SYLLABUS

FOR

INTERDISCIPLINARY SUBJECTS

(2013 SCHEME)

M.TECH / M.PLANNING/M.ARCH

University of Kerala

Thiruvananthapuram
LIST OF INTER DISCIPLINARY SUBJECTS - M.TECH/M.ARCH/M.PLANNING

1. ADI 3001  SUSTAINABLE DEVELOPMENT AND ARCHITECTURE
2. ADI3002  SUSTAINABLE INFRASTRUCTURE & TECHNOLOGY
3. ADI3003  EARTHQUAKE RESISTANT DESIGN AND MANAGEMENT
4. ADI3004  CLIMATOLOGY AND BUILT ENVIRONMENT
5. ADI 3005  URBAN DESIGN- THEORIES AND PRINCIPLES
6. BMI 3001  QUALITY AND SAFETY MANAGEMENT
7. BMI 3002  ENVIRONMENTAL ENGINEERING
8. BMI 3003  ENERGY ENGINEERING
9. BMI 3004  OPTIMISATION TECHNIQUES FOR ENGINEERS
10. BMI 3006  COMPUTATIONAL FLUID DYNAMICS
11. BMI 3007  ELEMENTS OF FINANCIAL MANAGEMENT
12. BMI 3008  ENTREPRENEURSHIP
13. CSI 3001  FINITE ELEMENT ANALYSIS
14. CSI 3002  MECHANICS OF COMPOSITES
15. CHI 3001  FUZZY SETS AND SYSTEMS IN ENGINEERING
16. CRI 3001  GEOINFORMATICS FOR INFRASTRUCTURE DEVELOPMENT
17. CGI 2001  GEOTECHNICAL ENGINEERING FOR INFRASTRUCTURE PROJECTS
18. CTI 3001  FUNDAMENTALS OF RELIABILITY ENGINEERING
19. CEI 3001  PHILOSOPHY OF TECHNOLOGY
20. CEI 3002  ENVIRONMENTAL MANAGEMENT
21. CEI 3003  ENVIRONMENT AND POLLUTION
22. EAI 3001  AUTONOMOUS POWER SYSTEMS
23. ECI 3001  CONTROL SYSTEMS
24. EGI 3001  INTRODUCTION TO NAVIGATION, GUIDANCE AND CONTROL
25. EMI 3001  BIOMEDICAL ENGINEERING
26. EPI3001  RENEWABLE ENERGY SOURCES AND TECHNOLOGY
27. EPI3002  ENERGY AUDITING & MANAGEMENT
28. EDI3001  SOLAR PHOTOVOLTAIC SYSTEM DESIGN
29. EII 3001  ARTIFICIAL NEURAL NETWORKS
30. EII 3002  ENGINEERING OPTIMIZATION
31. EII 3003  FUZZY SYSTEMS & APPLICATIONS
32. EII 3004  ADVANCED NUMERICAL TECHNIQUES FOR ENGINEERING
33. INI3001  BIOINFORMATICS
34. INI3002  SERVICE ORIENTED ARCHITECTURE
35. INI 3003  ADVANCED TECHNIQUES IN OPERATIONS RESEARCH
36. INI 3004  SERVICE ORIENTED ARCHITECTURE
37. INI 3005  ADVANCES IN E-COMMERCE
38. INI 3006  COMPONENT BASED TECHNOLOGY
39. INI 3007  INTELLIGENT SYSTEMS
40. MCI 3001  ARTIFICIAL INTELLIGENCE IN CIM
41. MCI 3002  ADVANCED NUMERICAL TECHNIQUES
42. MCI 3003  NANOTECHNOLOGY
43. MCI 3004  SURFACE ENGINEERING
44. MI I 3001  HEURISTICS FOR OPTIMIZATION
45. MII 3002  FINANCIAL MANAGEMENT
46. MII 3003  ORGANISATIONAL BEHAVIOUR
47. MII 3004  OPERATIONS RESEARCH
48. MII 3005: MANAGEMENT INFORMATION SYSTEMS
49. MDI 3001: APPLIED FINITE ELEMENT METHODS
50. MDI 3002: EXPERIMENTAL STRESS ANALYSIS FOR ENGINEERS
51. MPI 3001: COMPUTATIONAL FLUID DYNAMICS
52. MTI 2001: NUMERICAL METHODS
53. MRI 3001: ENERGY CONSERVATION IN REFRIGERATION AND AIR-CONDITIONING SYSTEMS
54. MRI 3002: ENERGY CONSERVATION IN BUILDINGS
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>55. MRI 3003</td>
<td>ENERGY CONSERVATION IN INDUSTRIAL PROCESSES &amp; EQUIPMENTS</td>
</tr>
<tr>
<td>56. RII 2001</td>
<td>.NET PROGRAMMING</td>
</tr>
<tr>
<td>57. RII 2002</td>
<td>JAVA PROGRAMMING</td>
</tr>
<tr>
<td>58. RCI 2001</td>
<td>OBJECT ORIENTED MODELING AND DESIGN</td>
</tr>
<tr>
<td>59. RCI 2002</td>
<td>SOFTWARE PROJECT MANAGEMENT</td>
</tr>
<tr>
<td>60. RCI 2003</td>
<td>BASIC DATA STRUCTURES AND ALGORITHMS</td>
</tr>
<tr>
<td>61. TMI 2001</td>
<td>FUZZY SYSTEMS AND APPLICATIONS</td>
</tr>
<tr>
<td>62. TAI 2001</td>
<td>MECHATRONICS</td>
</tr>
<tr>
<td>63. TSI 1001</td>
<td>ARTIFICIAL NEURAL NETWORKS</td>
</tr>
<tr>
<td>64. TEI 3001</td>
<td>EMBEDDED SYSTEMS</td>
</tr>
<tr>
<td>65. TEI 3002</td>
<td>REAL TIME OPERATING SYSTEM</td>
</tr>
<tr>
<td>66. TEI 3003</td>
<td>SOFTWARE ENGINEERING</td>
</tr>
<tr>
<td>67. TCI3001</td>
<td>MULTIMEDIA COMMUNICATION</td>
</tr>
<tr>
<td>68. TCI3002</td>
<td>FUZZY SYSTEM</td>
</tr>
<tr>
<td>69. TCI3003</td>
<td>MICROCONTROLLER BASED SYSTEM DESIGN</td>
</tr>
<tr>
<td>70. TNI 3001</td>
<td>NANO ELECTRONICS</td>
</tr>
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</table>
ADI 3001 SUSTAINABLE DEVELOPMENT AND ARCHITECTURE

Structure of the course:

Credits: 3
Lecture: 3 Hours/week
Internal Continuous Assessment: 40 marks
End Semester Examination: 60 marks

Course Objectives: - Understand the role of Architect/ professionals in construction industry towards deteriorating environmental quality through building design, construction and rapid urbanization. Examine the critical issues underlying the current and future environmental issues.

Learning Outcomes: The student will provide environmentally responsible solutions to problems encountered in construction industry. The course enables student to develop a critical awareness of the existing environmental rating systems and methods.

Module 1


Module 2

Components of Sustainability in buildings – Natural resource conservation; Water Conservation, need, methods, recycling, etc.- Solid waste management- sewage management – Methods and techniques for designing, constructing and maintaining Green buildings – Sustainable building materials – Green roofing – Xeriscape

Module 3

References


Structure of the Question Paper

For the End Semester Examination the question paper will have three questions (with sub-divisions) from each module out of which two questions are to be answered.
ADI3002 SUSTAINABLE INFRASTRUCTURE & TECHNOLOGY

Structure of the course:

Credits: 3
Lecture: 3 Hours/week
Internal Continuous Assessment: 40 marks
End Semester Examination: 60 marks

Course Objectives: - Understand the relationship between resource conservation and impact on environment. Examining the requirement to provide basic infrastructure facilities to urban/rural areas, like water supply, electricity, sewage, rain water collection, solid waste disposal, etc. Understand the critical sustainability issues underlying each of the basic amenities and their impact on the environment.

Learning Outcomes: The student understands the importance of providing sustainable infrastructure facilities while conceiving development projects. Practical application possibilities in providing sustainable infrastructure practices in regional context.

Module I

Water: Global needs, Regional needs, rational for shortage- methods of conservation-water recycling-water cycle-rain water-regional rain data-rain water harvesting, collection- rain water scenario in Kerala-sand mining- Xeriscape-concept of zero discharge building- Waste water; blue, grey and black water-purification techniques- water efficient toilets- recharge of ground water.

Module II

Electricity: Global, national and regional energy scenario- regional electricity needs, production and distribution- different sources of electricity production and its impact; Hydro, thermal, nuclear-possibilities using solar energy- building envelop, design techniques and electricity consumption pattern-technological inputs; LED, energy efficient appliances, energy rating, etc.- energy auditing- ECBC rules-Kyoto protocol- peak oil scenario.

Module III


Sewage management: present methods and techniques globally and in regional context- sewage plants-natural (bio) sewage management techniques.
References


Structure of the Question Paper

For the End Semester Examination the question paper will have three questions (with sub-divisions) from each module out of which two questions are to be answered.
AD13003 EARTHQUAKE RESISTANT DESIGN AND MANAGEMENT

Structure of the course:

Credits: 3
Lecture: 3 Hours/ week
Internal Continuous Assessment: 40 marks
End Semester Examination: 60 marks

Course Objectives: - To look at Earthquake risk for India. To examine the various earthquake mitigation measures adopted and practiced. Architectural detailing of earthquake resistant structures is also looked at.

Learning Outcomes: To create awareness among the students on disaster preparedness and management. The students are equipped to manage the hazardous situations.

Module I

Earthquake risk and hazard; Earthquakes – an overview; the Indian Perspective; Causes of earthquake; Strength of earthquakes-magnitude and intensity; Past experiences on the effect of earthquakes on building and soil; Seismic zonation maps; Earthquake philosophy

Module II

Management, Preparedness and mitigation - Predictability/ forecasting & warning, Community preparedness, retrofitting of existing structures, Population reduction in vulnerable areas, Awareness, Capacity building. Techno legal regime.

Module III

Earthquake resistant provisions at planning stage of buildings; Architectural detailing; Earthquake safe construction of timber structures, masonry structures, framed structures, steel structures; Codal provisions; Reduction of earthquake effects on buildings with case studies. Vernacular housing in seismic zones of India

References


5. Ministry of Home Affairs (MHA), (2004), National Programme for Capacity Building of Architects in Earthquake Risk Management (NPCBAERM), National Disaster Management Division (Government of India), New Delhi.


**Structure of the Question Paper**

For the End Semester Examination the question paper will have three questions (with sub-divisions) from each module out of which two questions are to be answered.
ADI3004  CLIMATOLOGY AND BUILT ENVIRONMENT

Structure of the course:

Credits: 3
Lecture: 3 Hours/week
Internal Continuous Assessment: 40 marks
End Semester Examination: 60 marks

Course Objective: - The course takes an overall view of the climate and its factors. Typologies of tropical climates and responses of traditional architecture to these climatic zones are also examined.

Learning Outcomes: The course introduces the students into various factors and parameters of climate. The student develops an understanding of climate responsive design.

Module I


Elements of Climate: Temperature, humidity, Wind, Precipitation – Measurements of climatic elements – Special characteristics and vegetation of a region – Graphical representation of climatic information – Micro and macro climate – Urban and rural climate – Site climate

Module II

Tropical climate – Classification of Tropical climates and its characteristics – warm-humid, warm humid island, hot dry desert, hot dry maritime desert, composite or monsoon and tropical upland climates – Climate of Kerala – Kerala rain data

Module III

Built environments shaped by the climate- Traditional solutions - Response by way of planning – Material selection- Techniques and Technology- Introduction to Climate Responsive Architecture.

References
2. B. Givoni, ‘Man, Climate and Architecture’
4. T.A. Markers & E.N. Morris, ‘Building Climate and Energy’
Structure of the Question Paper

For the End Semester Examination the question paper will have three questions (with sub-divisions) from each module out of which two questions are to be answered.
ADI 3005  URBAN DESIGN- THEORIES AND PRINCIPLES

Structure of the course:

Credits: 3
Lecture: 3 Hours/ week
Internal Continuous Assessment: 40 marks
End Semester Examination: 60 marks

Course Objectives: - Problems encountered due to rapid urbanization after industrial revolution is examined. Various theories that sought to solve the urban problems are studied. Current principles and trends in the practice of urban Design are examined.

Learning Outcome: The student will be introduced to how a city is shaped across time and space. The course intends to enable students to appreciate the various factors involved in the shaping, designing and functioning of cities. The course gives glimpses into the world of contemporary principles of Urban Design.

