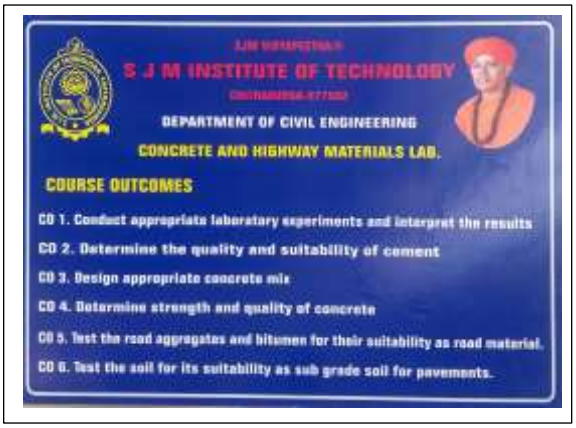
PO 12: To recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1:Capable to study, plan, analyze and design the civil engineering structures required for the professional demands.

PSO2:Utilize the appropriate software and related modern tools to develop skills to plan, produce detailed drawings, write specifications, and prepare cost estimates of civil engineering structures.

PSO3:Offer engineering services with professional, environmental and ethical responsibility.



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Department of Mechanical Engineering

PROGRAM OUTCOMES (PO's)

PO 1: Engineering Knowledge: Apply The Knowledge Of Mathematics, Science, Mechanical Engineering, Engineering Fundamentals, To The Solution Of Complex Engineering Problems.

PO 2: 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.

PO 3: 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, Societal, And Environmental Considerations.

PO 4: 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.

PO 5: Modern Tool Usage: Create, Select, And Apply Appropriate Techniques, Resources, Including Prediction And Modeling To Complex Engineering Activities With An Understanding Of The Limitations.

PO 6: The Engineer And Society: Apply Reasoning Informed By The Contextual Knowledge To Assess Societal, Health, Safety, Legal And Cultural Issues And T He Consequent Responsibilities Relevant To The Professional Engineering Practice.

PO 7: Environment And Sustainability: Understand The Impact Of The Professional Engineering Solutions In Societal And Environmental Contexts, And Demonstrate The Knowledge Of, And The Need For Sustainable Developments.

PO 8: ethics: apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual And Team Work: Function Effectively As An Individual, And As A Member Or Leader In Diverse Teams, And In Multidisciplinary Settings.

PO 10: 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.

PO 11: 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 Multi-disciplinary Environments.

PO 12: Life-long Learning: Recognize The Need For Identifying Contemporary Technical Challenges And Redefining To Develop Solutions To Satisfy Given Criteria In An Optimal Manner Using Creativity In Design.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: Apply Their Knowledge In The Domain Of Engineering Mechanics, Thermal And Fluid Sciences To Solve Engineering Problems Utilizing Advanced Technology.

PSO 2: Successfully Apply The Principles Of Design, Analysis And Implementation Of Mechanical Systems/processes Which Have Been Learned As A Part Of The Curriculum.

PSO 3: Develop And Implement New Ideas On Product Design And Development With The Help Of Modern Cad/cam Tools, While Ensuring Best Manufacturing Practices.

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Display of POs, PSOs & COs in Laboratory Manuals

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

SEMESTER-IV

SIMULATION OF OP-AMP CIRCUITS

LAB MANUAL

(As per CBCS scheme)

(21EEL484)

Prepared By

Prof.Sanjay Kumar.K

Prof.Sudha.T

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Department of Electrical &Electronics

PROGRAM OUTCOMES (PO's)

Po 1:Engineering Knowledge: Apply Knowledge Of Differential Equations, Vector Calculus, Complex Variables, Matrix Theory, Probability Theory, Physics And Chemistry, Electrical And Electronic Engineering Fundamentals.

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PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: Ability to specify architect, design and analyze systems that efficiency generate, transmit, distribute and utilize electrical power.

PSO 2: Ability to specify design, prototype and test modern electronic systems that perform analog and digital processing function.

PSO 3: Ability to use software for design, simulation and analysis of electrical system.

