OPEN ELECTIVES

List of Open Electives offered:

Department of Civil Engineering

S. No.	Course Code	Subject
1.	13A01709	Finite Element Methods in Engineering
2.	13A01710	Disaster management and Mitigation
3.	13A01711	Architecture and Town Planning
4.	13A01712	Intellectual Property Rights

Department of EEE

S. No.	Course Code	Subject
1.	13A02710	Optimization Techniques
2.	13A02711	Reliability and Safety Engineering
3.	13A02712	PLC & Its Applications.

Department of Mechanical Engineering

S. No.	Course Code	Subject
1.	13A03711	Energy Systems
2.	13A03712	Total Quality Management
3.	13A03713	Enterpreneurship
4.	13A03714	Reliability and Maintenance Engineering

Department of ECE

S. No.	Course Code	Subject
1.	13A04709	Concepts of Communication Systems
2.	13A04710	Neural Networks & Fuzzy Logic
3.	13A04711	Industrial Electronics

Department of EIE

S. No.	Course Code	Subject
1.	13A10707	Industrial safety & Management
2.	13A10708	MEMS & Applications
3.	13A10709	Nano Technology

Department of CSE

S. No.	Course Code	Subject
1.	13A05711	Soft Computing
2.	13A05712	Pattern Recognition
3.	13A05713	Intellectual Property Rights & Cyber Laws
4.	13A05714	Simulation & Modeling

Department of IT

S. No.	Course Code	Subject
1.	13A12706	E-Commerce
2.	13A05801	Cloud Computing
3.	13A05802	Software Project Management
4.	13A12707	Artificial Intelligence & Robotics

Department of Chemical Engineering

S. No.	Course Code	Subject
1.	13A08711	Basics of Nanotechnology
2.	13A08712	Industrial Safety & Hazard Management
3.	13A08713	Nuclear Engineering
4.	13A08714	Solid Waste Management

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(13A01709) FINITE ELEMENT METHODS IN ENGINEERING

Course Objective:
To familiarize the student with the latest developments in analysis for Civil Engineering problems.

UNIT   I
INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.
PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT   II
ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT   III
GENERATION OF ELEMENT: Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements.

UNIT   IV
ISOPARAMETRIC FORMULATION:
 Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.
AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element

UNIT   V
SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Text Books:
1. Finite Elements Methods in Engineering by Tirupati. R. Chandrnpatla and Ashok D. Belegundu – Pearson Education Publications.
2. Finite element method and its application by Desai ,2012, Pearson Pubilications.
3. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

Reference Books:
1. Finite element methods by Darrel W.Pepper, Vikas Pubilishers
2. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press, Hyderabad.
3. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
4. Finite element analysis by S.S. Bhavakatti-New age international publishers

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(13A01710) DISASTER MANAGEMENT AND MITIGATION

Course Objective:

The objective is to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazards and gives a suitable picture on the different types of hazards.

UNIT I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT II

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards –

UNIT III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of   - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

UNIT IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters

Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves.Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil   Erosion

Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion.Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes.Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation.Biological hazards/ disasters:- Population Explosion.

UNIT V

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text Books:

1. *Disaster Management by Rajib Shah, Universities Press, India, 2003*
2. *Disaster Mitigation: Experiences And Reflections by Pardeep Sahni*
3. *Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning*

Reference Books:

1.Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978
2.R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
3.H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
4.R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
5.Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003

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(13A01711) ARCHITECTRUAL AND TOWN PLANNING

Course Objective:
To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:
UNIT I
History of Architecture:
a)   **Western Architecture:** Egyptian, Greek, Roman Architectures; influences- Comparative Analysis Orders.
b)   **Indian Architecture:** Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.
c)   Indo - Sarsanic Architecture; Mosque - Place- Fort Tomb.

UNIT II
Architectural Design:
a)   **Principle of designing** : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color, Tone.
b)   **Principle of Compositions:** Unity, contrast, proportion, scale, Bab Rhuthm, character.
     Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and other factors.

UNIT III
Introduction of Post-classic Architecture and contribution of eminent architects to modern period.
Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone.

B) TOWN PLANNING:
UNIT IV
Historical Back Ground:
Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputra vijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London.

UNIT V
Components of Planning;
     a)   Zoning
     b)   Roads and road Traffic.
     a)   Housing-Slums, Parks, Play grounds.
     b)   Public Utility Services.
     c)   Surveys and maps for planning.
     d)   Neighbourhood Planning.
Planning New town, planning standards, National and regional Planning, town planning and legislation.
Garden cities and satellite town

Reference Books:

A)   *ARCHITECTURE*
1.   *Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.*
2.   *Planning and 'Design of Building -Section of Architecture by Y.S.Sane.*
3.   *Modern Architecture and Design by Nikolans, Pevshar.*
4.   *Modern Ideal Hol11nes for India by R.S.Deshpande.*

B)   *TOWN PLANNING*
1.   *Town and Country .Planning - A.J.Brown and H.M.Sherrard.*
2.   *Town Design .- Federik Gibbard, Architectural press, London.*
3.   *National Building Code of India.*
4.   *Town Planning in India - Town and Country Planning Organisation, New Delhi 1962.*
5.   *Regional Planning - Misra R.P., Mysore University.*
6.   *Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.*
7.   *Town and Country Planning - P. Abercrombe, Oxford University press.*

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(13A01712) INTELLECTUAL PROPERTY RIGHTS

UNIT I
Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT II
Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT III
Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents : Foundation of patent law, patent searching process, ownership rights and transfer

UNIT IV
Trade Secrets: Trade secret law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, False advertising.

UNIT V
New development of intellectual property: new developments in trade mark law ; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

Text Books & Reference Books:
1. Intellectual property right, Deborah. E. Bouchoux, cengage learing.
2. Intellectual property right – nleashmy the knowledge economy, prabuddha ganguli,
   Tate Mc Graw Hill Publishing company ltd.,

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(13A02710) OPTIMIZATION TECHNIQUES

Course Objective:
This subject introduces the optimization techniques for various engineering applications. And also mainly this course concentrates on various linear, non-linear and dynamic programming.

UNIT I
INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUE
Statement of an Optimization Problem- Design Vector- Design Constraints- Constraints Surface – Objective Function- Objective Function Surfaces- Classification of Optimization Problems.
Classical Optimization Techniques- Single Variable Optimization- Multi Variable Optimization Without Constraints- Necessary and Sufficient Conditions for Minimum/Maximum- Multi Variable Optimization With Equality Constraints
Solution by Method of Lagrange Multipliers- Multi Variable Optimization with Inequality Constraints – Kuhn- Tucker Conditions

UNIT II
LINEAR PROGRAMMING
Standard Form of Linear Programming Problem- Geometry of Linear Programming Problems- Definitions and Theorems- Solution of a System of Linear Simultaneous Equations- Pivotal Reduction of a General System of Equations- Motivation to The Simplex Method- Simplex Algorithm – Revised Simplex Method – Two Phase Simplex Method - Initial Basic Feasible Solution by North-West Corner Rule, Approximation Method- Testing for Optimally of Balanced.

UNIT III
UNCONSTRAINED NONLINEAR PROGRAMMING
One-Dimensional Minimization Methods: Classification, Fibonacci Method and Quadratic Interpolation Method- Unconstrained Optimization Techniques- Unvariate Method, Powell's Method Steepest Descent Method, Newtons Method.

UNIT IV
CONSTRAINED NONLINEAR PROGRAMMING
Characteristics of a Constrained Problem, Classification, Basic Approach of Penalty Function Method; Basic Approaches of Interior and Exterior Penalty Function Methods, Introduction to Convex Programming Problem

UNIT V
DYNAMIC PROGRAMMING
Dynamic Programming Multistage Decision Processes- Types- Concept of Sub Optimization and The Principle of Optimally- Computational Procedure in Dynamic Programming- Examples Illustrating The Tabular Method of Solution.

Text Books:
1. "Engineering optimization: Theory and practice"- by S.S.Rao, New Age International (P) Limited, 3rd edition, 1998.

Reference Books:
1. *"Optimization Methods in Operations Research and systems Analysis"- by K.V.Mital and C.Mohan, New Age International (P) Limited, 3rd edition, 1996.*
2. *Operations Research – by Dr.S.D.Sharma, S.Chand & Sons, 2001.*
3. *"Operation Research: An Introduction"-by H.A.Taha, PHI Pvt.Ltd., 6th edition, 2003.*
4. *Linear Programming- by G.Hadley, Addison-Wesley Publishing Company., 1963.*

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(13A02711) RELIABILITY AND SAFETY ENGINEERING

UNIT   I
BASIC RELIABILITY CONCEPTS
Introduction, Need for Reliability and Safety Engineering, Definitions and Terms, Basic Reliability Mathematics - Classical Set Theory and Boolean Algebra, Concepts of Probability Theory, Reliability and Hazard Functions, Distributions Used in Reliability and Safety Studies, Failure Data Analysis, Numerical Problems.

