



Shri Shamrao Patil (Yadavkar) Educational & Charitable Trust's
Sharad Institute of Technology College of Engineering
(An Autonomous Institute)

Yadav (Ichalkaranji)-416121, Dist. – Kolhapur

Department: Electronics & Computer Engineering

Rev: Course Structure/01/NEP/2023-24

Class: S.Y. B. Tech

Semester: III

Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
23EC2301	PCC	Analog Electronics	3	-	-	3	10	10	30	50	100	3
23EC2302	VSEC	Engineering Mathematics III	3	-	-	3	10	10	30	50	100	3
23EC2303	PCC	Data structure	3	-	-	3	10	10	30	50	100	3
23EC2304	PCC	Analog Electronics Laboratory	-	-	2	2	15	15	-	20	50	1
23EC2305	PCC	Data Structure Laboratory	-	-	2	2	15	15	-	20	50	1
23EC2306	PCC	Simulation Laboratory	-	-	2	2	15	15	-	20	50	1
23EC2307	EEM	Employability and Skill Development	2	-	-	2	25	25	-	-	50	2
23EC2308	VEC	Environmental Science	2	-	-	2	25	25	-	-	50	2
23EC2309	CEP	Mini Project – II	-	-	2	2	25	25	-	-	50	1
23ECMDXX	MDM	Multidisciplinary Minor	2	-	-	2	10	10	30	50	100	2
23OEEC21	OE*	Open Elective-I	2	-	-	2	10	10	30	50	100	2
23HSSM01	VEC	Aptitude Skills – I	1	-	-	1	25	25	-	-	50	1
23HSSM02	VEC	Language Skills – I	-	-	2	2	25	25	-	-	50	Audit
Total			18	-	10	28	220	220	150	310	900	22

Multidisciplinary Minor -I

Biomedical Engineering (Basket A)	Data Science (Basket B)	Industrial automation (Basket C)
Electrical & Electronics Measurement (23ECMDA1)	Python Programming for Data Science (23ECMDB1)	Electrical Machines and Instruments (23ECMDC1)

Note: (OE*) Open Elective-I Course will be offered to students of other programs and will not be offered to the students of the same program.




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Analog Electronics

23EC2301	PCC	Analog Electronics	3-0-0	3 Credits
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Teaching Scheme: Lecture: 3 hrs/week	Examination Scheme: CA-I:10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks
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Pre-Requisites: Basic Electronics

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the working of different JFET amplifier configurations.
CO2	Explain the operation of MOSJFET and its applications.
CO3	Build different types of voltage regulator
CO4	Analyze different feedback amplifier configurations.
CO5	Illustrate different oscillator circuits.
CO6	Make use of IC 555 in various multivibrator circuits and other applications

Course Contents:

Unit 1: JFET: Introduction, Types of JFET, Device structure, Operation of N Channel JFET, Parameters of JFET: Drain resistance, Pinch off voltage, trans conductance, amplification factor, FET input and output characteristics, FET amplifier configurations: CS, CD, and CG, Self-Biased CS amplifier and its DC analysis	[6]
Unit 2: MOSFET: Introduction, Device Structure, Basic Operation, Types of MOSFET, Construction of n-channel E-MOSFET and D-MOSFET, E-MOSFET characteristics, Non-ideal voltage current characteristics: Body effect, Sub-threshold conduction, breakdown effects and temperature effects. MOSFET as Inverter	[6]
Unit 3: Voltage Regulators: Introduction, Need of voltage regulator, Types, Analysis and Design of Zener Shunt voltage Regulator, Transistor series and Shunt Regulator, IC voltage regulator: Introduction, voltage regulator using IC's:78XX, 79XX, LM317, IC 723	[6]
Unit 4 Feedback Amplifiers:	[6]

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General Feedback Amplifier Structure, The closed loop gain of an amplifier, Properties of Negative Feedback, Basic Feedback topologies: Voltage Series, Voltage Shunt, Current Series, and Current Shunt negative feedback amplifiers, Classification of amplifiers, Effect of feedback on terminal characteristics of amplifiers, Analysis of Voltage series feedback amplifier	
Unit 5: Oscillators: Introduction, The concept of positive feedback in amplifier, Barkhausen criterion, Classification of oscillators, RC Oscillators: RC Phase Shift oscillator, Wein bridge oscillator, LC Oscillators: Hartley and Colpitts oscillators, Crystal oscillators, UJT Relaxation oscillator.	[6]
Unit 6: Multivibrators: Timmer IC 555: Introduction, internal circuitry, Pin diagram, Multivibrator: Introduction, Types of Multivibrators: Astable, Monostable and Bistable, Operation of Multivibrator circuits using IC555. Applications of IC555.	[6]
Text Books: <ol style="list-style-type: none">1. Millman Halkias, "Integrated Electronics-Analog and Digital Circuits and Systems", Tata McGraw Hill, 2000.2. Donald Neaman, "Electronic Circuit Analysis and Design", 3rd Edition, Tata McGraw Hill.	
Reference Books: <ol style="list-style-type: none">1. David A. Bell, "Electronic Devices and Circuits", 5th Edition, Oxford press2. R. L. Boylstad, L. Nashlesky, "Electronic Devices and circuits Theory", 9th Edition, Prentice Hall of India, 2006.3. Anil K. Maini and Varsha Agarwal "Electronic Devices and Circuits", Wiley India4. Phillip E. Allen, Douglas R. Holberg, "CMOS Analog Circuit Design", Second Edition, Oxford. K. R. Botkar, "Integrated Circuits", 5th Edition, Khanna Publication	




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Engineering Mathematics-III

23EC2302	VSEC	Engineering Mathematics-III	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Engineering Mathematics-I & II

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop the concept of Fourier series expansion of different periodic functions so as to use them in harmonic analysis.
CO2	Solve problems related to Fourier transform and inverse Fourier transform.
CO3	Solve finite difference equation using Z- transform
CO4	Apply the definition & properties of Laplace Transform to evaluate the integral & to find Laplace transform of elementary functions.
CO5	Apply the knowledge of Laplace transformation to find solution of linear differentiation equations with constant coefficient.
CO6	Apply numerical integration techniques whenever and wherever routine methods are not applicable, Apply various interpolation methods and finite difference concepts.




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Course Contents:

Unit 1: Fourier series Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions and half range series	[6]
Unit 2: Fourier Transforms Fourier Transforms, Fourier Sine and Cosine Transforms, Complex form of Fourier Integral, Finite Fourier Sine and Cosine Transform.	[6]
Unit 3: Z Transform Definition, properties of Z transform, Z Transform of basic sequences, Z transform of some standard discrete function, inverse Z transform, application to solve difference equation.	[6]
Unit 4: Laplace Transform Definition – conditions for existence, Transforms of elementary functions, Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, scale change property, transforms of functions multiplied by t^n , transforms of functions divided by t , transforms of derivatives; Evaluation of integrals by using Laplace transform.	[6]
Unit 5: Inverse Laplace Transform Introductory remarks, Inverse transforms of some elementary functions, General methods of finding inverse transforms, Partial fraction method and Convolution Theorem for finding inverse Laplace transforms, Applications to find the solutions of linear differential equations	[6]
Unit 6: Numerical Integration & Interpolation Numerical Integration: Trapezoidal rule, Simpson's $\frac{1^{rd}}$ rule, Simpson's $\frac{3^{th}}$ rule and Weddle's rule (without proof) Problems. Interpolation/extrapolation using Lagrange's formulae, Newton's forward and backward difference formulae, Newton's divided difference (All formulae without proof).	[6]
Text Books: 1. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics (Vol I & II), Pune Vidyarthi Griha Prakashan, Pune. 2. N. P. Bali, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.	




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Reference Books:

1. C. R. Wylie & L. C. Barrett, Advanced Engineering Mathematics, McGraw Hill Publishing Company Ltd.
2. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publications, New Delhi.
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.




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Data Structure

23EC2303	PCC	Data Structure	3-0-0	3 Credits
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Teaching scheme: Lecture: 3 hrs/week	Examination scheme: CA-I:10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks
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Pre-Requisites: - Basics of C programming.

Course Outcomes: At the end of the course, students will be able to:

CO1	Interpret the basics of data structure and its application.
CO2	Outline the concepts of array and records.
CO3	Demonstrate the concepts of Linked List and apply various operations on them.
CO4	Demonstrate concepts of stack and queue.
CO5	Make use of the concepts of Trees apply various operations on them.
CO6	Demonstrate Basic terminologies and representation of Graph.




