



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

Syllabus Open Elective-II

| Course Code | Course Title |
|-------------|---|
| CV1341 | OE II: Elements of Earthquake Engineering |
| CV1342 | OE II: Air Pollution and Solid Waste Management |
| CV1343 | OE II: Introduction to Finite Element Method |
| CV1344 | OE II: Disaster Management |
| CV1345 | OE II: Environmental Impact Assessment |
| ME1331 | OE-II: Total Quality Management |
| ME1332 | OE-II: Reliability Engineering |
| ME1333 | OE-II: Power Generation Engineering |
| EL1324 | OE II: Electrical Energy Audit and Safety |
| EL1325 | OE II: Utilisation of Electrical Energy |
| EL1326 | OE II Power System Engineering. |
| EE1328 | OE II: Fuzzy Logic & Neural Network |
| EE1329 | OE II: Basics of Analog and Digital Communication |
| EE1330 | OE II: Biomedical Instrumentation |
| ET1340 | OE II : Soft computing |
| ET1341 | OE II : Industrial Instrumentation |
| ET1342 | OE II : Medical Electronics |
| CT1351 | OE II: Multimedia and Animation |
| CT1352 | OE II: Current Trends and Technologies |
| IT1336 | OE II: Introduction to E-Commerce |
| IT1337 | OE II: Information Security |
| GE1314 | OE II: Combinatorial Theories |
| GE1315 | OE II: Electronic Materials and Applications |



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VI SEMESTER

| CV1341 | OE II: Elements of Earthquake Engineering | | | L=3 | T=0 | P=0 | CREDITS = 3 |
|-------------------|---|--------|----|-----|-------|-----|--------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | | 3 Hours |

| COURSE OBJECTIVES | COURSE OUTCOMES |
|---|--|
| <ol style="list-style-type: none"> To study geology of earth and interior. To study causes of earthquakes and its characteristics. To study behavior of different types of structures under earthquake loading. To study about disaster management, mitigation and different retrofitting techniques. | <ol style="list-style-type: none"> An ability to understand the the necessity and importance of earthquake engineering An ability to understand the provision of IS code used for earthquake resistance design of structure An ability to understand provision for earthquake resistance design of structures as per Indian standard An ability to study of damages caused due to past earthquake in & outside India and remedial measures |
| Mapped Program Outcomes: a, c, e, l, m, | |

UNIT – 1 :

Introduction to earthquakes:

Geology of earth, configuration of tectonic plates in a globe, behavior of plates, their motion and effects, causes of earthquake and their characteristics, Earthquake parameters, magnitudes, intensity, Seismic waves.

[07 Hrs.]

UNIT – 2 :

Analysis and interpretation of earthquake data, determination of magnitude, location of epicenter, focal depth.

[06 Hrs.]

UNIT – 3 :

Recording earthquakes, seismicity of the world, history of earthquakes in India and abroad, case studies of effects of earthquakes, causes and sources of earthquake damage.

[06 Hrs.]

UNIT – 4 :

Non-engineered earthquake resistant structures, load bearing structures, masonry structures, seismic zoning of India (IS 1893:2002 Part I), seismic coefficients for different zones, definitions, irregularities in buildings, consequences of irregularities.

[07 Hrs.]

UNIT – 5 :

Strengthening, rehabilitation and retrofitting of earthquake damaged structures.

[06 Hrs.]

UNIT – 6 :

Earthquake disaster management, mitigation and social aspects, lessons from past earthquake: - study of damages caused due to past earthquake in & outside India and remedial measures.

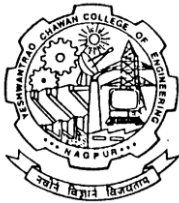
[07 Hrs.]

Text Books :

- Agrawal & Shrikhande, Design of Earthquake Resistant Structures, 3rd 2006, Prentice – Hall of India Pvt. Ltd.
- Roberto Villaverde, Fundamental Concepts of Earthquake Engineering, 2009, CRC Press
- Asadour H. Hadjian, Basic Elements of Earthquake Engineering, 2015, Wiley

Reference Books:

- C.V.R. Murty, Earthquake Tips, 2005, NICEE, IITK
- www.nicee.org / iaee / E_FrontCover.pdf, NICEE Guidelines for Earthquake Resistant Non-Engineered Construction, 2004, National information center of Earthquake engineering Indian Institute of Technology Kanpur Kanpur 208016, India
- Robin K. McGuire, Seismic Hazard and Risk Analysis, 2004, Earthquake Engineering Research Institute; First edition



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Syllabus Open Elective-II

VI SEMESTER

| CV1342 | OE II: Air Pollution and Solid Waste Management | | | L=3 | T=0 | P=0 | CREDITS = 3 |
|-------------------|---|--------|----|-----|-------|--------------|-------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration | |
| | 15 | 15 | 10 | 60 | 100 | 3 Hours | |

| COURSE OBJECTIVES | COURSE OUTCOME |
|---|--|
| <ol style="list-style-type: none">To provide general understanding of air pollution, air pollutants, their sources & their effectsTo provide knowledge about meteorological parameters, air sampling & measurement of pollutants.To provide knowledge of air pollution controlling technologies, air pollution due to automobiles & general idea of noise pollution.To study importance of solid waste management by processing, treatment, disposal & reuse of solid waste. | <ol style="list-style-type: none">An ability to understand the type, sources & effect of air pollutantsAn ability to understand the parameters affecting air pollution and various methods of measurement and estimation of pollutantsAn ability to understand basics of noise pollutionAn ability to understand various air pollution control equipments & pollution caused due to automobile exhaustAn ability to understand the concepts of solid waste management. |

Mapped Program Outcomes: a, d, e, h, j,

UNIT – 1 :

Introduction to air pollution: Air pollution episodes, Atmosphere and its zones, classification and sources of air pollutants, effects of air pollutants on man, plants animal & materials

[06 Hrs.]

UNIT – 2 :

Meteorological Aspects: Atmospheric stability, plume behaviour, Ambient air sampling and stack sampling, collection of particulates and gaseous pollutants, methods of estimation.

[07 Hrs.]

UNIT – 3 :

Air pollution control methods and equipment: Principle of control methods for particulates and gaseous pollutants, gravity settlers, electrostatic precipitators, bag filters cyclones, wet scrubbers, automobile exhaust: Pollution due to diesel and petrol engines, exhaust treatment and abatement, noise Pollution: Sources, ill effects, control measures.

[06 Hrs.]

UNIT – 4 :

Introduction to solid waste management, sources, quantification and characterisation, classification and components, sampling and analysis.

[07 Hrs.]

UNIT – 5 :

Method of collection, equipment used for collection and transportation, transfer stations, solid waste processing and management.

[06 Hrs.]

UNIT – 6 :

Treatment and disposal methods: composting, sanitary landfills, Incineration – concept, components and applications, leachate management.

[07 Hrs.]

Text Books:

- M.N. Rao & H.V.N. Rao, 1988, Air Pollution, Tata McGraw Hill Publishing Co. Ltd.
- C.S. RAO, 2007, Environmental Pollution Control Engineering, New Age International, Wiley Estern Ltd. New Delhi.
- Stern A. C., 1973, Air pollution, Academic Press.
- A.D. Bhide & Sunderesan B.B., 1983, Solid Waste Management in Developing countries, INSDOC, New Delhi.
- Tohobanoglous, 1993, Intgrated Solid Waste Management Engineering Principle and Management Issues, McGraw-Hill publication Ltd.
- K. V. S. G. Murlikrishna, 1995, Air Pollution, Kaushal & Company.

Reference books:

- P. Aarne Vesilind, William Worrell & Debra Reinhart, 2002, Solid Waste Engineering, Cengage Learning India pvt. Ltd.
- Dr. Y Anjaneyulu, 2002, Air Pollution and Control Technologies, Allied Publisher pvt. Ltd.



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Syllabus Open Elective-II

VI SEMESTER

| | | | | | | | |
|-------------------|--|--------|----|-----|-------|-----|--------------|
| CV1343 | OE II: Introduction to Finite Element Method | | | L=3 | T=0 | P=0 | CREDITS = 3 |
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | | 3 Hours |

| COURSE OBJECTIVES | COURSE OUTCOMES |
|---|--|
| <ol style="list-style-type: none">To provide the student with knowledge and analysis skills in applying basic laws and steps used in solving the problem by finite element method.To provide the student the knowledge of various interpolation functions and elements to solve simple problems by finite element method.To provide the student with some knowledge in isoparametric formulation.To provide students the knowledge of mathematical modelling techniques. | <ol style="list-style-type: none">Students will demonstrate an ability to apply the steps required for FEM solution to variety of physical systems.Students will demonstrate an ability to create models for simple structures.Students will be able to extend the knowledge of the application of FE to solve engineering problems. |
| Mapped Program Outcomes: a, d, e, k, | |

UNIT – I :

Introduction: Development, Historical background, Applications, Advantages and Disadvantages of FEM, General steps of FEM, direct equilibrium approach, Variational approach, weighted residual approach, local and global FEM, application to simple problems.

[07 Hrs.]

UNIT – II :

Shape functions: Introduction, requirement of Ideal displacement functions, Derivation of shape functions using Cartesian Coordinates, Lagrange and Serendipity elements.

[06 Hrs.]

UNIT – III :

Application of FEM to 1D problems: Derivation of element property matrix and influence vector, application, Application to bar, truss, steady state heat conduction, steady state flow through porous medium problems.

[06 Hrs.]

UNIT – IV :

Application of FEM to 2D problems: Equilibrium equations, Triangular and Rectangular element formulation using Cartesian Coordinates, Application to two-dimensional stress analysis.

[07 Hrs.]

UNIT – V :

Natural coordinates, Isoparametric elements, Application to 1D and 2D Problems.

[07 Hrs.]