Module I

Brief historical overview- ancient cities – Greece –Rome- medieval cities- Industrial revolution slums-
City beautiful Movement- Garden City concept- world wars and aftermath on rise of modern cities-
skyscrapers- New York city.

Indian historical developments- principles of city and town planning- Indraprastha and Nine square plan of Jaipur-colonial cities- Chennai- Mumbai-Calcutta.

Module II

Introduction to theories of urban design- Place theory, linkage theory etc.- Post-modern urbanism,
Lynch’s ideas of good city form, imageability and memory, - public and private domains, suburbs and periphery- Privacy, Territoriality and Proxemic theory, Defensible spaces , ideas of community through design- ideas of smart growth- New Urbanism-landscape Urbanism.

Module III

Impact of digital revolution- Place making in the digital Age- Reconfiguring Urban space- Sustainable cities program- Studies on Density – Revitalization of brown field sites- Digital media as facilitator for participatory, sustainable urban design.
References

1. Paul D. Spierigen, ‘Architecture of towns and cities’
2. Edmund Bacon,” Design of Cities”.
3. Spiro Kostof,”Cities shaped”.

Structure of the Question Paper

For the End Semester Examination the question paper will have three questions (with sub-divisions) from each module out of which two questions are to be answered.

MODULE 2: Biosafety guidelines and regulations-FAO, WDA and DBT guidelines on biosafety-Containment of equipment and apparatus in biotechnology industry and research-Good Laboratory Practices-Biosafety levels-Containment in BSL-1, BSL-2, BSL-3 and BSL-4 levels-Design requirements and standard microbiological laboratory practices in each level-Design for Good Laboratory practices-Waste disposal-Shipping/Transportation and treatment of biohazardous materials and waste products-Decontamination of industrial and laboratory wastes-agents, selection and methods

MODULE 3: Hazards of genetic engineering-Biosafety for human health and environment-Social and ethical issues related to genetic engineering-Biosafety in relation to transgenic research, r-DNA guidelines and applications-Biosafety and cartagene protocol- Environmental monitoring of GM organisms and crops released into the environment

REFERENCES:
1. Dale H Besterfield “Total Quality Management” Pearson Education
4. F. P Lease “Loss Prevention in process plants” Butterworth London
5. G. L. Wells “Safety in Process Plants Design” IChem E/ Godwin
Question Paper
The end semester question paper totaling 60 marks shall have three questions of 10 marks each, from each of the three modules - out of which any two need to be answered. It shall have questions on problems/theory (50%) and applications (50%).
For continuous evaluation, a minimum of four assignments and two tests should be considered.
BMI 3002  
ENVIRONMENTAL ENGINEERING  3-0-0-3

MODULE 1: Characterization of waste-physical, chemical and biological-wastewater composition.
Treatment of wastewater by chemical and biological methods-Activated sludge process for treatment of wastewater-design of ASP.

MODULE 2: Solid-liquid separation- primary and secondary clarifier
Anaerobic treatment of wastes - kinetics of anaerobic treatment-sludge treatment and disposal.


REFERENCES:
1. Metcalf Eddy: Waste Water Engineering Treatment and Reuse
2. Karia Christian: Waste water Treatment
3. Foster C. F, John Ware D. A,” Environmental Biotechnology”, Ellis Horwood Ltd. 1987

Question Paper
The end semester question paper totaling 60 marks shall have three questions of 10 marks each, from each of the three modules - out of which any two need to be answered. It shall have questions on problems/theory (50%) and applications (50%).
For continuous evaluation, a minimum of four assignments and two tests should be considered.
MODULE 1: Energy-units of energy-conservation factors-general classification of energy-world energy resources and energy consumption- Indian energy resources and energy consumption-energy crisis-energy alternatives-electrical energy from conventional energy resources-internal combustion engines-steam turbines-gas turbines-hydro turbines (thermodynamic cycles not included)- nuclear reactors-thermal, hydel and nuclear power plants(process outlines only)-efficiency, merits and demerits of the above power plants-combined cycle power plants-fluidized bed combustion-small hydropower.


Energy conservation in chemical process plants-energy audit energy saving in heat exchangers, distillation columns, dryers, ovens and furnaces and boilers-steam economy in chemical plants-energy conservation in petroleum, fertilizer and steel industry-cogeneratio,pinch technology-recycling fro energy saving-electrical energy conservation in chemical process plants-environmental aspectsof energyuse.
REFERENCE
5. VenkataswarluD., Chemical technology, I.S. Chand.
6. Pandey G.N., A Text book on energy systems and engineering, Vikas pub
8. RaiG.D., Non-conventional energy sources, Khanna pub

Question Paper
The end semester question paper totaling 60 marks shall have three questions of 10 marks each, from each of the three modules - out of which any two need to be answered. It shall have questions on problems/theory (50%) and applications (50%).
For continuous evaluation, a minimum of four assignments and two tests should be considered.
Question Paper

The end semester question paper totaling 60 marks shall have three questions of 10 marks each, from each of the three modules - out of which any two need to be answered. It shall have questions on problems/theory (50%) and applications (50%).

For continuous evaluation, a minimum of four assignments and two tests should be considered.
BMI 3006

COMPUTATIONAL FLUID DYNAMICS 3-0-0-3

MODULE 1: Introduction of the governing equations of fluid mechanics- Conservation equations for mass, momentum, energy and chemical species- derivation of the governing equations- turbulence closure and mass transfer models- dimensionless form- simplified equations- introduction to compressible flow- Euler equation- conservative/ non conservative forms- computational fluid dynamics techniques.

MODULE 2: Matrices and linear equations- Gauss elimination methods-Tri Diagonal matrix algorithm, Iterative method-Introduction of finite difference method-discretisation- linearization of the governing equations-Linear wave equation, Burgers equation, Convection diffusion equation First and second order numerical methods such as upwind, Lax-Frederichs, Lax- Wendroff, Mac Cormack, etc.,.


Computer programs for solving – Navier-Stokes equations- Practical exposure to differenyt CFD packages for solving Navier- Stokes equation, Euler equation, etc.

REFERENCES:

Question Paper

The end semester question paper totaling 60 marks shall have three questions of 10 marks each, from each of the three modules - out of which any two need to be answered. It shall have questions on problems/theory (50%) and applications (50%).

For continuous evaluation, a minimum of four assignments and two tests should be considered.


MOODULE 3: Management of receivables-Optimum credit policy-Benefits and costs of credit extension-Costs-benefits trade-off-Aspects of credit policy-Credit limit-Collection procedures-Inventory management techniques-Economic order quantity-Re-order point-Selective inventory control-Computation of safety stocks-Statements of financial information-Financial statements-Balance sheet-Income statement-Standards of financial reporting-accounting principles and concepts-Statements of changes in financial position-Forms of the statement -Preparing the statement-Sources and uses of cash-Incorporating all financial resources-Financial analysis-Ratio analysis-Types of ratios-Limitations of ratio analysis-Budgeting-Purposes-Essentials of

REFERENCES:

**Question Paper**
The end semester question paper totaling 60 marks shall have three questions of 10 marks each, from each of the three modules - out of which any two need to be answered. It shall have questions on problems/theory (50%) and applications (50%).

For continuous evaluation, a minimum of four assignments and two tests should be considered.
BMI 3008

ENTREPRENEURSHIP  3-0-0-3

MODULE 1

Entrepreneurial Competence: Entrepreneurship concept-Entrepreneurship as a career - Entrepreneur-Personality characteristics of successful entrepreneur-types of entrepreneurs-entrepreneurs Vs managers-knowledge skills required for as entrepreneur-successful entrepreneurs in India - Technocrats -women entrepreneurs.

Entrepreneurial Environment: Business environment - Role of Family & society - external and internal factors - entrepreneurship development & training-entrepreneurship training institutes and their role in entrepreneurial development - Central State govt. industrial policies and regulators.

MODULE 2


MODULE 3


Role of agencies in development of industries & rehabilitation of units: Role of Banks in Financing industries - SIDBI - IDBI-DIC-TIIC-SIDCO-TIDCO-SISI-NSIC- Banks, Licensing procedure-Industrial subsides-sickness-causes of sickness-prevention of sickness in small industries-Govt. role

References:
Question Paper
The end semester question paper totaling 60 marks shall have three questions of 10 marks each, from each of the three modules - out of which any two need to be answered. It shall have questions on problems/theory (50%) and applications (50%).
For continuous evaluation, a minimum of four assignments and two tests should be considered.
CSI 3001                      Finite Element Analysis

Structure of the Course

Lecture : 3 hrs/ Week          Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination      : 60 Marks

Course Objectives

• To provide an understanding of fundamental knowledge and technique of FEM
• To develop tools to analyse engineering problems using FEM and typical commercial
  FEA package.

Learning Outcomes

• Will be able to analyse and build FEA model for various engineering problems.
• Can be extended to the dynamic analysis of structures

Module I

Basics of elasticity- Equations of equilibrium- Strain-displacement relation- stress-strain
(constitutive) relation- Energy principles- Principle of virtual work- Principle of stationary
potential energy- Variational formulation- Rayleigh-Ritz method- Introduction to weighted
residual methods- Evolution of FEM- Review of direct stiffness method- Outline of the FE
procedure.

Module II

Element properties- Displacement functions- convergence requirements- equilibrium and
compatibility in the solution- Development of equilibrium equation- Types of finite elements-
Development of shape functions for truss, beam and frame elements- CST, LST- Lagrange and
Serendipity elements- Plane stress and plane strain problems- Gauss quadrature technique-
Development of stiffness matrix for truss and beam elements.
Module III

Development of consistent nodal load vector- patch test- static condensation- Concept of isoparametric formulation- Line element- Plane bilinear element- Subparametric and superparametric elements- Assembly procedure and storage techniques of stiffness matrix, Application of boundary conditions- Solution techniques of equilibrium equation- Introduction to plate and shell elements- Types of 3D elements- Discussion of finite element packages.

References

Structure of the question paper
For the end semester examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
CSI 3002  Mechanics of Composites

Structure of the Course

Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives:

Composite materials are finding immense application in the field of aerospace, automobile and Civil engineering presently due to its outstanding material capability. It is required for the present structural engineers to know the fundamentals of composite material for designing composite structures in various fields.

Learning Outcomes:

• An ability to identify the properties of fiber and matrix materials used in commercial composites, as well as some common manufacturing techniques.
• A basic understanding of linear elasticity with emphasis on the difference between isotropic and anisotropic material behavior.
• An ability to predict the failure strength of a laminated composite plate.
• An ability to use the ideas developed in the analysis of composites towards using composites in aerospace design.

Module I

Introduction. Composite Fundamentals: Definition of composites, Objectives, constituents and Classification of composites based on size (macro, micro, nano); structure (multilayered and multiphase); fibre architecture- linear, 2D, 3D, nd , matrix material (PMC,MMC,CMC, CC). General Characteristics of reinforcement- classification, terminology used in fibre science, General fibres- Glass, carbon, aramid, polyethylene, boron. Polymer matrix composites- Thermoplastics and thermosetting resins; mechanical properties, glass transition. Carbon fibre/epoxy, carbon fibre/PEEK, glass fibre/polyester, phenolic, epoxy, polyimide,
cyanate ester composites. Concept of A stage, B stage and C stage. Structural applications of Composite Materials, Manufacturing Processes.

**Module II**


**Module III**


**References**

3. Calcote, L. R., Analysis of Laminated Composite structures, Van Nostrand, 1969

**Structure of the Question paper**

For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
Structure of the Course

Lecture : 3hrs/week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

- To make the students familiar with the concepts of fuzzy sets.
- To familiarize the students with fuzzy relations and membership functions.
- To study the applications of fuzzy sets in the field of water resources engineering.