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COURSE OUTCOMES

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VTU curriculum syllabus sample copy providing COs

Analog Electronic Circuits and Op - Amps			
IPCC Course Code	**21EE32**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 12 Lab slots	Total Marks	100
Credits	04	Exam Hours	03

Course objectives:

- Provide the knowledge for the analysis of diode and transistor circuits.
- Develop skills to design the electronic circuits using transistors and Op-amps.
- To understand the concept and various types of converters.

Teaching-Learning Process (General Instructions)

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teachingmethods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinkingskills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the studentsto come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

MODULE-1

Diode Circuits: Diode characteristics, Diode clipping, and clamping circuits.

Transistor at Low Frequencies: Operating point, voltage divider bias circuit, stability factor, BJT transistormodelling- emitter follower, analysis using h – parameter model.

Teaching-Learning Process	Chalk and Board, Power Point Presentation, You Tube Videos.

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MODULE-2	
Multistage Amplifiers: Transistor Amplifiers, Cascade and cascode connections, Darlington circuits, analysisand design. **Feedback Amplifiers:** Feedback concept, different types, practical feedback circuits, analysis and design of feedback circuits.	
Teaching-Learning Process	Chalk and Board, Power Point Presentation, You Tube Videos.
MODULE-3	
Power Amplifiers: Classification, analysis and design of Class A – Directly Coupled and Transformer Coupled,Class B- Complementry Symmetry and Push Pull, Class C and Class AB. **FETs:** Construction, working and characteristics of JFETs and MOSFETs.	
Teaching-Learning Process	Chalk and Board, Power Point Presentation, You Tube Videos.
MODULE-4	
Op-Amp Applications: A.C. amplifier, summing, scaling & averaging amplifier, inverting and non-inverting configuration, Instrumentation amplifier. **Active Filters:** First & Second order high pass & low pass Butterworth filters. Band pass filters, all pass filters. **DC Voltage Regulators:** Voltage regulator basics, voltage follower regulator, adjustable output regulator, LM317 & LM337 Integrated circuits regulators.	
Teaching-Learning Process	Chalk and Board, Power Point Presentation, You Tube Videos.
MODULE 5	
OP –Amp Signal Generators: Integrator and Differentiator circuits, Triangular / rectangular wave generator, phase shift oscillator, saw tooth generator. OP –Amp Comparators and Converters: Basic comparator, zero crossing detector, inverting & non-inverting Schmitt trigger circuit, voltage to current converter with grounded load, current to voltage converter and basics of voltage to frequency and frequency to voltage converters.	
Teaching-Learning Process	Chalk and Board, Power Point Presentation, You Tube Videos.

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Sample Internal Test question Papers with COs

Department: **Electrical & Electronics Engg.**			Name of the Faculty : **MARUTHI NAIK RK**	
Course : **AEC &op-Amp**			Code :**21EE32**	
Semester : **3**	Test : 1^{St}	Date :12/12/2022	Time : **02:45 to 03:45PM**	Max. Marks : **40**
Note: ***Answer 1 or 2 And 3or 4***				

Q. No.		Questions	M	CL	CO	PO
1	a)	Define Clippers and Clampers? With neat sketches explain series negative clippers?	**6**	R/U	1	1-2
	b)	With neat sketches explain series positive clampers circuit?	**6**	R/U/AP	1	1-2
	c)	With neat sketches explain series positive clippers circuit?	**8**	R/U/AP	1	1-2
OR						
2	a)	Define operating point of Transistor? Explain BJT Transistor modelling.	**6**	R/UAP	1	1-2
	b)	What is biasing? Explain voltage divider bias circuit.	**6**	R/U/AP	1	1-2
	c)	Explain Emitter Follower circuit Analysis using its relevant Diagrams and waveforms.	**8**	R/U/AP	1	1-2
3.	a)	Explain stability factor (V_{BE}, I_{CEO}, β) of different biasing circuits.	**10**	AP/AN	1	1-2
	b)	**Explain Analysis of h –parameter model?**	**10**	**AP/AN**	**2**	1-2
OR						
4	a)	Explain operation of Inverting Summing, Scaling & Averaging Amplifier?	**10**	R/U	3	1-2
	b)	Explain Instrumentation Amplifier with Block diagram? Write parameters required?	**10**	AP/AN	2	1-2

Course outcomes:

- Obtain the output characteristics of clipper and clamper circuits.
- Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
- Explain the concept of feedback, its types and design of feedback circuits
- Design and analyse the power amplifier circuits and oscillators for different frequencies.
- Design and analysis of FET and MOSFET amplifiers.
- Demonstrate the application of Op-amps.

