Open Elective for 8th Semester

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Environmental Science**	Code:	**D000801(094)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- Be familiar with the reason of water pollution.
- Familiar with the causes of air pollution
- To learn various method of controlling pollution.

UNIT I	**Environmental Pollution** Definition, cause, effects and control measures of, Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
UNIT II	**Ecosystems** Concept, Structure, function, Producers, consumers, decomposers, Energy flow, ecological succession, food chains, food webs, ecological pyramids. Introduction, types, characteristic features, structure and function of the forest, grassland, desert and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
UNIT III	**Biodiversity and its conservation** Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India.
UNIT IV	**Land resources** Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.
UNIT V	**Environmental ethics** Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust dies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

Text books:

1. Visit to a local area to document environmental assets river/forest/grassland/hill/mountain.
2. Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

Reference Books:

1. Expected impact of climate change on agricultural production and water resources.
2. Mitigation Strategies and Economics of climate change.

Course Outcome:

Student should be able to

- To be able to plan and handle issues related to environment.
- To be able to identify the reason of climate change.
- Explain about different types of environmental pollution.
- Explain and apply various methods of controlling environmental pollution

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Industrial Engineering & Management**	Code:	**D000802(076)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

UNIT I	**Introduction** History & development, objective, place of Industrial Engineering in an organization, relation with otherdepartment, system approach **Plant Location** Need for a suitable location, Plant location problems factors affecting location, quantitative method forevaluation of plant location. **Plant Layout** Objective & Principles, factors affecting layout, types of layout.
UNIT II	**Work Study** Purpose, objectives and applications of work study, Productivity and work study. **Method Study** Introduction, procedure, flow process charts, Multiple activity chart, motion economy principles, Therbligs,cycle graph and chronocycle graph. **Work Measurement** Definition, types, Time Study- selection & timing the job, rating, allowances, Numerical on Normal and standard time calculation.
UNIT III	**Job Evaluation and Merit Rating** Definition, objectives, methods. **Wages and Incentives** Terminology, characteristics, factors, types of incentives, wage incentive plan, Rowan plan, Taylor's differential piece rate system, Emerson's efficiency plan, Halsey's 50-50 plan, Bedaux plan, Group task & Bonus system.
UNIT IV	**Basic concepts and Functions of management** Nature, Purpose and Objectives of basic functions of management, Authority and Responsibility, social responsibility of manager, ethics and management. **Human Resource Management** Nature and Scope of Human Resource Planning, Recruitment and Selection, Training and Development, Career Growth, Grievances, Motivation – needs and types, Maslow hierarchy of needs theory, Herzberg two factor theory, Need-want- satisfaction chain, Quality of working life, job enrichment and job enlargement.
UNIT V	**Marketing Management** Marketing Environment, Marketing Mix, Advertising and Sales Promotion, Channels of Distribution. **Financial Management** Book keeping, financial statement Analysis, Financial Ratios, Capital Budgeting, Break-Even Analysis.

Text books:

1. Industrial Engineering and Production Management -MartandTelsang - S.Chand.
2. Industrial Engineering & Management - S. Dalele&Mansoor Ali - Standard Publishers

Reference Books:

1. Industrial Engineering &Management ,A new perspective- Philip E Hicks - Mcgraw Hill
2. Company Essential of Management - H. Koonz and H. Weihrich – Mcgraw Hill
3. Marketing Management- Kotler Philip- Prentice Hall of India
4. Flexibilty in Management - Sushil, Vikas publication - New Delhi
5. Human Resource Management - Luthans Fred - McGraw Hill, Inc.
6. Financial Management - M.Y. Khan and P.K. Jain - Tata Mc-Graw Hill
7. Fundamentals of Business Organizations and Management -Y.K. Bhusan - S. Chand
8. Industrial Management - K.K. Ahuja - Khanna Publishers
9. Introduction of work study - ILO, Geneva - Universal Publishing Corporation, Bombay
10. Motion and Time Study - Ralph M. Bannes - John Wiley & Sons
11. Work Study and Ergonomics - H.S. Shan – DhanpatRai & Sons

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Soft Computing Techniques**	Code:	**D000803(022)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

The main objective of the course is to familiarize students with the underlying principle of soft computing with its usage in various applications to solve real life problems.