Learning Outcomes

- The students will be able to understand the principals of fuzzy systems.
- They will be able to design fuzzy systems using various approaches.
- Students will learn the applications of fuzzy systems in water resources

Module I
Fuzzy systems- concept of fuzzy set- fuzziness and randomness, types of uncertainty linguistic variables and Inference rules – Definition of fuzzy set, membership functions, basic concepts, extension principle - Operation on fuzzy sets, complement, union, intersection, combinations, Aggregation – Fuzzy numbers

Module II
Fuzzy relations – max min and max product composition-binary relations on a single set, transitive closure – Fuzzy relation equations, solution- fuzzy relation in n dimensions, projections, cylindric extension -Construction of membership functions, Direct and Indirect methods- single and multiple experts

Module III
Fuzzy logic control systems – structure and operation, fuzzification and defuzzification methods – applications. Fuzzy decision making – fuzzy linear and dynamic programming – applications. Fuzzy measures- Belief and Possibility measures, probability measures, possibility and necessity measures.
References

Structure of the Question Paper
For the End Semester Exam, there will be three questions from each module out of which two questions are to be answered by the students.
CRI 3001  Geoinformatics for Infrastructure Development

Structure of the Course
Lecture: 3 hrs/ Week     Credits: 3
Internal Continuous Assessment: 40 Marks
End Semester Examination : 60 Marks

Course Objective

- Expose the students with concept of GIS and remote sensing
- To provide exposure to the applications of GIS and Remote sensing for infrastructure development

Learning outcome

- The ability to understand various satellite images and GIS Techniques and its application in infrastructure development

Module I

Module II
Introduction to GIS: Geographical concepts and terminology, Components of GIS, Various GIS packages and their salient features, Applications of GIS. Spatial and non-spatial data, Vector and raster data, Coordinate Systems: Geographic coordinate systems-approximations of earth, ellipsoid and geoid models, Datum-geodetic and vertical, coordinate transformation, Map projections-concepts and properties, Data input and editing: Methods of data input, Spatial data editing. Vector data analysis-buffering, overlay, slivers, Raster data analysis- categories, Data visualization: cartographic symbolization, types of maps, map design, map production
Module III
Applications: Land use/ Land cover mapping, Network Analysis-Pipeline, sewer line, power line, road network, telecommunication DEM/DTM, water conveyance system, Suitable site for-land filling, water treatment plant, power grid, recreations, public buildings such as schools, colleges, hospitals, post offices etc, residential area.

References:
Structure of the Question paper

There will be three questions from each module out of which two questions are to be answered by the students.
CGI 2001  Geotechnical Engineering for Infrastructure Projects

Structure of the Course

Lecture: 3 hrs/Week  Credits: 3
Internal Continuous Assessment: 40 Marks
End Semester Examination: 60 Marks

Course Objectives

• General awareness of the versatile foundation requirements of infrastructure projects.
• Detailed knowledge of the requisite data for arriving at foundation choices
• Selection of right foundation for the structure.

Learning Outcomes

• Ability to choose the right foundation.
• Ability to design foundations for few typical situations.
• Understand the foundation demands (forces) of various structures.

Module I

Foundations for infrastructure facilities – requirements, types, suitability, selection.
Investigation for infrastructure projects: methods, data required, investigation planning, selection
of investigation types, obtaining and analysis of field data with special reference to IS code
provisions. Foundations for building infrastructure: Choice between shallow and deep
foundations (Piles, wells, large diameter drilled shafts), Types of shallow and deep foundations,
selection.

Module II

Design of deep and shallow foundations for typical cases. Foundations on rocks. Shallow
foundations on rock, rock socketed piles, IS code provisions. Equipment for deep foundation
construction. Foundations for power infrastructure: Dams, penstock supports, transmission line
towers. Foundations for transport infrastructure: embankments supporting transport structures,
application of soil reinforcement in embankments and retaining walls.
Module III


References


Structure of the Question paper

For the End Semester Examination there will be three questions from each module out of which two questions from each module are to be answered by the students.
CTI 3001                Fundamentals of Reliability Engineering

Structure of the Course

Lecture : 3 hrs/ Week          Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

• Understanding the concept of reliability in engineering
• Understanding the principles of engineering design
• Understanding reliable designs

Learning Outcomes

• Awareness of underlying principles of reliability
• Applying reliability principles to engineering design
• Conducting case studies on reliable design

Module I

Reliability Engineering: basic principles, elements of probability theory, elements of statistical theory, general stochastic processes, statistical failure models, system reliability, reliability improvement, maintainability and availability, fault tree analysis, failure mode effect analysis, reliability physics models.

Module II

Engineering Design: Introduction to engineering design, design morphology, production process & material selection; Concept of load, strength optimisation and safety; Product life cycle, design and development, risk reliability, product liability; Failure analysis techniques, Case histories of failures; Quality Control.

Module III

Reliable design: Design for maintenance; Ergonomics in design, probabilistic concept in design. Cost evaluation and economic decision making; Case studies: reliability design process in civil engineering systems.
**Reference**

2. Lewis, E., Introduction to Reliability Engineering, Wiley

**Structure of the Question paper**

For the end Semester Examination there will be three questions from each module out of which two questions are to be answered by the students.
CEI 3001 Philosophy of Technology

Structure of the Course
Lecture : 3hrs/week       Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course objectives
• To give a broader perspective about the evolution of technology and role of technology in human life.

Learning outcomes
• Students are able to perform the duties of teacher with broader perspective of ecological and cultural background.

Module I
Scope of Technology- Scope and subdivisions of philosophy- scope and historical development of philosophy of science and technology- Ethics and interpersonal relationship in engineering – IQ- Vs EQ – Ergonomics. Thoughts on technology: Martin Heidegger, Karl Marx and Mahatma Gandhi.

Module II

Module III
References


Structure of the Question paper

For the End Semester Exam, there will be three questions from each module out of which two questions are to be answered by the students.
CEI 3002 Environmental Management

Structure of the course
- Lecture: 3 hrs/week Credits: 3
- Internal Continuous Assessment : 40 Marks
- End Semester Examination : 60 Marks

Course Objective
- To create an attitude towards conserving our environment irrespective of the student’s field of study or work
- To induce sense of responsibility towards good environmental management and practice good environmental ethics
- To identify the impact on environment as a whole due to a product manufacture or a major policy decision

Learning outcomes
- Understand various environmental issues and its causes
- Identify different environmental management tools and apply depending on the need of the hour
- Familiarising with ISO14001

Module I
Importance of environmental management, Impact of Man on environment, Interdisciplinary nature of environmental education, Role of media in environmental education, Major environmental issues - Acid rain, Global warming, Greenhouse effects, Ozone layer depletion, Environmental Ethics, Policy and legal aspects – Environmental laws and legislation in India.

Module II

Module III
Tools of environmental management – EIA - Purpose of EIA, Steps in EIA, Different methods of conducting EIA (brief introduction only) Life cycle assessment-Steps in LCA, Scope of LCA,
Code of good conduct of LCA Environmental auditing,-Objectives and scope, Types of environmental audit, Basic Structure of EA, EA steps, Elements of EA Environmental Management system specification standard ISO 14001, Steps in establishing an EMS.

References

Structure of the Question paper
For the end Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
CEI 3003 Environment and Pollution

Structure of the Course
Lecture : 3hrs/week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To impart knowledge why environmental problems arise and why they should be tackled
• To make the students aware about the importance of protection of environment
• Generates curiosity, creativity, competence and compassion in students

Learning Outcomes
• To develop a deeper concern for the environment and a sense of commitment and responsibility to take proactive actions
• To develop necessary skills and attitudes and motivate them to work together and individually for a better man-nature relationship
• To create a society of motivated citizens to strive towards a life in perfect harmony with nature

Module I

Module II
Natural resources of environment- Water, land and energy- Environmental Ethics- Social, economical and environmental dimensions of sustainable development. Water pollution-Characteristics- Sources- Effects- Air pollution- Sources- Types- Effects- Solid waste Management-Landfill-Incineration-Composting

Module III
Population explosion- Effects- Global and Indian scenario- Key features of National population policy. Global environmental issues- Green House Effect, Global warming, Ozone layer depletion, Acid rain, Deforestation. Introduction to the applications of Remote sensing and GIS in environmental engineering
References

Structure of the Question paper
For the End Semester Exam, there will be three questions from each module out of which two questions are to be answered by the students.
Structure of the course

Lecture: 3Hrs /Week
Internal Assessment: 40 Marks.
End semester Examination: 60 Marks.

Credits: 3

Course Objective: Objectives of the course is to introduce autonomous power systems to students

Module -1
Classification of EES systems - Roles of electrical energy storage (EES) system – Emerging needs for EES - Types and features of energy storage systems Mechanical storage systems - Pumped hydro storage (PHS) - Compressed air energy storage (CAES) - Flywheel energy storage (FES) - Electrochemical storage systems: Secondary batteries - Flow batteries - Chemical energy storage: Hydrogen (H2) - Synthetic natural gas (SNG) - Electrical storage systems: Double-layer capacitors (DLC) - Superconducting magnetic energy storage (SMES) - Thermal storage systems - Standards for EES - Technical comparison of EES technologies

Module -2
Captive Power Plants: Selection Considerations - Diesel Generator Captive Power Plants – Comparison of different types of captive power plants - Selection and Installation Factors - Sizing of a Genset: High Speed Engine or Slow/Medium Speed Engine, Capacity Combinations, Air Cooling Vs. Water Cooling, get over-heated during summer months - Safety Features - Parallel Operation with Grid- Maximum Single Load on DG Set - Unbalanced Load Effects - Neutral Earthing - Site Condition Effects on Performance Derating - Operational Factors - Load Pattern & DG Set Capacity - Sequencing of Loads - Load Pattern - Load Characteristics - Power Factor - Unbalanced Load Transient Loading

Module -3
SMPS- Characteristics – Steady state Analysis - Control methods:-Design of feedback compression
UPS: Necessity - types - typical layouts of UPS. Stand alone high quality Electronics Power Supplies
Combined Cycle Power Plant: Introduction - Typical cycles - Gas Turbine - Gas as Turbine
HRSG Systems - Steam Turbine - Combined Cycle Plants - Availability and reliability

References:
4. Current Literature

Structure of the question paper
The question paper contains three questions from each module out of which two questions are to be
ECI3001

CONTROL SYSTEMS

Structure of the course

Lecture : 3 hrs/week
Internal Assessment : 40 Marks
End semester Examination : 60 Marks

Course objectives

1. To provide a strong foundation on classical and modern control theory.
2. To provide an insight into the role of controllers in a system.
3. To design controllers in the state space domain.
4. To study the essentials of Non-linear control.
5. To extend the analysis techniques for classical control theory to nonlinear system.
6. To analyse the physical system with inherent non-linearity for stability and performance.

Learning Outcomes

Upon successful completion of this course, students will be able to:-

1. Analyse a given system and assess its performance.
2. Realise a linear system in state space domain and evaluate controllability and observability.
3. Use tools including graphical and analytical for analysis of nonlinear control systems.
4. Use a complete treatment of design concepts for linearization via feedback.

Module I

Open loop-and closed loop control systems:-Introduction to state space -TF and state space model of simple - Mechanical and Electromechanical systems – Force voltage and force current analogy - block diagram representation – block diagram reduction - signal flow graph - Mason's gain formula - characteristics equation. State equation of linear continuous time systems, matrix representation of state equations. Phase variable and canonical forms of state representation- solution of time invariant autonomous systems- state transition matrix- relationship between state
equations and transfer function. Properties of state transition matrix- controllability & observability. State feedback design via pole placement technique.

Module II


Module III


References


Structure of the question paper

For the end semester examination, the question paper consists of at least 60% problems and derivations. The question paper contains three questions from each module (excluding the review part) out of which two questions are to be answered by the student.
EGI3001  INTRODUCTION TO NAVIGATION, GUIDANCE AND CONTROL
3-0-0-3

Structure of the Course

Lecture : 3 hrs/week                                    Credits : 3
Internal Continuous Assessment : 40 marks
End Semester Examination : 60 marks

Course Objective
To impart basic ideas of navigation, guidance and control of aerospace vehicles.

Learning Outcomes

Upon successful completion of this course, students will have fundamental understanding of the processes of navigation, guidance and control of aerospace vehicles.

Module I
Introduction to the concepts of navigation guidance and control. General principles of early conventional navigation systems. Geometric concepts of navigation. Reference frames. Direction cosine matrix, Euler angles, Quaternion representation in co-ordinate transformation. Comparison of transformation methods, GPS and GNSS.

Module II
Inertial navigation- block diagram- inertial sensors-Gyros - Principle of operation- Accelerometer- principle of operation-Inertial platforms-stabilised platforms-gimballed and strap down INS.

Module III
Stabilization and Control of space crafts, Missile control systems and Autopilots, Launch vehicle flight control systems. Longitudinal and lateral autopilots for aircraft. Radar systems-Command and Homing guidance systems
References


Structure of the Question paper

For the end semester examination, the question paper contains three questions from each module out of which two questions are to be answered by the student.
Structure of the course

Lecture: 3 hrs/week  
Credits: 3

Internal continuous assessment: 40 Marks

End Semester Examination: 60 Marks

Course Objectives

1. To give an introduction to Biomedical Engineering.
2. To introduce the students with modern instruments used for various diagnostic and therapeutic applications.

Learning Outcomes

Upon successful completion of the course, the students will be able to provide sufficient theoretical background for operation and maintenance of modern biomedical equipments used in clinical practice.