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Course Contents:

UNIT-1: Introduction & Overview Introduction to data structures & its data types, Operations, Algorithms: complexity, time space trade-off with example.	[6]
UNIT-2: Arrays, Records Introduction, linear arrays, representation of linear array in memory, traversing linear arrays, inserting & deleting, Sorting: bubble sort, searching: linear search, binary search, Multidimensional arrays Records: Record structures, representation of records in memory, parallel arrays, matrices, sparse matrices.	[6]
UNIT 3 Linked Lists: Introduction, linked lists & its representation, Traversing & searching a linked list, memory allocation, Garbage collection, insertion & deletion of nodes of linked list, header linked list, two-way lists.	[6]
UNIT 4 Stacks & Queues: Introduction to stacks, stack as an Abstract Data type, representation through Arrays & linked lists, Applications of stacks, stacks & recursion, Queue as an abstract data type representation, circular, double ended, priority, Quicksort, application of queues.	[6]
UNIT 5 Trees: Binary Tree: introduction, types, definition, properties, representations, operations, binary tree traversal, Header nodes; Threads, BST, Advanced trees: AVL trees or height balanced trees, representation operation, Expression trees. Multiway trees: trees, multiway search trees, B trees, Heaps, construction of a Heap.	[6]
UNIT-6 Graph: Introduction, Graph theory terminology, sequential representation of graphs: Adjacency Matrix, Path matrix, Warshall's Algorithm, shortest paths, linked representation. Operations, Traversing, Posets, Topological sorting.	[6]
Text Books: <ol style="list-style-type: none">1. S. Lipschutz, Data Structures, McGraw-Hill Publication, Revised Edition.2. Thomas Cormen, Introduction to Algorithms, PHI Publication, 2nd Edition, 2002.3. E. Horowitz, S. Sahani, Fundamentals of Data Structures, Galgotia Publication, 1st Edition, 1983. Reference Books: <ol style="list-style-type: none">1. Kyle Loudon, Mastering Algorithms with C: Useful Techniques from Sorting to Encryption, O'Reilly Media, 1st Edition, 19992. Mark Allen Weiss, Data structures and algorithms analysis in C++, Pearson Education, 4th Edition, 2013.3. Y. Langsam, M. Augenstein, A. Tanenbaum, Data Structure using C and C++, Prentice Hall India Learning Private Limited, 2nd Edition, 1998.4. Trembley and Sorenson, Introduction to Data Structures, PHI Publication, 2nd Revised Edition, 1983.	




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Analog Electronics Laboratory

23EC2304	PCC	Analog Electronics laboratory	0-0-2	1 Credit
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Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/week	CA-I:15 Marks CA-II: 15 Marks End Semester Exam-20 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Build and analyze common source amplifier circuits
CO2	Make use of FET for oscillator circuits.
CO3	Design and analysis of series and shunt voltage regulator circuits.
CO4	Demonstrate the use of timer IC for various applications

List of Experiments:

Sr.No.	Name of the Experiments
1.	Design a single stage self-biased FET CS Amplifier and verify its DC operating point
2.	Build and test the performance of single stage CS amplifier using FET.
3.	Simulate frequency response of single stage common source amplifier and find bandwidth.
4.	Simulate Voltage series feedback amplifier.
5.	Design Zener shunt regulator circuit and measure load and line regulation.
6.	Design and implement an adjustable voltage regulator using fixed voltage regulators.
7.	Design and implement an adjustable voltage regulator using LM317
8.	Implement LC oscillator using FET
9.	Implement RC oscillator using FET
10.	Simulate MOSFET Inverter.
11.	Design and study the monostable multivibrator circuit using 555 timer.
12.	Design and study the astable multivibrator circuit using 555 timer.




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Data structure Laboratory

23EC2305	PCC	Data structure Laboratory	0-0-2	1 Credit
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Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/Week	CA-I :15 Marks CA-II :15 Marks End Semester Exam: 20 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop logic for insertion, deletion & display
CO2	Make use of an array for searching & sorting.
CO3	Construct linked list, stack & queue.

List of Experiments:

Sr. No	Name of the Experiments
1.	Program to insert an element into an array.
2.	Program to delete an element from an array.
3.	Program to sort the array using bubble sorting.
4.	Program to search a number in an array using linear search.
5.	Program to search a number in an array using binary search.
6.	Program to perform operations on 2-D array.
7.	Program to insert node into linked list.
8.	Program to delete the node from linked list.
9.	Program to perform PUSH & POP operation on the stack.
10.	Program to perform queue operation.




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Simulation Laboratory

23EC2306	PCC	Simulation Laboratory	0-0-2	1 Credit
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Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/Week	CA-I :15 Marks CA-II :15 Marks End Semester Exam: 20 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Demonstrate Half, Full Adder and Half Subtractor Circuit using ORCAD PSpice.
CO2	Experiment with Half & Full wave Rectifier using Multisim.
CO3	Make use of Simulink for two Signal Addition & Multiplication.
CO4	Develop Series & Parallel Circuit using Proteus.

List of Experiments:

Sr. No	Name of the Experiments
1.	Study Simulation using ORCAD PSpice.
2.	Design the circuit of half adder. Using ORCAD PSpice.
3.	Design the circuit of Half Subtractor using ORCAD PSpice.
4.	Study Introduction to Multisim.
5.	Implement Half Wave Rectifier using Multisim .
6.	Implement Full Wave Rectifier using Multisim.
7.	Perform Experiment on two Signal Addition using Simulink .
8.	Perform Experiment on two Signal Multiplication using Simulink .
9.	Study Introduction to proteus.
10.	Design and test SERIES CIRCUIT using proteus.
11.	Design and test parallel CIRCUIT using proteus .




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Employability and skill Development

23EC2307	EEM	Employability and skill Development	2-0-0	2 Credits
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Teaching Scheme: Lecture: 2 hrs/week	Examination Scheme: CA-I: 25 Marks CA-II: 25 Marks Mid Semester Exam: NA End Semester Exam: NA
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Pre-Requisites: Basic Electronics

Course Outcomes: At the end of the course, students will be able to:

CO1	Define skills and preparedness for aptitude tests.
CO2	Develop the ability to think critically and logically.
CO3	Make use of presentation skill and be ready for facing interviews.
CO4	Apply grammar rules accurately in both written and spoken communication.
CO5	Utilize a sense of civic responsibility and the importance of financial planning.
CO6	Build team and lead it for problem solving.

Course Contents:

Unit 1: Soft Skills & Communication basics Soft skills Vs hard skills, Skills to master, Interdisciplinary relevance, Global and national perspectives on soft skills. Resume, Different formats of resume – Chronological, Functional, Hybrid, Job application or cover letter, Professional presentation- planning, preparing and delivering presentation, Technical writing.	[4]
Unit 2: Analytical Reasoning and Quantitative Ability Matching, Selection, Arrangement, Verification (Exercises on each of these types). Verbal aptitude (Synonym, Antonym, Analogy).	[4]
Unit 3: Skills for interviews Interviews- types of interviews, preparatory steps for job interviews, interview skill tips, Group discussion- importance of group discussion, difference between group discussion, panel discussion and debate, Listening skills- virtues of listening, fundamentals of good	[4]





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listening, Non-verbal communication-body movement, physical appearance, verbal sounds, closeness, time.	
Unit 4: Grammar and Comprehension English sentences and phrases, Analysis of complex sentences, Transformation of sentences, Paragraph writing, Story writing, Reproduction of a story, Letter writing, Paraphrasing and e-mail writing.	[4]
Unit 5: Constitutional values, Financial and Legal Literacy Constitutional values - Citizenship, Becoming a Professional in the 21st Century Duration, Diversity & Inclusion Significance of using financial products and services safely and securely, importance of managing expenses, income, and savings. significance of approaching the concerned authorities in time for any exploitation as per legal rights and laws.	[4]
Unit 6: Problem Solving Techniques Problem solving model: 1. Define the problem, 2. Gather information, 3. Identify various solution, 4. Evaluate alternatives, 5. Take actions, 6. Evaluate the actions. Problem solving skills: 1. Communicate. 2. Brain storming, 3. Learn from mistakes	[4]
Text Books: 1. R. Gajendra Singh Chauhan, Sangeeta Sharma, "Soft Skills- An integrated approach to maximize personality", ISBN: 987-81-265-5639-7, First Edition 2016, Wiley. 2. Wren and Martin, "English grammar and Composition", S. Chand publications. 3. R. S. Aggarwal, "A modern approach to verbal reasoning", S. Chand publications.	
Reference Books: 1. Philip Carter, "The Complete Book Of Intelligence Test", John Willey & Sons Ltd. 2. Philip Carter, Ken Russell, "Succeed at IQ test", Kogan Page 3. Eugene Ehrlich, Daniel Murphy, "Schaum's Outline of English Grammar", McGraw Hills. 4. David F. Beer, David A. McMurrey, "A Guide to Writing as an Engineer", ISBN : 978-1-118-30027-5 4th Edition, 2014, Wiley.	




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Environmental Sciences

23EC2308	VEC	Environmental Sciences	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs/week	CA -I: 25 Marks CA -II: 25 Marks

Pre-Requisites: NA

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain nature of environmental studies.
CO2	Explain various natural resources and associated Problems.
CO3	Summarize various ecosystems.
CO4	Explain the importance of conservation of biodiversity and its importance in balancing the earth.
CO5	Recognize various causes of environmental pollution along with various protection acts in India to limit the pollution.
CO6	Interpret the information based on field study and prepare a report.