UNIT I	**Introduction:** Introduction to soft computing; introduction to biological and artificial neural network, introduction to fuzzy sets and fuzzy logic systems.
UNIT II	**Artificial Neural Networks and Applications:** Different artificial neural network models, learning in artificial neural networks, neural network applications in control systems.
UNIT III	**Fuzzy Systems and Applications:** Fuzzy sets; fuzzy reasoning, fuzzy inference systems, fuzzy control, fuzzy clustering, applications of fuzzy systems.
UNIT IV	**Neuro-Fuzzy Systems:** Neuro-fuzzy modeling, Neuro-fuzzy control. Genetic Algorithms- Simple GA, crossover and mutation, genetic algorithms in search and optimization.
UNIT V	**Applications:** Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Analysis language processing.

Text books:

1. Fuzzy Logic And Soft Computing – Chen, Guoging, Ving, Mingsheng & Cai, Kai Yuan Ed – Kluwar Academic
2. Soft Computing and Intelligent Systems Design Theory Tools and Applications – Karray F O & Desilva C - Pearson, New Delhi

Reference Books:

1. A Computational intelligence: principles, techniques, and applications - Konar - Springer.
2. Introduction to pattern recognition: statistical, structural, neural, and fuzzy logic approaches: Friedman, M & Kandel, A. - World Scientific.
3. Neuro-fuzzy and soft computing: a computational approach to learning and machine intelligence - Jang, J S R, Sun, C T, & Mizutani E - Prentice Hall.
4. An introduction to genetic algorithms- Mitchell M - MIT press.
5. Fuzzy Logic with Engineering Applications - Ross T J - John Wiley & Sons

Course Outcomes:

On successful completion of the course, the student will be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Describe Artificial Neural Networks and Applications.
3. Describe Fuzzy Systems and Applications.
4. Describe Neuro-Fuzzy Systems and Applications.
5. Discuss applications of soft computing to solve real life problems

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Composite Materials**	Code:	**D000804(037)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- To be familiar with classification & characteristics of composite material and their application.
- To gain the knowledge about manufacturing methods, testing and environmental issue related with composite material.
- To train students to be able to design composite structures, select composite materials, conduct stress analyses of selected practical applications using laminated plate theories appropriate strength criteria.
- To be familiar with the properties and response of composite structures subjected to mechanical loading under static and cyclic conditions.

UNIT I	**Introduction to Composites:** Definition, classification and characteristics of composite materials. Basic composite constituents – fiber and matrix; Properties of unidirectional long fiber and short fiber composites; Polymeric materials and polymeric composites; Honeycomb and Sandwich Composite Structure; Application areas of composites.
UNIT II	**Manufacturing, Testing and Environmental Issues:** Moulding, pultrusion, filament winding, other advanced manufacturing techniques; Quality inspection and testing – uniaxial tension test, uniaxial compression test, shear test, fracture toughness testing of composites. Environmental Issues related with composite manufacturing and their applications.
UNIT III	**Material Properties**: Orthotropic and Anisotropic materials; properties relating stress to strain, properties relating temperature to strain, properties relating moisture to strain, properties relating stress (or strain) to failure, Failure Criterion – Maximum Stress and Maximum Strain; Review of force tensors, stress tensors, strain tensors
UNIT IV	**Elastic Response Analysis:** Hooke's law for orthotropic and anisotropic materials; Linear Elasticity for Anisotropic Materials; Unidirectional composite laminates; Rotations of Stresses, Strains; Residual Stresses; Stress and environmental effects on composites behaviour.
UNIT V	**Composite Laminates:** Thin-plate theory, classical lamination theory; Angle-ply and cross ply laminates; Static,dynamic and stability analysis for simple cases of composite plates; Interlaminar stress behaviour; Composite Joints; Design with Composites.

Text books:

1. "Analysis and Performance of Fiber Composites"- Agarwal, B. D., and Broutman L. J.- John Wiley and Sons, New York.
2. "Fiber Reinforced Composites: Materials, Manufacturing and Design" - Mallick, P.K. Marcel Dekker Inc.

Reference Books:

1. "Mechanics of Composite Materials and Structures"- Mukhopadhyay M, University Press, India.
2. "Primer on Composite Materials, Analysis" Halpin, J. C., Techomic Publishing Co.
3. "Composite Materials Technology: Processes and Properties"- Mallick, P. K. and Newman, S., Hansen Publisher, Munish.
4. "Stress Analysis of Fiber – Reinforced Composite Materials"- Hyer, M. W. - McGraw-Hill, New York.
5. "Engineering Mechanics of Composite Materials", Issac M. Daniel and Ori Ishai - Oxford University Press-2006, First Indian Edition – 2007.