UNIT – VI :

Numerical integration, Modeling, storage and solution techniques.

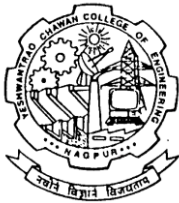
[06 Hrs.]

Text Books :

- Chandrapatla T.R., Belegundu A. D. Introduction to Finite Elements in Engineering, Prentice Hall India, 1991
- Godbole P. N. , . Introduction to Finite Element Method, I. K. International Publishing House Pvt. Ltd., New Delhi, 2013
- Desai Y. M., Eldho T. I. and Shah A. H., Finite Element Method s and Application to Engineering, Pearson , 2011.

Reference Books :

- Krishnamoorthy C S, "Finite Element Analysis – Theory and Programming", Tata McGraw Hill Publishing Co., New Delhi, 1994.
- Cook R D, Malkus D S, Plesha M E and Witt R J, "Concepts and Applications of Finite Element Analysis", John Wiley & sons inc, New York, Fourth Edition, 2003.
- Rajasekaran S, "Finite Element Analysis in Engineering Design". S Chand & Co., 2003.



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Syllabus Open Elective-II

VI SEMESTER

| CV1344 | OE II: Disaster Management | | | L=3 | T=0 | P=0 | CREDITS = 3 |
|-------------------|----------------------------|--------|----|-----|-------|--------------|-------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration | |
| | 15 | 15 | 10 | 60 | 100 | 3 HOURS | |

| COURSE OBJECTIVES | COURSE OUTCOMES |
|--|---|
| The various objectives of the course will be 1. To understand the nature & types of disaster, 2. To understand role of different government & private agencies in disaster management 3. To understand disaster management cycle. | At the end of syllabus, students shall be able to 1. Understand the nature & types of disaster, 2. Understand its preparedness, role of different government & private agencies, act & other statute 3. Understand provisions, management of disaster, post disaster condition & its management. |
| Mapped Program Outcomes: a, b, d, e, f, g, k, l, | |

UNIT – 1 :

Unit 1: Understanding Natural Disasters

natural disasters, which have been categorised as hydrological, wind-related, geo-physical, and climatic. Under each category, an attempt is made to discuss the causes and impacts, along with past illustrations and geographical distribution.

Flood, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic Eruptions, Heat and Cold Waves, Climate Change: Global Warming, Sea Level Rise, Ozone Depletion

[07 Hrs.]

Unit 2: Man-Made Disasters

Nuclear Disasters, Chemical Disasters, Biological Disasters, Building Fire, Coal Fire, Forest Fire, Oil Fire, Air Pollution, Water Pollution, Deforestation, Industrial Pollution, Road Accidents, Rail Accidents, Air Accidents, Sea Accidents

[06 Hrs.]

UNIT – 3 :

Risk & Cost Assessment:

Geographical conditions, Population, Living habits, Threats, Extent of damages to the lives, agricultural area, industrial units, Awareness & Safety Program. Relief arrangement & essential components, Shelters, Rescue & search tools & equipments, transport facilities. Cost assessment of each unit and funding.

[06 Hrs.]

Unit 4: DISASTER PREPAREDNESS

Disaster Preparedness: Concept and Nature, Disaster Preparedness Plan, Disaster Preparedness for People with Special Needs/Vulnerable Groups, Disaster Preparedness with Relevance to Housing, Infrastructure and Livestock,

Community Based Disaster Preparedness Plan, Role of Information, Education, Communication, and Training, Disaster Preparedness: Role and Responsibilities of Central, State, District, and Local Administration, Role and Responsibilities of Armed Forces, Police, Para-military Forces, National Service Scheme and Scouts, Role and Responsibilities of International Agencies, Non-governmental Organisations, Community Based Organisations, Community, and Media

Information Technology: Role in Disaster Preparedness with Special Reference to Geographical Information System, Use and Application of Emerging Technologies in Disaster Preparedness

[07 Hrs.]

Unit 5: DISASTER RESPONSE

Disaster Response Plan, Communication, Participation, and Activation of Emergency Preparedness Plan, Logistics Management, Needs and Damage Assessment, Disaster Response: Central, State, District, and Local Administration, Armed Forces in Disaster Response, Police and Other Forces. Role of Multiple Stockholders in Disaster Response, Psychological Response, Trauma and Stress Management. Rumour and Panic Management, Minimum Standards of Relief, Managing Relief, Funding Relief, Recovery

[06 Hrs.]



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|-------------------|----------------------------|--------|----|-----|-------|-----|--------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | | 3 HOURS |

Unit 6: Reconstruction and Rehabilitation

Damage Assessment, Role of Various Agencies in Disaster Management and Development Information Management Structure, Parameters of Vulnerability, Development of Physical and Economic Infrastructure, Creation of Long-term Job Opportunities and Livelihood Options, Funding Arrangements for Reconstruction, Nature of Damage to Houses and Infrastructure due to Disasters, Disaster Resistant House Construction, Role of Housing/Building Authorities, Education and Awareness Role of Information Dissemination, Participative Rehabilitation Process: Some Case Studies Long-term Recovery.

[07 Hrs.]

Text Books:

1. Satish Modh: Introduction to Disaster Management, Macmillan, 2009
2. Amit Awasthy: Disaster Management: Warning Response and Community Relocation, Global India Publications, 2009
3. Jyoti Purohit :Disaster Management in India: Structure and Challenges, 2013
4. Prakash Singh: Disaster Response in India, www.MilitaryBookshop.Companyuk, 2011

Reference Books:

1. D.B.N. Murthy: Disaster Management: Text and Case Studies, Deep and Deep Publications, 2007
2. National Policy on Disaster Management, NDMA, New Delhi, 2009.
3. A Global Report - Reducing Disaster Risk, A Challenge for Development; UNDP Publication, 2004.
4. Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, New Delhi, 2005.



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Syllabus Open Elective-II

VI SEMESTER

| CV1345 | OE II: Environmental Impact Assessment | | | L=3 | T=0 | P=0 | CREDITS = 3 |
|-------------------|--|--------|----|-----|-------|--------------|-------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration | |
| | 15 | 15 | 10 | 60 | 100 | 3 Hours | |

| COURSE OBJECTIVES | COURSE OUTCOME |
|--|---|
| <ol style="list-style-type: none"> To provide students with an overview of the principles and current practices of environmental impact assessment (EIA). To learn and understand process, and necessary techniques for environmental impact assessment, mitigation and monitoring. To introduce students to the legal, economic, administrative and technical process of preparing and/or evaluating environmental impact documents. To relate the uses of scientific research to practical situations in project planning and decision making. To provide experience and training in environmental planning and related professions | <p>At the end of the course, students will be able to</p> <ol style="list-style-type: none"> Understand the EIA process, analyse major environmental issues for development projects. Monitor and model tasks within an EIA cycle. Prepare portions of environmental documents through administrative and legal requirements and standards of professional practice. |
| Mapped Program Outcomes: b, d, e, f, h | |

UNIT – I :

Evolution of EIA: Concepts, Nature & Type of impacts, Need of EIA, Participation in EIA, New concepts- Life cycle assessment.

[07 Hrs.]

UNIT – II :

Methods for impact assessment: Screening, Scoping, Base line studies, Check list, Mitigation, Matrices, Interaction of network methodologies, environmental setting various factors, environmental impact assessment methodology, documentation and selection process, environmental indices and indicators for describing affected environment.

[06 Hrs.]

UNIT – III :

Prediction and assessment of impact for air and noise environment: Basic information of air quality, identification of type and quantity of air pollutant, existing air quality and air quality standards, impact prediction and assessment, mitigation. Basic information of noise, existing noise levels and standards, prediction of noise levels and assessment of impact, mitigations.

[07 Hrs.]

UNIT – IV :

Prediction and assessment of impact for water and soil environment: Basic information of water quality (Surface water and ground water), water quality standards, identification of impact, prediction of impact and assessment, mitigations. Background information of soil environment, soil and ground water standards, prediction and assessment of impact for ground water and soil, mitigations.

[06 Hrs.]

UNIT – V :

Prediction and assessment of impact on cultural and socioeconomic environment:

Basic information on cultural resources, rules and regulations for cultural resources, Basic information of socioeconomic environment, description of existing socioeconomic environment, prediction and assessment of impact, mitigation, resettlement and rehabilitation.

[07 Hrs.]

UNIT – VI :

EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, Categorization of Industries for seeking environmental clearance from concerned authorities, procedure for environmental clearance, procedure for conducting environmental impact assessment report, general structure of EIA document, Environmental management plan, post environmental monitoring. Case studies in EIA.

[06 Hrs.]

Text Book:

- Anand Bal, An Introduction to Environmental Management, Himalaya Publishing House.
- Canter L.W. 1977. Environmental Impact Assessment. McGraw Hill, Inc. Printed in the United States of America.
- Peter Watten (Eds.) - 'Environmental Impact Assessment Theory and Practice', Unwin Hyman, London (1988).



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VI SEMESTER

| CV1345 | OE II: Environmental Impact Assessment | | | L=3 | T=0 | P=0 | CREDITS = 3 |
|-------------------|--|--------|----|-----|-------|--------------|-------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration | |
| | 15 | 15 | 10 | 60 | 100 | 3 Hours | |

Reference Books:

1. John G. Rau and David C Hooten (Ed)., "Environmental Impact Analysis Handbook", McGraw-Hill Book Company, 1990.
2. "Environmental Assessment Source book", Vol. I, II & III. The World Bank, Washington, D.C., 1991.
3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II", Blackwell Science, 1999.
4. Bass, Herson and K. Bogdon, 2001, The NEPA Book: A step-by-step guide on how to comply with the National Environmental Policy Act, Solano Press.
5. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.