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Course Contents:

Unit 1: Nature of Environmental studies Definition, scope and importance, Multidisciplinary nature of environmental studies. Need for public awareness.	[4]
Unit 2: Natural Resources and Associated Problems Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, conflicts over water. Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, nuclear energy. Land resources: land degradation, man induced landslides, soil erosion and desertification. Role of individuals in conservation of natural resources.	[4]
Unit 3: Ecosystems Concept of an ecosystem, types of ecosystems, structure and function of an ecosystem, producers, consumer and decomposers. Energy flow in the ecosystem, food chain, food web and ecological pyramids, ecological succession. Different types of ecosystems are a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystem	[4]
Unit 4: Biodiversity Introduction-Definition: genetic, species and ecosystem diversity, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Western Ghats as a biodiversity region Hot spot of biodiversity. Threats to biodiversity, man and wildlife conflicts. Conservation of biodiversity. In-situ conservation and Ex-situ conservation.	[4]
Unit 5: Environmental Pollution and Environmental Protection Definition: Causes, effects and control measures of various types of pollution. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Concept of sustainable development: From Unsustainable to Sustainable development. Environmental Protection Act. Air (Prevention and Control of pollution) Act. Water (Prevention and Control of pollution) Act. Forest conservation Act. Wildlife Protection Act. Human Rights.	[4]




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Unit 6: Field work Visit to a local area to document Environmental assets-River, Forest, Grassland, Visit to local polluted site, Study of common plants, insects, birds, Study of ecosystem river, ponds etc.	[4]
Text Books: 1. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics (Vol I & II), Pune Vidyarthi Griha Prakashan, Pune. 2. N. P. Bali, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.	
Reference Books: 1. C. R. Wylie & L. C. Barrett, Advanced Engineering Mathematics, McGraw Hill Publishing Company Ltd. 2. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publications, New Delhi. 3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers. 4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons. 5. Peter O'Neil, A Text Book of Engineering Mathematics, Thomson Asia Pvt. Ltd. Singapore	




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Mini Project-II

23EC2309	CEP	Mini Project-II	0-0-2	1 Credit
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Teaching Scheme:	Examination Scheme:
Lecture: --NA Tutorial: -- NA Practical:2hrs/week	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: None.

About Ideathon

The project is a part of addressing societal and industrial needs. An ideathon is a brief, intense event where students can work on some of the most important problems that the world is facing today. Ideathons are brainstorming events where people with diverse knowledge backgrounds, skill sets and interests get together to predetermined problems, and come up with substantive, innovative and comprehensive solutions. An ideathon's output might be ideas, a roadmap or an actionable plan. Teams leverage design thinking and cutting-edge techniques to brainstorm and collaborate on potential solutions within a given time frame.

Course Outcomes: At the end of the course, students will be able to:

CO1	Identify problems based on societal /research needs
CO2	Apply Knowledge and interpersonal skills to solve societal problems in a group.
CO3	Draw the proper inferences from available results through theoretical/experimental/simulations.
CO4	Analyse the impact of solutions in societal and environmental context for sustainable development.
CO5	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
CO6	Demonstrate project management principles during project work.




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Course Contents:

Week 1: Higher Education and Case Study Pedagogy <ul style="list-style-type: none">Students shall form a group of 3 to 4 students, while forming a group shall not be allowed less than three or more than four students, as it is a group activity.Allocation of mentor	[2]
Week 2: Topic Selection <ul style="list-style-type: none">Briefly interact with students to provide hand-holding for topic selection.Students should do survey and identify needs, which shall be converted into problem statement for mini project in consultation with faculty supervisorIllustrative Examples : Any Industry or Societal ProblemFinalization of Title.	[2]
Week 3: Case Study Design/Ideathon: Part 1 <ul style="list-style-type: none">If needed, provide hand-holding to students for finalizing objectives.Review the objectives of the case study groups.Identify what can be quantified related to your topic and how.Decide objectives for your case study.Continue reading especially recent work specific to your topic.	[2]
Week 4: Case Study Design/Ideathon: Part 2 <ul style="list-style-type: none">Prepare a roadmap of your case study, identify what is to be measured on the field.Ensure student groups have finalized the objectives.	[2]
Week 5: Survey Design <ul style="list-style-type: none">Prepare a questionnaire and try it out with your group members as mock.Decide sampling strategy.	[2]
Week 6: Analysis Phase-1 <ul style="list-style-type: none">Students in a group shall understand problem effectively, propose multiple solution.The students have to work on different approaches and search for the different methodology to solve the problem in consultation with the project guide.	[2]
Week 7 Analysis Phase-2 <ul style="list-style-type: none">The students have to finalize the best methodology to solve the problem in consultation with the project guide.25% Presentation has to be conducted by mentor/guide based on above activity.	[2]
Week 8: Analysis-3 <ul style="list-style-type: none">Identify appropriate data visualization tools for your case study.Analyze the data	[2]
Week 9: Analysis-4 <ul style="list-style-type: none">Identify appropriate data visualization tools for your case study.Analyze the data	[2]
Week 10: Report writing Part:1 <ul style="list-style-type: none">Prepare an outline of the report and start organizing the write-up for the first draft.Prepare and submit the first draft of the report to the course coordinator.	[2]





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Week 11: Report writing Part:2 <ul style="list-style-type: none">• Make necessary corrections if any as per the suggestions of course coordinator.• Submit the final draft of the case study	[2]
Week 12: Final Presentation <ul style="list-style-type: none">• 50% Presentation has to be conducted by mentor/guide based on above activity.	[2]




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Electrical & Electronics Measurement

23ECMDA1	MDM	Electrical & Electronics Measurement	2-0-0	2 Credits
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Teaching Scheme: Lecture: 2 hrs/week	Examination Scheme: CA-I:10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks
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Pre-Requisites: Mathematics General Mathematics Class XII Physics Electricity Class XII.

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop the knowledge of theoretical and mathematical principles of electrical measuring instruments.
CO2	Examine various real-life situations in domestic or industrial scenario where measurements of electrical quantities are essential.
CO3	Choose the proper type and specification of measuring procedure and measuring instruments for different industrial/commercial/domestic applications.
CO4	Identify the fault conditions in electrical installations with identify necessary remedial measures.
CO5	Make use of different electronics instruments.
CO6	Classify the different sensors and transducers with their applications.

Course Contents:

Unit 1: Measurement Basic Electrical Measurements: Method of measurement, Measurement system, Classification of instruments, Definition of accuracy, Precision, Resolution, Speed of response, Error in measurement, Classification of errors, loading effect due to shunt and series connected instruments.	[6]
Unit 2: Analog meters General features, Construction, Principle of operation and torque equation of Moving coil, Moving Iron, Electrodynamometer, Induction instruments. Principle of operation of the Electrostatic, Thermoelectric, Rectifier type instruments, Extension of instrument ranges and Multipliers.	[6]

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Unit 3: Instrument transformer Disadvantage of shunt and multipliers, Advantage of Instrument transformers, Principle of operation of Current & Potential transformer, errors. Measurement of Power: Principle of operation of Electrodynamic & Induction type wattmeter. Wattmeter errors.	[6]
Unit 4: AC Bridges Measurement of Energy: Construction, theory and application of AC energy meter, testing of energy meters. Potentiometer: Principle of operation and application of Crompton's DC potentiometer, Polar and Co-ordinate type AC potentiometer. Application. Measurement of Inductance, Capacitance and frequency by AC bridges.	[6]
Unit 5: Electronic Instruments CRO: - Measurement of voltage, current, frequency & phase by oscilloscope. Frequency limitation of CRO. Sampling and storage oscilloscope, Double beam CRO. Electronic Instruments: Advantages of digital meter over analog meters, Digital voltmeter, Resolution and sensitivity of digital meters, Digital multimeter.	[6]
Unit 6: Introduction to Sensors & Transducers Introduction to sensors & Transducers, Strain gauge, LVDT, Temperature transducers, Flow measurement using magnetic flow measurement.	[6]
Text Books: 1. A course in Electrical & Electronic Measurements & Instrumentation, A.K. Sawhney, Dhanpat Rai & sons. 2. Electrical Measurement & Measuring Instruments, E.W. Golding & F.C. Wides, Wheeler Publishing. 3. Electronic Instruments, H.S. Kalsi, Tata Mc-Graw hill, 2nd Edition.	
Reference Books: 1. Sensors & Transducers, D. Patranabis, PHI, 2nd edition. 2. Digital Instrumentation, A.J. Bouwens, Tata Mc-Graw hill. 3. Modern Electronic instrumentation & Measuring instruments, A.D. Heltric & W.C. Copper, Wheeler Publication. 4. Instrument transducers, H.K.P. Neubert, Oxford University press	



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Python Programming for Data Science

23ECMDB1	MDM	Python Programming for Data Science	2-0-0	2-Credits
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Teaching Scheme: Lecture: 2 hrs/week	Examination Scheme: CA-I:10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks
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Pre-Requisites: Basics of programming language & Statistics for Data Science

Course Outcomes: At the end of the course, students will be able to:

CO1	Understand basics of Python Programming
CO2	Describe Python function, Modules & Packages
CO3	Describe different lists, tuple and dictionary
CO4	Examine concept of Input-output and exception handling.
CO5	Identify and describe the methods and techniques commonly used in Data Science.
CO6	Implement NumPy and Pandas.