Course Outcomes:

On successful completion of the course, the student will be able to:

- Acquire knowledge and hands-on competence in applying the knowledge of composite materials in the design and
- development of mechanical systems.
- Demonstrate creativeness in designing new systems components in the field of engineering.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Industrial Automation**	Code:	**D000805(025)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- To develop and apply Mathematical and Engineering skills to identify, formulate and solve industrial process problems.
- This subject seeks to close the gap between Instrumentation and Mechanical Engineering.
- This subject provides the knowledge of different types of controller & their applications.
- This subject provides the basic knowledge of PLC and DCS.

UNIT I	**Introduction to Process Control :** Process Control Block Diagram ,Control System Evaluation, Digital Control , Supervisory Control ,Direct Digital Control, Networked Control Systems, Distributed Digital Control, Smart Sensor, Definitions of the terms used to describe Process Control .Data Acquisition Systems :DAS Hardware ,DAS Software, Data Logger.
UNIT II	**Controller Principles:** Process Characteristics ,Process Equation, Process Load, Process Lag, Self-Regulation, Control System Parameters: Error, Variable Range, Control Parameter Range, Control Lag, Dead Time, Cycling, Controller Modes: Discontinuous Controller Mode, Two Position Mode, Multi Position Mode, Floating Control Mode, Continuous Control Mode ,Proportional Control Mode, Integral Control Mode, Derivative Control Mode, Composite Control Modes: PI Control, PD Control, PID Control
UNIT III	**Analog Controllers:** Introduction, Electronic Controllers: Error Detector, Single Controller Modes, Composite Controller Modes, Pneumatic Controllers :General features, Mode Implementation.
UNIT IV	**Programmable Logic Controller:** PLC Architecture, Basic Structure, PLC Programming: Ladder Diagram, Ladder Diagram symbols, Ladder Diagram circuits, PLC Communications and Networking, PLC Selection ,I/O Quantity and Type ,I/O Remoting requirements, Memory size and type, Programmer Units, PLC Installation, Advantages of using PLCs.
UNIT V	**Distributed Control System:** Introduction, Overview of Distributed Control Systems, DCS Software configuration, DCS Communication, DCS Supervisory Computer Tasks, DCS Integration with PLC and Computers, Features of DCS, Advantages of DCS.

Text books:

1. Process Control Instrumentation Technology by C.D. Johnson ,PHI
2. Computer Aided Process Control by S.K.Singh ,PHI

Reference Books:

1. Introduction to Instrumentation & Control by A.K.Ghosh, Eastern Economy Edition
2. Intelligent Instrumentation, by George C.Barney, Prentice Hall India

Course Outcomes:
On successful completion of the course, the student will be able to:

- Understand process variables, degrees of freedom, and Self regulation, first &second order Process System.
- Know the importance of on-off, proportional, integral and derivative modes, composite control modes- PI, PD and PID controllers.
- Understand ,Communication in DCS, DCS system integration with PLC and computers, Data loggers, Data Acquisition systems
- (DAS), computer control hierarchy levels and Direct Digital control(DDC).

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Production & Product Management**	Code:	**D000806(037)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- To introduce the concept of Organization , Production systems and Cost analysis
- To give knowledge about the Sales Forecasting Methods
- To understand Production Planning and Control and Material Handling
- To study about Materials Management and Quality Control