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Syllabus Open Elective-II

6TH Semester

| | | | | | |
|--------|---------------------------------|-----|-----|-----|-----------|
| ME1331 | OE I : Total Quality Management | L=3 | T=0 | P=0 | Credits=3 |
|--------|---------------------------------|-----|-----|-----|-----------|

| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
|-------------------|-------|--------|----|-----|-------|--------------|
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

| Objective | Course Outcome |
|---|--|
| To familiarize the student with :- 1. Understand the philosophy and core values of Total Quality Management (TQM) [d,k] 2. Various Techniques for Quality Improvement. [d,k] | (I) Students will be able to Select and apply appropriate techniques in identifying customer needs, as well as the quality impact in TQM methodologies. [d,k] (II) The students will be able to Select and Implement Proper Quality Improvement Techniques. [d,k] |

Unit 1 [7 hrs]
 Principles of Quality Management, Pioneers of TQM, Quality costs, Quality system Customer Orientation, Benchmarking, Re-engineering [d, k]

Unit 2 [7 hrs]
 Leadership, Organizational Structure, Team Building, Information Systems and Documentation – Quality Auditing, ISO 9000 - QS 9000.QMS, Quality awards. [d, k]

Unit 3 [8 hrs]
 Single Vendor Concept, J.I.T., Quality Function deployment, Quality Circles, KAIZEN, SGA POKA -YOKE, Taguchi Methods. SMED, Kanban system. Cost of quality. Robust design [d, k]

Unit 4 [8 hrs]
 Methods and Philosophy of Statistical Process Control, Control Charts for Variables and Attributes [d, k]

Unit 5 [8 hrs]
 Cumulative sum and exponentially weighted moving average control charts, Others SPC Techniques – Process Capability Analysis. Acceptance Sampling Problem, Single Sampling Plans for attributes, double, multiple and sequential sampling, [d, k]

Unit 6 [7 hrs]
 Six sigma manufacturing concepts. Six-sigma philosophy Quality strategy and policy. Motivation and leadership theories. Continuous vs. breakthrough improvements. Management of change, DMAIC Methodology. Lean manufacturing [d, k]

| .Reference books: | | | | |
|-------------------|--|-------------------------------|----------------------------|---|
| S.N. | Title of the book | Edition (Year of publication) | Author(s) | Publisher |
| 1 | Total Quality Management for Engineers | 1991 | Mohamed Zairi | Woodhead Publishing Limited 1991 |
| 2 | Production and Operations mangament - Total Quality and Responsiveness | 1995 | Harvid Noori and Russel | McGraw-Hill Inc, 1995 |
| 3 | Managing for Total Quality | 1998 | N.Logothesis | Prentice Hall of India Pvt .Ltd,1998 |
| 4 | The Essence of Total Quality Management | 1995 | John Bank | Prentice Hall of India Pvt.Ltd., 1995. |
| 5 | Introduction to Statistical Quality Control | 1991 | Douglus C. Montgomery | 2nd Edition, John Wiley and Sons, 1991. |
| 6 | Statistical Quality Control | 1984 | Grant E.L and Leavensworth | McGraw-Hill, 1984. |



6TH Semester

| | | | | | |
|--------|--------------------------------|-----|-----|-----|-----------|
| ME1332 | OE II: Reliability Engineering | L=3 | T=0 | P=0 | Credits=3 |
|--------|--------------------------------|-----|-----|-----|-----------|

| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
|-------------------|-------|--------|----|-----|-------|--------------|
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

| Objective | Course Outcome |
|--|---|
| 1.To develop in the engineering students the ability to analyze any engineering problem in a simple and logical manner and to apply a few well understood basic principles to find its solution. | (I) Student will be able to use reliability modeling as a tool for evaluating system performance. [a,c,d,f,g,h,i,j,l] |
| 2.Learn how to get higher operating plant and equipment reliability that lifts efficiency and output of operating assets, stops equipment failures and creates higher plant and equipment reliability, with this subject.[a, c, d, e, f, g, h, i, j, l,] | (II) Student will be able to analyze the failure of a machine, determine the failure rate of systems or components.. [a,c,d,f,g,h,i,j,l] (III) Student will able to understand importance of the maintenance of engineering systems and factors affecting maintainability. [a,c,d,f,g,h,i,j,l] |
| | (IV) Student will be able to prepare the production & maintenance schedule of particular engineering system. [a,c,d,f,g,h,i,j,l] |

Unit 1

[7hrs]

Fundamental concepts:-

Reliability definitions, failure, Failure density, Failure Rate, Hazard Rate, Mean Time To Failure, MTBF, maintainability, availability, safety and reliability, Quality, cost and system effectiveness, Life characteristic phases, modes of failure, Quality and reliability assurance rules, product liability, Importance of Reliability, [a, c, d, e, f, g, h, i, j, l,]

Unit 2

[8hrs]

Probability theory:-

Set theory, laws of probability, total probability theorem, probability distributions, parameters and applications.

[a, c, d, e, f, g, h, i, j, l,]

Unit 3

[7hrs]

System reliability and modeling:

Series and parallel components, mixed configuration, complex systems. Redundancy, element redundancy, unit redundancy, standby redundancy. Types of stand by redundancy, parallel components. Markov models for reliability estimation. [a, c, d, e, f, g, h, i, j, l,]

Unit 4

[8hrs]

Maintainability and Availability:

Objectives of maintenance, types of maintenance, Maintainability, factors affecting maintainability, system down time. Availability - Inherent, Achieved and Operational availability, reliability and maintainability trade-off. Markov models for availability estimation. [a, c, d, e, f, g, h, i, j, l,]

Unit 5

[7hrs]

System reliability Analysis:

Reliability allocation or apportionment. Reliability apportionment techniques. Reliability block diagrams and models.

Reliability predictions. Life testing and accelerated testing. [a, c, d, e, f, g, h, i, j, l,]

Unit 6

[8hrs]

Strength based reliability:

Safety factor, safety margin, Stress strength interaction, Failure Mode, Effects and Criticality Analysis-, , FMECA examples, Ishikawa diagram .fault tree construction, basic symbols development of functional reliability block diagram, Fault tree analysis, fault tree evaluation techniques, Design of Mechanical components and systems:-Material strengths and loads. [a, c, d, e, f, g, h, i, j, l,]

..Reference books:

| S.N. | Title of the book | Edition (Year of publication) | Author(s) | Publisher |
|------|--|-------------------------------|----------------------------|-------------------------------------|
| 1 | Concepts of Reliability Engg | 1985 | L.S. Srinath | Affiliated East-Wast Press (P) Ltd |
| 2 | Reliability Engineering | 1983 | A.K. Govil | Tata McGraw-Hill Publishing Co. Ltd |
| 3 | Reliability Engineering | 1984 | E. Balagurusmy | Tata McGraw-Hill Publishing Co. Ltd |
| 4 | Engineering Reliability | 1980 | B.S. Dhillion, C. Singh | John Wiley & Sons |
| 5 | Probabilistic, Reliability | 1968 | M.L. Shooman | McGraw-Hill Book Co., |
| 6 | Practical Reliability Engg | 1985 | Patric D.T.O'connor | Heyden and sons ltd. |
| 7 | Reliability in Engineering Design | 1977 | K.C. Kapur, L.R. Lamberson | John-Wiley and sons. |
| 8 | Reliability Engineering, Theory and Practice | Third Edition, 1999 | A.Birolini | Springer, |



6TH Semester

| | | | | | |
|--------|-------------------------------------|-----|-----|-----|-----------|
| ME1333 | OE II: Power Generation Engineering | L=3 | T=0 | P=0 | Credits=3 |
|--------|-------------------------------------|-----|-----|-----|-----------|

| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
|-------------------|-------|--------|----|-----|-------|--------------|
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

| Objective | Course Outcome |
|--|----------------|
| 1.To study the basics of power generations systems. | (I) |
| 2.To study conventional & non-conventional power plants. | (II) |
| 3.To study the combined operations of different power plants. | (III) |
| 4.To study Power load analysis & Economic analysis of power generations systems. [a,c,d,e,h,j,k,l] | (IV) |
| | (V) |

Unit 1

THERMAL POWER PLANT- I

Introduction to thermal power plants and power plant layouts. Site selection. Fuel characteristics, handling, storage, preparation & firing methods. Ash & dust collection and handling. Boiler: classification, general arrangement, details of different components and system like draught system, steam turbine systems, condenser, cooling towers. [a, d, h, j, l]

[7 Hrs]

Unit 2

THERMAL POWER PLANT- II

Gas Turbine Power Plant: -Introduction, power plant layouts, Open cycle, close cycle power plants. Various components and systems. Methods to improve efficiency. Reheat and Regeneration cycle and their combinations Diesel Electric Power Plant: - Introduction, Outline, type of engines, different components, performance, plant layout. Comparison with other power plant. (visit to nearby power plant shall be arrange for the students) .[a,d, l,]

[8 Hrs]

Unit 3

HYDROELECTRIC POWER PLANT.

Hydrology: - Rainfall, Runoff, Hydro graph, flow duration curve, mass curve. Hydroelectric power plant: - Site selection, classification of hydroelectric power plant, general arrangement, details of different components, turbine selection. Governing. Comparison with other power plant. .[a, c, e, l]

[7 Hrs]

Unit 4

POWER PLANT ECONOMICS

Load Analysis - Fluctuating Load on power plants, Load curves, various terms & definition, peak load, effect of fluctuating load. Economic Analysis: - Cost of electric energy [a, c, e, l]

[8 Hrs]

Unit 5

NUCLEAR POWER PLANT

Introduction to Nuclear Engineering, Global scenario, prominent installations worldwide, present & proposed nuclear plant in India.