Course Contents:

Unit 1: Introduction to Python programming History, Features, setting up path, Working with Python, Syntax, Variables and data types, operator. Conditional statements: If, If-else, Nested If-else. Looping: For, While, Nested loops. Control statements: Break, continue, pass and string manipulation.	[6]
Unit 2: Python function, Modules & Packages Modules and functions, Function definition and use, flow of execution, parameters and arguments, Standard packages: Mathematics, Internet Access, Dates and Times, Data Compression, Multi-threading.	[6]
Unit 3: Python List, Tuple & Dictionary	[6]





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List: Accessing list, List operations, Working with Lists, Functions and Methods. Tuple: Accessing Tuples, operations, Working with Lists, Functions and Methods. Dictionary: Accessing values in Dictionaries, Working with Dictionaries, Properties and Functions.	
Unit 4: Input-Output Printing on screen, reading data from keyboard, opening and closing file, reading and writing files, functions, exception handling, except clause, Try, finally clause, User defined Exceptions.	[6]
Unit 5: Introduction to data science Data Science and Its Scope: What Is Data Science, Data Science and Statistics, Role of Statistics in Data Science, A Brief History, Difference between Data Science and Data Analytics, Knowledge and Skills for Data Science Professionals, Some Technologies used in Data Science, Benefits and uses of data science, Facets of data, data science project lifecycle.	[6]
Unit 6: NumPy and Pandas Introduction Pandas, Installing Pandas, Features of Pandas, NumPy Arrays, NumPy Data Types, Ways to create NumPy Arrays, Difference between Pandas and NumPy.	[6]
Text Books: 1. "Introducing Data Science", DAVY CIELEN, ARNO D. B. MEYSMAN, MOHAMEDALI, Manning Publications. 2. "Python Data Science Handbook: Essential Tools for Working with Data", Jake VanderPlas, O'REILLY Publication.	
Reference Books: 1. Data Science from Scratch: First Principles with Python By O'Reilly Media, 2015. 2. Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining by Glenn J. Myatt John Wiley Publishers, 2000	




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Electrical Machines and Instruments

23ECMDC1	MDM	Electrical Machines and Instruments	2-0-0	2-Credits
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Teaching Scheme: Lecture: 2 hrs/week	Examination Scheme: CA-I:10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks
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Pre-Requisites: Mathematics General Mathematics Class XII Physics Electricity Class XII.

Course Outcomes: At the end of the course, students will be able to:

CO1	Interpret theoretical knowledge with mathematical principles of DC machines.
CO2	Experiment with various real-life situations in domestic or industrial of induction and synchronous motors.
CO3	Utilize proper types and specifications of measuring procedure and measuring instruments for different industrial/commercial/domestic applications.
CO4	Develop the knowledge of theoretical and mathematical principles of sensors and Different types of transducers.
CO5	Discover new sensing and measuring schemes for various electrical and electronic applications.
CO6	Evaluate sensing and measuring schemes for various I/O devices.



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Course Contents:

Unit 1: DC Machine DC machines construction, working principle, Types and its characteristics of DC machines (motor and generator), starters of DC machines, speed control of DC machine, Braking of DC machine, applications of DC machines	[6]
Unit 2: Induction motor and Synchronous motor Induction Motor- Construction, working principle and types. Speed control of 3 phase induction motor, braking of induction motors, applications. Synchronous motor – construction, working principle, starting methods, applications.	[6]
Unit 3: Special Purpose Machines Construction, working and application of stepper motor, servo motor, linear IM, Variable reluctance motor. repulsion motor.	[6]
Unit 4: Sensors and Transducers Classification selection of Transducers, Pressure Transducers, LVDT, Temperature Transducers, piezoelectric transducers, photosensitive Transducers, Proximity sensors.	[6]
Unit 5: Electronic Instruments CRO: - Measurement of voltage, current, frequency & phase by oscilloscope. Frequency limitation of CRO. Sampling and storage oscilloscope, Double beam CRO. Electronic Instruments: Advantages of digital meter over analog meters, Digital voltmeter, Resolution and sensitivity of digital meters, Digital multimeter.	[6]
Unit 6: I/O Devices Recorder X-Y plotters and its applications optical oscillograph.	[6]
Text Books: 1. A course in Electrical & Electronic Measurements & Instrumentation, A.K. Sawhney, Dhanpat Rai & sons. 2. Electrical Measurement & Measuring Instruments, E.W. Golding & F.C. Wides, Wheeler Publishing. 3. Electronic Instruments, H.S. Kalsi, Tata Mc-Graw hill, 2nd Edition.	
Reference Books: 1. Sensors & Transducers, D. Patranabis, PHI, 2nd edition. 2. Digital Instrumentation, A.J. Bouwens, Tata Mc-Graw hill. 3. Modern Electronic instrumentation & Measuring instruments, A.D. Heltric & W.C. Copper, Wheeler Publication. 4. Instrument transducers, H.K.P. Neubert, Oxford University press	





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Aptitude Skills-I
(Numerical Ability)

23HSSM01	VEC	Aptitude Skills-I	1-0-0	1 Credit
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Teaching Scheme:	Examination Scheme:
Lecture: 1 hrs/week Tutorial: NA Practical: NA	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: English Communication

Course Outcomes: At the end of the course, students will be able to:

CO1	Make use of multiplications, squares, square roots, cubes and cube roots to solve aptitude problems
CO2	Solve questions based on Number system
CO3	Solve questions based on percentage, average, ratio, proportion, Speed, Time and Distance
CO4	Solve questions based on Profit & Loss and mensurations.

Unit 1: Speed Math Techniques Multiplication, Squares, Square roots, Cubes, Cube roots.	[3]
Unit 2: Number System Types of Number System, Last Digit Method, BODMAS Calculation, HCF and LCM, Progressions.	[3]
Unit 3: Basic Aptitude Percentage, Average, Ratio and Proportion, Fraction, Partnership. Speed- Time- Distance Speed, Time, and Distance, Trains, Boats, Streams, Races.	[3]
Unit 4: Business Aptitude Profit & Loss, Simple Interest, Compound Interest	
Geometry and Venn Diagram 2D and 3D Mensuration, Venn diagram.	[3]



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Text Books:

1. Arun Shrama - Quantitative aptitude for CAT.
2. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand Publisher; 2016 edition.

Reference Books:

1. Fast Track Objective Arithmetic Paperback, by Rajesh Verma – 2018
2. Teach Yourself Quantitative Aptitude, Arun Sharma
3. The Pearson Guide to Quantitative Aptitude for Competitive Examination by Dinesh Khattar



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Language Skills- I

23HSSM02	VEC	Language Skills- I	0-0-2	Audit
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Teaching Scheme:	Examination Scheme:
Lecture: NA Tutorial: NA Practical: 2 hrs/week	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: Basics of Programming.

Course Outcomes: At the end of the course, students will be able to

CO1	Develop flowchart and Algorithm to solve the given problem statements.
CO2	Develops programs using Data Types and Operators.
CO3	Make use of Decision Making and Looping Statements to develop conditional programs.
CO4	Make use of Arrays to develop programs in C language.




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Course Contents:

Expt.No.	Name of Experiments.
01	Explain basics of C such as Editing, Compiling, Error Checking, executing, testing and debugging of Programs and Design Algorithms and Flowcharts.
02	Explain basics of Variable, Data types and operators and develop programs on arithmetic Operators.
03	Develop programs on Conditional, logical and Bitwise Operators.
04	Develop programs on Sizeof () and typecasting operator.
05	Develop programs on increment and decrement operator.
06	Develop programs on simple if and if-else statement.
07	Develop programs on simple if-else ladder and Nested if-else.
08	Develop programs on Switch case statement.
09	Develop programs on For-loop & Nested For-loop.
10	Develop programs on while and do-while loop.
11	Develop programs on one dimensional array.
12	Develop programs on two-dimensional array.
13	Develop programs on string handling functions.