UNIT I	**Production Management** Definition, objectives, scope, benefits, functions of production management, place of production management in an organization, types of production system, Product life cycle, product design and development, production cycle. Costing and Cost Analysis Elements of costs, Break even analysis, Incremental costs, make or buy decision.
UNIT II	Sales Forecasting Purposes, methods **– Delphi, linear regression, economic indicators, time-series analysis, adjustment for seasonal variations, moving average, exponential smoothing.**
UNIT III	Production Planning and Control Functions, Organization, Master Scheduling, Aggregate planning and strategies , Materials requirement planning, product structure tree, Routing, Loading Scheduling – forward and backward, Dispatching – priority rules, Sequencing, Johnson's algorithm for n jobs and two machines, Gantt's chart, Bar chart, Flow process chart. Materials Handling Principles of materials handling, unit load, Types of materials handling equipment, Relation between materials handling and plant layout.
UNIT IV	Material Management Objectives and functions of materials management, Organization of materials management. Procurement Objectives of purchase deptt. purchase responsibilities and organization, types of purchasing, purchase procedures, Import and Export. Stores Keeping Stores management, functions of stores, classification of materials, standardization of materials, identification and maintenance of layout of stores, physical control of materials, pricing of stores, issuing of stores. Inventory Control Objective, scope and functions of inventory control, inventory control techniques, economic ordering quantity, periodic ordering quantity, A.B.C. analysis, General idea regarding inventory control under risk and uncertainty.
UNIT V	**Quality Control** Difference between inspection and quality control, acceptance sampling, procedure's risk and consumer's

	risk, operating characteristic curve for single sampling plan, AOQL Quality of conformance, quality of design, economics of quality, SQC charts for variables and attributes. Introduction to JIT manufacturing, Kanban system.

Text books:

1. Production and operation Management – By P. Ramamurty – New Age International Pub., 2005
2. Production and operation Management – By R. Mayer – TMH
3. Quality Planning and Analysis, Juran and Gryna

Reference Books:

1. Industrial Engineering & Production Management – Martand Telsang – S. Chand & Co., 2004
2. Production and operations Management by – Adam and Ebert – PHI – 6th Edn., 2003
3. Production planning and Control – By Samuel Eilon, Navneet Prakashan Ltd., Bombay

Course Outcomes:

On successful completion of the course, the student will be able to:

- The students will know about the Organization , Production systems and Cost analysis
- The students will know about the methods of making sales forecasting
- They students will understand the methods of material handling and materials management
- The students will be able to appreciate the methods of Quality Control

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Virtual Instrumentation**	Code:	**D000807(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- To review background information required for studying virtual instrumentation.
- To study the basic building blocks of virtual instrumentation.
- To study the various techniques of interfacing of external instruments of PC.
- To study the various graphical programming environment in virtual instrumentation.
- To study a few applications in virtual instrumentation.

UNIT I	**REVIEW OF DIGITAL INSTRUMENTATION** Representation of analog signals in the digital domain – Review of quantization in amplitude and time axes, sample and hold, sampling theorem, ADC and DAC.
UNIT II	**FUNDAMENTALS OF VIRTUAL INSTRUMENTATION** Concept of virtual instrumentation – PC based data acquisition – Typical on board DAQ card – Resolution and sampling frequency Multiplexing of analog inputs – Single-ended and differential inputs – Different strategies for sampling of multi-channel analog inputs. Concept of universal DAQ card - Use of timer-counter and analog outputs on the universal DAQ card.
UNIT III	**CLUSTER OF INSTRUMENTS IN VI SYSTEM** Interfacing of external instruments to a PC – RS232, RS 422, RS 485 and USB standards - IEEE 488 standard – ISO-OSI model for serial bus – Introduction to bus protocols of MOD bus and CAN bus.
UNIT IV	**GRAPHICAL PROGRAMMING ENVIRONMENT IN VI** Concepts of graphical programming – Lab-view software – Concept of VIs and sub VI - Display types – Digital – Analog – Chart – Oscilloscopic types – Loops – Case and sequence structures - Types of data – Arrays – Formulae nodes –Local and global variables – String and file I/O.
UNIT V	**ANALYSIS TOOLS AND SIMPLE APPLICATIONS IN VI** **Fourier transform - Power spectrum - Correlation – Windowing and filtering tools – Simple temperature indicator – ON/OFF controller – P-I-D controller - CRO emulation - Simulation of a simple second order system – Generation of HTML page.**

Text books:

1. PC Interfacing for Data Acquisition and Process Control, S. Gupta and J.P Gupta, Instrument Society of America, 1994.
2. Understanding Serial Communications, Peter W. Gofton, Sybex International.
3. Learning with Lab-view, Robert H. Bishop, Prentice Hall, 2003.

Reference Books:

1. PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control Kevin James, Newness, 2000.
2. Lab-view Graphical Programming, Gary W. Johnson, Richard Jennings, McGraw Hill Professional Publishing, 2001.

Note: To offer this elective, multi-user licensed copy of Lab-view software should be available.