Nuclear Reactors: - Types of reactors, PWR, BWR, CANDU, Gas cooled, liquid metal cooled, Breeder reactor. Operational requirements and difficulties, site selection for location of a nuclear power station Nuclear Waste Disposal. Comparison with other power plant. .[a, h,]

[8 Hrs]

Unit 6

COMBINED OPERATION OF DIFFERENT POWER PLANTS

Combined operation: - Need division, combination of different plant & their coordination, advantages.

NON CONVENTIONAL POWER GENERATION SYSTEMS

Introduction to Non Conventional power Generation Systems

Geo-Thermal Power Plant, Tidal Power Plant, Wind Power Plant, Solar Power Plant. [a, d, h, j, l]

[7 Hrs]

| .Text books: | | | | |
|-------------------|-------------------------|-------------------------------|------------------|-------------------|
| S.N. | Title of the book | Edition (Year of publication) | Author(s) | Publisher |
| 1 | Power Plant Engineering | 2002 | Domkundwar. | Dhanpat Rai & Co. |
| .Reference books: | | | | |
| 1 | Power Plant Engineering | 2007 | Vopal & Slortzki | |



6th Semester

| | | | | | |
|--------|---|------|-----|-----|-----------|
| EL1324 | OE II: Electrical Energy Audit and Safety | L= 3 | T=0 | P=0 | Credits=3 |
|--------|---|------|-----|-----|-----------|

| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
|-------------------|-------|--------|----|-----|-------|--------------|
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

| Course Objectives | Course Outcomes |
|---|---|
| Understand various operating characteristics of electrical equipments, its monitoring, tools used in comprehensive energy audit and its procedure to save the electricity with and without investment, calculation of energy saving and its global impact | <ol style="list-style-type: none"> 1) Types of energy sources, energy consumption pattern, and method of energy conservation and salient features of electricity act 2003. 2) Basics of electricity tariff thermal energy and its conversion 3) Types and need of energy management and audit, substitute of fuel and energy available, types of energy audit instruments and its use 4) Elements of energy monitoring and targeting various techniques used to measure the energy consumption 5) The terminologies of global environments concerns (UNFCC, COP, CDM and PCF) 6) The various hazards due to improper use of electricity, safety practices which minimizes the risk against electrical hazards |

UNIT-1: Energy Scenario

Commercial and Non-commercial energy, primary energy sources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance. Restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features, Salient Features of Electricity Act 2003.

UNIT-2: Basics of Energy and its various forms

Electricity basics- DC & AC currents, electricity tariff, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

UNIT-3 : Energy Management & Audit

Definition, need and types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments.

UNIT-4: Energy Monitoring and Targeting

Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques - energy consumption, production, cumulative sum of differences (CUSUM).

UNIT-5: Global environmental concerns

United Nations Framework Convention on Climate Change (UNFCC), sustainable development, Kyoto Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), Prototype Carbon fund (PCF).

UNIT-6: Electrical Safety

Primary hazards associated with electricity. Control measures and safety-related work practices to minimize the risk associated with electrical hazards. Response procedures in the event of electrical shock or fire.

Text books:

| | | | | |
|---|---|-------------------------|-----------------|--|
| 1 | Principles of Energy Conservation | 1991 | Archie, W Culp | McGraw Hill |
| 2 | Energy management handbook | 8 th Edition | Wayne C. Turner | John Wiley and Sons |
| 3 | Bureau of Energy Efficiency Study material for Energy Managers & Auditors Examination | -- | --- | Bureau of Energy Efficiency www.beeindia.in |

Reference books:

| | | | | |
|---|--|--|------------------|------|
| 1 | Handbook on Energy Audits and Management | | Amit Kumar Tyagi | TERI |
|---|--|--|------------------|------|



6th Semester

| | | | | | |
|---------------|--|-------------|------------|------------|------------------|
| EL1325 | OE II: Utilization of Electrical Energy | L= 3 | T=0 | P=0 | Credits=3 |
|---------------|--|-------------|------------|------------|------------------|

| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
|-------------------|-------|--------|----|-----|-------|--------------|
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

| Course Objectives | Course Outcomes |
|---|--|
| To understand the basic principle of electrical heating, welding, illumination, refrigeration and air conditioning, fans, pumps, compressors and digi sets. | On completion of this course, students will be able to 1. understand working of various electric heating equipment 2. understand electric welding methods and its operation 3. understand nature of light and design various lighting schemes and fittings in use 4. Understand operation of refrigeration , AC system 5. figure-out the different schemes of traction schemes and its main components. Design a suitable scheme of speed control for the traction systems 1) understand economics of various power generating units, tariff |

UNIT 1: Electric Heating:

- i) Electric Heating : Types and methods of electrical heating, advantages of electrically produced heat
Types & application of electric heating equipment's, transfer of heat.
- ii) Resistance Ovens: General constructions, design of heating elements, efficiency & losses, radiant heating.
- iii) Induction heating: Core type & core less induction furnace, indirect induction oven, medium and high frequency eddy - current heating.
- iv) Dielectric heating: Principle and application.
- v) Arc furnace: Direct & indirect arc furnace, power supply, characteristics & control.

UNIT-2: Electric Welding:

- i) Importance, Advantages & Disadvantages of welding, classification of welding processes.
- ii) Resistance welding, Butt welding, Spot welding, Projection welding, Seam welding.
- iii) Electric arc welding: carbon arc welding, metal arc welding, submerged arc welding, Welding positions, Types of welding electrodes
- iv) Ultrasonic welding, electron beam welding, laser beam welding.

UNIT-3: Illumination:

Nature of light, terms used in illumination, solid angle, laws of illumination, polar curves, Colour Rendering Index (CRI), types of lamps, luminaries, Design of illumination systems, indoor lighting systems, factory lighting, outdoor lighting design, flood lighting, street lighting, energy saving in lighting systems.

UNIT-4: Refrigeration & Air conditioning:

Terminology, refrigeration cycle, refrigeration systems (Vapour compression, vapour absorption), domestic refrigerator, water cooler, desert cooler.

Air conditioning: Factors involved in air conditioning, comfort air conditioning, industrial air conditioning, effective temperature, summer / winter air conditioning systems, types of air conditioning systems, room air conditioning, and central air conditioning.



Nagar Yuwak Shikshan Sanstha's

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(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

Syllabus Open Elective-II

6th Semester

| | | | | | |
|--------|---|------|-----|-----|-----------|
| EL1325 | OE II: Utilization of Electrical Energy | L= 3 | T=0 | P=0 | Credits=3 |
|--------|---|------|-----|-----|-----------|

| | | | | | | |
|-------------------|-------|--------|----|-----|-------|--------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

UNIT-5: Electric Traction

Traction system, requirement of an ideal traction system, different systems for traction, system of railway electrification, comparison between AC and DC systems, power supply for electric traction system, overhead equipments (collector gear for overhead equipments, conductor-rail equipment) Speed- Time curve for train movement, crest speed, average speed and schedule speed, simplified speed-time curve

UNIT-6: Economics of Power Generation, Electric Power Supply and Utilization

Terms and Definitions, base load and peak load, selection of power plant equipment (boilers, prime-movers, size and number of generating units), economics in plant selection, economics of hydroelectric power plant, economics of combined hydro and steam power plant, performance and operating characteristics of power plants, power plant useful life, tariff for electrical energy, objective and requirements of tariff, general tariff forms, comparison between private generating plant and public supply.

Text books:

| S. N | TITLE | EDITION | AUTHOR | PUBLISHER |
|------|---|---------|--------------|------------------------------|
| 1 | Utilization of Electric Power & Electric Traction | | J.B. Gupta | Kataria & Sons |
| 2 | Art and Science of Utilization of Electrical Energy | | H Pratap | Dhanpat Rai & Sons, Delhi |
| 3 | Utilization of Electrical Power | | R. K. Rajput | Laxmi Publications Pvt. Ltd. |

Reference books:

| | TITLE | EDITION | AUTHOR | PUBLISHER |
|---|---|---------|------------------------|--|
| 1 | Guide book for National Certification Examination for Energy Managers and Energy Auditors | | | Bureau of Energy Efficiency |
| 2 | Utilization of Electrical Power | | Dr N. V. Suryanarayana | Wiley Eastern Ltd, New Age International |
| 3 | Utilization of Electrical Energy | | E.Openshaw Taylor | Orient Longman |



6th Semester

| | | | | | |
|---------------|---|-------|-------|-------|-------------|
| EE1328 | OE II : Fuzzy Logic & Neural Network | L = 3 | T = 0 | P = 0 | Credits = 3 |
|---------------|---|-------|-------|-------|-------------|

| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
|-------------------|-------|--------|----|-----|-------|--------------|
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

| Objectives | Outcomes |
|---|--|
| <ul style="list-style-type: none"> To make the students well acquainted with Soft computing techniques, especially Fuzzy logic, Neural networks and Genetic algorithm. To make the students able to identify the complex problems in conventional structures, obtain intelligent acceptable solutions for these problems using soft computing techniques and take the necessary corrective action in the light of ongoing events. | <p>Students</p> <ol style="list-style-type: none"> Can define, describe and analyze uncertainty, unpredictability and vagueness using fuzzy logic concepts. Are able to find solution to automation problems through fuzzy logic controllers. Are able to introduce intelligence in conventional structure using neural networks and solve pattern recognition and classification problems. Are able to determine optimized solutions for some problems using concepts of Genetic algorithm. |

UNIT-1:

Crisp sets: An overview, Fuzzy sets: Basic types, basic concepts, basic properties of α -cuts, representation of fuzzy sets, and extension principle of fuzzy sets

(8 Hours)

UNIT-2:

Operations on fuzzy sets, Fuzzy numbers, Arithmetic operations on intervals, arithmetic operations on fuzzy numbers, fuzzy equations

(7 Hours)

UNIT-3 :

Fuzzy controllers: an overview with applications, applications of fuzzy logic

(8 Hours)

UNIT-4:

Fundamental concepts of ANN: Basic building blocks of artificial neural networks, network architectures, activation functions, McCulloch-Pitt's neuron model, Learning rules: Hebbian learning rule, Perceptron learning rule, Delta learning (Widrow- Hoff and LMS)rule, Competitive learning rule, Boltzmann learning

(7 Hours)

UNIT-5:

Brief introduction to single layer and multilayer perceptions, ADALINE and MADALINE, feed-forward networks, back propagation networks and applications.