Text Books:

1. C Programming Absolute Beginner's Guide, Que Publishing; 3rd edition (22 August 2013)
2. C Programming Language 2nd Edition, Pearson Publication

Reference Books:

1. Programming in C Practical Approach by Ajay Mittal, Pearson
2. Let Us C, By Yashwat Kanetkar




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Department: Electronics and Computer Engineering

Rev:Course Structure/01/NEP/2023-24

Class: S.Y. B.Tech

Semester: IV

Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
23EC2401	PCC	Analog and Digital Communication	3	-	-	3	10	10	30	50	100	3
23EC2402	PCC	Digital Electronics and Microprocessor	3	-	-	3	10	10	30	50	100	3
23EC2403	PCC	Operating System	3	-	-	3	10	10	30	50	100	3
23EC2404	PCC	Analog and Digital Communication Laboratory	-	-	2	2	15	15	-	20	50	1
23EC2405	PCC	Digital Electronics and Microprocessor Laboratory	-	-	2	2	15	15	-	20	50	1
23EC2406	VSEC	MATLAB Programming	-	-	2	2	25	25	-	-	50	1
23EC2407	CEP	Mini Project – III	-	-	2	2	25	25	-	-	50	1
23MILEXX	AEC	Modern Indian Language	2	-	-	2	25	25	-	-	50	2
23ECMDXX	MDM	Multidisciplinary Minor	3	-	-	3	10	10	30	50	100	3
23OEEC22	OE*	Open Elective-II	3	-	-	3	10	10	30	50	100	3
23HSSM03	VEC	Aptitude Skills – II	1	-	-	1	25	25	-	-	50	Audit
23HSSM04	VEC	Language Skills – II	-	-	2	2	25	25	-	-	50	1
		Total	18	-	10	30	205	205	150	290	850	22

Multidisciplinary Minor-II

Biomedical Engineering (Basket A)	Data Science (Basket B)	Industrial Automation (Basket C)
Linear Integrated Circuits (23ECMDA2)	Mathematics for Data Science 23ECMDB2)	Programming Logic Controller (23ECMDC2)

Note-(OE*) Open Elective –II Course will be offered to students of other programs and will not be offered to the students of the same program.



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Analog and Digital Communication

Table with 5 columns: Course ID (23EC2401), Credit (PCC), Title (Analog and Digital Communication), Sem (3-0-0), and Credits (3-Credits)

Table with 2 columns: Teaching Scheme (Lecture: 3 hrs/week) and Examination Scheme (CA-I: 10 Marks, CA-II: 10 Marks, Mid Semester Exam: 30 Marks, End Semester Exam: 50 Marks)

Pre-Requisites: Fundamental electronics & Fundamental Mathematics.

Course Outcomes: At the end of the course, students will be able to:

Table with 2 columns: Outcome ID (CO1-CO6) and Description of outcome

Table with 2 columns: Unit Description (Unit 1-5) and Marks ([6])



Handwritten signature and typed name: Head of the Department, Electronics & Computer Engineering, Sharad Institute of Technology College of Engineering, Yadrav (Ichalkaranji) Dist. Kolhapur



Unit 6:Noise

Introduction, Sources of noise, Types of noise, Noise calculations, Signal to Noise ratio, Noise figure, Noise Factor, Noise Temperature.

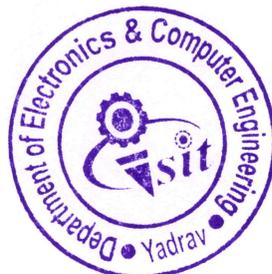
[6]

Text Books:

1. Kennedy, "Electronics Communications Systems", McGraw-Hill New Delhi-1997, 4th Edition.
2. Anokh Singh, "Principles of communication engineering" S.Chand
3. Wayne Tomasi, "Electronic Communication Systems", Pearson Education-2005, 5th Edition
4. K. Sam Shanmugam- Digital & Analog Communication (John Wiley)
5. Simon Haykin- Digital Communication (Wiley).

Reference Books:

1. Bernard Sklar, Pabitra Kumar Ray- ' Digital Communications' -2nd Edition- Pearson
2. Taub- Schilling – Saha- ' Principals of communication systems' -3rd Edition-Mc Graw Hill
3. Lathi B P & Ding Z –'Modern Digital & Analog Communication Systems'- Oxford University Press, Fourth Edition
4. Ha Nguyen Ed Shwedyk-A First Course in Digital Communication – Cambridge Uni press
5. Roddy & Coolen, "Electronic communication" PHI
6. Taub & Schilling "Principles of communication systems" Tata Mc Graw Hill
7. Beasley & Miller, "Modern Electronic Communication", Prentice-Hall India-2006, 8th Edition





Digital Electronics and Microprocessor

23EC2402	PCC	Digital Electronics and Microprocessor	3-0-0	3-Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basic Electronics, Logic Gates.

Course Outcomes: At the end of the course, students will be able to:

CO1	Make use of basic logic gates and various reduction techniques of digital logic circuit.
CO2	Design and implement combinational logic circuits.
CO3	Design and implement sequential circuits
CO4	Explain the basic digital logic families
CO5	Explain microprocessor architecture and its instruction set
CO6	Analyze the interfacing of 8085 microprocessor for its various applications.

Course Contents:

Unit 1: Fundamentals of Digital Electronics Number Systems, Codes and their arithmetic (Binary, Octal, Hexadecimal), Ones and Two's complement arithmetic. Standard representations for logic functions, k-map representation of logic functions (SOP and POS forms), minimization of logical functions for min-terms and max-terms (up to 4-variables), don't care conditions.	[6]
Unit 2: Combinational Circuits Introduction to combinational logic, Design of arithmetic circuits – Adder, Subtractor, BCD adder, Comparator, Code Converter, Multiplexer, Demultiplexer, Decoder, Encoder, BCD to Seven Segment decoders.	[6]
Unit 3: Sequential Circuits 1-Bit Memory Cell, Latches and Clocked SR, JK, D & T Flip-Flops, Excitation table for Flip-Flops, Conversion of Flip-Flops Applications of Flip-Flops: Shift Registers, Counters .	[6]
Unit 4: Digital Logic Families and Semiconductor Memories Classification and Characteristics of digital logic families: TTL Logic, CMOS logic. Interfacing CMOS and TTL, Memory organization and operation, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM.	[6]
Unit 5: Fundamentals of Microprocessor 8085 – Architecture, Pin functions, Addressing Modes, Instruction set, Introduction to Timing Diagram – T- states, Timing diagram of instructions, Interrupt structure.	[6]
Unit 6: Programming and Interfacing Assembly Language Programming, Basic Interfacing Concepts, Introduction to Interfacing – 8255, LED, 7 – Segment Display, Stepper Motor, Relay.	[6]




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Text Books:

1. Fundamentals of Digital Circuits A. Anand Kumar PHI 3rd 2008.
2. Microprocessor Architecture, Programming and Applications with 8085 Ramesh Gaonkar.

Reference Books:

1. Digital Design Principles Wakerly 4th 2006
2. Digital Design Leach, Malvino 4th 2011.




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Operating system

23EC2403	PCC	Operating system	3-0-0	3-Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Fundamental electronics & Fundamental Mathematics.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the basic concept of operating system & their types
CO2	Demonstrate the flow of process with its states and different process scheduling policies
CO3	Explain concepts of Mutual exclusion and IPC
CO4	Make use the concept of deadlocks
CO5	Illustrate concept of memory management policies
CO6	Illustrate the concepts of Unix and Linux OS

Course Contents:

Unit1: Introduction Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Systems – Concept of Virtual Machine	[6]
Unit2: Process Management Processes: Definition, Process Relationship, Process states, Process State transitions, Process Control Block, Context switching – Threads – Concept of multithreads, Benefits of threads, Types of threads. Process Scheduling :Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) Scheduling algorithms: Preemptive and Non-preemptive, FCFS–SJF– RR, Multiprocessor scheduling : Types , Performance evaluation of the scheduling	[6]
Unit3: Inter process Communication Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, and Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem etc., Scheduling, Scheduling Algorithms	[6]
Unit4: Deadlocks Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: banker's algorithm, Deadlock detection and Recovery	[6]
Unit5: Memory Management	[6]





<p>Basic Memory Management: Definition, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction, Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing – Disadvantages of paging.</p> <p>Virtual Memory: Basics of Virtual Memory – Hardware and control structures– Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies: Optimal (OPT), First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU)</p>	
<p>Unit6: Unix/Linux Operating System Development of Unix/Linux, Role & Function Of Kernel, System Calls, Elementary Linux command& Shell Programming, Directory Structure, System Administration Case study: Linux, Windows Operating System</p>	[6]
<p>Text Books:</p> <ol style="list-style-type: none">1. Russell, Norvig, Artificial Intelligence: A Modern Approach, Third edition, Prentice Hall, 20102. Hastie, Tibshirani, Friedman. The elements of statistical learning, Second edition, Springer, 20093. Tsang. Foundations of constraint satisfaction, Academic press, 19934. Daphne Koller and Friedman. Probabilistic Graphical Models-Principles and Techniques, The MIT Press, 2009	
<p>Reference Books:</p> <ol style="list-style-type: none">1. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, ISBN-10:0596009526, ISBN-13: 978-05960095262. Harvey M. Deitel, Operating Systems, Prentice Hall, ISBN-10:0131828274, ISBN-13:978-01318282783. Thomas W. Doepfner, Operating System in depth: Design and Programming, WILEY, ISBN:978-0-471-68723-84. Mendel Cooper, Advanced Shell Scripting, Linux Documentation Project5. Operating Systems by D. M. Dhamdhere, Tata Mc Graw Hill 2nd edition Unix Shell Programming–by Yashwant Kanetkar, BPB publications.	