Module I

Introduction to biomedical engineering, Various branches of biomedical engineering, transducers and electrodes used in biomedical engineering, Biomechanics and Biomaterials—Mechanical properties of bone and soft tissues, Visco-elasticity analysis of forces in skeletal joints, Biocompatibility, Characteristics of an ideal biomaterial, Metals, Polymers and Ceramics.

Module II


Module III

Therapeutic Equipments, Cardiac pacemakers, Defibrillators, haemodialysis machines and diathermy machines. Instrumentation for clinical laboratory, Measurement of PH value of blood.

References


Prerequisite: Basic knowledge in electronic instrumentation.

Structure of the question paper

For the end semester examination, the question paper contains three questions from each module out of which two questions are to be answered by the student.
EPI3001  RENEWABLE ENERGY SOURCES AND TECHNOLOGY  3-0-0-3

Structure of the course

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<td>End semester Examination</td>
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Credits: 3

Course Objective

This subject provides sufficient knowledge about the promising new and renewable sources of energy so as to equip students capable of working with projects related to it and to take up research work in connected areas.

Learning Outcomes

Upon successful completion of this course, students will be able to compare different renewable energy techniques and choose the most appropriate based on local conditions.

Module I


Fuel Cell: Principle of working, construction and applications.

Module II


Microhydel: Operating principles, components of a microhydel power plant. types and characteristics of turbines, selection and modification, load balancing.
Module III

Biomass: Operating principles, combustion and fermentation, types of biogas plants, applications, bio diesel

Ocean Energy: Ocean energy resources, principles of ocean thermal energy conversion systems, ocean thermal power plants- wave energy, characteristics, energy and power from the waves, wave energy conversion devices. Tidal power, energy estimation, site selection, types, tidal power plants.

Geothermal energy: Types of geothermal energy sites, site selection, geothermal power plants.

References


Structure of the question paper

For the end semester examination, the question paper contains three questions from each module out of which two questions are to be answered by the student.
EPI3002 ENERGY AUDITING & MANAGEMENT 3-0-0-3

Structure of the course

Lecture : 3 hrs/week
Internal Assessment : 40 Marks
End semester Examination : 60 Marks

Credits: 3

Course Objective
Understanding, analysis and application of electrical energy management-measurement and accounting techniques-consumption patterns- conservation methods-application in industrial cases.

Learning Outcomes
Upon successful completion of this course, students will be able to manage energy consumption efficiently and to apply energy conservation method in industries.

Module I
System approach and End use approach to efficient use of Electricity; Electricity tariff types;
Energy auditing: Types and objectives-audit instruments.
Electric motors-Energy efficient controls and starting efficiency-Motor Efficiency and Load Analysis- Energy efficient /high efficient Motors-Case study; Load Matching and selection of motors.
Variable speed drives; Pumps and Fans-Efficient Control strategies- Optimal selection and sizing -Optimal operation and Storage; Case study

Module II
Transformer Loading/Efficiency analysis, Feeder/cable loss evaluation, case study.
Peak Demand controls- Methodologies-Types of Industrial loads-Optimal Load scheduling-case study.

Module III

Cogeneration-Types and Schemes-Optimal operation of cogeneration plants-case study; Electric loads of Air conditioning & Refrigeration-Energy conservation measures- Cool storage. Types-Optimal operation-case study; Electric water heating-Gysers-Solar Water Heaters- Power Consumption in Compressors, Energy conservation measures; Electrolytic Process; Computer Controls- software-EMS

References


Structure of the question paper

For the end semester examination, the question paper contains three questions from each module out of which two questions are to be answered by the student.
Structure of the Course

Lecture: 3 hrs/week
Internal Continuous Assessment: 40 Marks
End Semester Examination: 60 Marks

Course Objective

Fundamentals, design and application of solar photovoltaic systems for power generation on small and large scale electrification.

Learning Outcomes

Upon successful completion of the course the students will be able to understand and apply

1. The principle of solar energy conversion to electric power using PV technology.
2. The structure, materials and operation of solar cells, PV modules, and arrays.
3. The socio-economic and environmental merits of photovoltaic systems for a variety of applications.
4. The prospects of photovoltaic technology for sustainable power generation.
5. The concept of achieving high penetration of photovoltaic systems into the utility grid while maintaining or improving the power quality and the reliability of the grid.

Module I

Introduction to Solar energy: solar insolation vs. world energy demand, current energy consumption from different sources, environmental and health effects; Sustainable Energy: production and storage, resources and utilization.

Module II


Principles of designing high-quality PV systems: load, suitability, site adequacy, weather, system balance, additional considerations. Classification of PV system - Classification - Stand-alone PV system, Grid-Interactive PV System, Small system for consumer applications, Hybrid solar PV system.

Module III

System pre-sizing: load profile, solar radiation analysis, photovoltaic energy calculation, sizing of PV, battery bank, inverter, wires, cables and fuses.

Power considerations and system design – Array integration: mechanical integration, electrical integration, utility integration. Permits and Inspection . Commissioning, maintenance and troubleshooting. Economic analysis , environmental aspects of PV power systems.

Solar Energy Grid Integration Systems (SEGIS)- High PV Penetration and the Utility Distribution System – Approaches to enable high penetration of PV-Value analysis of SEGIS.

References


**Structure of the Question paper**

For the end semester examination, the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
EII 3001  ARTIFICIAL NEURAL NETWORKS

Structure of the course

Lecture : 3hrs/week Credits: 3

Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objective

To provide an idea about artificial neural networks

Learning Outcomes

Upon successful completion of this course, students will be acquainted with Neural Networks, various Learning Algorithms, and applications.

Module I


Module II


Module III

References

2. Christopher M. Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995

For the end semester exam (50 marks), the question paper shall have six questions of 10 marks each covering entire syllabus out of which any five shall be answered. It shall have 75% problems & 25% Theory. For the Internal marks of 50, two tests of 20 marks each and 10 marks for assignments (Minimum two) /Term Project.

Structure of the Question paper

For the end semester examination, the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
EII3002 ENGINEERING OPTIMIZATION

Structure of the course

Lecture : 3 hrs/week Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objective

Familiarising different optimization procedures to solve a wide variety of problems which can be applied to different fields

Learning Outcomes

Upon successful completion of this course, students will be able to apply optimisation techniques for various applications in engineering

Module I


Module II

Nonlinear programming- Unconstrained optimization techniques-Direct search methods-Descent methods -Constrained optimization - Direct and Indirect methods - Kuhn tucker conditions.

Module III

References


Structure of the Question paper

For the end semester examination, the question paper will consist of three questions from each module out of which two questions are to be answered by the students
EII3003     FUZZY SYSTEMS & APPLICATIONS

Structure of the course

Lecture : 3 hrs/week   Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objective

Knowledge about fuzzy systems.

Learning Outcomes

Upon successful completion of this course, students will be able to apply fuzzy systems for different applications.

Module I

Introduction to Fuzzy sets and systems. Basics of fuzzy sets, membership function, support of a fuzzy set, height - Normalised fuzzy set, alpha- cuts (decomposition of a fuzzy set), set theoretic definitions on fuzzy sets, complement, intersection and union equality, subsethood - basic definition based on membership functions. The law of the excluded middle and law of contradiction on fuzzy sets. Properties of fuzzy sets operations (logical proof only). Extension of fuzzy sets concepts - Type-2 and Level-2 Fuzzy sets - examples.

Module II

Module III


References


Structure of the Question paper

For the end semester examination, the question paper will consist of three questions from each module out of which two questions are to be answered by the students
Structure of the course

Lecture : 3 hrs/week
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objective

Overview of different numerical techniques.

Learning Outcomes

Upon successful completion of this course, students will be able to apply advanced numerical techniques for engineering problems.

Module I


Module II


Module III

References


Structure of the Question paper

For the end semester examination, the question paper will consist of three questions from each module out of which two questions are to be answered by the students
**Structure of the course**

Lecture: 3 Hrs/Week  
Internal Assessment: 40 Marks.  
End semester Examination: 60 Marks.

**Course Objective:** This subject provides sufficient knowledge about the promising new and renewable sources of energy so as to equip students capable of working with projects related to it and to take up research work in connected areas.

**Module 1**
- Fuel Cell: Principle of working, construction and applications.

**Module 2**
- Microhydro: Operating principles, components of a microhydro power plant. Types and characteristics of turbines, selection and modification, load balancing.

**Module 3**
- Biomass: Operating principles, combustion and fermentation, types of biogas plants, applications, bio diesel
- Ocean Energy: Ocean energy resources, principles of ocean thermal energy conversion systems, ocean thermal power plants- wave energy, characteristics, energy and power from the waves, wave energy conversion devices. Tidal power, energy estimation, site selection, types, tidal power plants.
- Geothermal energy: Types of geothermal energy sites, site selection, geothermal power plants.

**Reference**

**Structure of the question paper**

The question paper contains three questions from each module out of which two questions are to be answered by the student.
Structure of the course

Lecture: 3 Hrs  
Credits: 3

Internal Assessment: 40 Marks.
End semester Examination: 60 Marks.

Course Objective: Understanding, analysis and application of electrical energy management-measurement and accounting techniques-consumption patterns-conservation methods-application in industrial cases.

Module 1

System approach and End use approach to efficient use of Electricity; Electricity tariff types; Energy auditing: Types and objectives-audit instruments.
Electric motors-Energy efficient controls and starting efficiency-Motor Efficiency and Load Analysis-Energy efficient/high efficient Motors-Case study; Load Matching and selection of motors.
Variable speed drives; Pumps and Fans-Efficient Control strategies-Optimal selection and sizing-Optimal operation and Storage; Case study

Module 2

Transformer Loading/Efficiency analysis, Feeder/cable loss evaluation, case study.
Peak Demand controls-Methodologies-Types of Industrial loads-Optimal Load scheduling-case study.

Module 3:

Cogeneration-Types and Schemes-Optimal operation of cogeneration plants-case study; Electric loads of Air conditioning & Refrigeration-Energy conservation measures-Cool storage. Types-Optimal operation-case study; Electric water heating-Gysers-Solar Water Heaters-Power Consumption in Compressors, Energy conservation measures; Electrolytic Process; Computer Controls-software-EMS

References


**Structure of the question paper**

The question paper contains three questions from each module out of which two questions are to be answered by the student.
**Structure of the course**

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**Course Objective:** Objectives of the course is to introduce autonomous power systems to students

**Module -1**

Classification of EES systems - Roles of electrical energy storage (EES) system – Emerging needs for EES - Types and features of energy storage systems Mechanical storage systems - Pumped hydro storage (PHS) - Compressed air energy storage (CAES) - Flywheel energy storage (FES) - Electrochemical storage systems: Secondary batteries - Flow batteries - Chemical energy storage: Hydrogen (H2) - Synthetic natural gas (SNG) - Electrical storage systems: Double-layer capacitors (DLC) - Superconducting magnetic energy storage (SMES) - Thermal storage systems - Standards for EES - Technical comparison of EES technologies

**Module -2**

Captive Power Plants: Selection Considerations - Diesel Generator Captive Power Plants – Comparison of different types of captive power plants - Selection and Installation Factors - Sizing of a Genset: High Speed Engine or Slow/Medium Speed Engine, Capacity Combinations, Air Cooling Vs. Water Cooling, get over-heated during summer months - Safety Features - Parallel Operation with Grid- Maximum Single Load on DG Set - Unbalanced Load Effects - Neutral Earthing - Site Condition Effects on Performance Derating - Operational Factors - Load Pattern & DG Set Capacity - Sequencing of Loads - Load Pattern - Load Characteristics - Power Factor - Unbalanced Load Transient Loading

**Module -3**

SMPS- Characteristics – Steady state Analysis - Control methods:-Design of feedback compression

UPS: Necessity - types - typical layouts of UPS. Stand alone high quality Electronics Power Supplies

Combined Cycle Power Plant: Introduction - Typical cycles - Gas Turbine - G as Turbine

HRSG Systems - Steam Turbine - Combined Cycle Plants - Availability and reliability

**References:**

8. Current Literature

**Structure of the question paper** The question paper contains three questions from each module out of which two questions are to be answered by the students.
INI 3002 BIOINFORMATICS

Structure of the Course

Lecture : 3 hrs/ Week                              Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

• To impart knowledge on various techniques of Bioinformatics.
• Learn the key tools used in bioinformatics

Learning Outcomes

• Understand the basics and special topics of bioinformatics
• Understand sequence analysis and secondary structure predictions
• Understand mapping and sequence

Module I

Introduction to Genomic data and Data Organization: Sequence Data Banks - Introduction to sequence data banks - protein sequence data bank, NBFR-PIR, SWISSPROT, Signal peptide data bank, Nucleic acid sequence data bank - GenBank, EMBL nucleotide sequence data bank, AIDS virus sequence data bank. RRNA data bank, structural data banks - Protein Data Bank (PDB), The Cambridge Structural Database (CSD) : Genome data bank - Metabolic pathway data : Microbial and Cellular Data Banks.