UNIT   II
SYSTEM RELIABILITY MODELING
Reliability Block Diagram, Markov Models, Fault Tree Analysis, Monte Carlo Simulation, Dynamic Reliability Analysis, Numerical Problems.

UNIT   III
PROBABILISTIC SAFETY ASSESSMENT
Introduction, Concept of Risk and Safety, Probabilistic Safety Assessment Procedure, Identification of Hazards and Initiating Events, Event Tree Analysis, Importance Measures, Common-cause Failure Analysis, Human Reliability Analysis.

UNIT   IV
APPLICATIONS OF PROBABILISTIC SAFETY ASSESSMENT
Objectives of Probabilistic Safety Assessment, Probabilistic Safety Assessment of Nuclear Power Plants, Technical Specification Optimization, Risk Monitor, Risk-informed In-service Inspection.

UNIT   V
UNCERTAINTY MANAGEMENT IN RELIABILITY/SAFETY ASSESSMENT
Mathematical Models and Uncertainties, Uncertainty Analysis: an Important Task of Probabilistic Risk/Safety Assessment, Methods of Characterizing Uncertainties, Uncertainty Propagation, Uncertainty Importance Measures, Treatment of Aleatory and Epistemic Uncertainties, Dempster – Shafer Theory, Probability Bounds Approach, Bayesian Approach, Expert Elicitation Methods, Case Study to Compare Uncertainty Analysis Methods, Numerical Problems.

Text Books:
Reliability and Safety Engineering – by Ajit Kumar Verma, Srividya Ajit, Durga Rao Karanki, Springer Publications, 2010.

Reference Books:
1. *Roy Billinton and Ronald N. Allan, Reliability Evaluation of Engineering Systems, Pitman Advanced Publishing Program, 2nd Edition 1998.*
2. *Charles E. Ebeling , Reliability and Maintainability Engineering, Tata McGraw Hill, 2000*
3. *E. Balagurusamy, Reliability Engineering, Tata McGraw Hill, 2003.*
   A. *K. Gupta, Reliability, Maintenance & Safety Engineering, University Science Press, 2013.*

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(13A02712) PLC & ITS APPLICATIONS

Course Objective:
This course introduces the basics of Programmable Logical Controllers, Design, various modules, peripheral devices, Ladder Logic Implementation of PLC and also solution for various Industrial Applications by using PLC.

UNIT I
PLC Basics: PLC System, I/O Modules and Interfacing, CPU Processor, Programming Equipment, Programming Formats, Construction of PLC Ladder Diagrams, Devices Connected To I/O Modules.
PLC Programming: Input Instructions, Outputs, Operational Procedures, Programming Examples Using Contacts and Coils. Drill Press Operation.

UNIT II
Digital Logic Gates, Programming in the Boolean Algebra System, Conversion Examples. Ladder Diagrams for Process Control: Ladder Diagrams & Sequence Listings, Ladder Diagram Construction and Flowchart for Spray Process System.

UNIT III
PLC Registers: Characteristics of Registers, Module Addressing, Holding Registers, Input Registers, Output Registers. PLC Functions: Timer Functions & Industrial Applications, Counter Function & Industrial Applications, Arithmetic Functions, Number Comparison Functions, Number Conversion Functions

UNIT IV
Data Handling Functions: SKIP, Master Control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep Functions and Their Applications. Bit Pattern and Changing a Bit Shift Register, Sequence Functions and Applications, Controlling of Two-Axis & Three Axis Robots With PLC, Matrix Functions.

UNIT V
Analog PLC Operation, Types of PLC Analog Modules and Systems, PLC Analog Signal Processing, BCD or Multibit data Processing, Analog output application examples, PID Modules, PID Tuning, Typical PID Functions, PLC Installation, Troubleshooting and Maintanance.

Text Books:
Programmable Logic Controllers- Principles and Applications by John W. Webb & Ronald A. Reiss, Fifth Edition, PHI, 2011.

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(13A03711) ENERGY SYSTEMS

Course Objective:
To know the depletion rate of conventional energy resources and importance of renewable energy resources.
To know alternate viable energy sources to meet the energy requirements.
To discuss about solar energy, wind energy, tidal energy and geothermal energy etc., as alternate resources.

UNIT I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Learning Outcomes &Suggested Student Activities:
Students aware of the solar energy, physics of the sun and solar energy reaching earth surface. How solar energy is collecting on earth surface. By learning this unit students may think in the direction of utilizing solar energy properly and how to increase the efficiency of the solar equipments. Now a days individual houses and industries started using solar energy, it is going to become primary energy sources shortly. Students are advised to go through the web sites http://www.youtube.com/watch?v=YCLHl0FoTp0;http://www.solarenergy.com/; http://www.youtube.com/watch?v=tdivW7inP0k;http://www.ecoshift.ca/Types-of-Solar-Collectors.html for more information.

UNIT II

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Learning Outcomes & Suggested Student Activities:
Students can expose to different methods of storing and application of solar energy and also known about how wind energy is generated and performance of wind energy, wind energy is one of the most useful renewable energy resource in the universe. Students are advised to go through the web sites http://www.youtube.com/watch?v=CaN-4gFz72g;   https://www.youtube.com/watch?v=sLXZkn2W-lk for more information.

UNIT III

OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

Learning Outcomes &Suggested Student Activities:
Students can understand the different methods of ocean energy is existed, about tidal and wave energy, mostly about mini-hydel power plants which can be implemented for small scale industries and large house holding etc., in first part. In the second part student can understand how Bio-mass

can be used as renewable energy resource, bio-conversion, anaerobic/aerobic digestion, types of bio-gas energy is generated and performance of Bio-mass energy, where Bio-mass is one of the useful renewable energy resource in the rural areas. Student is advised to go through the web sites https://www.youtube.com/watch?v=RS99aLdPjXQ; https://www.youtube.com/watch?v=79nW2o-kYa4; for more information.

UNIT IV

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, advantages, disadvantages and applications of Geo thermal energy, potential in India.

THERMIONIC GENERATION: Thermo electric power- basic principle, performance analysis, Thermo electric materials, selection of materials, Thermionic Emission and work function, basic thermionic Generator, Analysis of Thermionic Generator.

Learning Outcomes &Suggested Student Activities
Students can understand different methods of wells, advantages , disadvantages and application of Geo-thermal energy in first part. In the second part student can know about how Thermionic energy is generated and Analysis of Thermionic energy, Types of materials used for thermionic energy generation, where it is one of the latest useful renewable energy resource to generate in small quantity of power.

UNIT V

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Learning Outcomes &Suggested Student Activities:
Students can understand the direct energy conversion, principles of DEC, what is MHD generators, MHD accelerators, Hall Effect and major power generation systems. By learning this students may think in the direction how we can utilize some of effects to generate energy available on earth surface effectively. How to increase the efficiency of electron gas dynamic conversion.

Text Books:
1. *Renewable energy resources, G.N.Tiwari and M.K.Ghosal, Narosa,2005.*
2. *Non-ConventionalEnergy Sources, G.D. Rai*

Reference Books:
1. *Renewable Energy Sources, Twidell& Weir*
2. *Non-Conventional Sources, B.H.Khan, 2/e, TMH, 2009*
3. *Solar Power Engineering, B.S.Magal Frank Kreith&J.F.Kreith.*
4. *Renewableenergy sources and emerging Technologies, Solanki, PHI.*
5. *Non-Conventional Energy, Ashok V Desai, WileyEastern*
6. *Non-Conventional EnergySystems, K Mittal, Wheeler.*

Web References:
http://www.tn.gov.in/spc/tenthplan/CH_11_2.PD
http://bieap.gov.in/Nonconventionalenergysourses
http://www.em-ea.org/Guide%20Books/book-4/4.12App%20of%20Non% 20conventional

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(13A03712) TOTAL QUALITY MANAGEMENT

Course Objective:
To provide knowledge about Total Quality Management (TQM) and its underlying Principles, TQM tools with an emphasis on their application in manufacturing
To make the students aware of the Quality Certification Procedures and Audit Procedures
At the end of the course students will be able to know meaning of TQM and Theories about TQM and Planning and manufacturing for quality its tools and techniques, human involvement to improve quality and the development and transformation due to such involvement.