Analog and Digital Communication Laboratory

23EC2404	PCC	Analog and Digital Communication Laboratory	0-0-2	1-Credit
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Teaching Scheme: Practical: 2hrs/week	Examination Scheme: CA-I: 15 Marks CA-II: 15 Marks End Semester Exam: 20 Marks
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Course Outcomes: At the end of the course, students will be able to:

CO1	Demonstrate generation and detection of analog and digital modulation techniques.
CO2	Examine the concept of sampling and reconstruction
CO3	Apply time division multiplexing concept with different pulse modulation techniques.

List of Experiments: Minimum 8 Experiments should be conducted.

Sr. No.	Name of the Experiments
1	Demonstration of Amplitude modulation and demodulation
2	Calculation of modulation index of AM using AM Wave using and Trapezoidal Pattern
3	Observe Waveform of DSB modulation and Demodulation
4	To Study SSB modulation and Demodulation
5	To Perform experiment on Frequency Modulation and Demodulation
6	To Study Natural Flat top sampling and reconstruction
7	Demonstration of PWM modulation and Demodulation
8	To Perform experiment on PPM modulation and Demodulation
9	To Perform experiment on four- channel PAM- TDM
10	To Study Amplitude Shift Keying
11	To Study Frequency shift keying
12	To Study Phase shift keying





Digital Electronics and Microprocessor Laboratory

23EC2405	PCC	Digital Electronics and Microprocessor Laboratory	0-0-2	1-Credit
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Teaching Scheme: Practical: 2 hrs/week	Examination Scheme: CA-I: 15 Marks CA-II: 15 Marks End Semester Exam: 20 Marks
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Course Outcomes: At the end of the course, students will be able to:

CO1	Demonstrate logic functions using universal gates and various combinational circuits.
CO2	Design and verify sequential logic circuits.
CO3	Make use of 8085 instructions to build simple assembly language program.

List of Experiments: Minimum 10 Experiments should be conducted.

Sr. No.	Name of the Experiments
1	Realization of Basic Gates using Universal Gates
2	Design of Half Adder and Full Adder using Basic Gates
3	Design of Half Subtractor and Full Subtractor using Basic Gates
4	Design and Implement 4-bit Binary to Gray and Gray to Binary
5	Design of 8:1 MUX using IC 74151
6	Design 1:8 DEMUX using IC 74138
7	Study of basic gates using TTL and CMOS IC
8	Study and verify D FF and JK FF
9	Design and test counters using Flip-flop
10	Design and test MOD - 5 counter using Flip-flop
11	Experiment Based on Arithmetic and Logical Operation: - (Minimum one) Addition / Subtraction, Multiplication / Division
12	Experiment Based on Arrays: - (Minimum one) Block Transfer / Block Exchange, Finding Minimum / Maximum, Arranging in Ascending /Descending, etc
13	8255 Based Experiments: - (Minimum one) Display interface, Stepper motor interface, ADC, DAC





MATLAB Programming

23EC2406	VSEC	MATLAB Programming	0-0-2	1-Credits
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Teaching Scheme:	Examination Scheme:
Practical: 2hrs/week	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: Fundamental electronics & Fundamental Mathematics.

Course Outcomes: At the end of the course, students will be able to:

CO1	Experiment with various arithmetic operators and functions in MATLAB.
CO2	Develop efficient programming skills using Branching and Control statements.
CO3	Make use of different built and user-defined functions in MATLAB
CO4	Construct different Processing Model Using Simulink Toolbox in MATLAB

Course Contents:

Unit1: Introduction to MATLAB Software, The Command Prompt, Workspace, Simple Mathematical Expressions Basic Mathematics Using MATLAB: MATLAB basics variables, arrays, Multi dimensional sub-arrays, Special values, displaying output data, data files, scalar and array operations, Hierarchy of operations built-in Matlab functions Graph: Introduction to plotting, Debugging Matlab programs.	[6]
Unit2: Branching and Control Statements Branching, Statements and logical data type, Branches, write if & for loop logical arrays and vectorization, programming User-defined & i/o functions.	[6]
Unit3: Private functions, Nested functions. Complex data, string functions, text read function, load and save commands, an introduction to Matlab file processing, file opening and closing, binary i/o functions, formatted i/o functions, comparing formatted and binary i/o function, file positioning and status functions	[6]
Unit4: Simulink basics Simulink modeling, solvers, simulating models using variables from MATLAB, data import/export, state-space modeling & simulation, creation of subsystems.	[6]
Text Books: 1. Getting Started with MATLAB by Rrudra Pratap 2. MATLAB and its Applications in Engineering by Raj Kumar Bansal	
Reference Books: 1. MATLAB for Beginners by Peter Issa Kattan. 2. A Guide to MATLAB for Beginners and Experienced user by Brian R.	





List of Experiments: Minimum 8 Experiments should be conducted.

Sr. No.	Name of the Experiments
1	To study Basic of MATLAB.
2	Write a program for Operation on matrix.
3	Write a program for Complex function handling.
4	Write a Program for branching & looping statements.
5	To study 2D and 3D plotting.
6	Write a program for User defined function.
7	Write a Program for file handling.
8	To study String Manipulation.
9	Write a program for Simulink.
10	Write a program for the Generation of Discrete & Continuous signals.
11	Write a program for the Operation of signal & sequence.




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Mini Project-III

23EC2407	CEP	Mini Project-III	0-0-2	1-Credit
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Teaching Scheme:	Examination Scheme:
Practical: 2hrs/week	CA-I: 25 Marks CA-II: 25Marks

Pre-Requisites: Fundamental electronics & Fundamental Mathematics.

Course Outcomes: At the end of the course, students will be able to:

CO1	Select the appropriate method for solving the problem
CO2	Make use of various engineering techniques and tools to give a solution
CO3	Justify the method/tools used to develop the solution.
CO4	Demonstrate tangible solutions to the problem
CO5	Describe the solution with the help of a project report and presentation.

About Hackathon:

The project is a part of addressing societal and industrial needs. Hackathon is one of the platforms that students will use to solve real-world challenges. This course focuses on the selection of methods/engineering tools/analytical techniques for problem-solving. Through this course, students gain a thorough understanding of engineering basics and ideas, gain practical experience, have the opportunity to display their skills and learn about teamwork, financial management, communication skills, and responsibility.

Guidelines:

01	Every student shall undertake the Hackathon activity for semester V.
02	Minimum three and maximum of five students should work together in Hackathon.
03	The students have to work on different approaches and finalize the best methodology to solve the problem in consultation with the project guide.
04	The students should use different tools /Techniques for the development of the solution to the problem.
05	While developing solutions, the student can take care of effective use of resources, follow ethical practices, finance management.
06	The solution should be optimal, affordable, user-friendly and environment friendly.
07	Critically analysis and testing of the solution provided.
08.	By using IPR, students should reserve their rights of innovations as well as communicate new findings to society with the help of research papers.

The committee of senior faculty members and a project guide will be appointed to monitor the progress and continuous evaluation of each project. The assessment shall be done jointly by the guide and committee members





Modern Indian Language

1. Marathi

23MILE01	AEC	Marathi	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2hrs/week	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: Fundamental electronics & Fundamental Mathematics.

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop the knowledge of local language/mother tongue and relate the same to daily life and social media.
CO2	Make use of rhetoric and verb to form sentences in Marathi Language
CO3	Identify Infinitive compounds in the given Marathi sentence.
CO4	Make use of Phrases and proverbs and form a sentence and Solve Prose Assessment/Summary Writing
CO5	Model a letter to appropriate end user in Marathi Language
CO6	Identify writing type of Marathi stanza and write appropriate writing.

Course Contents:

अध्याय 01: भाषापरीचय भाषा आणि व्यक्तिमत्वसहसंबंध, भाषा, जीवनव्यवहार आणि नवमाध्यमे व समाजमाध्यमे, चिन्हव्यवस्था-विरामचिन्हे, संवादकौशल्य (तोंडीपरीक्षा), सर्वनाम-पुरुषात्मक, दर्शक, संबंधी, प्रश्नार्थक, सामान्य व आत्मवाचकसर्वनाम, विशेषण-गुणविशेषण, संख्याविशेषण, सार्वनामीकविशेषण	[4]
अध्याय 02: मराठी व्याकरण नाम, सर्वनाम, विशेषणे, क्रियापद, क्रियाविशेषणअव्यय, शब्दयोगीअव्यय, उभयान्वयीअव्यय, केवलप्रयोगीअव्यय, विभक्तीवत्याचेप्रकार, काळवप्रकार	[4]
अध्याय 03: अलंकार व क्रियापदे अलंकार-शब्दलांकार- अनुप्रास, यमक, श्लेषउदाहरणे, अर्थालंकार-उपमा, उत्प्रेक्षा, व्यक्तिरेक, अपदुनती, रूपक, व्यक्तिरेक, अननव्य, अतिशयोक्ती उदाहरणे प्रयोग-कर्तरी, कर्मणी, भावे वाक्यप्रकार-केवलवाक्य, मिश्रवाक्य, संयुक्त वाक्य समास-अव्ययीभाव, तत्पुरुष, द्वंद्व, बहवृही क्रियापदे- कर्तावकर्म, क्रियापदाचेप्रकार- अकर्मक, सकर्मक, उभयविध, संयुक्त, क्रियाविशेषण-कालवाचक, स्थळवाचक, रितीवाचक, संख्यावाचक, प्रश्नार्थक, निषेधार्थक	[4]
अध्याय 04: वाक्प्रचार व म्हणी व गद्य आकलन/सारांशल्लेखन अर्थ सांगून वाक्यात उपयोग करणे (कमीतकमी ३० वाक्यप्रचार व म्हणी), गद्य आकलन- अपठित गद्य उतारा व त्यावरील प्रश्नउत्तरे (कमीतकमी ०५ उतारे व त्यावरील प्रश्नउत्तरे), सारांशआकलन	[5]
अध्याय 05: लेखनप्रकार	[5]