(8 Hours)

UNIT-6:

Radial basis function network, Self organizing feature map and applications

(7 Hours)

| Text books: | | | | | |
|------------------|--|-------------------------------|--|-------------------------------------|----------------------|
| 1 | Fuzzy sets and Fuzzy logic | 2008 | | George J. Klir and Bo Yuan | Prentice Hall |
| 2 | Neural Networks: A comprehensive Foundation' | 2 nd Edition, 2005 | | Simon Haykin | Pearson publications |
| Reference books: | | | | | |
| 1 | Fuzzy sets: Uncertainty & information | 1988 | | Klir and Folger | PHI |
| 2 | Introduction of Artificial Neural Networks | 1999 | | Jacek Zurada | Pws Pub Co |
| 3 | Fuzzy Logic with engineering applications, | 3rd Edition, | | Timothy Ross, | Wiley Publication |
| 4 | Principles of Soft Computing | , 2nd Edition, | | S. N. Sivanandanam and S. N. Deepa, | Wiley Publication |



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Syllabus Open Elective-II

6th Semester

| | | | | | |
|---------------|---|------|-------|-------|------------|
| EE1329 | OE II : Basics of Analog and Digital Communication Systems | L= 3 | T = 0 | P = 0 | Credits =3 |
|---------------|---|------|-------|-------|------------|

| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
|-------------------|-------|--------|----|-----|-------|--------------|
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

| Objective | Outcome |
|--|--|
| <ul style="list-style-type: none"> ➤ To Study of amplitude, frequency & phase modulation. ➤ To learn the concept of PPM, PAM, PWM & PCM & delta modulation. ➤ To understand the operation of digital modulation techniques. | Students <ol style="list-style-type: none"> 1. Will Recognize and utilize latest analogue and digital communication technologies. 2. Will understand fundamental concepts & limits in information theory in the context of digital communication theory. 3. Will demonstrate different modulation techniques. 4. Will be able to explain digital modulation techniques for transmitting digital data. 5. Will be able to describe various types of transmitters & receivers in communication system. |

UNIT-1: Basic block diagram of Analog communication system, Modulation techniques: Need for modulation, Basic concepts of AM, FM, PM, Transmitters.

(7 Hours)

UNIT-2: Receivers: Basic receiver (TRF), Super heterodyne receiver, AM detectors, FM Detectors, Noise Types of Noise, Definition of Noise figure, signal to noise ratio, calculation of noise figure.

(8 Hours)

UNIT-3: Pulse Modulation: Generation and demodulation of PAM, PWM, PPM, Time division Multiplexing, Frequency division multiplexing.

(8 Hours)

UNIT-4: Basic digital Modulation System, Channel capacity, PCM, ADPCM, Delta Modulation, ADM.

(7 Hours)

UNIT-5: Digital Modulation techniques: ASK, FSK, PSK, BPSK, QPSK, MSK, DPSK, BFSK,

(8 Hours)

UNIT-6: Source coding and channel coding, Information theory, Huffman coding, LZ coding, Basic concept of convolution code.

(7 Hours)

| Text books: | | | | |
|------------------|--|----------------------|------------------|-------------------|
| 1 | Electronic Communication System | Fourth Edition, 1999 | Gorge Kennedy | Tata McGraw-Hill |
| 2 | Digital Communications | | Symon Hykin | Wiley, 1988 |
| Reference books: | | | | |
| 1 | Electronic Communication Systems | Second Edition, 1993 | Frank R. Dungan | Delmar Publishers |
| 2 | Communication Electronics | Third Edition, 2007 | Louis Frenzel | McGraw-Hill |
| 3 | Digital and analog communication systems | Fifth Edition, 2003 | K. Sam Shanmugam | John Wiley & Sons |



6th Semester

| | | | | | |
|--------|------------------------------------|------|-------|-------|-------------|
| EE1330 | OE II : Biomedical Instrumentation | L= 3 | T = 0 | P = 0 | Credits = 3 |
|--------|------------------------------------|------|-------|-------|-------------|

| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
|-------------------|-------|--------|----|-----|-------|--------------|
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |

| Objective | Outcome |
|--|---|
| <ul style="list-style-type: none"> This course is intended for exposing the students to basics of biomedical instrumentation. | <p>Students</p> <ol style="list-style-type: none"> Will learn the basic concepts of biomedical instrumentation. Will learn measurement techniques for involved in processes such as cardiovascular measurements. Will also learn techniques in x-rays, EMG, etc. |

UNIT-1:

Introduction to Biomedical instrumentation, development of biomedical instrumentation, biometrics, Physiological system of body, problems encountered in measuring a living system.

UNIT-2:

Basic transducer principle, active transducer, passive transducer, electrode theory, biopotential electrodes, biochemical transducers

UNIT-3 :

The heart and cardiovascular system, characteristics of blood flow, blood pressure measurement, heart sound measurement. Principles of ultrasonic diagnosis, temperature measurement, electrocardiograph, plethysmography, pulmonary function measurement spirometry, pulmonary function analyzers, respiratory gas analyzers

UNIT-4:

Generation of ionizing radiation, instrumentation for diagnostic X-ray, special technique, instrumentation for medical use of radioisotopes, radiation therapy, EMG

UNIT-5 :

Patient care and monitoring, the elements of intensive care monitoring, diagnosis, calibration, reparability of patient monitoring equipment, instrumentation for monitoring patient, pacemakers, defibrillators,

UNIT-6:

Computers in biomedical instrumentation, digital computer, microprocessor, interfacing the computer with medical instrumentation and other equipments, Electrical safety of medical equipment. Physiological effects of electrical current, shock hazards from electrical equipments, Methods of accident prevention.

Text books:

| | | | |
|---|--|--|-----|
| 1 | Biomedical Instrumentation & Measurement | By Leslie Cromwell, Fred Weibell, Erich A Pfeiffer | PHI |
|---|--|--|-----|

Reference books:

| | | | |
|---|---|-----------------------------|---------------|
| 1 | Handbook of Biomedical Instrumentation | R.S.Khandpur | TMH |
| 2 | Bioelectronic Measurement | Dean A Dman, David Michaels | Prentice Hall |
| 3 | Medicine and Clinical Engineering | Jacobson and Webster | PHI |
| 4 | Introduction to Biomedical Equipment Design | Carr and Brown | John Wiley |
| 5 | Biomedical Digital Signal Processing | Tompkins | |



6th Semester

| ET1340 | OE II : Soft Computing | | L= 3 | T = 0 | P = 0 | Credits = 3 |
|--|------------------------|--------|--|-------|-------|--------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
| | | 15 | 15 | 10 | 60 | 100 |
| Course Objective Students should be able to 1. Familiarize with soft computing concepts. 2. Introduce the concepts of Genetic algorithm 3. Introduce the ideas of Neural networks. 4. Introduce the concepts of Fuzzy Logic. 5. Describe the basics of Soft computing and its application areas particularly to intelligent systems | | | Course Outcome Students will be able to 1. Identify and describe genetic operators and genetic algorithms in problem solving 2. Apply supervised multilayer NN algorithm in pattern classification 3. Apply unsupervised multilayer NN algorithm in pattern classification 4. Apply fuzzy logic to handle uncertainty and solve engineering problems 5. Apply fuzzy arithmetic and reasoning in problem solving 6. Define fuzzy rule base and design fuzzy controller for a given problem. | | | |

UNIT-1

Introduction of Soft Computing Methods, Fundamentals of Genetic Algorithms, Encoding, Fitness function, Genetic modeling, Applications of GA

06Hrs

UNIT-2

Introduction of neural networks, learning methods, perceptrons, perceptron training algorithm, single layer perceptron, multiplayer perceptron, neural network architectures, ADALINE, MADALINE

06 Hrs

UNIT-3

Back propagation algorithm, RBF networks, ART Networks, self-organizing feature maps, Applications of ANN

06 Hrs

UNIT-4

Overview of Crisp Sets, Concepts of Fuzzy sets, representation of fuzzy sets, extension principle, fuzzy compliments, t-norms and t- conforms

06Hrs

UNIT-5

Fuzzy numbers, arithmetic operation on intervals and on fuzzy sets, fuzzy equations, fuzzy relations, binary fuzzy relations, fuzzy equivalence,

06 Hrs

UNIT-6

Fuzzy controllers, Defuzzification Methods , Fuzzy Inference Techniques, Applications of fuzzy logic

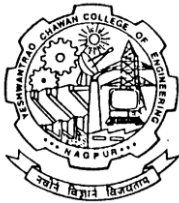
06 Hrs

Text books:

| | | | | |
|---|---|------|------------------------------------|------------|
| 1 | Fuzzy sets and Fuzzy logic | 1995 | by George Klir, Bo Yuan | PHI |
| 2 | Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and applications | 2003 | By S. Rajsekharan, Vijayalaxmi Pai | PHI |
| 3 | Elements of Artificial Neural Network | 1997 | K. Mehrotra | MIT Cognet |

Reference books:

| | | | | |
|---|---|------|---------------------|--------------|
| 1 | Neural Networks, a comprehensive foundation | 1999 | By Simon Haykins | PHI |
| 2 | Artificial Neural Networks | 2004 | By B. Yegnanarayana | PHI |
| 3 | Fuzzy Logic & Applications | 2003 | J. Ross, TMH/Mc | Mc Graw Hill |