Module II

Introduction to MSDN (Microbial Strain Data Network): Numerical Coding Systems of Microbes, Hibridoma Data Bank Structure, Virus Information System Cell line information system; other important Data banks in the area of Biotechnology/life sciences/biodiversity.
Sequence analysis: Analysis Tools for Sequence Data Banks; Pair wise alignment - NEEDLEMAN and Wunsch algorithm, Smith Waterman, BLAST, FASTA algorithms to analyze sequence data: Sequence patterns motifs and profiles.

Module III

Secondary Structure predictions : Prediction algorithms; Chao-Fasman algorithm, Hidden-Markov model, Neural Network model. Tertiary Structure predictions; prediction algorithms; Chao-Fasman algorithm, Hidden-Markov model, Neural Network model.
Special Topics in Bioinformatics: DNA Mapping and sequencing – Map alignment – Large scale sequencing and alignment – Shotgun – DNA sequencing – Sequence assembly – Gene predictions – Molecular predictions with DNA strings.

Reference

1. “Introduction to Bioinformatics”, Atwood, Pearson Education
2. Lesk, Introduction to Bio Informatics, Lesk, OUP
4. Developing Bioinformatics Computer Skills, Cynthia Gibas and Per Jambeck, 2001 SPD
7. Murty CSV, Bioinformatics, Himalaya

**Structure of the Question paper**
For the End Semester Examination the question paper will consist of 60% Design problems and 40% Theory. There will be three questions from each module out of which two questions are to be answered by the students.
INI 3003     ADVANCED TECHNIQUES IN OPERATIONS RESEARCH

Structure of the Course

Lecture : 3 hrs/ Week                  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course Objectives

• Improve the ability to rigorously prove mathematical statements.
• Cultivate an ability to analyze the structure of and mathematically model various complex systems occurring in industrial applications.
• Develop knowledge of the mathematical structure of the most commonly used deterministic linear optimization models.
• Develop an understanding of the techniques used to solve linear optimization models using their mathematical structure.
• Develop an understanding of the use of modeling languages for expressing and solving optimization models.
• Develop knowledge of existing commercial solvers for linear optimization.

Module I

Module II

Module III

REFERENCES:
2. Simmons D. M, Nonlinear Programming for Operations Research, PHI.

Structure of the Question paper
For the End Semester Examination the question paper will consist of 70% Design problems and 30 % Theory. There will be three questions from each module out of which two questions are to be answered by the students.
INI 3004
SERVICE ORIENTED ARCHITECTURE

Structure of the Course
Lecture : 3 hrs/ Week  
Internal Continuous Assessment : 40 Marks  
End Semester Examination : 60 Marks  
Credits : 3

Course Objectives

• Introduce the strategic and technological aspects of service oriented architecture for enterprise applications.
• Enable the students to participate in the development and implementation of Enterprise Architecture.

Learning Outcomes

• Understand benefits and limitations of service-oriented architecture
• Model and design services from a business perspective of an enterprise.
• Participate in designing an architectural framework for an organisation.
• Evaluate and choose methods, models and tools

Module I

Module II

Module III
Research Topics in SOA
Reference


Structure of the Question paper
For the End Semester Examination the question paper will consist of 60% Design problems and 40% Theory. There will be three questions from each module out of which two questions are to be answered by the students.
INI 3005

ADVANCES IN E-COMMERCE

Structure of the Course
Lecture : 3 hrs/ Week                      Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To introduce various advances taking place in the field of E-commerce.
• To introduce various business opportunities available in the field of E-commerce

Learning Outcomes
• Understand major electronic commerce activities.
• Ability to implement E-commerce hardware/software infrastructure

Module I


Module II


Module III


Reference

3. Deborah L. Bayles, E-Commerce Logistics and Fulfillment, Pearson Education.
5. Latest international journals on E-commerce

Structure of the Question paper
For the End Semester Examination the question paper will consist of 60% Design problems and 40% Theory. There will be three questions from each module out of which two questions are to be answered by the students.
INI 3006  
 COMPONENT BASED TECHNOLOGY

Structure of the Course
Lecture : 3 hrs/ Week  
Credits : 3
Internal Continuous Assessment : 40 Marks  
End Semester Examination : 60 Marks

Course Objectives
- Introduces in depth JAVA, Corba and .Net Components
- Deals with Fundamental properties of components, technology and architecture and middleware.
- Component Frameworks and Development are covered indepth.

Learning Outcomes
- To be familiar with the latest advances in the field of Component-Based Computing.
- To know the different considerations of using the component software applications and their standards.
- To understand the technological issues related to Component-Based Computing.
- To be familiar with the tools, platforms used with the Component-Based Computing such as DCOM, COBRA and .NET).

Module I

Module II


References:

Structure of the Question paper
For the End Semester Examination the question paper will consist of 60% Design problems and 40 % Theory. There will be three questions from each module out of which two questions are to be answered by the students.
Structure of the Course
Lecture : 3 hrs/ Week                      Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course Objectives

• Introduce principles of intelligent systems and teach basic approaches used in this field.
• To introduce applications of intelligent systems in different research areas in Computer Science / Information Technology.

Learning Outcomes

• Understand advantages and disadvantages of intelligent systems.
• Students will be able to apply intelligent systems to research problems

Module I

Module II
Fuzzy logic - fuzzy sets - properties - operations on fuzzy sets - fuzzy relations - operations on fuzzy relations - the extension principle - fuzzy measures – membership functions - fuzzification and defuzzification methods - fuzzy controllers - Mamdani and Sugeno types - design parameters - choice of membership functions - fuzzification and defuzzification methods - Fuzzy Associative Memories. Neuro-Fuzzy Modelling -Applications

Module III

Reference
6. Neurofuzzy and Soft Computing, J S R Jang, C T Sun, E Mizutani, PHI.
7. Latest International Journals

**Structure of the Question paper**
For the End Semester Examination the question paper will consist of 60% Design problems and 40 % Theory. There will be three questions from each module out of which two questions are to be answered by the students.
INI 3001

NEURAL NETWORK AND APPLICATIONS

Structure of the Course
Lecture : 3 hrs/ Week                      Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course Objectives

• Should understand the motivation behind artificial neural network (ANN), its potential and limitations
• Should familiarize various architecture of ANN and its applications
• Ability to apply ANN for solving classification task

Learning Outcomes

• Understand various architectures of ANN
• Understand various tasks that can be handled using ANN
• Understand the use of ANN for various applications

Module I
Biological Neuron, Artificial Neural Model, Types of activation functions, architecture: Feedforward and Feedback, Learning Process: Error Correction Learning, Memory Based Learning, Hebbian learning, Competitive Learning, Boltzman Learning, Supervised and Unsupervised Learning, Learning Tasks: Pattern Space, Weight Space, Pattern Association, Pattern Recognition, Function Approximation, Control, Filtering, Beamforming, Memory, Adaptation, Statistical Learning Theory

Module II
Single Layer Perceptron – Perceptron Learning Algorithm, Perceptron Convergence Theorem, Least Mean Square Learning Algorithm.
Radial Basis Function Networks - Exact Interpolator, Regularization Theory, Generalized Radial Basis Function Networks, Learning in Radial Basis Function Networks, Applications: XOR Problem, Image Classification.

Module III
Support Vector Machines - Optimal Hyperplane for Linearly Separable Patterns and Nonseparable Patterns, Support Vector Machine for Pattern Recognition, XOR Problem, Support Vector Machines for Nonlinear Regression.
Neural Network Associative Memory – Linear Associative Memory, Hopfield Network, Content Addressable Memory, Error Performance of Hopfield Networks, Applications of Hopfield Networks
Self-organizing Map – Maximal Eigenvector Filtering, Sanger’s Rule, Generalized Learning Law, Competitive Learning, Vector Quantization, Mexican Hat Networks, Self organizing Feature Maps, Applications

Reference

Structure of the Question paper
There will be three questions from each module out of which two questions are to be answered by the students.
MCI 3001 ARTIFICIAL INTELLIGENCE IN CIM

Structure of the Course
Lecture : 3 hrs/ Week                     Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course Objectives
To provide an introduction to the basic principles and applications of Artificial Intelligence in CIM environment.
To provide hands-on experience in the design and implementation of intelligent agent systems, employing a variety of AI techniques.

Learning Outcomes
Students will have an understanding of the basic areas of artificial intelligence including problem solving, knowledge representation, reasoning, decision making, planning, perception and action, and learning and their applications.

Module 1
Artificial Intelligence (A.I.), Learning and Problem Solving, Knowledge Acquisition and Representation, Learning Systems, Expert systems, Expert system applications for CIM,

Module 2
Knowledge based systems (KBS), Applications of KBS for Assembly, Process Planning and Scheduling.

Module 3
Artificial Neural Networks, Fuzzy Logic And Fuzzy Sets, Multi layered networks, Applications of Fuzzy systems and ANNS for selection of Robots, Fault Diagnostics

References :
3. Andrew Kusiak, Computational Intelligence in Design and Manufacturing, John Wiley and Sons, 2000

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students
MCI 3002 ADVANCED NUMERICAL TECHNIQUES

Structure of the Course
Lecture : 3 hrs/ Week                      Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course Objectives
To computationally solve scientific problems that arise in science and engineering. They will learn how to design and implement efficient sequential and parallel algorithms for solving important problems in their field of study.

Learning Outcomes
On completion of the course students will have a solid grounding in the theory and practice of numerical methods for solving linear and nonlinear equations and in the numerical approximation of standard mathematical functions.

Module 1
Solution of Algebraic and Transcendental Equation: Newton-Raphson method including method of complex roots, Graeffe’s root square method (Computer based algorithm and programme for these methods)
Interpolation and Approximation: Lagrange’s and Newton-divided difference formula, Newton interpolation formula for finite differences, Gauss’s forward and backward interpolation formulae, Bessel’s and Laplace-Everett’s formulae.

Module 2
Solution of Linear Simultaneous Equations: Cholesky’s (Crout’s) method, Gauss-Seidel iteration and relaxation methods, Solution of Eigenvalue problems; Smallest, largest and intermediate Eigen values (Computer based algorithm for these methods)
Numerical Differentiation and Integration: Numerical differentiation using difference operators, Simpson’s 1/3 and 3/8 rules, Boole’s rule, Weddle’s rule.

Module 3

References
5. Atkinson, K.E., An Introduction to Numerical Analysis, John Wiley & Sons, NY
Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
MCI 3003 NANOTECHNOLOGY

Structure of the Course
Lecture : 3 hrs/ Week                Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course Objective:
To understand the general issues relating to nanotechnology and nanofabrication:
Methods for production of Nanoparticles, Characteristic techniques of nanomaterials

Learning outcome:
To appreciate the students with the background, applications and current status of nanotechnology and nanomaterials, and to make them understand the relevant basic scientific principles underpinning nanotechnology.

Module 1
Introduction To Nanomaterials: Amorphous, crystalline, microcrystalline, quasi-crystalline and nano-crystalline materials. Historical development of nanomaterials – Issues in fabrication and characterization of nanomaterials

Module 2

Module 3
Applications Of Nanomaterials: Applications in Mechanical, Electronics engineering industries – Use of nanomaterials in automobiles, aerospace, defense and medical applications – Metallic, polymeric, organic and ceramic nanomaterials.
Nano Fabrication And Machining: LIGA, Ion beam etching, Molecular manufacturing techniques – Nano machining techniques –, Top/Bottom up Nano fabrication techniques - Sub micron lithographic technique, conventional film growth technique, Chemical etching, Quantum materials.

References:

**Structure of the Question paper**
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students
MCI 3004 SURFACE ENGINEERING

Structure of the Course
Lecture: 3 hrs/Week  Credits: 3
Internal Continuous Assessment: 40 Marks
End Semester Examination: 60 Marks

Course Objectives
To develop expertise in advanced coating technologies with an emphasis on thermal spray, weld overlay and physical vapour deposition

Learning Outcomes
Students will
Be able to gain in depth knowledge of various surface coating technologies and their application in industry
Be able to be familiar with standard methods of testing of modified surfaces

Module 1

Module 2

Module 3

Reference:
1. Griffiths B.J., Manufacturing surface design and monitoring for performance, Elsevier

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students
MII 2001 HEURISTICS FOR OPTIMIZATION 3-0-0-3

Structure of the Course

Lecture: 3 hrs/ Week  Credits: 3
Internal Continuous Assessment  : 40 Marks
End Semester Examination  : 60 Marks

Course Objectives

The main objectives of this course are:-

• To introduce the students to heuristic solution techniques.
• To enhance problem solving skills to more advanced levels.
• To experiment with real life problems and promote decision making skills.
• To demonstrate various meta-heuristic solution techniques which provide faster heuristic solutions as against time consuming exact algorithms.