पत्रलेखन व त्याचे प्रकार-निमंत्रण, आभार, अभिनंदन, मागणी, कोटुंबिक, विनंती, तक्रारसंधी-स्वरसंधी, व्यंजनसंधी, विसर्गसंधी, वृत्तलेखन, जाहिरातलेखन, कथालेखन, अहवाललेखन, आवेदनपत्र, अभिप्रायलेखन	
अध्याय 05:कल्पनाविस्तार व मुलखात कल्पनाविस्तार, मुलाखत कौशल्ये, मुलाखतीचे वैशिष्ट्ये, मुलाखतीचे स्वरूप, लाखत घेताना घ्यावयाची काळजी, मुलाखत देताना आवश्यक बाबी उदा. आत्मविश्वास, व्यक्तिमत्वविकास, भाषाकौशल्ये इ.	[4]
Text Books: 1. व्यावहारिक मराठी, डॉ.ल.रा.नसिरा बादकर, फडके प्रकाशन, कोल्हापूर. 2. व्यावहारिक मराठी, डॉ.लीला गोविलकर, डॉ.जयश्री पाटणकर, स्नेहवर्धन प्रकाशन, पुणे 3. सुगम मराठी व्याकरण लेखन, मो.रा. वाळंबे, नितीन प्रकाशन पुणे	
Reference Books: 1. अनिवार्य मराठी व्याकरण, लेखन व आकलन, डॉ. प्रल्हाद लुलेकर, केदार काळवणे, Pearson पब्लिकेशन्स 2. मराठी व इंग्रजी अत्यावश्यक निबंध, प्रा.विजयकुमार वेधपाठक, K. Sagar पब्लिकेशन 3. उपयोजित लेखन, मराठी, प्राची शेंडे, सावली म्हात्रे, टारगेट पब्लिकेशन्स	





Modern Indian Language

2. Hindi

23MILE02	AEC	Hindi	2-0-0	2 Credits
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Teaching Scheme: Lecture: 2hrs/week	Examination Scheme: CA-I: 25 Marks CA-II: 25 Marks
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Pre-Requisites: Fundamental electronics & Fundamental Mathematics.

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop the awareness of Hindi language and relate the same to daily life and social media.
CO2	Identity Infinitive compounds in the given Marathi sentence.
CO3	Make use of Phrases and proverbs and form a sentence in Hindi language.
CO4	Identity the mistakes in grammar of Hindi language and corrections in it
CO5	Make use of rhetoric to form sentences in Hindi Language
CO6	Illustrate the prose and verse in the given literature

Course Contents:

अध्याय 01:हिंदी भाषा परीचय हिन्दी भाषा और उसका विकास, हिन्दी साहित्य काइतिहास, भाषाके , लिखितभाषा, रूप-वर्णमाला, विरामचिन्ह, शब्दरचना, अर्थ, वाक्यरचना, वर्णोंकाउच्चारणऔरवर्गीकरण	[5]
अध्याय 02:समास समास, क्रियाएँ, अनेकार्थीशब्द, विलोमशब्द, पर्यायवाचीशब्द,	[5]
अध्याय 03:मुहावरे एवं लोकोक्ति मुहावरेएवंलोकोक्ति, तत्समएवंतद्भव, देशज, विदेशी, वर्तनी, अर्थबोध	[4]
अध्याय 04:हिन्दी भाषा में प्रयोग होने वाली अशुद्धियाँ हिन्दी भाषा में प्रयोग होने वालीअशुद्धियाँ,अनेक शब्दों के लिएएकशब्द, रस	[5]
अध्याय 05:अलंकार अलंकार, छन्द, विशेषणऔरविशेष्य, भाषा-विज्ञान	[4]
अध्याय 06: भाषा-विज्ञान भाषा-विज्ञान, हिन्दीपद्य/गद्यरचनावरचनाकार, संज्ञासेअवयवतक, रिक्तस्थानोंकीपूर्ति, क्रमबद्धता.	[4]
Text Books: 1. हिंदीव्याकरण- पंकमताप्रसदगुरु, प्रकाशनसंस्था, नईदिल्ली 2. हिंदी साहित्यिक काविद्ग्यानिकइतिहास-डाँगणपतिचंद्रगुप्त, लोकभारतीप्रकाशन,नईदिल्ली	
Reference Books: 1. हिंदीभाषाशिक्षण-संपाहिंदीअध्ययनमंडल, सावित्रीबाईफुलेपुणेविश्विद्यालयपुणे, राजकमलप्रकाशन	





1. Linear Integrated Circuits

23ECMDA2	MDM	Linear Integrated Circuits	3-0-0	3-Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basic Electronics & Analog Circuit.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the characteristics of IC & op-amp parameters
CO2	Design linear and Nonlinear applications using op-amp
CO3	Compare different active filters using op-amp
CO4	Make use of op-amp to test various oscillators using op-amp
CO5	Make use of IC 555 and design multivibrators
CO6	Relate and implement different converters using op-amp

Course Contents:

<p>Unit 1: Introduction to op-amp Block diagram of OP-AMP, Explanations of each block, Differential Amplifier configurations, Differential amplifier analysis (DC) for dual-input balanced-output configuration using, level shifter, current mirror circuits, and Op-Amp parameters. OP-AMP configurations: Voltage Series Amplifier, voltage shunt amplifier.</p>	[6]
<p>Unit 2: Applications of op-amp Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtractor Circuit, Instrumentation amplifier, Precision Rectifiers, Comparators, Schmitt Trigger, Clippers & Clampers.</p>	[6]
<p>Unit 3: Active Filters Introduction, Analysis & Design of Butterworth filters: High Pass filter, Low Pass filter (First & Second order), Band Pass filter, Band Reject filter, All Pass Filter, Introduction to Chebyshev Filter.</p>	[6]
<p>Unit 4: Waveform Generators Analysis & Design of Square wave generator, Triangular wave generator, Sawtooth wave generator. Analysis & Design of RC phase shift oscillator, RC wein-bridge oscillator, Colpitts oscillator, Hartley oscillator.</p>	[6]
<p>Unit 5: Special Purpose ICs IC 555 Timer: Block Diagram, Operating Principle, Multi-vibrator using IC 555. IC 565 PLL: Operating Principles, applications, Introduction of (block diagram, features, and application areas): IC OP177 op-amp,</p>	[6]





Unit 6: System Design Using Op-amp Analog to digital Converter, Digital to analog Converter, V to I & I to V Converter, voltage to frequency converter, On off controller, proportional controller, PID Controller	[6]
Text Books: 1. Ramakant A. Gaikwad, “Op Amps and Linear Integrated Circuits”, Pearson Education second and latest edition	
Reference Books: 1. Robert Coughlin, Fredric Driscoll, “Operational Amplifiers and Linear Integrated Circuits”, Sixth edition, PE, 2006. 2. David Bell, “Operational Amplifiers and Linear ICs”, Third edition, Oxford University Press 3. B. Somanathan Nair, “Linear Integrated Circuits- Analysis, Design & Applications”, Wiley India 4. T.R Ganesh Babu, “Linear Integrated Circuits” 3rd Edition, Scitech Publication 5. David. A. John & Ken Martin “Analog Integrated Circuit Design”, Student Edition, Wiley 6. Sergio Franco “Design with op-amp & Analog Integrated Circuits”, 3rd Edition, Tata McGraw Hill. 7. S. Salivahanan & Bhaaskaran “Linear Integrated Circuits”, 1st Edition, Tata McGraw Hill.	





2. Mathematics for Data Science

23ECMDB2	MDM	Mathematics for Data Science	3-0-0	3-Credits
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Teaching Scheme: Lecture: 3 hrs/week	Examination Scheme: CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks
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Pre-Requisites: HSC Mathematics

Course Outcomes: At the end of the course, students will be able to:

CO1	Determine whether a given structure is vector space, subspace structure, determine basis and dimension of vector space
CO2	Solve algebra of linear transformations, convert a given linear transformation into matrix form.
CO3	Find the Orthogonalization in inner product space, apply diagonalization to find powers of matrices.
CO4	Illustrate and formulate fundamental probability distribution and density functions, as well as functions of random variable.
CO5	Apply different methods to find the correlation between the variables. Develop basic mathematical tools for regression analysis.
CO6	Apply various statistical tests to test the hypothesis.