6th Semester

| ET1341 | OE II : Industrial Instrumentation | | L= 3 | T = 0 | P = 0 | Credits = 3 |
|---|------------------------------------|--------|---|-------|-------|--------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |
| Course Objective Students should be able to | | | Course Outcome Students will be able to | | | |
| <ol style="list-style-type: none"> 1. Study the characteristics of Instruments. 2. Understand the Concepts of Pressure Measurements and its calibration process 3. Understand the working principle of various passive temperature transducers. 4. Learn the working principle of various active temperature transducers. 5. Learn the working principle of various flow transducers. 6. Learn the working principle of various transducers like level , thickness speed, ph value etc. | | | <ol style="list-style-type: none"> 1. Design instrumentation system using various transducers and its calibration process. 2. Analyze pressure using pressure measuring instruments and its calibration process. 3. Measure and analyze the temperature using passive temperature transducers. 4. Measure and analyze the temperature using active temperature transducers. 5. Measure and analyze flow using flow transducers. 6. Measure and analyze various parameters like level , thickness speed, ph value etc. | | | |

UNIT I : INTRODUCTION

Block diagram of instrumentation system, static and dynamic characteristics of instruments, functions of instruments, Definition of Transducers- Role of transducers in instrumentation- Advantages of electrical transducers - Classification of transducers- Analog and Digital, Active and passive, Primary and Secondary transducers- Inverse transducer- Sensitivity and specification for transducers - Characteristics and Choice of transducer-Factors influencing choice of transducer. Need of transducers, Classification, selection criteria,

06Hrs

UNIT II : PRESSURE MEASUREMENT

Units of pressure - Manometers – Different types – Elastic type pressure gauges – Bourdon type bellows – Diaphragms – Electrical methods – Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo resistive pressure sensor –Testing and calibration of pressure gauges – Dead weight tester.

06Hrs

UNIT III : TEMPERATURE MEASUREMENT 1

Different types of filled in system thermometer , Bimetallic thermometers – Electrical methods of temperature measurement – Signal conditioning of industrial RTDs and their characteristics – Three lead and four lead RTDs.

06 Hrs

UNIT IV : TEMPERATURE MEASUREMENT 2: THERMOCOUPLES AND PYROMETERS

Thermocouples – Laws of thermocouple – Signal conditioning of thermocouples output –cold junction compensation – Response of thermocouple, Radiation methods of temperature measurement – Radiation fundamentals – Total radiation & selective radiation pyrometers – Optical pyrometer – Two color radiation pyrometers.

06 Hrs

UNIT V: FLOWMETERS

Variable head type flow meters: – Orifice plate – Venturi tube – Pitot tube.
Area flow meter: – Rotameter, Principle and constructional details of electromagnetic flow meter – Ultrasonic flow meters flow measurements for gases

06 Hrs

UNIT VI : MISCELLANEOUS MEASUREMENT

Electrical level gauge: – Resistive - capacitive – Nuclear radiation - Ultrasonic type, Radar type ,Speed measurement D.C and A.C tacho generators ,rotary encoder, Proximity sensors- Inductive and capacitive, soil & water pH Measurement

06 Hrs

| Text books: | | | | |
|------------------|--|-------|---------------------------|--|
| 1 | Industrial Instrumentation and Control | 2003 | S.K. Singh | Tata McGraw Hill, 2003. |
| 2 | Transducers and Instrumentation | | D V S Murthy | prentice Hall of India Pvt. Ltd., New Delhi |
| Reference books: | | | | |
| 1 | Principles of Industrial Instrumentation | | D. Patranabis | Tata McGraw Hill Publishing Company Ltd, 1996. |
| 2 | Instrumentation Measurement & Analysis | 2004. | B.C. Nakra & K.K.Chaudary | Tata McGraw Hill Publishing Ltd |
| 3 | Measurement Systems – Application and Design | 2003 | E.O. Doebelin | Tata McGraw Hill publishing company |
| 4 | Industrial Instrumentation | | D.P. Eckman | Wiley Eastern Ltd. |



6th Semester

| ET1342 | OE II : Medical Electronics | | L= 3 | T = 0 | P = 0 | Credits = 3 |
|--|-----------------------------|--------|--|-------|-------|--------------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs |
| Course Objective Students should be able to 1. Know the physiology of heart , brain and skin. 2. Understand the basic principles of physical parameters such as blood pressure, heart rate and body temperature. 3. Comprehend the working principle of recording instruments such as ECG, EEG EMG and phonocardiograph. 4. Comprehend the working principle of instrumentation for Blood Pressure, Blood flow, Pulse oximeters, Heart rate, respiration rate ,temperature and hearing Aid. 5. Know the physical concepts of radiography related to X rays. 6. Learn working principles of advanced medical imaging system | | | Course Outcome Students will be able to 1. Analyze various parameters using ECG,EEG and EMG 2. Analyze various physical measurements such as blood pressure, heart rate, temperature etc. 3. Measure and analyze various parameters using ECG, EEG EMG and phonocardiograph. 4. Measure and analyze various parameters such as - Blood Pressure, Blood flow rate, Pulse rate, Heart rate, respiration rate and temperature and hearing ability. 5. Interpret the working principle of X-ray equipments 6. Describe working principles of advanced medical imaging systems. | | | |

Unit 1 : Cell as bio electric generator:

Heart and Circulatory system, ECG, Brain and nervous system, EEG, Skeletal , Muscle and Skin Systems, EMG

06Hrs

Unit 2 : Physical Measurement

Blood pressure and Flow, Heart rate and Heart sounds, Respiration and temperature

06Hrs

Unit 3 : Recording Instrumentation

Electrodes, Basic Instrumentation, Electrocardiograph, Electroencephalograph, Electromyograph, Phonocardiograph

06Hrs

Unit 4 : Measuring Instrumentation

Transducers, Blood Pressure, Blood flow and Pulse oximeters, Heart rate , respiration rate and temperature meters, Audiometer and hearing Aid

06Hrs

Unit 5 : X-rays

X-ray Physics, Fluoroscopy and radiography, X-ray tubes and X-ray Equipments

06Hrs

Unit 6 : Advanced Imaging Systems

Ultrasonic scanner, CT scan, MRI, Endoscope and Electron microscope

06Hrs

| Text books: | | | | |
|------------------|---|------------------|---------------------|--|
| 1 | Medical Electronics | 2003 | ISTE Excel book | Patil A. G. |
| 2 | Biomedical Instrumentation and Measurements | 2004 | PHI, second edition | Leslie Cromweel , Fred J. Weibell, Erich A. Pfeiffer |
| Reference books: | | | | |
| 1 | Handbook of Biomedical Instrumentation | New Delhi, 2003. | TATA McGraw-Hill | Khandpur, R.S. |
| 2 | Introduction to Biomedical equipment Technology | New York, 2004 | John Wiley and Sons | Joseph J.Carr and John M.Brown |



6th Semester

| | | | | | | | | |
|---|---------------------------------|--------|----|-----|--|--------------|-----|-----------|
| CT1351 | OE II: Multimedia And Animation | | | | L=3 | T=0 | P=0 | Credits=3 |
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration | | |
| | 15 | 15 | 10 | 60 | 100 | 3Hrs | | |
| OBJECTIVES | | | | | OUTCOMES | | | |
| 1. To learn basics of multimedia, applications of multimedia, requirements to make good multimedia. 2. To study Multimedia hardware, Macintosh and windows production platforms, multimedia authoring tools. 3. Multimedia building blocks. 4. The basics of animation, techniques of animation. 5. Animation in Flash. 6. To study 3D Animation, Types of 3D Animation Applications & Software of 3D Animation. | | | | | 1. To understand the Basics of multimedia. 2. To understand multimedia hardware and multimedia authoring tools. 3. To develop skills in design, illustration, image manipulation, graphic designing, video editing, visual effects and game designing. 4. To apply the fundamental broad-based skills in traditional Animation techniques and emphasize to apply in practice. 5. To develop the skills in Flash Animation and apply it on some script. 6. To develop the 3D Animation skills. | | | |
| PO, PSO MAPPING:- a,b,c,d,e,g,h,i,j,k,l | | | | | | | | |

UNIT I

Multimedia definitions, CD-ROM and the multimedia highway. Applications of multimedia, introduction to making multimedia, the stages of project, requirements to make good multimedia, multimedia skills and training, the multimedia tech.

UNIT II

Multimedia hardware, Macintosh and windows production platforms, hardware peripherals, connections, memory and storage devices, input devices output hardware, communication devices, media software, basic tools, making instant multimedia authoring tools.

UNIT III

Multimedia building blocks – text- using text in multimedia, computers and text, font editing and design tools, Sound-the power of sound , multimedia system sound, Digital audio, preparing digital audio files, Audio file format, images- Making still Images, Color, Image file format, video- Broadcast video standard, Analog video, Digital video, optimizing video files for CDROM .

UNIT IV

What is meant by Animation, Why we need Animation, History of Animation, Uses of Animation. Types of Animation, Principles of Animation, Some Techniques of Animation, and Animation on the WEB, Special Effects, and Creating Animation.

UNIT V

Creating Animation in Flash: Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers – Action script.

UNIT VI

3D Animation & its Concepts, Types of 3D Animation, Skeleton & Kinetic, 3D Animation Texturing & Lighting of 3D Animation, 3D Camera Tracking, Applications & Software of 3D Animation.

TEXT BOOKS:

1. Multimedia Making Work by Tay Vaughan (TMH), 3rd Ed.
2. Principles of Multimedia by Ranjan Parekh, 2007, TMH.
3. Multimedia Technologies by Ashok Banerji, Ananda Mohan Ghosh, McGraw Hill Publication.

REFERENCE BOOKS:

1. Multimedia systems design by K. Andleigh, K. Thakkrar, Phi Pub.
2. Multimedia: Computing, Communications & Applications by Raif Stein Metz and Kiara Nahrstedt.
3. Advanced Multimedia Programming by Steve Rimmer, McGraw Hill Pub.