Course Outcomes:

On successful completion of the course, the student will be able to:

- The students will come to know importance of VI in present scenario.
- They will also come to know about application of mathematical tools in Virtual Instrumentation

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Data Sciences**	Code:	**D000808(022)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- The objective of this course is to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications.

UNIT I	**Introduction to Data Science:** Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting.
UNIT II	**Introduction to Programming Tools for Data Science:** Tool kits using Python: Matplotlib, NumPy, Scikit-learn, NLTK Visualizing Data: Bar Charts, Line Charts, Scatter plots **Working with data:** Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.
UNIT III	Mathematical Foundations 1.4 Linear Algebra: Vectors, Matrices. Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation. Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem. Hypothesis and Inference: Statistical Hypothesis Testing, Confidence Intervals, Phacking, Bayesian Inference.
UNIT IV	**Machine Learning Overview of Machine learning concepts –** Over fitting and train/test splits, Types of Machine learning Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), Classification and Regression algorithms- Naïve Bayes, K- Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks Learning And Generalization, Overview of Deep Learning.
UNIT V	**Case Studies of Data Science Application Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis.**

Text Books/References:

1. Joel Grus, "Data Science from Scratch: First Principles w
2. Aurélien Géron, "Hands-On Machine Learning with ScikConcepts, Tools, and Techniques to Build

Intelligent SyMedia

3. Jain V.K., “Data Sciences”, Khanna Publishing House, Del
4. Jain V.K., “Big Data and Hadoop”, Khanna Publishing Ho
5. Jeeva Jose, “Machine Learning”, Khanna Publishing Hous
6. Chopra Rajiv, “Machine Learning”, Khanna Publishing H
7. Ian Goodfellow, Yoshua Bengio and Aaron Courville, http://www.deeplearningbook.org
8. Jiawei Han and Jian Pei, "Data Mining Concepts and Techgan Kaufmann Publishers.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Computational Fluid Dynamics**	Code:	**D000809(037)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- To introduce the student to widely used techniques in the numerical solution of fluid equations, issues that arise in the solution of such equations, and modern trends in CFD.
- To acquire core knowledge of the fundamentals of CFD for engineers, and an introduction to the methods and analysis techniques used in CFD.
- By studying a variety of flow situations students will develop a better intuition of fluid mechanics more quickly than is possible with traditional analytical approaches.
- Quantify and analyze the numerical error in CFD discetization schemes.
- Develop finite difference and finite volume forms of the CFD equations and important model systems
- Formulate explicit and implicit algorithms for solving the Navier-Stokes equations..
- Understand and apply verification strategies for evaluating CFD code.

UNIT I	**Fundamental Concepts** Introduction- Governing Equations of Fluid Dynamics. Mathematical Behavior of Partial Differential Equations - Elliptic, Parabolic and Hyperbolic equations. Physical Classification of fluid dynamics problems, Well-posed problems.
UNIT II	**Finite Element and Finite Difference Method Overview of Finite Element and Finite difference Techniques in Computational Fluid Dynamics. Strong and Weak Formulations of a Boundary Value Problem.**
UNIT III	**Finite Volume Schemes General Discretisation Methodologies:** Cell Centered Formulation- Lax-Vendor off Time Stepping, Runge-Kutta Time Stepping, Multistage Time Stepping. Cell Vertex Formulation - Multistage Time Stepping. Discretisation of convective fluxes: Flux-vector splitting formulation, Flux-difference splitting formulation. Up-wind formulation.
UNIT IV	**Discretization Boundary layer Equations and methods of solution -**Implicit time dependent methods for inviscid and viscous compressible flows - Concept of numerical dissipation –Stability properties of explicit and implicit methods - Conservative up-wind discretization for Hyperbolic systems - Further advantages of upwind differencing.
UNIT V	**Principles of Grid Generation Structured grid:** C-, H- and O-Grid topology. Algebraic, Elliptical and Hyperbolic Grid Generation, Unstructured grid: Delaunay Triangulation, Advancing-Front Method, Generation of Anisotropic Grids, Mixed-Element/Hybrid Grids, Assessment and Improvement of Grid Quality.