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Department: **Electrical & Electronics Engg.**			Name of the Faculty : **MARUTHI NAIK RK**	
Course : **AEC &OP-Amp**			Code :**21EE32**	
Semester : **3**	Test : 2nd	Date :05/01/2023	Time : **02:45 to 03:45 PM**	Max. Marks : **40**
Note: ***Answer 1 or 2 And 3or 4***				

Q. No.		Questions	M	CL	CO	PO
1	a)	Explain first order high pass Butterworth Filter with Circuit And equations Analysis?	**10**	R/U	1	1-2
	b)	Explain Second order high pass Butterworth Filter with Circuit And wave form Analysis?	**10**	R/U/AP	1	1- 2
2	a)	Explain operation LM317 regulator?	**10**	R/UAP	1	1-2
	b)	Explain operation LM337 regulator?	**10**	R/U/AP	1	1-2
AND						
3.	a)	Explain Basics of voltage regulators? With circuit discuss voltage follower regulator.	**10**	AP/AN	1	1-2
	b)	Explain adjustable output regulator with circuit and waveforms.	**10**	AP/AN	2	1-2
4	a)	Explain first order low pass Butterworth Filter with Circuit And equations Analysis?	**10**	R/U	3	1-3
	b)	Explain second order low pass Butterworth Filter with Circuit And wave form Analysis?	**10**	AP/AN	2	1-2

Course outcomes:• Obtain the output characteristics of clipper and clamper circuits.

- Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
- Explain the concept of feedback, its types and design of feedback circuits
- Design and analyse the power amplifier circuits and oscillators for different frequencies.
- Design and analysis of FET and MOSFET amplifiers. Demonstrate the application of Op-amps.

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Department: **Electrical & Electronics Engg.**			Name of the Faculty : **MARUTHI NAIK RK**	
Course : **AEC &OP-Amp**			Code : **21EE32**	
Semester : **3**	**Test : 3rd**	**Date :28/03/2023**	Time : **02:45 to 03:45 PM**	Max. Marks : **40**
Note: ***Answer 1 or 2 And 3 or 4***				

Q. No.		Questions	M	CL	CO	PO
1	a)	What is an integrator? Explain triangular/Rectangular Wave Generator With Circuit Diagram And Wave Forms.	**10**	R/U	1	1-2
	b)	With circuit Diagram Explain RC phase Shift oscillator & Write Advantages and Disadvantages of this circuit?	**10**	R/U/AP	1	1- 2
2	a)	Write a note on Barkhausen criteria for oscillators with black diagram of oscillator circuit?	**10**	R/UAP	1	1-2
	b)	Using 741 Op Amp With a supply of +_ 12v. Design RC- phase Shift Oscillator to have an output frequency of 3.5 kHz?	**10**	R/U/AP	1	1-2
AND						
3.	a)	Explain Zero crossing Detector of Inverting & Non inverting combination With circuit & waveforms?	**10**	AP/AN	1	1-2
	b)	Explain regenerative comparator (Schmitt Trigger) of Inverting & Non inverting combination.	**10**	AP/AN	2	1-2
4	a)	What is Voltage to Frequency converters explain with waveforms & circuit? And Write a note on current to voltage converter.	**10**	R/U	3	1-3
	b)	What is Frequency to Voltage converters explain with waveforms & circuit? And Write a note on voltage to current converter.	**10**	AP/AN	2	1-2

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Course outcomes:

- Obtain the output characteristics of clipper and clamper circuits.
- Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
- Explain the concept of feedback, its types and design of feedback circuits
- Design and analyse the power amplifier circuits and oscillators for different frequencies.
- Design and analysis of FET and MOSFET amplifiers.
- Demonstrate the application of Op-amps.

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Sample of COs written in Internal Test Answer Book

COURSE OUTCOME'S (COs)

CO1 obtain the output characteristics of clipper and clampers circuits.

CO2 Design and compare biasing circuits for transistor amplifiers and explain the transistor switching.

CO3 Explain the Concept of feedback, its types and design of feedback circuits.

CO4 Design and analyse the power amplifier ckts and oscillators for different frequencies.

CO5 Design and analysis of FET and MOSFET amplifiers.