UNIT I

TQM – Overview, Concepts, Elements – History-Quality Management Philosophies-Juran, Deming, Crosby , Feigenbaum, Ishikawa– Stages of Evolution– Continuous Improvement
– Objectives – Internal and External Customers. Quality Standards – Need for Standardization - Institutions – Bodies of Standardization, ISO 9000 series – ISO 14000 series – Other Contemporary Standards – ISO Certification Process-Third Party Audit

Learning outcome & Suggested Student Activities:
At the end of this Unit, the students will know what is TQM, how does it differ from traditional approach to quality control and they will be familiar with various bodies of standardization. They will have knowledge about standardization and certification.
For better understanding of Evolution and contributions of various quality leaders and case study, students may visit http://www.wiley.com/college/sc/reid/chap5.pdf

UNIT II

Process Management- Quality Measurement Systems (QMS) – Developing and Implementing QMS – TQM Tools & Techniques- 7 QC Tools- 7 New QC Tools.
Problem Solving Techniques - Problem Solving Process – Corrective Action – Order of Precedence– System Failure Analysis Approach – Flow Chart – Fault Tree Analysis – Failure Mode Assessment and Assignment Matrix – Organizing Failure Mode Analysis – Pedigree Analysis.

Learning Outcome & Suggested Student Activities:
At the end of this Unit, the students will be familiar with QMS and various TQM tools & techniques and also various problem solving techniques.
For better understanding of 7QC tools, 7 QC tools also known as ISHIKAWAS 7QC tools which revolutionised the Japane& the World in Sixties & Seventies, students may visit http://www.math.mun.ca/~variyath/New7QCTools.pdf

UNIT III

Quality Circles – Organization – Focus Team Approach – Statistical Process Control –Process Chart – Ishikawa Diagram – Preparing and using Control Charts.

Learning Outcome & Suggested Student Activities:
At the end of this Unit, the students will have the concept of Quality Circles and its importance in industry.
The students are advised to form Quality Circles in their own class to improve the quality of learning in the class room.
For further information, students may visit: http://www.clemson.edu/ces/credo/classes/Lect4016.pdf .

UNIT IV

Quality Function Development (QFD) – Elements of QFD – Benchmarking-Types- Advantages & Limitations of Benchmarking – Taguchi Analysis – Loss function - Taguchi Design of Experiments, Robust Design, Poka-yoke, Kaizen, Deming Cycle.

Learning Outcome & Suggested Student Activities:
At the end of this Unit, the students will have knowledge about Quality Benchmarking through Quality Function Development and they will have knowledge on Robust Design using Taguchi Techniques and they will understand the different philosophies of Qualty and know the systematic way for developing products based on the needs of the Customer.
For the case study of QFD and more details, students may visit http://www.ciri.org.nz/downloads/Quality%20Function%20Deployment.pdf
and for Tauguchi analysis-case study, they may visit: https://controls.engin.umich.edu/wiki/images/0/0b/Lecture.25.pdf.

UNIT V

Value Improvement Elements – Value Improvement Assault – Supplier Teaming; Business Process Reengineering & Elements of Supply Chain Management.
Six Sigma Approach – Application of Six Sigma Approach to various Industrial Situations.

Learning Outcome & Suggested Student Activities:
This Unit will make the students understand how the various concepts discussed in this Unit are useful for continuous improvement of performance of the organization.
Students may visit:
http://webs.twsu.edu/whitman/papers/ijii99muthu.pdf (for Value improvement analysis)
http://www.qualitywaves.com/Articles%20about%20Process%20Reengineering/BPR%20UOW.pdf (for better understanding of BPR)
http://www.bus.iastate.edu/nilakant/MIS538/Readings/BPR%20Case%20Honeywell.pdf(BPR Case Study)
http://www.iiml.ac.in/events/C9_02_Sudarshan%20Naidu.pdf (for supply chain case study)
http://www.sixsigmaonline.org/ (for better understanding of Six Sigma approach to various industrial situations)

Text Books:
1Total Quality Management,Dakh Besterfield, Pearson Edu, 3rd edition, 2011.
2. Total Quality Management, K.Shridhar Bhat, Himalaya.

Reference Books:
1. Quality management, Howard Giltow-TMH
2. Quality management, J.R.Evans, 2nd edition, 2007.
3. Quality management, Bedi

Suggestions:
- *Students may watch 'youtube' video lectures on Total Quality Management. Useful quality videos are available on 'youtube'.*
- *To download Lectures and material, students may visit: www.nptel.org .*
- *NPTEL offers courses on TQM. Students may attend the courses.*
- *http://freevideolectures.com/Course/2688/Human-Resource-Management/13*

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(13A03713) ENTREPRENEURSHIP

Course Objective:
To make the student learn about various aspects that are required to create a successful new venture.
To understand the broad spectrum of entrepreneurship
To understand the preliminary aspects of setting up of a business unit
To learn the importance of purchasing in business
To learn the marketing basics that is essential for any business
To make the student become aware of the financing opportunities from various sources

UNIT I
Concept of an Entrepreneurship, Definition of Entrepreneurship, Types of Entrepreneurs, Entrepreneur vs Manager, Entrepreneur vs Intrapreneur, Entrepreneurial Decision Process, Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs, Opportunities for Entrepreneurs in India and abroad.

Learning Outcome & Suggested Student Activities:
At the end of the Unit, the student will have the general idea about Entrepreneurship and the related activities.

UNIT II
Creating and Starting the Venture, Sources of New Ideas, Methods of Generating Ideas, Problem Solving, Product Planning and Development Process, Choosing Location and Layout, Issues related to Selection of Layout; Business Plan - Nature and Scope of Business Plan, Writing Business Plan, Evaluating Business Plans, Using and Implementing Business Plans; Marketing Plan, Financial Plan and the Organizational plan.

Learning Outcome &Suggested Student Activities:
At the end of the Unit, the student will have knowledge about the various planning requirements for starting a new venture including the conceptualization of the business ideas.
A guest lecture by a leading Industrial consultant will be of immense help to the students.

UNIT III
New Venture Expansion Strategies and Issues, Features and Evaluation of Joint Ventures, Acquisitions, Merges, Franchising, Public Issues, Rights Issues, Bonus Issues and Stock Splits.

Learning Outcome & Suggested Student Activities:
At the end of the Unit, the student will have knowledge on Business expansions into larger scales and the related legal issues.
A guest lecture and interaction session with an expert in Corporate Business will be very much useful to understand the business expansions, take-overs etc.

UNIT IV
Financing and Managing the New Venture, Sources of Capital, Venture Capital , Angel Investment, Record Keeping, Recruitment, Motivating and Leading Teams, Financial Controls, Marketing and Sales Controls, E-commerce and Entrepreneurship, Internet advertising.

Learning Outcome & Suggested Student Activities:
At the end of the Unit the student will be able to know about various financing options, Staffing and usage of Technology in Business Management.
An interaction/Lecture by an Investment expert from a leading Industrial Financing Bank or District

Industries Centre will be useful for the students to better understanding.
*The following URL will help the student understand the scenario of Entrepreneurship in India*http://www.learnerstv.com/video/Free-video-Lecture-11851-Management.htm

UNIT   V
Production and Marketing Management- Thrust of Production Management, Selection of Production Techniques, Plant Utilization and Maintenance, Designing the Work Place, Marketing Functions, Market Segmentation, Market Research and Channels of Distribution, Sales Promotion and Product Pricing.

Learning Outcome &Suggested Student Activities:
At the end of the Unit, the student will have knowledge on the factors related to Work place design, Market Analysis, Marketing and Distribution Strategies.
An interaction with a Marketing Expert will be highly useful for the students to appreciate the importance of Marketing & Distribution.

Text Books:
1. Entrepreneurship, Robert Hisrich, & Michael Peters, TMH, 6th edition, 2010.
2. Entrepreneurship, Dollinger, Pearson, 4/e 2004.