Text Books

1. Introduction to computational fluid dynamics: the finite volume method - Versteeg, & Malalasekera - Addison- Wesley.
2. Introduction to Computational Fluid Dynamics – Niyog & Chakraborty – Pearson ,Singapore

Reference Books:

1. Computational Techniques for Fluid Dynamics, - Vols. I and II - Fletcher C.A.J. – Springer, Verlag, Berlin,1988.
2. Computational Fluid Dynamics: An Introduction - John F. Wendt (Editor) – Springer, Verlag, Berlin.
3. Numerical Computation of Internal and External Flows, Vols. I and II - Charles Hirsch - John Wiley & Sons,New York.
4. Computational Fluid Dynamics for Engineers, Vols. I & II - . Klaus A Hoffmann and Steve T. Chiang - Engineering Education System, W. Wichita, K.S., 67208 – 1078 USA.
5. Fundamentals of Aerodynamics - Anderson, Jr.D - McGraw Hill.

Course Outcomes:

On successful completion of the course, the student will be able to:

- Develop an understanding for the major theories, approaches and methodologies used in CFD.
- Build up the skills in the actual implementation of CFD methods for mechanical engineering design,analysis and application.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Medical Biotechnology**	Code:	**D000810(018)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- To make the students understand about human genetics, disorders and diseases associated.
- To understand the factors involves in diseases.
- To familiarize the students with diagnostic techniques used in medicine.
- To learn about the identification and treatment of diseases.
- To make the students aware with ethical issues associated with techniques in human genetics.

UNIT I	**IIntroduction** • **Introduction:** Human genetics (types of diseases: Chromosomal disorders, Numerical disorders e.g. trisomies & monosomies. • Structural disorders e.g. deletions, duplications, translocations & inversions, chromosomal instability syndromes; • Gene controlled diseases: Autosomal and X-linked disorders, mitochondrial disorders), inheritance pattern, general study of causes of genetic disorders.
UNIT II	**Diseases and their causes** • **Genetic diseases**: Huntington's Disease, Myotonic muscular dystrophy, sickle cell anaemia, cystic fibrosis, Duchenne muscular dystrophy, hemophilia, phenylketoneurea, Familial Hypercholesterolemia, Congenital hypothyroidism, Tay-Sachs, Alzheimer, Parkinsonism, Mongolism, Cri-du-chat, Edwards syndrome, Turner's syndrome, klinefelter's syndrome, down's syndrome, cleft palate. • **Cancer and oncogenes:** Types of Cancer, properties of cancer, genetic basis of cancer. • **Oncogenes:** Tumor suppressor genes function and mechanism of action of pRB and p53.
UNIT III	**Diagnosis** • Gene testing (prenatal, new born screening, carrier detection screening, predictive and presymptomatic testing, forensic testing) • Immunodiagnostics for pregnancy: Diagnosis using protein and enzyme markers, monoclonal antibodies. • Invasive techniques: Amniocentesis, Chorionic Villi Sampling (CVS). • Non-invasive techniques : ultrasonography, X-ray, maternal serum and fetal cells in maternal blood, microarray technology- genomic and c - DNA arrays, probe, biosensors, FISH cytogenetics.
UNIT IV	**Therapy** • Therapy: Gene Knockouts /silencing, gene disruption-p53, immunological (MAb, vaccines). • Gene therapy for non inheritable diseases: somatic cell gene therapy and germ line gene therapy; Stem cell therapy; Radiotherapy; Chemotherapy; Enzyme therapy.
UNIT V	**Ethical issues** • Ethical issues in medicine: In vitro fertilization, surrogate therapy; Prenatal sex determination.

	• Genetic counseling; Germline gene therapy. • IPR, patenting; Human transgene.

Text Books

1. Medical Biotechnology, Albert Sasson (2006), United Nations Publications.
2. Medical Biotechnology, S. N. Jognand (2000), Himalaya Publication.
3. Human Molecular Genetics 3rd Edition Tom Strachan and A.P.Read, Garland science publications.

Reference Books:

1. Biotechnology and Biopharmaceuticals (2003), Rodney J.Y. Ho and milo Gilbaldi, Wiley John & sons.
2. Biotechnology Demystified Sharon Walker (2006) Mc Graw Hill Publication.