CO6 Demonstrate the application of op-amps.

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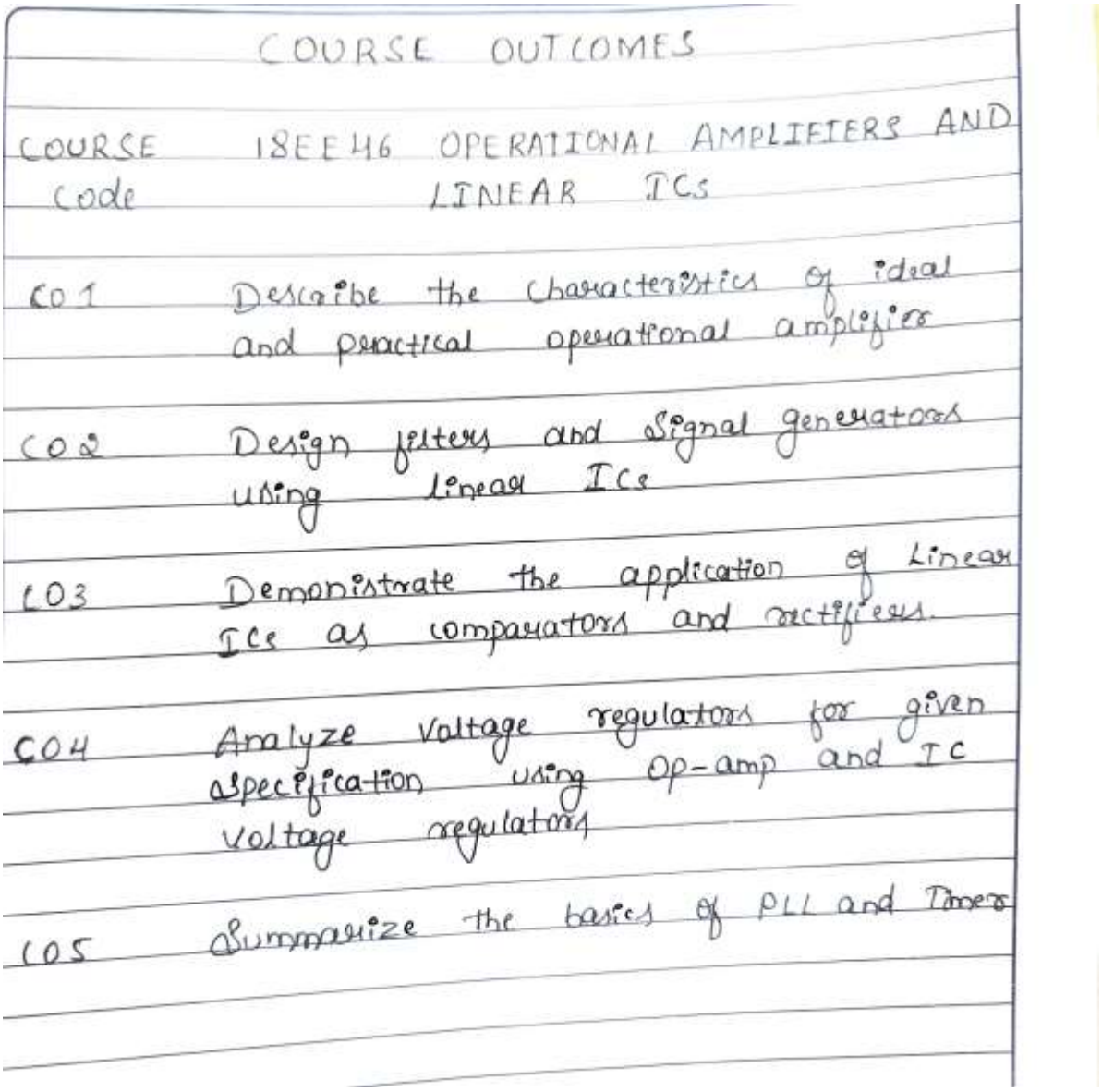
Sample of COs written in Laboratoty Record Book