Reference Books:
1. Dynamics of Entrepreneurial Development and management, Vasant Desai, Himalaya Publishing House, 2004.
2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
3. Entrepreneurial Management, . Robert J.Calvin:, TMH, 2004.
4. The Entrepreneurial Connection, GurmeetNaroola TMH, 2001.
5. Indian Economy. Dutt&Sundaram S. Chand, 2005.
6. Essential of Entrepreneurship and small businessmanagement, Thomas W. Zimmerer& Norman M. Scarborough, PHI, 4/e, 2005.
7. Industrial Relations &Labour Laws, Srivastava, Vikas, 2005.
8. Industrial Law, ND Kapoor, Sultan Chand & Sons, 2005

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(13A03714) RELIABILITY AND MAINTENANCE ENGINEERING

> *Course Objective:*
> *To make the students to understand the concept of reliability, reliability functions, reliability models and configurations of reliability.*
> *To learn about the Reliability design process and preventive maintenance.*
> *To study about the Failure types and causes of failures. Fault detection methods.*
> *To make the students to understand Maintenance and type of maintenance, vibration, noise monitoring and vibration modes*
> *To learn about Wear monitoring analysis.*

UNIT I
CONCEPTS OF RELIABILITY, SYSTEM AND MODELS Definition of reliability –reliability Vs quality - reliability function - MTTF – hazard rate function- bathtub curve – derivation of the reliability function-constant failure rate model – time dependent failure models. Weibull distribution– normal distribution–the log normal distribution. Serial configuration – parallel configuration – combined series parallel systems.

> *Learning outcome &Suggested Student Activities:*
> *After completion of this unit students are able to understand the reliability, reliability functions, different failure models and the improvement methods of reliability like Serial configuration – parallel configuration – combined series and parallel systems.*
> *http://www.learnerstv.com/video/Free-video-Lecture-6984-DISABLED.htm*

UNIT II
Reliability design process – system effectiveness – economic analysis and life cycle cost– reliability under preventive maintenance – state dependent systems with repair – Maintainability and availability, MTBF and MTTR, probability and frequency of failure, state space analysis, Markov process, steady state probability and dependent failures.

> *Learning outcome & Suggested Student Activities:*
> *After completion of this unit students are able to understand the reliability design, economic analysis, frequency of failures, preventive maintenance.*
> *http://www.learnerstv.com/video/Free-video-Lecture-6984-DISABLED.htm*

UNIT III
Failure types and causes of failure – failure classification, human factors analysis of different causes of failures. Fault detection, Environmental standards testing, X-ray and Gamma ray radiography, Xerography, Electromagnetic methods, ultrasonic methods.

> *Learning outcome &Suggested Student Activities:*
> *After completion of this unit students are able to understand the causes of failures and failure types, factors affecting the failure and detection methods of failure.*
> 1. *http://www.learnerstv.com/video/Free-video-Lecture-6984-DISABLED.htm*

UNIT IV
Maintenance and type of maintenance – conditions monitoring techniques Signature analysis – vibration and noise monitoring, faults and vibration modes. Permissible limits of vibrations, temperature monitoring, infrared camera.

> *Learning outcome & Suggested Student Activities:*
> *After completion of this unit students are able to understand the types of maintenance and condition monitoring techniques, noise and vibration effects on machine and Permissible limits of vibrations.*

UNIT V

Wear monitoring analysis of wear partials, ferography, spectroscopic analysis, performance trend monitoring, choice of condition monitoring methods.

Learning outcome &Suggested Student Activities:
After completion of this unit students are able to understand the condition monitoring methods, wear monitoring methods.

Text Books:
1.An introduction to Reliability and Maintainability Engg, Charles E. Ebling, Tata McGraw-Hill, 2000.
2 Reliability Engineering, L.S. Srinath, Affiliated East-West Press, New Delhi.

Reference Books:
1. Reliability Engineering, L.Balagurusamy, Tata Mc-Graw Hill, New Delhi, 1st edition, 2002.
2. Reliability Engineering and life testing – VNA Naikan, PHI,2009.
3. Reliability Based Design, S. Rao, Mc-Graw Hill, 1992.
4. Reliability in Engineering Design, K.C. Kapur and L.R. Lamberson, Wiley Publications.
5. Reliability Engineering, D.J. Smith, 1972, E.W. Publications.
6. Reliability Engineering, A.K.Govil, Tata Mc-Graw Hill, New Delhi.

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(13A04709) CONCEPTS OF COMMUNICATION SYSTEMS

Course Objective:
- *To study about principles involved in different types of communication systems.*
- *To study about various types of modulation and demodulation techniques in communications*
- *To study about principles of operation of advanced communication systems like Cellular Communications, Optical Communications, and Data Communications.*

Learning Outcome:
After the completion of the course the students will be able to
- *Understand principles involved in different types of communication systems.*
- *Know the importance of modulation and demodulation in communications.*
- *Gets clear knowledge regarding functioning of advanced communication systems like Cellular Communications, Optical Communications, Data Communications.*

UNIT I
Introduction to Communications systems: Communications – General Block Diagram-Information, Transmitter, Receiver, Noise – External Noise, Internal Noise, Simple Noise Calculations, Noise Figure, Noise Temperature, Modulation- Description, Need for Modulation, Amplitude Modulation-AM theory- Frequency spectrum of AM wave, Representation of AM. FM theory- Description of system, Representation of FM, Frequency spectrum of FM wave, Brief description of other Modulation schemes – DSB, SSB, PM.

UNIT II
RF TRANSMITTERS & RECEIVERS
Transmitters: AM Transmitters, SSB Transmitters, FM Transmitters
Receivers: Tuned Radio Frequency (TRF) Receiver, Super Heterodyne Receiver, AM Receivers – RF Selection and Characteristics, Frequency Changing and Tracking, Intermediate Frequencies and IF Amplifiers, Detection and Automatic Gain Control (AGC), FM Receivers – Common circuits in comparison with AM receivers, Amplitude limiting, Basic FM Demodulators.

UNIT III
Pulse Analog Modulation Techniques: Sampling Theorem, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM).
Digital Modulation schemes: Pulse Code Modulation (PCM), Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Quadrature Phase Shift Keying (QPSK) - Modulations and Demodulations
Multiplexing: Frequency Division Multiplexing (FDM) &Time Division Multiplexing (TDM).

UNIT IV
Optical Communication Systems – Block Diagram, Optical Fiber Types, Light Propagation, Optical Fiber Configurations, Optical Fiber Classifications, Losses in Fiber cables, Optical Sources, Detectors.
Data Communications – Introduction to data Communications, Data Communication Network Architecture, Protocols, Standards, Data Communication Circuits – DTE, DCE, LCU, UART, USRT, Data communication Codes, Error Detection & Correction, Serial Interface Standard – RS-232.

UNIT V
Cellular Telephone Concepts - Evolution of Cellular Telephone, Fundamental concepts of cellular telephone, Frequency reuse, interface, cell splitting and sectoring, Roaming and Hand off's, Cellular Telephone call processing, Multiple Access Techniques – FDMA, TDMA, CDMA, Cellular

Telephone Systems - 1st Generation, 2nd Generation – GSM, GSM System Architecture, GSM Standards, 3rd Generation Communication System – WCDMA, cdma – 2000.

Text Books:
1. Kennedy and Davis, "Electronic &Communication Systems", TMH, 4th edition, 2004.
2. Wayne Tomasi, "Advanced Electronic Communication Systems", 6th Edition, PHI, 2010.

Reference Books:

1. *B.P Lathi, "Modern Digital and Analog Communication Systems", 3rd edition Oxford, 2000.*
2. *T. S. Rappaport, "Wireless Communications – Principles and Practice," PHI, 2001.*
3. *B. A.Forouzan, "Data Communication and Computer Networking", 3rd ed., TMH, 2008.*

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(13A04710) NEURAL NETWORKS & FUZZY LOGIC

Course Objective:
- *To get an overview of different types of neural network models.*
- *To study about the working single, multi layer feed forward neural networks, associative memories and their rules and algorithms.*
- *To study about fundamentals of fuzzy logic, their rules and applications.*

Learning Outcome:
After completion of the course the students will be able to
- *Get an overview of different types of neural network models.*
- *Understand the functioning of single; multi layer feed forward neural networks, associative memories and their rules and algorithms.*
- *Understand about fundamentals of fuzzy logic, their rules and applications.*

UNIT I   Introduction to Neural Networks
Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Potential Applications of ANN. Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

UNIT II   *Single & Multi Layer Feed Forward Neural Networks*
Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT III   Associative Memories
Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network

UNIT IV   Fuzzy Logic - Introduction
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT V   Fuzzy Logic - Fuzzy Membership, Rules
Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

Text Books:
1. *S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.*
2. *S.N.Sivanandam, S.Sumathi, S.N.Deepa, "Introduction to Neural Networks using MATLAB 6.0", TMH, 2006.*
3. *Bart Kosko, "Neural Networks and Fuzzy Logic System", PHI Publications.*

Reference Books:
1. *N.P.Padhy, "Artificial Intelligence and Intelligent Systems" Oxford University Press.*
2. *James A Freeman and Davis Skapura, "Neural Networks", Pearson Education, 2002.*
3. *Simon Haykins, "Neural Networks", Pearson Education.*

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(13A04711) INDUSTRIAL ELECTRONICS

Course Objective:
- *To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.*
- *To study the characteristics of AC to DC converters.*
- *To know about the practical applications Electronics in industries.*

Learning Outcome:
After completion of the course the students will be able to
- *Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.*
- *Understand the characteristics of AC to DC converters.*
- *Understand about the practical applications Electronics in industries.*

UNIT I : SEMICONDUCTOR DEVICES
Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

UNIT II: JUNCTION TRANSISTORS
Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

UNIT III : AC TO DC CONVERTORS
AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

UNIT IV: INDUSTRIAL APPLICATIONS - I
Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding.
Induction heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating
Dielectric heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

UNIT V : INDUSTRIAL APPLICATIONS - II

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

Text Books:

1. G. K. Mithal, "Industrial Electronics", Khanna Publishers, Delhi, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, "Industrial Electronics", Anuradha Publications, 2011.