   The Cell, Geoffrey MCooper and Robert E. Hausman

Course Outcomes:

After completion of course, student should be able to

- The students will gain knowledge of human genetics and molecular mechanisms of the diseases.
- They can apply the concepts in research related works.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Bioterrorism and National Security**	Code:	**D000811(018)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- Familiarization of issues involved and threats facing society due to bioterrorism and approaches to tackle it effectively.
- To know the relationship of microbes and immune system.
- To gain the knowledge of bioweapons and bioterrorism.
- To learn the method used in prevention and control of bioterrorism.
- To understand the ethical issues involved in bioterrorism management.

UNIT I	**Terrorism and Bioterrorism** • Definition-Traditional Terrorists-New Terrorists-Nuclear, chemical, and radiological weapons. • The psychology of Bioterrorism-Historical perspective.
UNIT II	**Microbes and Immune System** • Primary classes of Microbes-bacteria, virus, and other Agents-Immune system. • Interaction between microbes and the immune system.
UNIT III	**Bioterrorism Weapons and Techniques** • Characteristics of microbes and the reasons for their Use-Symptoms • Pathogenicity-Epidemiology-natural and targeted release. • The biological, techniques of dispersal, and case studies of Anthrax, Plague-Botulism, Smallpox, and Tularemia and VHF.
UNIT IV	**Prevention and Control of Bioterrorism** • Surveillance and detection, Detection equipment and sensors, • Diagnosis, Treatment, Vaccinations-Supplies, Effectiveness, Liability, Public Resistance-Response, First Responders. • Infectious Control, Hospital Prevention, Protection, Decontamination. • Notification-Role of Law Enforcement-Economic impact.
UNIT V	**Bioterrorism Management** • Ethical issues: personal, national, the need to inform the public without creating fear, • Cost benefit, Rations, Information Management, Government control and industry Support-Microbial forensics.

Text Books

1. Bioterrorism: Guidelines for Medical and Public Health Management, Henderson, Donald, American Medical Association, 1st Edition, 2002.
2. Biological Weapons: Limiting the Threat (BCSIA Studies in International Security), Lederberg, Joshua

(Editor), MIT Press ,1999.

3. Bioterrorism and Infectious Agents: A New Dilemma for the 21st Century (Emerging Infectious Diseases of the 21st Century), I.W. Fong and Kenneth Alibek, Springer, 2005.

Reference Books:

1. The Demon in the Freezer: A True Story, Preston, Richard, Fawcett Books, 2003.
2. The Anthrax Letters: A Medical Detective Story, Cole, Leonard A., Joseph Henry Press, 2003.
3. Biotechnology research in an age of terrorism: confronting the dual use dilemma, National Academies of Science, 2003.

Course Outcomes:

After completion of course, student should be able to

- Exposure to threats for national security.
- Learn methods to tackle them and support law enforcement & health agencies to handle them.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Precision Medicine & Wellness**	Code:	**D000812(018)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- To understand the principle of genomics and proteomics
- The course will teach the students about use of modern omics techniques and systems biology in providing personalized medicine and preventive health care.
- To know about the screening methods of Genetics
- To know the importance of pharmacogenomics in drug testing
- To learn about the ethical issues involved in pharmacogenomics..

UNIT I	**Genomics and Proteomics** • Use of genomics, transcriptomics. • Proteomics and metabolomics in understanding disease condition
UNIT II	**Genomics and Proteomics** • Biomarker identification and validation of a disease state. Human Genome project. Cancer genome project. • Different types of genetic and nongenetic variations.
UNIT III	**Genetic screening** • Genetic screening and diagnosis: prenatal carrier testing. • Newborn screening for Mendelian diseases.
UNIT IV	**Pharmacogenomic** • Pharmacogenomic testing for drug selection, dosing and predicting adverse effects of commonly prescribed drugs. • Tumor profiling, Patient data and clinical decisions. • Risk assessment through omics approach.
UNIT V	**Ethical and Legal Policy** • Ethical, legal, and social implications of health privacy and policy laws for precision medicine. • Ayurveda system of *Prakriti* and *Agni*.