6th Semester

| | | | | | | | | |
|--|--|--------|----|-----|---|--------------|-----|-----------|
| CT1352 | OE II: Current Trends and Technologies | | | | L=3 | T=0 | P=0 | Credits=3 |
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration | | |
| | 15 | 15 | 10 | 60 | 100 | 3Hrs | | |
| OBJECTIVES | | | | | OUTCOMES | | | |
| 1. The objective of this course is to make the students aware of the basic fundamentals of communication. 2. Growth of technologies in Internet, E- Technologies & E-Learning. 3. Students should know about the Green Computing and its implementation. | | | | | 1. Using the Basics of Internet for deployment of various servers and recourses. 2. Designing and implementation of Etechnologies 3. Design E-Learning Resources. 4. Choose appropriate processors and Real Time System for Green Computing 5. Develop the Social Networking for next generation. | | | |
| PO,PSO MAPPING :- a,b,c,d,e,f,g,h,i,j,k,l,m | | | | | | | | |

UNIT I

Fundamentals of Communications: Types of communication- Wired, wireless, mobile, Modes of transmission: Simplex, Half Duplex, Full Duplex, Multiplexing techniques, History and evolution of wireless and mobile systems, Transition and characteristics of 1G, 2G, 3G, 4G, Spectrum, regulations, and frequency allocation.

UNIT II

Fundamental of INTERNET: History, Internet working, Connections, Internet services, The World Wide Web, Tools for the WWW, Web servers, Web browsers, Web page makers and editors, Plug-ins and delivery vehicles.

UNIT III

E-Technologies: Electronic Commerce: Framework, Media Convergence of Applications, Consumer, Applications, Organization Applications, Electronic Payment Systems: Digital Token, Smart Cards, Credit Cards, Risks in Electronic, Payment System, Designing Electronic Payment Systems, Electronic Data Interchange (EDI): Concepts, Applications, (Legal, Security and Privacy) issues, EDI and Electronic Commerce, Standardization and EDI, EDI Software, Implementation, EDI Envelope for Message Transport, Internet-Based EDI.

UNIT IV

E-Learning: Definition, Introduction, Types of e-Learning: Learner-led e-Learning, Facilitated e-Learning, Instructor-led e-Learning, Embedded e-Learning, Tele monitoring And e- Coaching E-Learning Models: WBT, CBT, LMS, LCMS, Virtual School Systems, E-Learning Tools And Technologies: e-mail, Online Discussion, Chat and Instant Messaging, Voting, Whiteboard, Application Sharing, Conferencing, Online Meeting Tools, Case study.

UNIT V

Green Computing: Introduction, Why....Green Computing? Approaches to Green Computing- Virtualization, Power Management, Power supply, Storage, Video Card, Display, IT Equipment, Recycling, Remote Conferencing & Telecommuting Strategies, Product longevity, Resource allocation, Terminal servers, Operating system support, How to Implement? Industrial implementations of Green Computing- Blackle, Fit-PC, Zonbu computer, Sunray thin client.

UNIT VI

Social Networking: Definition, Overview of Social Networking Sites, Types of Social Networking Sites: General purpose, Niche. Advantages of Social Networking Sites, Drawbacks of Social Networking Sites, Features and Need of Social Networking, Security Issues with Social Networking Sites, Case Studies.

TEXT BOOKS:

1. Impact of E-Business Technologies on Public and Private Organizations by OzlemBak, Nola Stair.
2. Mobile Computing by Tomasz Imielinski, Henry F. Korth.
3. Broadband telecommunications technology by Byeong Gi Lee, Minh Kang, Jonghee Lee.

REFERENCE BOOKS:

1. Introduction to broadband communication systems by Cajetan M. Akujuobi, Matthew, N. O. Sadiku.
2. E-Learning Tools and Technologies William Hortan, Katherine Hortan, Wiley Pub
3. Internet (Use of Search Engines Google & Yahoo etc).



6th Semester

| | | | | | | |
|-------------------|---|--------|-----|-----|-------|--------------|
| IT1336 | OE II : Introduction to E-Commerce | | L=3 | T=1 | P=0 | Credits=4 |
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs. |

| Course Learning Objective | Course Outcomes |
|---|--|
| <ol style="list-style-type: none"> To understand the scope of e-commerce in the realm of modern Business. To learn the marketing methods & Business strategies used in e-commerce. To know how the electronic data interchange and how to manage-commerce solutions. Recognize the business impact and potential of e-Commerce Assess the impact of the Internet and Internet technology on business-electronic commerce and electronic business Understand the security threats & electronic payment system. | <p>After completion of the course students will be able to:</p> <ol style="list-style-type: none"> Understanding of contemporary ecommerce concepts and terminology, and the processes and management decisions that are involved in launching, operating and managing business activity on the World Wide Web. To analyze and understand the human, technological and business environment associated with e-commerce Defining and analyzing the concept of electronic data interchange and its legal, social and technical aspects evaluate the key aspects of B2C e-commerce discuss the trends in e-Commerce and the use of the Internet Define and analyze the security issues over the web, the available solutions, future aspects of e-commerce security, concept of E-commerce and electronic payment system. |

| Course Outcomes | Statement | Mapped PO | | | | | | | | | | | | PSPO | | | |
|-----------------|---|-----------|---|---|---|---|---|---|---|---|----|----|----|------|---|--|--|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | | |
| IT1336.1 | Understanding of contemporary ecommerce concepts and terminology, and the processes and management decisions that are involved in launching, operating and managing business activity on the World Wide Web | M | L | | | | H | | | | | | L | L | | | |
| IT1336.2 | To analyze and understand the human, technological and business environment associated with e-commerce | H | H | | | | M | | | | | | L | L | | | |
| IT1336.3 | Defining and analyzing the concept of electronic data interchange and its legal, social and technical aspects | H | H | | | | M | | | | | | H | L | | | |
| IT1336.4 | evaluate the key aspects of B2C e-commerce | M | L | | | | L | | | | | | H | H | | | |
| IT1336.5 | Discuss the trends in e-Commerce and the use of the Internet. | L | L | | | | L | | | | | | L | H | | | |
| IT1336.6 | Define and analyze the security issues over the web, the available solutions, future aspects of e-commerce security, concept of E-commerce and electronic payment system. | M | H | | | | M | | | | | | H | L | | | |
| IT1336 | | M | H | | | | M | | | | | | H | L | | | |

UNIT I

[07 Hrs.]

Internet & Introduction to Electronic Commerce: The basics of internet access, email, FTP, TELNET, Introduction to WWW: The basics of WWW & browsing working of Web Browser & Web Server, Web Browser architecture. Introduction to Electronic Commerce: The scope of Electronic Commerce, Definition of Electronic Commerce, Electronic Commerce and the Trade.



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Syllabus Open Elective-II

6th Semester

| | | | | | | |
|-------------------|---|--------|-----|-----|-------|--------------|
| IT1336 | OE II : Introduction to E-Commerce | | L=3 | T=1 | P=0 | Credits=4 |
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs. |

UNIT II

[07 Hrs.]

Business Strategy in an Electronic Age: The Value Chain System, Competitive Advantage, Business Strategy.

UNIT III

[08 Hrs.]

Business to Business Electronic Commerce: Inter-organisational Transactions, Electronic Markets, Electronic Data Interchange, EDI: EDI Technology, EDI Standards, EDI, Communication, EDI Implementation, EDI Security, EDI and Business, Inter-organisational e-Commerce.

UNIT IV

[07Hrs.]

Business to Consumer Electronic Commerce: Consumer Trade transactions, What you want, when you want it, internet e-commerce, Internet Shopping and the Trade cycle, Advantage and Disadvantage of Consumer e-commerce.

UNIT V

[07 Hrs.]

The Elements of e-Commerce & e-Business: Elements, e-Visibility, The e-shop, Online Payments, Delivering the Goods, After-Sales Service.

e-Business: Introduction, Internet Bookshops, Software Supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the Net.

UNIT VI

[08 Hrs.]

Security Threats to E-Commerce, Electronic Payment Systems (EPS).

| Text books: | | | | |
|-------------------------|--|-------------------------|------------------------------------|-------------------------------|
| 1 | E-Commerce | 2001 | David Whiteley | McGraw Hill Pub |
| 2 | Electronic Commerce | 2 nd Edition | Gary P. Schneider & James T. Perry | Course Technology |
| Reference books: | | | | |
| 1 | Teach Yourself Web Technologies - Part 1 | 2003 | Ivan Bayross | BPB Publications |
| 2 | Web Technologies TCP/IP Architecture, and Java Programming | 2 nd Edition | Achyut S. Godbole and Atul Kahate | McGraw-Hill Education (India) |



6th Semester

| | | | | | | |
|-------------------|-------------------------------------|--------|-----|-----|-------|--------------|
| IT1337 | OE II : Information Security | | L=3 | T=0 | P=0 | Credits=3 |
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs. |

| Course Learning Objective | Course Outcomes |
|---|---|
| <ol style="list-style-type: none"> To focus on the foundations Computer Security and Threats to security The basic concepts of Threats and Intruders, To demonstrate Communication security and understanding standards To know the working of Server security To know various System and Application Security To understand secure programming languages | <p>Students who complete this course will be able to</p> <ol style="list-style-type: none"> To focus on the fundamentals of Network Security, common attacks against network assets, the associated threats and vulnerabilities, and what network security personnel do to secure assets. To understand how to protect information and provide authentication Effectively use of encryption standards and its implementation To Understanding various technologies and Internet Application To understand Security threads and its implementations To understand how to implement multiprogramming, |

| Course Outcomes | Statement | Mapped PO | | | | | | | | | | | | PSPO | | |
|-----------------|---|-----------|---|---|---|---|---|---|---|---|----|----|----|------|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| IT1337.1 | To focus on the fundamentals of Network Security, common attacks against network assets, the associated threats and vulnerabilities, and what network security personnel do to secure assets. | H | M | | | | | | | | | | | | | |
| IT1337.2 | To understand how to protect information and provide authentication | H | M | | | | | | | | | | | | | |
| IT1337.3 | Effectively use of encryption standards and its implementation | | M | | | | | | | | | | | | | |
| IT1337.4 | To Understanding various technologies and Internet Application | | | | | | | | | | | | | | | |
| IT1337.5 | To understand Security threads and its implementations | | | | | M | | | | | | | | | M | M |
| IT1337.6 | To understand how to implement multiprogramming, | | | | | | | | | | | | | | M | M |
| IT1337 | | H | M | | | M | | | | | | | | | M | M |

UNIT I

[07 Hrs.]