Reference Books:

1. F. D. Petruzulla, "Industrial Electronics", McGraw Hill, Singapore, 1996.
2. M. H. Rashid, "power Electronics Circuits, Devices and Application", PHI, 3rd edition, 2004.
3. G. M. Chute and R. D. Chute, "Electronics in Industry", McGraw Hill Ltd, Tokyo, 1995.

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(13A10707) INDUSTRIAL SAFETY AND MANAGEMENT

Course Objective:
To understand the importance of industrial safety

Learning Outcome:
Students will acquire knowledge on the Industrial safety and management

UNIT I
Energy conversion – world fossil fuel reserves – world energy consumption – historical lives of fossil fuels – global energy and environmental management – environmental aspects of fossil, nuclear, hydro and biomass energy conversion – gaseous emissions – solid waste – liquid waste.

UNIT II
Energy management – need for energy conservation – energy auditing – conducting real time continuous energy audits – data collection – automated data acquisition – data analysis – role of energy manager – energy audit instruments – gas analyzer – energy conservation in industries: boilers, pumps, fans, compressed air systems, refrigeration and air conditioning systems, DG sets, electrical motors, variable speed motors.

UNIT III
Air pollutants and global climate – air pollutant effects. Pollution control laws and regulation – national and international – role of environmental monitoring in environmental management systems – continuous emissions monitoring systems. Pollution control – review of pollution control methods in thermal power plants –   industrial – nuclear – automobiles – disposal/treatment of solid and liquid wastes – alternate fuels.

UNIT IV
Safety and productivity – causes of accidents in industries – accidents reporting and investigation – measuring safety performance – workman compensation rules.

UNIT V
Safety codes and standards – general safety considerations in power plants, pressure vessels and pressurized pipe lines – operation and inspection of extinguishers – preventing the spread of fire – emergency exit facilities.

Text Books:
1. Blake Roland. P, "Industrial safety", Prentice Hall of India, 1973.
2. Callaghan. P. O, "Energy Management", McGraw Hill Book Co., 1993.

Reference Books:
1. Culp. A. W, "Principles of Energy Conservation", McGraw Hill Book Co., 1991.
2. Noel de Nervers, "Air Pollution Control Engineering", McGraw Hill Book Co.,
*   2000.*

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(13A10708) MEMS & APPLICATIONS

Course Objective:
To provide knowledge of fabrication process and applications.

Learning Outcome:
Upon completion of this course the student shall be able to apply his instrumentation knowledge and understand MEMS fabrication and its use in the industries.

UNIT I
Introduction to MEMS: MEMS; Use of MEMS. Fabrication process
The Substrate and adding material to it: Introduction, The silicon substrate, Additive technique: Oxidation, Additive technique: Physical vapour deposition, other additive techniques.

UNIT II
MEMS Fabrication:
Creating and transferring patterns- Photolithography: Introduction, Keeping it clean, Photo resist, working with resist, masks, Resolution, Permanent resists.
Creating structures-Micromachining: Introduction, Bulk Micromachining processes, Surface Micromachining, Process Integration.

UNIT III
MEMS Transducers: I
Thinking about modelling: What is modeling? Units, The input-output concept, Physical variables and notation, preface to the modeling chapters.
MEMS Transducers-An overview of how they work: What is a transducer? Distinguishing between sensors and actuators, Response characteristics of transducers, MEMS Sensors: Principles of operation, MEMS Actuators: Principles of operation, Signal conditioning, RF applications and Optical applications.
Piezoresistive transducers: Introduction, Modeling Piezoresistive transducers, Piezoresistive pressure sensor.

UNIT IV
MEMS Transducers: II
Capacitive transducers: Introduction, Capacitor fundamentals, Modeling a capacitor sensor, Capacitive accelerometer.

UNIT V
MEMS Transducers: III
Piezoelectric transducers: Introduction, Modeling piezoelectric materials, Mechanical modelling of beams and plates, Cantilever piezoelectric actuator.
Thermal transducers: Introduction, Basic heat transfer, Hot-arm actuator.

Text Books:
    1. Introductory MEMS Fabrication and Applications

Reference Books:
    1. MEMS and Microsystems: Design and manufacture, Tai-Ran Hsu ,McGraw-Hill, 2002
    2. MEMS: Applications Mohamed Gad-el-Hak, CRC Press, 29-Nov-2005

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(13A10709) NANO TECHNOLOGY

Course Objective:
Nano Technology provides knowledge to understand the science of creating structures and devices using nano scale building blocks.

Learning Outcome:
The student is able to understand the design and manufacture of thin film technology used in miniaturization. MEMS help to understand miniaturization and application of electromechanical systems.

UNIT I
THIN FILM TECHNOLOGY
Electro plating, Electroless plating, Langmuir- Blodget films,Thermal growth, Chemical vapour deposition, sputtering deposition, molecular beam epitaxy atomistic nucleation process, cluster coalescence and deposition, grain structure of films and coatings, amorphous thin films.

UNIT II
ANALYSIS OF THIN FILMS
Mechanical, electrical, magnetic and optical properties of thin film. Analysis of thin films.

UNIT III
VACUUMED TECHNOLOGY
Pump selection and exhaust handling , rotary oil pumps, roots pump, diffusion pumps, turbo molecular pump, cryo pump, sputter-ion pump, pressure measurements, thermodynamics of evaporation, evaporation rate, alloys, compounds, sources, transport and deposition monitoring.

UNIT IV
MEMS
MEMS and Microsystems – Evolution of Micro Fabrication – Micro Systems and Microelectronics. Application of MEMS in Various Fields. Introduction – Substrate and Wafer, Active Substrate Material. Silicon as a substrate material, MEMS packaging. Case study on pressure sensor with packaging.

UNIT V
SILICON TECHNOLOGY
Semiconductor as base material- band diagram of semiconductor- band diagram of inhomogeneous semiconductor- different types of components in semiconductor, different types of transistor integration- technological processes for microminiaturization- methods and limits of microminiaturization in silicon.

Text Books:
1. Karl Glosekotter, "Nanoelectronics and Nanosystems",.Springer, 2004
2. M.Ohring The material science of thin films, Academic press, Boston, 1991

Reference Books:
1. Tai-Ran Hsu, "MEMS & Microsystems – Design and Manufacture," Tata McGraw Hill, 2002

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(13A05711) SOFT COMPUTING

Course Objective:
- *To familiarize with soft computing concepts.*
- *To introduce the ideas of neural networks, fuzzy logic and use of heuristics based on human experience.*
- *To introduce the concepts of Genetic algorithm and its applications to soft computing using some applications.*

Learning Outcome:
- *At the end of the course students will be assessed to determine whether they are able to*
- *Recognize the feasibility of applying a soft computing methodology for a particular problem*
- *Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems*
- *Apply genetic algorithms to combinatorial optimization problems*
- *Apply neural networks to pattern classification and regression problems*
- *Evaluate and compare solutions by various soft computing approaches for a given problem.*

UNIT I
Artificial Intelligence: AI Problems, Techniques, Problem Spaces, Pattern and Data
Search Techniques: Generate and Test, Hill Climbing, Best First Search Problem reduction. Knowledge Representation using Predicate Logic and Rules
Introduction: Hard Computing and Soft Computing.
Characteristics of Neural Networks: Biological Neural Networks and Features, Performance of Computer and Biological Neural Networks

UNIT II
Artificial Neural Networks: Introduction, Basic models of ANN, important technologies Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network, Associative Memory Networks, Training Algorithms for pattern association, BAM and Hopfield Networks