Learning Outcomes

• The students will have knowledge of various heuristic solution techniques and applications of the same.
• The students will have the skill to model and solve real life problems.

Module I

Introduction to evolutionary computation: Biological and artificial evolution, Evolutionary computation and AI-different historical branches of EC.

Module II

Module III

Local Search Algorithms, Tabu Search -Neighborhood, Candidate list-Short term and Long term memory, Threshold Accepting, Application of TS in solving facility location problem, Quadratic Assignment problem etc. Simulated Annealing -Main Components of Simulated Annealing, Homogenous vs. Inhomogenous Simulated Annealing, Annealing Schedules Applications in sequencing and scheduling, Travelling salesman problem etc. Multi objective evolutionary optimization: Pareto optimality, Multiobjective evolutionary algorithms.

References:

3) Goldberg D E , Genetic Algorithms in Search, Optimization & Machine Learning, Addison Wesley
4) Banzhaf W,Nordin P,Keller et al., Genetic Programming : An Introduction, Morgan Kaufmann
6) J.Dreo,A.Petrowski,Eric Taillard , Metaheuristics for Hard Optimization:Methods and case studies, Springer.
7) Fred Glover , Tabu Search.
8) Zbigniew Michalewicz, David B. Fogel , How to Solve It: Modern Heuristics, ACM Press
9) Marco Dorigo, Thomas Stützle , Ant Colony Optimization, MIT Press
10) Günther Zäpfel • Roland Braune, Michael Bögl, Metaheuristic Search Concepts-A Tutorial with Applications to Production and Logistics, Springer

Structure of the Question paper

For the End semester Examination There will be three questions from each module out of which two questions are to be answered by the students.
MII 3002: FINANCIAL MANAGEMENT 3-0-0-3

Structure of the Course

Lecture: 3 hrs/ Week                  Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
At the end of the course students should be able to:

• Understand the use of basic financial management concepts.
• Understand and use the tools of analysis such as valuation, risk-return relationships, financial statement analysis, capital budgeting, cost of capital, capital structure and working capital management.

Become familiar with the various types of financing available to a firm

Learning Outcomes
After successful completion of the course, the students are able to:

• Obtain an overview of Indian financial system.
• Analyze financial statements using standard financial ratios.
• Apply techniques to project financial statements for forecasting long-term financial needs.
• Explain the role of short-term financial needs.
• Apply time value, risk, and return concepts.
• Obtain an overview of international financial management.

Module I

International financial management: World monetary system, foreign exchange markets and rates, financing foreign operations.

Module II

Working capital management: importance, objectives, inventory management, receivables management, credit policy, cash management.
Module III

Sources of finance: Long term-equity capital-debenture capital-term loans, deferred credit-
government subsidies -leasing and hire purchase, Short term financing-accruals-trade credit-short
term bank finance public deposit-commercial paper.

Capital structure and dividend policies. Financial analysis: ratio analysis- types of ratios-time
series analysis-common size analysis-DuPont analysis-funds flow analysis. Break even analysis
and leverages.

References:

1. Corporate Finance – Berely&Mayers
5. Financial Management – S. N. Maheswary – Himalaya
6. Investment Analysis – Preethi Singh – Himalaya

Structure of the Question paper

For the End Semester Examination there will be three questions from each module out of which
two questions are to be answered by the students
MII 3003: ORGANISATIONAL BEHAVIOUR 3 – 0 – 0 - 3

Structure of the Course

Lecture: 3 hrs/ Week  Credits: 3
Internal Continuous Assessment  : 40 Marks
End Semester Examination  : 60 Marks

Course Objectives

The main objective of the course is to:

- Understand the conceptual framework for the study of organizational behavior.
- Study various dimensions of perception, personality and motivation.
- Learn theories of leadership including the trait, group and exchange, contingency and path goal approaches.
- Learn about formal and informal groups
- Learn the phases and models of decision making
- Learn about organizational culture and its change

Learning Outcomes

The student is expected to

- Have a clear understanding of job attitudes, satisfaction and commitment
- Explore the dynamics of organizational behavior in achieving the goals of the organization

Module I

Dimensions of human behaviour: self development, perception, motivation, personality and leadership- concepts, theories and applications. Modes of values, beliefs, attitudes and intelligents in determining human behaviour.

Module II

Group dynamics: nature of groups and group decision making. Conflict management , Transactional Analysis . Organizational development: Concepts of QWL, Organizational change, Goals of organizational change.

Module III

Concept of organizational climate, health and effectiveness. Organizational culture: nature and characteristics, Motivation of person across cultures, Managerial leadership across cultures. Case studies.
References:

1. Jerry l. Gray, Frederick A. Stark, Organisational Behaviour concepts and applications
2. Fred Luthans , Organizational Behaviour , McGraw Hill
4. Uma Sekharan, Organizational Behaviour-Text and Cases, TMH

Structure of the Question paper

For the End Semester Examination there will be three questions from each module out of which two questions are to be answered by the students.
MII3004  OPERATIONS RESEARCH  3 – 0 – 0 - 3

Structure of the Course

Lecture: 3 hrs/ Week  Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

The main objective of the course is to:
• Introduce important ideas in Operations Research (OR),
• Prepare and motivate future specialists to continue in their study by having an insightful overview of OR,
• To develop student’s skill in formulating and building models,
• To translate a verbal description of a decision problem into an equivalent mathematical model,
• To demonstrate the cohesiveness of OR methodology.

Learning Outcomes

After successful completion of the course:
• The students increase their skills in formulating and building formal models of complex decision environments and in perceiving the critical issues to be resolved.
• The students learn how to achieve sound and incisive evaluations of the important alternatives.
• The students learn how to attain crucial insights to actual managerial problems.
• Students appreciate and understand the pivotal concepts in operations research.

MODULE I

Overview of OR modeling approach;
Linear programming - formulation, simplex method, revised simplex method, duality theory and sensitivity analysis. Dual Simplex method, Parametric linear programming;
The Transportation and Assignment problems.

MODULE II

Game Theory – Two person zero sum game, Games with mixed strategies, Graphical solution;
Replacement Problems – Individual replacement policy, Group replacement policy;
Introduction to Nonlinear programming (Overview only)
**MODULE III**

Sequencing – n jobs on 1 machine, Hodgson’s algorithm, n jobs on m machines, Johnson’s procedure. 
Queuing Theory; Introduction to softwares for OR.

**References**

4. Gross and Harris, Fundamentals of Queuing Theory, John Wiley & Sons  

**Structure of the Question paper**

For the End Semester Examination there will be three questions from each module out of which two questions are to be answered by the students.
MII 3005: MANAGEMENT INFORMATION SYSTEMS 3 – 0 – 0 - 3

Structure of the Course

Lecture: 3 hrs/ Week Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

The main objective of the course is to:
• To learn about different information systems.
• To effectively use and manage information technology in today’s network enterprises.
• To study inter connected networks of information systems for end user collaboration.
• To learn systems for making timely decisions based on organized informations.

Learning Outcomes

After the completion of the course the student is expected to
□ Widen his knowledge about information technology that will enable him to solve management problems.
□ Explore full potential of computer as a problem solving tool.

MODULE I


MODULE II


MODULE III

References:


Structure of the Question paper

For the End Semester Examination there will be three questions from each module out of which two questions are to be answered by the students.
MDI3001: APPLIED FINITE ELEMENT METHODS

Structure of the Course

Lecture: 3 hrs/ Week     Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives:

The objective in this course is to summarize modern and effective finite element procedures for the non linear analysis of static and dynamic problems. The modeling of geometric and material nonlinear problems is discussed. The basic finite element formulations employed are presented, efficient numerical procedures are discussed, and recommendations on the actual use of the methods in engineering practice are given.

Learning Outcomes:

The student may be able to model nonlinear problems
- Geometric nonlinear problems
- Material nonlinear problems
- Large deformation problems
- Dynamic problems of above types

Module I

Introduction to Nonlinear Analysis, Basic Considerations in Nonlinear Analysis Lagrangian Continuum Mechanics Variables for General Nonlinear Analysis, Total Lagrangian and updated Lagrangian formulation for Incremental General Nonlinear Analysis from the principles of continuum mechanics

Module II

Formulation of Finite Element Matrices from the principles of continuum mechanics: Two and Three-Dimensional Solid Elements; Plane Stress, Plane Strain, and Axisymmetric Conditions, Two-Noded Truss Element using Updated and Total Lagrangian Formulation.

Module III

Solution of the Nonlinear Finite Element Equations in Static Analysis, Solution of Nonlinear Dynamic Response, Use of Elastic Constitutive Relations in Total Lagrangian Formulation, Formulation of Finite Element Matrices for Beam, Plate and shell Elements.

Extra reading -
(Assignments to write programs in Matlab/Fortran and to practice in FEM packages)

Modeling of Elasto-Plastic and Creep Response
Reference:

1. Finite element procedures K. J. Bathe, PHI.

Structure of the Question paper

For the End Semester Examination There will be three questions from each module out of which two questions are to be answered by the students.
MDI 3002  Experimental Stress Analysis For Engineers  3-0-0-3

Structure of the Course

Lecture: 3 hrs/ Week  Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

➢ To familiarize the basics of commonly used experimental stress analysis techniques.
➢ To familiarize different strain gages.
➢ To establish the fundamental concepts and new experimental techniques.
➢ To be able to use the experimental techniques on the practical problems.
➢ To equip the students with basic theory of elasticity and stress-strain relationships.
➢ To familiarize various strain measurement techniques.
➢ To familiarize various instrumentation for strain measurements.
➢ To introduce the concept of photo elastic stress analysis methods.
➢ To familiarize various nondestructive test methods.

Learning Outcomes:

➢ Apply the principles and techniques of photo elastic measurement.
➢ Apply the principles and techniques of strain gage measurement.
➢ Apply the principles and techniques of moiré analysis.
➢ Apply the principles and techniques of brittle coating analysis.

Module I

Stress analysis by strain measurement: Principal stresses and strains. Mohr’s circle-measurement of strains and stresses. Strain gauges and Stress gauges. Mechanical, Optical and Electrical gauges- construction and applications. Variable resistance strain gauges, Gauge characteristics, Gauge sensitivity, circulatory for resistance strain gauges, Recording equipments static and dynamic strains- reduction of strain gauge data-compensation-strain measurement over long period at high and low temperature.

Module II


Module III

Strain rosettes- Rectangular rosette, Delta rosette. Residual stresses: Beneficial and harmful effects – Principle of residual stress measurement:-methods only.
Introduction to lasers in NDT – Ultrasonic flow detection

References:

2. Dove and Adams-Experimental stress Analysis and Motion measurement-Prentice hall

Structure of the Question paper

For the End Semester Examination There will be three questions from each module out of which two questions are to be answered by the students.
MPI 3001: COMPUTATIONAL FLUID DYNAMICS

Structure of the Course

Lecture: 3 hrs/ Week                Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

A number of physical problems related to Propulsion Engineering and Thermal Engineering can be modeled as partial differential equation and often non-linear. These equations can not be solved by analytical methods and suitable numerical techniques are to be applied. The objective this stream elective is to give the students the necessary fundamentals ideas and their applications for real problems. An exposure to open source computational tools is also aimed. Reading and understanding at least two Journal Publications dealing with later developments in solution algorithms for flow and heat transfer.

Learning Outcomes

- Mathematical formulation of physical problems and their solution.
- Capability to write computer programs based on the techniques learned.
- Development of a directory containing the basic and applied computer programs, tutorials and their document.

Module I


Module II

Module III

Development of a computer program for the analysis of incompressible flows in two dimensions – solution of few typical problems using the computer program. Study of any two latest papers describing development in CFD.

References:


Structure of the Question paper

For the End semester Examination There will be three questions from each module out of which two questions are to be answered by the students.
MTI 3001: NUMERICAL METHODS

Structure of the Course

Lecture: 3 hrs/ Week          Credits: 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives

- To prepare and motivate students to pursue research programmes or to serve in industry or technical profession through rigorous education.
- To provide students with a solid foundation of the theory of Numerical Techniques thus equipping them to solve mathematical models of engineering systems.
- To equip students with good scientific and mathematical principles to model and solve engineering problems met with in engineering design so as to innovate or improve existing designs in view of the purpose of improvement of standard of life.
- To inculcate in student’s professional and ethical attitude, effective communication skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context.
- To provide students with an academic environment that encourages them towards excellence, gain leadership qualities, to learn and live by ethical codes and guidelines and lifelong learning needed for a successful professional career.
- With all of the above it is desired, as the objectives, that they become useful contributors to society and thus return to it what they received in their making of a successful individual.