Introduction- Computer Security, Threats to security, History of Computer security, Computer System Security and Access Controls (System access and data access).

UNIT II

[08 Hrs.]

Threats - Viruses ,worms , Trojan horse, bombs, trap doors, spoofs, email virus, macro viruses, remedies, Intruders, Malicious software, Firewalls, vulnerabilities & threats, Network Denial of service attack.

UNIT III

[08 Hrs.]

Communication security- Encryption, classical encryption techniques, data encryptions standards, advance encryption techniques Network Security-Kerberos,X.509



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Syllabus Open Elective-II

6th Semester

| | | | | | | |
|-------------------|-------------------------------------|--------|-----|-----|-------|--------------|
| IT1337 | OE II : Information Security | | L=3 | T=0 | P=0 | Credits=3 |
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration |
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs. |

[08 Hrs.]

UNIT IV

Server security- security for network server, web servers, mobile technologies (java and java script etc)
Intrusion detection techniques – techniques to provide privacy in Internet Application and protecting digital contents(music, vedio, software) from unintended use, authentication.

UNIT V

System and Application Security- mail security (PGP etc) file System security, program and security, memory security, Sandboxing. Security threads protection intruders- Viruses-trusted system

[07 Hrs.]

UNIT VI

Secure programming languages- concepts structured multiprogramming, shared classes, cooperating sequential processes, structure of multiprogramming system RC-4000

[07 Hrs.]

| Text books: | | | | |
|------------------|---|-------------------------|---|-------------------|
| 1 | Computer Security | 2 nd Edition | Dieter Gollmann | John Wiley & Sons |
| 2 | Computer Security: Art and Science | 1 st Edition | Matt Bishop | Addison Wesley |
| Reference books: | | | | |
| 1 | Introduction to computer Security | 1 st Edition | Mathew Bishop | Pearson |
| 2 | Network Security: Private Communication in a Public World (Prentice Hall Series in Computer Networking and Distributed) | 2 nd Edition | Charlie Kaufman, Radia Perlman, Mike Speciner | Pearson Education |
| 3 | Cryptography and Network Security | 6 th Edition | william Stallings | Pearson Education |



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Syllabus Open Elective-II

Mathematics Department

| GE 1314 | Combinatorial Theories | | | | L=3 | T=0 | P=0 | Credits=3 |
|-------------------|------------------------|--------|----|-----|-------|--------------|-----|-----------|
| Evaluation Scheme | MSE-I | MSE-II | TA | ESE | Total | ESE Duration | | |
| | 15 | 15 | 10 | 60 | 100 | 3 Hrs | | |

UNIT 1: Combinatory

Basic counting techniques, pigeon-hole principle, recurrence relations, generating functions. Examples using ordinary power series and exponential generating functions, general properties of such functions. Dirichlet Series as generating functions. A general family of problems described in terms of "cards, decks and hands" with solution methods using generating functions.

UNIT II: Generating function

Proofs of the sieve formula and of various combinatorial identities. Certifying combinatorial identities. Some analytical methods and asymptotic results. Polya's counting theorem. Basics of graph theory. Introduction to probabilistic method in combinatorics.

UNIT III: Number Theory

Examples of continued fractions. The study of the continued fractions. α has infinite continued fraction if α is irrational. Formal logic: Propositional logic: proof system, semantics, completeness, compactness. Length of proofs, polynomial size proofs, efficiency of proof systems.

UNIT IV: Theory of rational irrational numbers

α has periodic continued fraction if α is quadratic irrational. Application to approximation of irrationals by rationals. Hurwitz's Theorem.

First order logic: models, proof system, compactness, Examples of formal proofs in say, number theory or group theory. Some advanced topics.

UNIT V: Pell's equation / Continued fraction expansion

Application to solutions of Pell's equation. Proof that means $\cos\{(p \times \pi)/q\}$, for natural numbers p and q are irrational (apart from obvious exceptions). Example: CS application of logic, introduction to modal and temporal logics, Or formal number theory including incompleteness theorem.

UNIT VI: Transcendental numbers

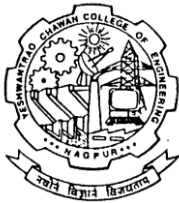
Statement of Liouville's Theorem on algebraic numbers. Construction of transcendental numbers. Elements of proof theory including cut elimination, Or zero-one law for first order logic.

Text Book:

- 1) Niven, Zuckerman and Montgomery, An Introduction to the Theory of Numbers, (5th edition), 1991, Wiley.
- 2) Devid M. Burton, Elementary number theory, Tata Mc Graw Hill, 6th addition

Reference Book:

1. Martin Aigner, Combinatorial theory, Springer, 1979 edition.
2. Amritanshu Prasad, Representation theory, A combinatorial view point.



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Syllabus Open Elective-II

Physics Department

| | | | | | |
|---------|---------------------------------------|-------|-------|-------|-------------|
| GE 1315 | Electronic Materials and Applications | L = 3 | T = 0 | P = 0 | Credits = 3 |
|---------|---------------------------------------|-------|-------|-------|-------------|

| EVALUATION SCHEME | MSE I | MSE II | TA | ESE | TOTAL |
|-------------------|-------|--------|----|-----|-------|
| | 15 | 15 | 10 | 60 | 100 |

| Objective | Outcome |
|--|---|
| The objective of this paper is to study different conducting, dielectric, magnetic, nano materials and their behaviour with some important applications. | With the completion of this syllabus students will be in position to understand the behavior of conducting, dielectric, magnetic, nano materials and their important applications and able to select materials for various electronic applications. |

Unit I : Conducting materials (6 periods)

Conduction in metals, Factors affecting electrical resistivity of metals, Properties of Conducting materials and applications, Phenomenon of Superconductivity, Characteristic and applications, New developments.

Unit II : Dielectrics: (6 periods)

Dielectric parameters, Mechanisms of polarization, Lorentz field, Clausius-Mosotti equation, Dielectric in ac field, Frequency and temperature dependence of polarization, Dielectric loss Dielectric breakdown and mechanism, Dielectric materials and applications.

Unit III : Active Dielectrics : (6 periods)

Ferroelectricity, Origin of ferroelectricity; Important characteristics of ferroelectrics: Normal and relaxor ferroelectrics; Applications of ferroelectricity, Piezoelectricity: Phenomenon, Origin, Piezoelectricity in Quartz; Piezoelectric materials and applications.

Pyroelectricity, Phenomenon, Origin, Pyroelectric materials and applications.

Unit IV : Magnetic materials, (6 periods)

Magnetic parameters, Origin of magnetization/ Magnetic moment, Bohr's magneton, Classification of magnetic materials: diamagnetic, paramagnetic, ferromagnetic, anti ferromagnetic, and ferri magnetic (ferrites), Hard and soft magnetic materials, Properties and applications.

Unit V : Optical materials : (6 periods) Refractive index and relative dielectric constant, Optical absorption, Luminescence: LCD, LED materials and applications, Photo detectors, Solar cell.

Unit VI: Nanomaterials (6 periods)

Introduction to Nanoscience, Synthesis of nanomaterials: Top down and Bottom-up process, Different types of nano structures (1-D, 2-D and 3-D), Properties of nano materials and comparison with bulk material, Nanostructured materials (Structure, Properties and uses): Graphene, Fullerene, CNTs



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Syllabus Open Elective-II

Physics Department

| | | | | | |
|----------------|--|--------------|--------------|--------------|--------------------|
| GE 1304 | Electronic Materials and Applications | L = 3 | T = 0 | P = 0 | Credits = 3 |
|----------------|--|--------------|--------------|--------------|--------------------|

| <u>EVALUATION SCHEME</u> | MSE I | MSE II | TA | ESE | TOTAL |
|---------------------------------|--------------|---------------|-----------|------------|--------------|
| | | 15 | 15 | 10 | 60 |

Text books :

- 1.Solid State Physics : S.O.Pillai, New Age International Publishers
- 2.Applied Physics : P.K.Palanisamy, Scitech Publication (India Pvt Ltd , Chennai) 600017
- 3 Principles of electronic materials and devices : S.O.Kasap

Reference Books

1. Engineering Physics : Pandey and Chaturvedi ,Ceanage Publication
2. Engineering Physics: Malik and Singh ,McGraw Hill Publication
3. Applied Physics : T Bhima Sankaran and Prasad, BS publications
4. Electrical Engineering materials , N.Alagappan and N.T .Kumar Tata McGraw- Hill Publishing Co.Ltd , New Delhi 110002
5. Electrical Engineering materials , C.S.Indulkar and S.Thiruvengadam, S.Chand and C. Ltd , Nagpur
6. Electrical Engineering materials , Seth
7. Electrical Engineering materials , A.J. Dekker, Prentice Hall of India Pvt Ltd, New Delhi
8. Introduction to Magnetic materials : B.D.Cullity : Addison Wesley
9. Fandamentals of Material Science : John Wiely and sons , Callister
10. The science of Engineering Materials : D.R.Askeland and P.P Phule.