UNIT III
Unsupervised Learning Network: Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohenen-Self-Organizing Featue Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks, Special Networks- Introduction o various networks

UNIT IV
Introduction to Classical Sets (crisp sets) and Fuzzy Sets: operations and Fuzzy sets. Classical Relations and Fuzzy Relations-Cardinality, Operations, Properties and composition, Tolerance and equivalence relations.
Membership functions: Features, Fuzzifications, membership value assignments, Defuzzification

UNIT V
Fuzzy arithmetic and Fuzzy Measures, Fuzzy Rule Base and Approximate Reasoning Fuzzy Decision making and Fuzzy Logic Control System.
Genetic Algorithm: Introduction and basic operators and terminology. Applications: Optimization of TSP, Internet Search Techniques

Text Books :
1. *Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley, India, 2007.*
2. *Soft Computing and Intelligent System Design- Fakhreddine O Karry, Clarence D Silva, Pearson Edition, 2004.*

Reference Books :

1. *Artificial Intelligence and SoftComputing- Behavioural and Cognitive Modelling of the Human Brain-Amit Konar, CRC press, Taylor and Francis Group.*
2. *Artificial Intelligence – Elaine Rich and Kevin Knight, TMH, 1991, rp2008.*
3. *Soft Computing, Sameer Roy, Pearson Education,2013.*
4. *A first course in Fuzzy Logic-Hung T Nguyen and Elbert A Walker, CRC. Press Taylor and Francis Group.*
5. *Artificial Intelligence and Intelligent Systems, N.P.Padhy, Oxford Univ. Press*
6. *Artificial Intelligence and Neural Networks, Umarao, Pearson-Sangune*

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(13A05712) PATTERN RECOGNITION

Course Objective:

- *The objective of this course is to enable the students to understand the fundamentals of Pattern recognition.*
- *The students should learn to choose an appropriate pattern classification algorithm for a pattern recognition problem, properly implement the algorithm using modern computing tools such as MatLab, OpenCV.*
- *Analyze, and report the results using proper technical terminology*

Learning Outcome:

- *Student understands the fundamental pattern recognition and machine learning theories*
- *Student has the ability to design and implement certain important pattern recognition techniques*
- *Student attains the capability of applying the pattern recognition theories to applications of interest.*

UNIT I
Introduction to Pattern Recognition: Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition,
Pattern Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature, Feature Selection, Evaluation of Classifiers, Evaluation of Clustering

UNIT II
Nearest Neighbour Based Classifiers: Nearest Neighbour Algorithm, Variants of the NN Algorithm , Use of the Nearest Neighbour Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection,
Bayes Classifier: Bayes Theorem, Minimum error rate classifier, Estimation of Probabilities, Comparison with the NNC, Naive Bayes Classifier, Bayesian Belief Network.

UNIT III
Hidden Markov Models: Markov Models for Classification, Hidden Markov Models, Classification Using HMMs, Classification of Test Patterns.
Decision Trees: Introduction, Decision Trees for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Over fitting and Pruning, Example of Decision Tree Induction.

UNIT IV
Support Vector Machines: Introduction, Linear Discriminant Functions, Learning the Linear Discriminant Function, Neural Networks, SVM for Classification, Linearly Separable Case, Non-linearly Separable Case.
Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers, Evaluation of Classifiers, Evaluation of Clustering

UNIT V
Clustering: Clustering and its Importance, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets, An Application to Handwritten Digit Recognition: Description of the Digit Data, Pre-processing of Data, Classification Algorithms, Selection of Representative Patterns.

Text Books :
1. *Pattern Recognition an Introduction, V. Susheela Devi M. Narasimha Murty, University Press.*
2. *Pattern Recognition, Segrios Theodoridis, Konstantinos Koutroumbas, Fourth Edition, Elsevier*

Reference Books :
1. *Pattern Recognition and Image Analysis, Earl Gose, Richard John Baugh, Steve Jost, PHI 2004.*
2. *C. M. Bishop, 'Neural Networks for Pattern Recognition', Oxford University Press, Indian Edition, 2003.*
3. *Pattern Classification, R.O.Duda, P.E.Hart and D.G.Stork, Johy Wiley, 2002*

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(13A05713) INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS

Course Objective:
- *To understand Intellectual Property Rights(IPR)*
- *To learn Legal protection, IPR in cyberspace.*
- *To learn Intellectual property exploitation and Risk coverage mechanisms.*

Learning Outcome:
At the end of the course students will be assessed to determine whether they are able to
- *Understand the breadth and complexity of intellectual property protection the global context.*
- *Develop the understanding of relationship between commerce and cyberspace.*
- *Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber crimes for example, child pornography etc., that are taking place via the Internet.*

UNIT I
IP & Trade Mark: IP Law – Types of IP - Agencies for IP Registration – International Treaties. Purpose and Function of Trademarks – Types of marks – Acquisition of Trademark Rights – Categories of marks – Trade names and Business names – protectable matter. Selection and Evaluation of a mark. Loss of Trademark Rights – Trademark Use and Compliance Policies – Trademark Policing and Maintenance - Use of Marks Owned by Third Parties – Transfer of Ownership or Rights in Trademarks

UNIT II
Copy Rights: Foundations of Copyright Law – Originality of Material – Fixation of Material – Exclusions from Copyright Protection – Compilations, Collections, and Derivative Works. Rights of Reproduction – Rights to Prepare Derivative works – Rights of Distribution – Rights to Perform the Work Publicly – Rights to Display the Work Publicly – Limitations on Exclusive Rights. Copyright Ownership Issues – Joint works – Ownership in Derivative works – Works Made for hire – Transfers of Copyright – Termination of Transfers of Copyright – Duration of Copyright

UNIT III
Copyright Infringement: Elements of Infringement – Contributory Infringement and Vicarious Infringement – Defenses to Infringement – Infringement Actions – Remedies for Infringement. Copyright Protection for Computer Programs – Copyright Protection for Automated Databases – Copyright in the Electronic Age – The Digital Millennium Copyright Act – Recent Developments in Copyright Law – Terms of the Trade – Vessel Hull Protection

UNIT IV
Patents: Patentability – Design Patents – Double Patenting – Patent Searching – Patent Application Process – Prosecuting the Application, Post-issuance Actions, Term and Maintenance of Patents. Ownership Rights – Sole and Joint Inventors – Disputes over Inventor ship – Inventions Made by Employees and Independent Contractors – Assignment of Patent Rights – Licensing of Patent Rights – Invention Developers and Promoters

UNIT V
Patent Infringement: Direct Infringement – Inducement to Infringe – Contributory Infringement – First Sale Doctrine – Claims Interpretation – Defenses to Infringement – Remedies for Infringement – Resolving an Infringement Dispute – Patent Infringement Litigation. New Developments in Patent Law – International Patent Protection, Patent Law Treaty

Text Books:
Intellectual Property Rights by Deborah E. Bouchoux, Cengage Learning

Reference Books:
1. *Managing Intellectual Property – The Strategic Imperative, Second Edition by Vinod V. Sople, PHI Learning Private Limited.*
2. *Intellectual Property – Copyrights, Trademarks, and Patents by Richard Stim, Cengage Learning*
3. *Intellectual Property Rights, Watal, Oxford University Press*

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B.Tech. IV - I Sem.   (CSE)

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(13A05714) SIMULATION AND MODELING

Course Objective:
- *To provide an introduction to system modelling using both computer simulation and mathematical techniques*
- *To understand the principles of simulation*
- *To create simulation models of various types*
- *To verify, and validate simulation models*

Learning Outcome:
- *At the end of the course students will be assessed to determine whether they are able to:*
- *Apply the fundamental laws of performance analysis to establish the relationships between workload parameters and system performance for a given system.*
- *develop performance models for simple real-world systems and will be able to solve those models to obtain meaningful performance measures*

UNIT I
Introduction: When simulation is appropriate and when not, advantages and disadvantages of simulation, application areas in communication, computer and software design, systems and systems environment, components of a system, discrete and continuous systems, model of a system, types of models, discrete-event simulation, steps in a simulation study. Simulation Examples- Simulation of queueing systems, on-demand and inventory systems

UNIT II
General Principles: Concepts in discrete event simulation, event scheduling/time advance algorithms, world views. List Processing: properties and operations, data structures and dynamic allocation, techniques,
Simulation Software: Integrated environments. Examples and review of some existing software popular and useful in the industry, e.g., Arena, AutoMod, Extend, Flexsim, Micro Saint, ProModel, Quest, SIMUL8, WITNESS etc. Simulation using languages and environments like C++/Java/GPSS/SSF etc. Experimentation and Statistical-Analysis Tools