Learning Outcomes

- Graduates will have received training in solving real-life engineering problems from the study of theory and problem-solving skills practiced in the class-room.
- Graduates will have their minds developed to equip them in their career to recognize problems faced by industry and society, and forge out viable solutions there to.
- Graduates will demonstrate knowledge of professional and ethical responsibilities.
- Graduate will be able to communicate effectively in both verbal and written form.
- Graduates will show understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.
- Graduates will develop confidence for self education and ability for life-long learning.
- Graduate be able to participate and succeed in competitive examinations

Module I

Module II


Module III


References:

1) Numerical methods for Scientific and Engineering Computation – Jain M.K.,
2) Elementary Numerical Analysis – Conte and Carl DeBoor
3) Introduction to Numerical Analysis – Gupta A and Bose S C
4) Introduction to Numerical Analysis – Hilderbrand FB
5) Introduction to Numerical Analysis – Fjorberg C E
6) An Introduction to Numerical Analysis – Kendall E Atkinson
7) Statistics – Murrey R Spiegel
8) Numerical Mathematical Analysis – James B. Scarborough
9) Applied Numerical Analysis – C F Gerald & P O Wheatley
10) Numerical algorithms – E V Krishnamurthy & S K Sen

Structure of the Question paper

For the End semester Examination There will be three questions from each module out of which two questions are to be answered by the students.
MRI 3001 ENERGY CONSERVATION IN REFRIGERATION AND AIR-CONDITIONING SYSTEMS

Structure of the Course
Lecture : 3 hrs/ Week                Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course Objectives
➢ To provide the students with a foundation in the subject.
➢ To recognize the aspect of engineering problems solvable by applying the subject.
➢ To make the students aware of the capabilities and limitations of the subject for engineers.
➢ Understand the various processes related to the subject.
➢ To study advanced features of the subject.
➢ To understand the associativity between the subject and Mechanical Engineering.

Learning Outcomes
➢ To synthesize and apply the concepts learnt.
➢ Describe various operations in Mechanical Engineering using the subject.
➢ Undertake, under supervision, laboratory experiments incorporating the subject.

Module 1
REFRIGERATION CYCLES: Refrigerators and heat pumps, reversed Carnot cycle, ideal and actual vapour compression refrigeration cycles, selection of refrigerants, heat pump systems, gas refrigeration cycles, absorption refrigeration systems, thermo-electric refrigeration systems. compressors, evaporators, condensers, throttle valves, properties of refrigerants, refrigerants and the ozone layer.

Module II
AIR-CONDITIONING: Introduction p-h, T-S, p-v and psychometric charts: comfort air-conditioning and industrial air-conditioning, factors affecting human comfort, air quality and standards, air conditioning for tropical climates, load types, determination of cooling load, air-conditioning systems and equipment selection, design of ducting and piping systems installation, commissioning and maintenance of refrigeration equipments, thermal storage systems.

Module III
ENERGY CONSERVATION IN REFRIGERATION AND AIR-CONDITIONING SYSTEMS: Factors affecting refrigeration and air-conditioning system performance and savings opportunities, flow control, strategies and energy conservation opportunities in fans, blowers, compressors and pumps, exhaust air heat recovery, refrigeration cycle heat recovery, evaporative cooling, solar cooling and heating and ice storage, hybrid types and applications, IAQ requirement.
SYSTEM DESIGN USING TOOLS: Use of softwares for energy efficient design of refrigeration and air-conditioning systems.

References:

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
MRI 3002 ENERGY CONSERVATION IN BUILDINGS

Structure of the Course
Lecture : 3 hrs/ Week                Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
➢ To provide the students with a foundation in the subject.
➢ To recognize the aspect of engineering problems solvable by applying the subject.
➢ To make the students aware of the capabilities and limitations of the subject for engineers.
➢ Understand the various processes related to the subject.
➢ To study advanced features of the subject.
➢ To understand the associativity between the subject and Mechanical Engineering.

Learning Outcomes
➢ To synthesize and apply the concepts learnt.
➢ Describe various operations in Mechanical Engineering using the subject.
➢ Undertake, under supervision, laboratory experiments incorporating the subject.

Module 1
INTRODUCTION: The sun-earth relationship and the energy balance on the earth's surface, climate, wind, solar radiation, and solar temperature, sun shading and solar radiation on surfaces, energy impact on the shape and orientation of buildings, thermal properties of building materials.

ESTIMATION OF BUILDING LOADS: Steady state method, network method, numerical method, correlations, computer packages for carrying out thermal design of buildings and predicting performance.

Module II
ENERGY EFFICIENT TECHNOLOGIES FOR BUILDINGS: Passive cooling and day lighting, active solar and photovoltaic, building energy analysis methods, building energy simulation, building energy efficiency standards, lighting system design, lighting economics and aesthetics, impacts of lighting efficiency.

INDOOR ENVIRONMENTAL QUALITY REQUIREMENT AND MANAGEMENT: Psychrometry, comfort conditions, thermal comfort, ventilation and air quality, air conditioning requirement, visual perception, illumination requirement, auditory requirement, energy management options, energy audit and energy targeting, technological options for energy management.
Module III

ENERGY CONSERVATION IN AIR CONDITIONING SYSTEMS: Cycles, air conditioning systems, energy conservation in pumps, fans and blowers, refrigerating machines, heat rejection equipment, energy efficient motors, insulation.

GREEN BUILDINGS: Ecological sustainable design, life cycle analysis, barriers to green buildings, green building rating tools, material selection, embodied energy, operating energy, façade systems, ventilation systems, transportation, water treatment systems, water efficiency, building economics, leed and IGBC codes.

REFERENCES:
6. Energy Conservation Building Codes: www.bee-india.nic.in

Structure of the Question paper

For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
MRI 3003 ENERGY CONSERVATION IN INDUSTRIAL PROCESSES & EQUIPMENTS

Structure of the Course

Lecture : 3 hrs/ Week                Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination         : 60 Marks

Course Objectives

➢ To provide the students with a foundation in the subject.
➢ To recognize the aspect of engineering problems solvable by applying the subject.
➢ To make the students aware of the capabilities and limitations of the subject for engineers.
➢ Understand the various processes related to the subject.
➢ To study advanced features of the subject.
➢ To understand the associativity between the subject and Mechanical Engineering.

Learning Outcomes

➢ To synthesize and apply the concepts learnt.
➢ Describe various operations in Mechanical Engineering using the subject.
➢ Undertake, under supervision, laboratory experiments incorporating the subject.

Module 1

INTRODUCTION: Material and energy balances of different manufacturing industries, major process equipments and their characteristics, performance evaluation, specific energy consumption analysis.

HEAT TRANSFER SYSTEMS AND EQUIPMENTS: Heat transfer principles and coefficient evaluation, evaluation of jacketed pan, heating coils immersed in liquids, refrigeration cycles and refrigerant, mechanical equipments, freezing and cold storage systems.

Module II

ABSORPTION: Theory of absorption, extraction and washing equipments, performance evaluation.

 ADSORPTION: Desiccant and adsorption systems in vehicles, energy recovery systems, chemical dehumidification, cold storage.

CRYSTALLIZATION: Theory and types of crystallization, membrane separation, chiller equipments, performance evaluation.

Module III

MECHANICAL SEPARATION: Cyclones, centrifuges, filters, size reduction equipments, mixers, chemical reactors and bio-reactors, performance evaluation.

COOLING TOWERS: Cooling tower system, types, performance parameters – range,
approach, cycles of concentration, effectiveness, cooling tower losses, factors affecting performance, flow control strategies, energy saving opportunities, performance improvement.

REFERENCES:

Structure of the Question paper
For the End Semester Examination the question paper will consist of three questions from each module out of which two questions are to be answered by the students.
RII 2001     .NET PROGRAMMING           3-0-0-0

Lecture : 3 hrs/ Week
Credits : 3

Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To impart conceptual, programming and application level aspects of .NET platforms

Learning Outcomes
• The student gets a thorough understanding of the fundamental principles of .NET framework and acquires ability to do programming in .NET platforms for real-life applications

MODULE 1
.Net architecture, Name-spheres, Assemblies, object oriented features, memory management, interoperation with IOM, transaction in .NET, Structured exception handling, code access security.

MODULE 2
VB.NET: Similarities & differences with Visual Basic, windows focus, ADO.NET, working with databases, object oriented features.cASP.NET: Similarities & difference with ASP, Architecture, web form development, XML, databases interface.

MODULE 3

References
2. M. Reynolds et. al., “.NET Enterprise”, Wrox/SPD, 2002

Structure of the Question paper
For the End Semester Examination the question paper will consist of at least 50% analytical problems. There will be three questions from each module (with sub-divisions) out of which two questions are to be answered by the students.
RII 2002

JAVA PROGRAMMING

Lectures : 3 hrs/Week  Credit : 3

Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To impart conceptual, programming and application level aspects of Java

Learning Outcomes
• The student gets a thorough understanding of the fundamental principles of Java
coding and interface design and acquires ability to do programming in Java
platform for real-life applications.

MODULE 1
Java Fundamentals: Features of Java, OOPs concepts, Java virtual machine, Reflection
byte codes, Byte code interpretation, Data types, variable, arrays, expressions,
operators, and control structures, Classes and objects, inheritance, polymorphism,
parameter passing. Java Classes: Abstract classes, Static classes, Inner classes. Packages,
Wrapper classes, Interfaces, final, this, super, Access control. Exception handling:
Exception as objects, Exception hierarchy, try, catch, finally, throw, throws.

MODULE 2
IO package: Byte streams - Input streams, Output streams, Character streams – Reader,
Writer. Files, Object serialization, De-serialization. String handling: String and
StringBuffer classes. Multi threading: Thread life cycle, use of Thread class and
Runnable interface, thread creation, priority, Synchronization. Networking – classes
and interfaces, communication using stream and datagram sockets, URL class. Applet
class, Applet life cycle, Passing parameters embedding in HTML.

MODULE 3
Event handling- delegation event model, event classes, event listener interfaces.
Introduction to AWT programming: window fundamentals, working with Frames,
Graphics, Color, Font, AWT controls and event handling, Layout managers, Swings –
features, components, sample programs. Database connectivity: JDBC architecture,
Establishing connectivity and working with connection interface, Working with
statements, Creating and executing SQL statements, Dynamic queries, Working with
ResultSet. Basics of Beans, EJB.
References:


Structure of the Question paper
For the End Semester Examination the question paper will consist of at least 60% programming/analytical problems. There will be three questions from each module (with subdivisions) out of which two questions are to be answered by the students.
RCI 2001

OBJECT ORIENTED MODELING AND DESIGN

Lecture : 3 hrs/ Week
Credits : 3

Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To impart conceptual and application level aspects of object oriented modelling and design

Learning Outcomes
• The student gets a thorough understanding of the fundamental principles of object-oriented modelling and design and is able to apply the principles in practical scenarios.

MODULE 1

MODULE 2

MODULE 3
Components: Abuses of inheritance, danger of polymorphism, mixin classes, rings of operations, class cohesion and support of states and behavior, components and objects, design of a component, lightweight and heavy weight components, advantages and disadvantages of using components.

References:
4. References

Structure of the Question paper
For the End Semester Examination the question paper will consist of at least 40% analytical problems. There will be three questions from each module (with sub-divisions) out of which two questions are to be answered by the students.
SOFTWARE PROJECT MANAGEMENT

Lecture : 3 hrs/ Week
Credits : 3

Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To impart conceptual and application level aspects of software project management

Learning Outcomes
• The student gets a thorough understanding of the fundamental principles of software project management and is able to apply the principles in practical scenarios.

MODULE 1
Introduction to Software Project Management: Software development as a project; Stakeholders in software project; Software product, process, resources, quality, and cost; Objectives, issues, and problems relating to software projects. Overview of Project Planning: Steps in project planning; Defining scope and objectives; work breakdown structure; Time, cost, and resource estimation; Alternatives in planning Project Evaluation: Strategic assessment; Technical assessment; Cost benefit analysis; Cash flow forecasting; Cost benefit evaluation techniques; Break even analysis; Risk evaluation
Selection of Appropriate Project Approach: Choosing development technology and methodology; choice of process model; Rapid application development; Waterfall model; V-process model; Spiral model; Prototyping; Incremental delivery.