COURSE OUTCOMES

COURSE Code	18EE46 OPERATIONAL AMPLIFIERS AND LINEAR ICs
CO 1	Describe the characteristics of ideal and practical operational amplifier
CO 2	Design filters and Signal generators using linear ICs
CO3	Demonistrate the application of Linear ICs as comparators and rectifiers.
CO4	Analyze voltage regulators for given specification using Op-amp and IC voltage regulators
CO5	Summarize the basics of PLL and Timers

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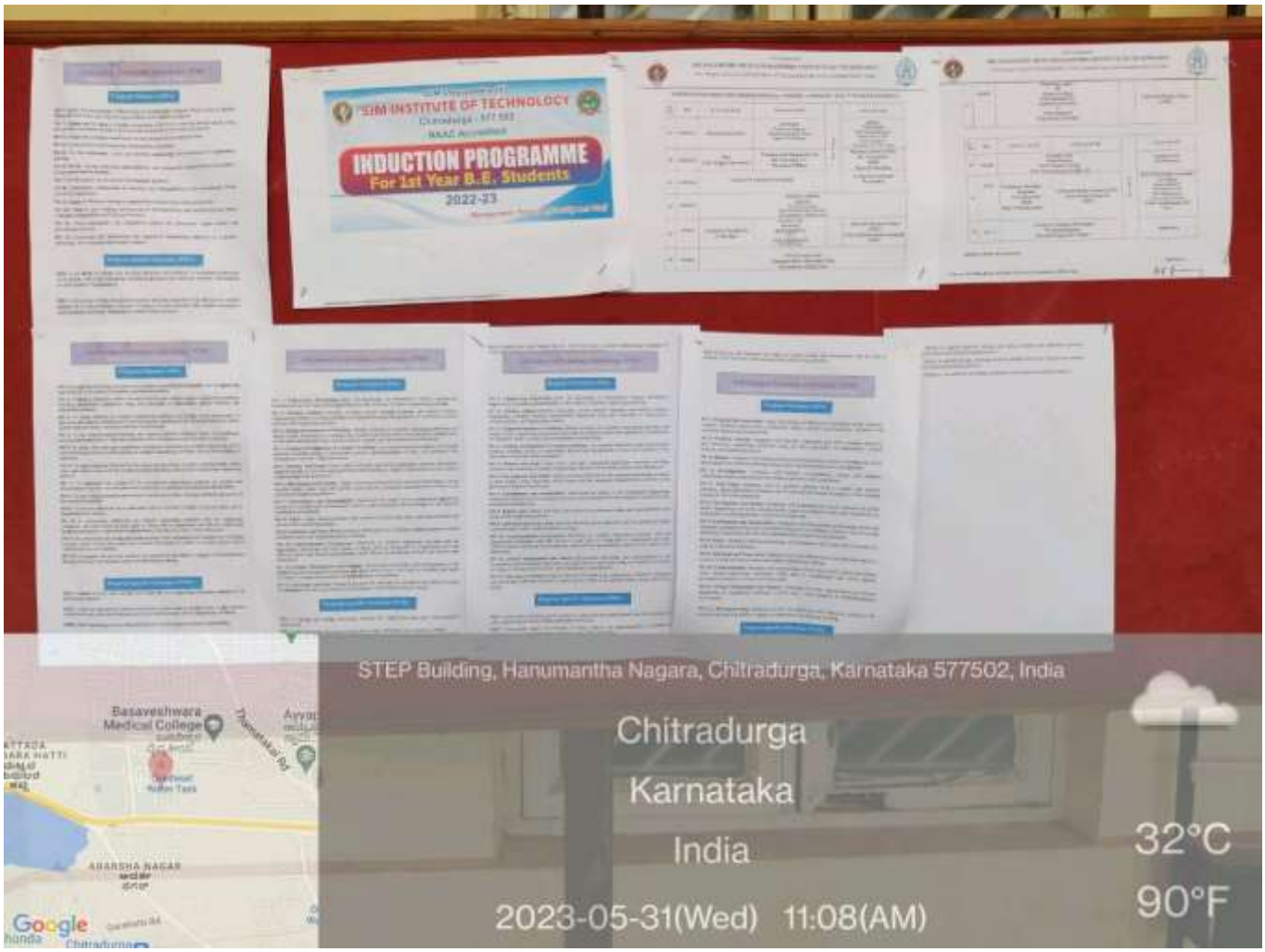
POs and PSOs displayed during INDUCTION Program (2022-23



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