UNIT III
Statistical Models in Simulation: Terms and concepts. Statistical Models, Review of discrete and continuous distributions, Review of Poisson (stationary and non-stationary) processes, Empirical Distributions
Queueing Models: Characteristics of Queueing Systems, The Calling Population, System Capacity, The Arrival Process, Queue Behavior and Queue Discipline, Service Times and the Service Mechanism, Queueing Notation, Long-Run Measures of Performance of Queueing Systems, Steady-State Behavior of Infinite-Population Markovian Models, Steady-State Behavior of Finite-Population Models (M/M/c/K/K), Networks of Queues

UNIT IV
Random Number Generation: Properties. Generation of Pseudo-Random Numbers, Techniques for Generation of Pseudo-Random Numbers: Linear Congruential, Combined Linear Congruential, Random Number Streams. Tests for Random Numbers, Inverse Transform Techniques, Acceptance-Rejection Techniques, Special Properties

UNIT V
Input Modeling: Data collection, identifying the Distribution with Data, Parameter Estimation, Goodness of Fit Tests
Verification and Validation of Simulation Models: Verification and Validation of Simulation Models, Calibration and Validation

Output Analysis for a Single Model: types of simulation with respect to Output analysis, Stochastic Nature of the Output Data, Measures of Performance and Estimation, Output Analysis of Steady State Simulations

Text Books:
1. *Discrete-Event System and Simulation, Jerry Banks, John S. Carson II, Barry L. Nelson and David M. Nicol, , 5th Edition, Pearson, New Delhi, 2012*
2. *Simulation modeling and analysis (SIE), Averill M. Law, Tata McGraw Hill India, 2007*

Reference Books:
1. *Discrete-event modeling and simulation: a practitioner's approach, Gabriel A. Wainer, CRC Press, 2009.*
2. *Theory of modeling and simulation: integrating discrete event and continuous complex dynamic systems, Bernard P. Zeigler, Herbert Praehofer, Tag Gon Kim, Academic Press, 2000.*
3. *Applied Modeling and Simulation, David Cloud, Larry Rainey, Tata McGraw Hill, India.*
4. *Modeling and simulation: theory and practice, Walter J. Karplus, George A. Bekey, Boris Yakob Kogan, Springer, 2003.*
5. *Modeling and simulation: the computer science of illusion, Stanislaw Raczynski, Wiley, 2006.*
6. *Building software for simulation: theory and algorithms, with applications in C++, James J. Nutaro, Wiley, 2010.*
7. *System Simulation and Modeling, Sankar Sengupta, Pearson, 2013*
8. *System Simulation, Gordon Geoffrey, 2nd edition, PHI*

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(13A12706) E-COMMERCE

Course Objective:
1. *Understand the significance of E-Commerce*
2. *Understand the mechanisms for Securing E-Commerce*
3. *Understand the mechanisms for Advertising in E-Commerce*

Learning Outcome:
1. *Ability to securely perform online transactions*
2. *Ability to design applications for E-Commerce*
3. *Ability to design mechanism for advertising in the E-commerce world*

UNIT I
Introduction to E-Commerce: What is E-Commerce, Benefits, Impact of E-Commerce, Classifications, Web 2.0 based social networking platform for social media e-commerce, Applications, What is business Model, Conventional Trading Process, EDI, Building blocks of EDI, Value Added Networks, Benefits of EDI, Applications.

UNIT II
E-Commerce: Architectural Framework, FTP Application, e-mail, WWW Server, HTTP, Web Server Implementations, Information Publishing, Web Browsers, HTML, CGI, Multi Media Content, Other Multimedia Objects, VRML.

UNIT III
Securing E-Commerce: Why Information on Internet is vulnerable, Security Policy, Procedures and Practices, Site Security, Protecting the Network, Firewalls, Securing the Web Services, Importance of Supply Chain Management, Impact of E-Commerce Technologies on Supply Chain Management, Introduction to payment systems, Online Payment Systems, Pre-paid Electronic Payment Systems, Requirements Metrics of a Payment System.

UNIT IV
E-Commerce Marketing: Influence on Marketing, Search Engines and Directory Services.

UNIT V
E-Commerce Marketing(continued): Internet Advertising, Mobile Commerce-Introduction, Framework, and Models, Agents in E-Commerce.

Text Books:
- *"Electronic Commerce-Framework Technologies and Applications", Bharat Bhaskar, 4ᵗʰ Edition, 2013, McGrawHill.*

Reference Books:
- *"Introduction to Electronic Commerce", Third Edition, Turban, David King, Lang, Pearson.*
- *"E-Commerce Fundamental Application", Chan, Lee, Dillon, Chang, Wiley India.*
- *"Global Electronic Commerce", West Land, Clark, University Press.*
- *"E-Commerce and Mobile Commerce Technologies", Pandey, Srivastava and Shukla, S. Chand Publications.*
- *"E-Business: Theory and Practices", Canzer, Cengage Publishers.*

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(13A05801) CLOUD COMPUTING

Course Objective:
1. *To explain the evolving computer model called cloud computing.*
2. *To introduce the various levels of services that can be achieved by cloud.*
3. *To describe the security aspects in cloud.*

Learning Outcome:
1. *Ability to create cloud computing environment*
2. *Ability to design applications for Cloud environment*

UNIT I   Systems Modeling, Clustering and Virtualization
Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.

UNIT II   Foundations
Introduction to Cloud Computing, Migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

UNIT III   Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS)
Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing.
Aneka, Comet Cloud, T-Systems', Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments.

UNIT IV   Monitoring, Management and Applications
An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

UNIT V   Governance and Case Studies
Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services.

Text Books:
1. *Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, 2011, Wiley.*
2. *Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, 2012, Elsevier.*

Reference Books:
1. *Cloud Computing: A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.*
2. *Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.*
3. *Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F.Ransome, CRC Press, rp2012.*
4. *Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'Reilly, SPD, rp2011.*
5. *Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011.*

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(13A05802) SOFTWARE PROJECT MANAGEMENT

Course Objective:
The main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management). The goals of the course can be characterized as follows:

- *Understanding the specific roles within a software organization as related to project and process management*
- *Understanding the basic infrastructure competences (e.g., process modeling and measurement)*
- *Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships*

Learning Outcome:
1. *Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.*
2. *Compare and differentiate organization structures and project structures.*
3. *Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.*

UNIT I
Conventional Software Management: The waterfall model, conventional software Management performance, Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

UNIT II
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
The old way and the new: The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.

UNIT III
Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

UNIT IV
Work Flows of the process: Software process workflows, Inter trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.
Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation : Automation Building Blocks, The Project Environment.

UNIT V

Project Control and Process instrumentation: The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminants, Example.

Future Software Project Management: Modern Project Profiles Next generation Software economics, modern Process transitions.

Case Study : The Command Center Processing and Display System-Replacement(CCPDS-R).

Text Books:
1. *Software Project Management, Walker Royce, 1st edition, 2007, Pearson Education.*
2. *Software Project Management, Bob Hughes & Mike Cotterell, 4th edition, 2009, Tata Mc-Graw Hill.*

Reference Books:
1. *Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006*
2. *Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly,2007*
3. *Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, second edition, Wiley   India, 2004.*
4. *Agile Project Management, Jim Highsmith, Pearson education, 2004*
5. *The art of Project management, Scott Berkun, O'Reilly, 2005.*
6. *Software Project Management in Practice, Pankaj Jalote, Pearson Education,2002.*

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B.Tech. IV - I Sem. (IT)	3	1	3

(13A12707) ARTIFICIAL INTELLIGENCE AND ROBOTICS

UNIT I
Scope of AI-Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

UNIT II
Problem solving - State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

UNIT III
Knowledge Representation- Predicate Logic: Unification, modus pones, resolution, dependency directed backtracking.
Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtrack.
Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.

UNIT IV
Handling uncertainty and learning- Non-Monotonic Reasoning, Probablistic reasoning, use of certainty factors, fuzzy logic. Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

UNIT V
Robotics : Robot Classification, Robot Specification, notation; Direct and Inverse Kinematics: Co-ordinates Frames, Rotations, Homogeneous Coordinates, Arm Equation of four Axis SCARA Robot, TCV, Inverse Kinematics of Four Axis SCARA Robot.

Text Books:
1. E. Rich and K. Knight,"Artificial intelligence", 2nd edition., 1992, TMH.
2. N.J. Nilsson, "Principles of AI", 2000, Narosa Publ. House.
3. Robin R Murphy, Introduction to AI Robotics, 2000, PHI Publication.