Course Contents:

Unit 1:Vector spaces The n-dimensional vectors, Vector space, Subspace, Linear dependence & independence of vectors, Basis and dimension.	[6]
Unit 2:Linear transformations Definition, algebra of linear transformations, Inverse of a Linear transformation, Composition of a linear Transformation, Range and Kernal, Rank and nullity, Rank-Nullity theorem, Matrix representation of a linear transformation.	[6]
Unit 3:Eigen values, Eigen vectors and Inner product spaces Introduction to Eigen values and Eigen vectors of a matrix, Eigen Bases, Diagonalization, Inner product space, Norm of a vector, Normed vector space, Orthogonal and orthonormal sets, Gram Schmidt Orthogonalization process.	[6]
Unit 4:Basic Probability & Theoretical Probability Distributions Basic concepts of probability, Random variables, Probability distributions, Probability mass function, Probability density function, Binomial distribution, Poisson distribution, Normal distribution, Fitting of binomial & Poisson's distributions, Properties of binomial, Poisson and normal distributions.	[6]
Unit 5:Correlation &Linear Regression Analysis Introduction, Types of correlation, Karl Pearson's correlation coefficient, Spearman's rank	[6]



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correlation Coefficient, Probable errors. Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Coefficients of regression, Properties of regression coefficient.	
Unit 6: Applied Statistics Test of significance for Large sample size (z tests) for single mean, difference of means, single proportion, difference of proportions, Test of significance for small sample size(t test).	[6]
Text Books: 1. G. V. Kumbhojkar, Probability and Random Processes, C. Jamnadas and Co., 14th Edition, 2010 2. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010. 3. Stephen H. Friedberg, Linear algebra, 5 th Edition, by Pearson 4. David C lay, steven R lay, Linear algebra and its applications,5 th edition, pearson	
Reference Books: 1. Kishor S. Trivedi, Probability, Statistics with Reliability, Queuing and Computer Science Applications, Wiley India Pvt. Ltd, 2nd Edition, 2001. 2. Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh, An Introduction To Probability and Statistics, Wiley Publication, 2nd Edition, 2001 3. Seymour Lipschutz, Mark Lipson, Linear Algebra, 3 rd edition, Schaum's Outline 4. Infostudy's Linear algebra by Dr.A.P.singh , 3 rd edition 5. Murray Spiegel, John Schiller, R. ALU Srinivasan, Probability and Statistics, Schaum's Outlines, 4th Edition, 2013.	





3. Programming Logic Controller

23ECMDC2	MDM	Programming Logic Controller	3-0-0	3-Credits
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Teaching Scheme: Lecture: 3 hrs/week	Examination Scheme: CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks
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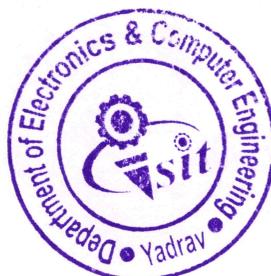
Pre-Requisites: : Fundamental electronics & Fundamental Mathematics.

Course Outcomes: At the end of the course, students will be able to:

CO1	Analyze the major components of a Programmable Logic Controller (PLC)
CO2	Illustrate the different parts of PLC.
CO3	Experiment with the PLC programming with different condition.
CO4	Make use of Ladder Logic for writing programs directly from narrative description
CO5	Experiment with Programming timers and counters
CO6	Illustrate the basics of SCADA.

Course Contents:

Unit 1: Introduction to PLC PLC: Characteristics, Operation, function, Types of PLC, Architecture Of PLC, Applications of PLC and PC v/s PLC.	[6]
Unit 2: PLC Hardware The I/O Section, Discrete I/O Modules, Analog I/O Modules, Special I/O Modules, I/O Specifications, The Central Processing Unit (CPU), Memory Design, Memory Types, Programming Terminal Devices, Recording and Retrieving Data, Human Machine Interfaces (HMIs), Power Supply.	[6]
Unit 3:PLC programming Processor Memory Organization, Program Scan, PLC Programming Languages, Relay-Type Instructions, Instruction Addressing, Branch Instructions, Internal Relay Instructions, Programming Examine If Closed and Examine If Open Instructions, Entering the Ladder Diagram, Modes of Operation.	[6]
Unit 4: Fundamental PLC Wiring Diagrams and Ladder Logic Programs: Electromagnetic Control Relays, Contactors, Motor Starters, Manually Operated Switches, Mechanically Operated Switches, Sensors, Output Control Devices, Seal-In Circuits, Latching Relays, Converting Relay Schematics into PLC Ladder Programs, Writing a Ladder Logic Program Directly from a Narrative Description.	[6]
Unit 5: Programming timers and Counters Mechanical Timing Relays, Timer Instructions, On-Delay Timer Instruction, Off-Delay Timer Instruction, Retentive Timer, Cascading Timers. Counter Instructions, Up-Counter, Down-Counter, Cascading Counters, Incremental	[6]




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Encoder-Counter Applications, Combining Counter and Timer Functions.	
Unit 6: Process Control, Network Systems, and SCADA: Types of Processes, Structure of Control Systems, On/Off Control, PID Control, Motion Control, Data Communications, Supervisory Control and Data Acquisition (SCADA).	[6]
Text Books: <ol style="list-style-type: none">1. Programming Logic Controllers: Frank Petruzella, McGraw Hills, 5th Edition2. Programmable Logic Controllers Principles and applications Webb John W. and Reis A. Ronald PHI, New Delhi, Latest edition3. Programmable Logic Controllers Bolton W. Elsevier India Pvt. Ltd. New Delhi4. Programmable Logic Controllers John R Hack worth Pearson education New Delhi, Latest edition	
Reference Books: <ol style="list-style-type: none">1. Process Control Instrumentation C. D. JOHNSON, John Wiley and Son2. Programmable Logic Controllers and Industrial Automation an Introduction Mitra, Madhuchanda; Gupta, Samarjit Sen Param International Publishing (India) Pvt. Ltd., New Delhi, Latest edition.	





**Aptitude Skills-II
(Verbal Ability)**

23HSSM03	VEC	Aptitude Skills-II	1-0-0	Audit
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Teaching Scheme: Lecture: 1 hrs/week	Examination Scheme: CA-I: 25 Marks CA-II: 25 Marks
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Pre-Requisites: Fundamental electronics & Fundamental Mathematics.

Course Outcomes: At the end of the course, students will be able to:

CO1	Apply sentence formation rules to spot the error
CO2	Solve the questions based on the types of tenses
CO3	Solve the questions based on Direct/Indirect Speech and Passive/active voice and Substitution and Elimination.
CO4	Make use of Proverbs, Idioms and phrases in sentence construction vocabulary.

Course Contents:

Unit1: Structure and Types of Sentences, Conditional Sentences.	[3]
Unit2: Present tense, Past tense, Future tense, Use of Tenses in Sentence forming	[3]
Unit 3: Direct and Indirect Speech, Active and Passive Voice Use of Modal verbs in Sentence Forming, Substitution and Elimination	[3]
Unit4: Use of Proverbs, Idioms and Phrases in Sentence Construction, Judgment and Inference Sentence Vocabulary Building in Various Situations.	[3]
Text Books: 1. Raymond Murphy, Essential English Grammar with Answers, Murphy. 2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017).	
Reference Books: 1. Rao and D.V. Prasada, Wren & Martin High School English Grammar and Composition Book, S. Chand Publishing, 2017. 2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press; Second edition.	





Language Skill- II

23HSSM04	VEC	Language Skill- II	0-0-2	1-Credit
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Teaching Scheme: Practical: 2hrs/week	Examination Scheme: CA-I: 25 Marks CA-II: 25 Marks
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Pre-Requisites: : Language Skill- I

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop programs using Functions.
CO2	Make use of Structures & Union to develop programs in C language.
CO3	Make use of Pointers to develop programs in C language.
CO4	Develop programs to perform various operations on files using File Handling.

Course Contents:

Experiment No.	Name of Experiment	
1	Develop programs on using different built-in functions.	[2]
2	Develop programs on using function without argument and without return category.	[2]
3.	Develop programs on using function with argument and without return category.	[2]
4	Develop programs on using function without argument and with return category.	[2]
5	Develop programs on using function with argument and with return category.	[2]
6	Develop programs using more than one used defined functions.	[2]
7	Develop programs on recursion.	[2]
8	Develop programs on Structure using various entities and size of structure.	[2]
9	Develop programs on array of structure.	[2]
10	Develop programs on structures and functions and compare structure and union.	[2]
11	Develop programs to display different data type of data and their addresses using pointer	[2]
12	Develop programs on pointer to array, pointer to structure, pointer to functions and pointer expressions.	[2]





13	Develop program to read, write and append data from a file.	[2]
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Text Books:

1. C Programming Absolute Beginner's Guide, Que Publishing; 3rd edition (22 August 2013)
2. C Programming Language, 2nd Edition, Pearson Publication

Reference Books

1. Programming in C Practical Approach by Ajay Mittal, Pearson.
2. Let Us C, By Yashwat Kanetkar.




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