MODULE 2
Software Effort Estimation Problem in software estimation; Effort estimation techniques; Expert judgment; Estimation by analogy; Delphi technique; Algorithmic methods; Top-down and bottom-up estimation; Function point analysis; Object points; COCOMO model. Activity Planning Network planning model; activity-on-arrow network; Precedence network; Forward pass; Backward pass; Critical path; Slack and float. Risk Analysis and Management Nature and categories of risk in software development; risk Identification; Risk assessment; Risk mitigation, monitoring, and management; Evaluating schedule risk using PERT. Recourse Allocation Nature of project resources; Identifying resource requirement of activities; Allocating and scheduling resources; cost of resources; Standard, planned, and actual cost; Cost variance; time-cost tradeoff.
MODULE 3
Project Tracking and Control Measurement of physical and financial progress; Earned value analysis; Status reports; Milestone reports; Change control. Contract Management Outsourcing of products and services; Types of contracts; Stages in contract placement; Terms of contract; Contract monitoring; Acceptance testing Managing People and Organizing Teams Organizational behaviour; Recruitment and placement; Motivation; Group behaviour; Individual and group decision making; Leadership and leadership styles; forms of organizational structures. Software Quality Assurance Planning for quality; Product versus process quality management; Procedural and quantitative approaches; Defect analysis and prevention; Statistical process control; Pareto analysis; Causal analysis; Quality standards; ISO 9000; Capability Maturity Model; Quality audit. Configuration Management Configuration management process; Software configuration items; Version control; change control; Configuration audit; Status reporting.

References:

Structure of the Question paper
For the End Semester Examination the question paper will consist of at least 40% analytical problems. There will be three questions from each module (with sub-divisions) out of which two questions are to be answered by the students.
RCI 2003

BASIC DATA STRUCTURES AND ALGORITHMS

Lecture : 3 hrs/ Week
Credits : 3

Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To gain basic concepts about
  o Algorithms and complexity analysis
  o Data structures and their use in different algorithms
  o Sorting and searching techniques

Learning Outcomes
• Basic understanding of the various data structures and their applications, and analysis of algorithms.

MODULE 1

MODULE 2

MODULE 3
Sorting – Bubble sort, Insertion sort, Selection sort, Radix Sort , Merge sort, Quick sort, Heap Sort, Searching – Linear and Binary Search -Preliminary time and space complexity analysis of sorting and searching algorithms.
References

Structure of the Question paper
For the End Semester Examination the question paper will consist of at least 60% analytical/design problems. There will be three questions (with sub-divisions) from each module out of which two questions are to be answered.
TM1 2001 Fuzzy Systems and Applications

Structure of the Course
Lecture: 3 hrs/Week Credits: 3
Internal Continuous Assessment: 40 Marks
End Semester Examination: 60 Marks

Course Objectives
- To comprehend what is meant by fuzziness.
- To develop an understanding of fuzzy theory and learn how to use the fuzzy systems approach to solving engineering problems

Learning Outcomes
- Aware of the concept of fuzziness involved in various systems.
- Adequate knowledge about fuzzy set theory.

Module I.
Introduction to fuzzy sets and systems. Crisp set and Fuzzy set, Basic concepts of fuzzy sets, membership functions, support of a fuzzy set, height-Normalized fuzzy set, alpha cuts, Resolution Principle, Theoretic definitions on fuzzy sets, complement, intersection and union equality, subs sethood-basic based on membership functions, Law of Excluded middle and law of contradiction on fuzzy sets. Properties of fuzzy set operations, Extensions of fuzzy set concepts-type 2 and level 2 fuzzy sets-examples

Module II.

Module III.

Reference
2. Timothy J Ross, Fuzzy logic with Engineering applications, 2/e, McGraw Hill.
3. Yen, Fuzzy logic: Intelligence, Control and Instrumentation, Pearson education.

There will be three questions from each module out of which two questions are to be answered by the students.
Structure of the Course
Lecture : 3 hrs/ Week Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• To explore the concepts of Mechatronics design and its applications.
• To Study about Mechanical, electrical Systems, Sensors & Transducers.
• To Study about CNC machines, DNC and PLC.

Learning Outcomes
• Understand the concepts of mechatronics design its applications.
• Understand Mechanical, electrical Systems, Sensors & Transducers.
• Understand and write part programming, APT programming & PLC Programming.

Module I

Module II
Mechatronic Control in Automated Manufacturing, Artificial Intelligence in Mechatronics, Fuzzy Logic Applications in Mechatronics, Microsensors in Mechatronics. Introduction to Modern CNC Machines - Advantages of CNC Machines. CNC Machining Centre Developments, Turning Centre Developments, Tool Monitoring on CNC Machines, Other CNC Developments. Manual part programming examples - point to point programming and simple contour programming, canned cycles, selection of tools.

Module III

References
2. Mechatronics – HMT Ltd., TMH

There will be three questions from each module out of which two questions are to be answered by the students.
TSI 1001 ARTIFICIAL NEURAL NETWORKS

Structure of the Course
Lecture : 3 hrs/ Week                  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination          : 60 Marks

Course Objectives
• Introduce students to a range of topics in the field of artificial neural networks
• To provide knowledge on different architectures of neural networks
• To get an idea of different training algorithms like Hebbian learning, Perceptron learning, Winner Take all learning, Gradient Descent Learning, Widrow Hoff Learning upon which the different neural network structures are developed
• To equip the students with the architecture and algorithm of different neural network structures as Hebb net, ADALNE net, Associative networks, Hopfield net, Kohonen net, SOM net, ART network, Back Propagation net, RBF network, Boltzmann machine etc
• To introduce the students to the variety of applications of neural network algorithms like pattern association, classification problems, optimization problems etc so that they can develop network structures by their own.

Learning Outcomes
• Understand different aspects of neural networks research.
• Have an understanding of a variety of neural networks techniques as error back propagation learning, self-organising maps, Hopfield networks, counter propagation networks, adaptive resonant networks etc
• Analyse a problem for Neural Network solution in terms of these methods
• Have an awareness of the computational theory and algorithms underlying NNs
• Have motivation to try programming NN for different applications with available tools like Matlab

Module I

Module II
Module III
Probabilistic Neural Networks-Bolzmann machine-Adaptive Resonance Theory:- ART 1 and ART 2 –(Architecture, Algorithms and Applications) -Applications of neural networks- Optimization problems solving , System identification and control, decision making, pattern recognition,sequence recognition

References


There will be three questions from each module out of which two questions are to be answered by the students.
TEI 3001 EMBEDDED SYSTEMS

Structure of the Course
Lecture : 3 hrs/ Week Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
- Introduce the student to the basic concepts of embedded systems
- Familiarize with the basic components of embedded system

Learning Outcomes
- Ability use embedded processors for product design
- Ability upgrade and trouble shoot products with embedded system components

Module I: AN INTRODUCTION TO EMBEDDED SYSTEMS
Concepts of RISC & CISC-An Embedded System- Processor in The System- Other Hardware Units- Software Embedded into a System- Exemplary Embedded Systems- Embedded Processor and Memory Organization: Structural Units In a Processor, Processor Selection for an Embedded System, Memory Devices, Memory Selection for an Embedded Systems, Allocation of Memory to Program Cache and Memory Management Links, Segments and Blocks and Memory Map of a System, DMA

Module II: 8051 MICROCONTROLLER
Architecture of 8051 - Signals - Operational features - Memory and I/O addressing - Interrupts - Instruction set – Applications - The software model – functional description – central processing unit, pin descriptions, operation of timers/counters, serial communication, exception and interrupts, input/output ports.

Module III: PIC MICROCONTROLLER
PIC microcontrollers: History and features Comparison of PIC with other CISC & RISC based systems and Microprocessors, 16f877 architecture and pin details, RAM, FLASH, UART. Interrupts and timers. ARM controller: Architecture – Memory Organization – Pipeline and cache concepts – ARM (32 bit) Architecture - Switching between ARM and THUMB instructions. Study of ARM CPU Cores-ARM710T, ARM 720T, ARM 740T

References
1. Rajkamal, “Embedded systems: Architecture, Programming and Design”, TMH
3. Arnold S Burger, “Embedded system design”, CMP
4. Steve Heath; Butterworth Heinenann,“Embedded systems design: Real world design”, Newton mass USA 2002.

There will be three questions carrying 10 marks each from each module out of which two questions are to be answered by the students. The question paper will consist of 60% problems and 40 % Theory.
Structure of the Course
Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Objectives
• Ability to apply RTOS concepts for solving multi task applications

Learning Outcomes
• Understand, Analyze RTOS features and apply them for real time applications

MODULE I

MODULE II

MODULE III

References
7. www.keil.com/rtx51/

There will be three questions carrying 10 marks each from each module out of which two questions are to be answered by the students. The question paper will consist of 60% problems and 40 % Theory.
**TEI 3003 SOFTWARE ENGINEERING**

*Structure of the Course*

<table>
<thead>
<tr>
<th>Lecture</th>
<th>: 3 hrs/ Week</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Internal Continuous Assessment</td>
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<tr>
<td>End Semester Examination</td>
<td>: 60 Marks</td>
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</tbody>
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*Course Objectives*

- Familiarize with the principles of software engineering

*Learning Outcomes*

- Ability to use the principles of software engineering in embedded system design

**MODULE I**


**MODULE II**


**MODULE III**


*References*


There will be three questions carrying 10 marks each from each module out of which two questions are to be answered by the students. The question paper will consist of 60% problems and 40% Theory.
TCI3001 MULTIMEDIA COMMUNICATION

Structure of the course:
Lecture: 3 hrs/Week      Credits: 3
Internal Continuous Assessment: 40 Marks
End Semester Examination : 60 Marks

Course Learning Objectives:
• To introduce the concept of multimedia communication systems
• To have an idea on various Computer and Multimedia Networks
• To study various Compression techniques & Standards

Course Outcomes:
• Understand the issues related to various Computer and Multimedia Networks
• Understand various Compression techniques & Standards

Module I
Introduction to multimedia systems, Definition of terms and concepts related to multimedia. Trends in the development and the use of multimedia, Tools, techniques, and guidelines facilitating the planning, design, production, and implementation of multimedia products.

Module II

Module III

References
5. S. Pandey and M. Pandey. Multimedia : System, Technology a Communication, Katharia and Sons publishing, 2010

There will be three questions from each module out of which two questions are to be answered by the students. It shall have 60% problems and 40% theory.
TCI3002 FUZZY SYSTEM

Structure of the course:
Lecture : 3 hrs/ Week  Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Learning Objectives:
• To introduce the concept of fuzzy systems.
• To study various operations in fuzzy sets.
• To study design of various fuzzy logic system.

Course Outcomes:
• Able to design various fuzzy logic systems and Fuzzy control systems.
• Able to do various operations in a fuzzy set.

Module I
Introduction to Fuzzy sets and systems. Basics of fuzzy sets, membership function, support of a fuzzy set, height - Normalised fuzzy set, α - cuts (decomposition of a fuzzy set), set theoretic definitions on fuzzy sets, complement, intersection and union equality, subsethood - basic definition based on membership functions. The law of the excluded middle and law of contradiction on fuzzy sets. Properties of fuzzy sets operations (logical proof only). Extension of fuzzy sets concepts - type-2 and level 2 fuzzy sets - examples.

Module II

Module III
References
1. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley India, 2011

There will be three questions from each module out of which two questions are to be answered by the students. It shall have 60% problems and 40% theory.
TCI3003 MICROCONTROLLER BASED SYSTEM DESIGN

Structure of the course:
Lecture : 3 hrs/ Week      Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination : 60 Marks

Course Learning Objectives:
• To study the architecture & programming of 8051 microcontroller
• To introduce the architecture & programming of PIC microcontroller

Course Outcomes:
• Able to design various microcontroller based systems
• Able to solve issues related to various microcontroller systems

Module I

Module II

Module III

References
There will be three questions from each module out of which two questions are to be answered by the students. It shall have 60% problems and 40% theory.
Structure of the Course

Lecture : 3 hrs/ Week          Credits : 3
Internal Continuous Assessment : 40 Marks
End Semester Examination       : 60 Marks

Course Objectives

• Introduction to electronics at nano scale.
• Get a thorough understanding of laws governing atomic structure, reversible computation and quantum logic

Learning Outcomes

• After the course the student will be capable to Design, analyze, and develop quantum computing systems

Module I

An atomistic view of electronic conduction, Schrodinger equation, Self-consistent field -Basis functions, Band structure, Sub-bands - Capacitance, Level broadening Coherent transport - Atom to transistor and new paradigms in nano electronics - Modeling and Analysis of single electron transistor (SET).

Module III


Module III


References

1. S. Data, "Quantum Transport: Atom to Transistor", Cambridge University Press, 2005