Reference Books:
1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
3. George Lugar, .Al-Structures and Strategies for and Strategies for Complex Problem solving., 4/e, 2002, Pearson Educations.

B.Tech. IV - I Sem.   (Chem. Engineering)   **Th   Tu   C**
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(13A08711) BASICS OF NANOTECHNOLOGY

Course Objective:
To impart an understanding about the basics of nanotechnology-the emerging interdisciplinary technology. The subject provides knowledge about nanostructures, nanofabrication techniques, synthesis of nanomaterials, etc.

Learning Outcome:
The students will learn the nanofabrication techniques and systhesis of nanomaterials.

UNIT I
Introduction to Nano Technology: Effects of Confinement & Finite size in 1D &2D nanostructures (Concepts of surface & interfacial energy), Application of Nanotechnology

UNIT II
Inter molecular forces in organic polymerics , Aqueous, Biological , Vander waal, Electro static , Double Layer Forces in Acid Phase and Acid base systems, Depletion interactions, Hydro phobic forces layering.

UNIT III
Mesoscale thermodynamics of Nano scale particles, Gibbs treatment of interfaces, Mesoscale fluid dynamics, Thin films.

UNIT IV
Nano fabrication, nucleation, patterning of soft materials by self organizing, Chemical Self assembly.

UNIT V
Synthesis of Nano Particles using solgel, hydro thermal methods, freeze drying attrition , ion implantation, gas phase condensation and Chemical Vapor Deposition.

Text Books:
1. Introduction to Nanotechnology, Charles P. Poole, Jr., Frank J. Owen, Wiley, 2013.
2. Nano Material & Introduction to Synthesis, Properties & Application. Dieter Vollath, Wiley VCH 2006.
3. The physics of Micro/Nano fabrication, Brodie Muray, Springer Intl Edition.

Reference Books:
1. Nanoparticles-Building blocks for nanotechnology, Vincent Rotello, Springer Intl Edition.
2. Nanotechnology-The science of Small, M.A. Shah and K.A. Shah, Wiley, 2013.

Codes/Books : Nil

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B.Tech. IV - I Sem. (Chem. Engineering)   Th   Tu   C

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(13A08712) INDUSTRIAL SAFETY & HAZARD MANAGEMENT

Course Objective:
To train the students regarding industrial hazards and prevention methods and models and government regulations.

Learning Outcome:
The students will be able understand the concepts of industry process safety and basic awareness in safety procedures to be followed in industries.

UNIT I

Introduction: Safety program, Engineering ethics, Accident and loss statistics, Acceptable risk, Public Perception, **Industrial Hygiene:** Government regulations, Identification, Evaluation, Control. Important OSHA requirements and other legal issues.

UNIT II

Safety Audit - Components of safety audit, types of audit, audit methodology, non conformity reporting (NCR), audit checklist and report – review of inspection, remarks by government agencies, consultants, experts – perusal of accident and safety records, formats – implementation of audit indication - liaison with departments to ensure co-ordination – check list – identification of unsafe acts of workers and unsafe conditions in the shop floor.

UNIT III

Accident investigation and reporting- Concept of an accident, reportable and non reportable accidents, reporting to statutory authorities – principles of accident prevention – accident investigation and analysis – records for accidents, departmental accident reports, documentation of accidents – unsafe act and condition – domino sequence – supervisory role – role of safety committee –cost of accident.

UNIT IV

Safety performance monitoring - ANSI (Z16.1) Recommended practices for compiling and measuring work injury experience – permanent total disabilities, permanent partial disabilities, temporary total disabilities - Calculation of accident indices, frequency rate, severity rate, frequency severity incidence, incident rate, accident rate, safety "t" score, safety activity rate – problems.

UNIT V

Hazards Identification: Process hazards checklists, Hazard surveys, Hazop safety reviews.

Text Books:
1. Heinrich H.W. "Industrial Accident Prevention" McGraw-Hill Company, New York, 1980.
2. Krishnan N.V. "Safety Management in Industry" Jaico Publishing House, Bombay, 1997.
Reference Books:
1. Chemical Process Safety (Fundamentals with Applications), D.A.Crowl &   J.F.Louvar –
   Prentice Hall (1990).
2. Safety and Accident Prevention in Chemical Operationsby H.H.Fawcett and W.S.Wood, John
   Wiley and sons, 2ⁿᵈ edition, New York 1982
3. Coulson and Richardson's – Chemical engineering – R.K.Sinnot, Vol.6, Butterworth-Heinmann
   Limited 1996.
4. Industrial Safety, Health Environment and Security, Basudev Panda, 1ˢᵗ Edition, University
   Science Press, 2013.
Codes/Books : Nil

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(13A08713) NUCLEAR ENGINEERING

Course Objective:
The main purpose of incorporating this subject is to have the basic knowledge, on importance of nuclear energy and various reactions, reactors, safety aspects that will be used/required for/during the production of Nuclear

Learning Outcome:
The Student will acquire basic knowledge on importance of nuclear energy which is important in present day context.

UNIT 1
Introduction: Motivation for Nuclear Energy, India's Nuclear Power Program
Nuclear Physics: Nuclear model of the atom - Equivalence of mass and energy - Binding - Radio activity - Half life - Neutron interactions - Cross sections.

UNIT II
Nuclear Reactions and Reactor Materials
Mechanism of nuclear fission and fusion - Radio activity - Chain reactions - Critical mass and composition - Nuclear fuel cycles and its characteristics - Uranium production and purification - Zirconium, thorium, beryllium.

UNIT III
Reprocessing
Nuclear fuel cycles - spent fuel characteristics - Role of solvent extraction in reprocessing - Solvent extraction equipment.

UNIT IV
Nuclear Reactors
Reactors - Types of fast breeding reactors - Design and construction of fast breeding reactors - heat transfer techniques in nuclear reactors - reactor shielding.

UNIT V
Safety, Disposal and Proliferation
Nuclear plant safety- Safety systems - Changes and consequences of an accident - Criteria for safety - Nuclear waste - Type of waste and its disposal - Radiation hazards and their prevention - Weapons proliferation.
Text Books:
1. Thomas J.Cannoly, " Fundamentals of Nuclear Engineering ", John Wiley (1978).
2. G,Vaidyanathan," Nuclear Reactor Engineering", Chand Publishers, 2013

Reference Books:
1. Collier J.G., and G.F.Hewitt, " Introduction to Nuclear Power ", (1987), Hemisphere Publishing, New York.
2. Lamarsh U.R. " Introduction to Nuclear Engineering Second Edition ", (1983), Addison Wesley M.A.
3. Lipschutz R.D. " Radioactive Waste - Politics, Technology and Risk ", (1980), Ballingor, Cambridge. M.A.
Codes/Books : Nil

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(13A08714) SOLID WASTE MANAGEMENT

Course Objective:

The main purpose of incorporating this subject is to have the basic knowledge, concept and handling of solid waste. The solid waste like industrial, domestic and biomedical wastes has become major problem in the world and need special techniques for their reduction, reuse, recycle and disposal.

Learning Outcome:

The Student will acquire basic knowledge on handling of various solid wastes both hazardous and non-hazardous in nature.

UNIT I
Introduction: Solid waste problem meaning and definition of solid waste, concept and classification of municipal solid waste, solid waste management and urbanization, solid waste generation, sources of waste generation, waste trend.

UNIT II
Solid waste management-strategic planning, concept of strategic planning process. Strategic planning cycle. Prioritizing the objectives, preparation of financial plan, implementation, monitoring and evaluation. Public participation and involvement in solid waste facility siting, Evaluating the effectiveness of siting strategy.

UNIT III
Developing a solid waste management programme, California Integrated waste management Board (CIWMB), organizing a waste management programming, Developing a solid waste collection and transfer system, Identifying of collection equipment and crew size requirements, evaluating transfer needs and options, evaluating collection and transfer alternatives.

UNIT IV
Solid waste management techniques: Solid waste management hierarchy, waste reduction, source reduction programs, Developing recycling programmes. Waste to collect recyclebins, large scale mutual recovery/recycling facility.

UNIT V
Waste Disposal Techniques:
Composting, waste to energy techniques, land fill techniques, biomedical waste management, disposal of plastic waste, e-waste management.

Text Books:
Solid Waste Management- S.Saisikuren, Sanoop Gopi Krishna.
Understanding Environmental Pollution- Marquitak. Hall. Cambridge University Press- 2004.

Reference Books:
Environmental Engineering- G.N. Pandey GC CARNEY- Tata Mc Graw Hill education pvt ltd-1989.
Codes/Books: *Nil*