Text Books

1. National Institute of General Medical Sciences. The New Genetics. Bethesda, MD: U.S. Department of Health and Human Services.
2. Genomic and Precision Medicine, Geoffrey Ginsburg and Huntington Willard,

Reference Books:

1. The Language of Life: DNA and the Revolution in Personalized Medicine, Francis S. Collins.

Course Outcome:

After completion of course, student should be able to

- The students will be introduced to precision medicare and preventive care system using modern omics tools.
- They will be exposed to recent advances in disease risk prediction, molecular diagnosis and progression of diseases, and targeted therapies for individuals.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Non Conventional Energy Sources**	Code:	**D000813(019)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

1. Explicatory concepts on non conventional energy sources and environmental aspects of power generation.
2. Comprehensive knowledge about Solar Energy and its application of the kinetics of enzyme and immobilization of enzymes.
3. Demonstrative understandings on Biomass, Biodigestion, Biogas, Biodiesel, Wind Energy, Tidal Energy and Wave Energy.
4. Illustrative capability and critical thinking on various non conventional chemical energies and design of equipments.

UNIT I	**Non Conventional Energy Sources and Environmental Aspects of Power Generation** Introduction to non conventional energy sources; Solar Energy; Physical principles of conversion of solar radiation into heat utilization; Flat Plate Collectors (FPC) and applications; Focusing Type Collectors: Orientation and Sun tracking systems; Types and performance of concentrating collectors: Cylindrical parabolic collector, Compound parabolic collector.
UNIT II	**Solar Energy** Introduction to Solar energy; Applications of solar energy: Solar water heating, Space heating and cooling, Solar photovoltaic cell, Solar cooking, Solar distillation & desalination, Solar industrial process heating, Solar power generation, Solar Green House, Solar thermo mechanical power, Solar refrigeration & air conditioning, Solar ponds.
UNIT III	**Biomass, Biogas and Biodiesel** Introduction to biomass; Type of biomass sources; Energy from Biomass; Methods for obtaining energy from biomass; Biomass conversion technologies; Biodigestion; Factors affecting biodigestion, Thermal gasification of biomass; Gasifier: Classification, Advantages, Disadvantages and Application; Alcohol fuels from biomass: Overview, Feedstock, methods for alcohol production, Ethanol as an alternative liquid fuel, Engine performance with alcohol fuels; Biogas: Community/Industrial biogas plant; Design of a biogas plant, Advantages and disadvantages of biogas plants, Utilization of biogas; Biodiesel from biomass.
UNIT IV	**Wind Energy, Tidal Energy and Wave Energy** Introduction to Wind Energy; Basic principles of wind energy conversion; Power in the wind; Maximum power; Forces on the blades, lift and drag; Components of wind energy conversion systems (WEC); Classification, advantages and disadvantages of WEC system; Types of wind machines, Performance of wind machines; Design considerations, Energy storage, Application of wind energy, Environmental aspect. Introduction to Tidal Energy: Components of tidal power plants; Single and double basin arrangements; Estimation of energy and power; Advantages and limitations of tidal power. Wave energy: Energy and power from wave energy; Advantages and disadvantages
UNIT V	**Non Conventional Chemical Energies** Introduction to Non Conventional Chemical Energies and Sources. Fuel cells: Design, principle, classification, types, advantages and disadvantages, Work output and

	EMF of fuel cells, Application of fuel cells. Hydrogen energy: Introduction to Hydrogen Energy; Properties of hydrogen; Methods of hydrogen production; Storage and transportation of hydrogen; Advantages and disadvantages; Applications. Introduction to Atomic Energy.

Text Books

1. G D Rai, Non-Conventional Energy Sources, Khanna Publishers, New Delhi.
2. S P Sukhatme, Solar Energy-Principles of Thermal Collection & Storage, Tata McGraw Hill, New Delhi.

Reference Books:

1. John A Duffie & William A Beckman, Solar Energy Thermal processes, Wiley Interscience Publication.

2. P Garg & J Prakash, Solar Energy - Fundamentals and Applications, Wiley Interscience Publication.

3. Jay Cheng, Biomass to Renewable Energy Processes, 1st Edition, CRC Press.

Course Outcome:

CO1: Define non conventional energy sources and environmental aspects of power generation capably.
CO2: Illustrate Solar Energy and apply conceptual knowledge owing to various applications.
CO3: Describe and apply the technologies of biomass, biogas and biodiesel suitably.
CO4: Demonstrate wind energy, tidal energy and wave energy towards the need of the society.
CO5: Exemplify the various non conventional chemical energies and their suitable usages.
CO6: Explain and elucidate the critical calculations of various non conventional chemical energies and design of equipments.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Air pollution and control measures**	Code:	**D000814(020)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

UNIT I	**Air Pollution:** Problem, Definitions, Classification of pollutants, characteristics and sources. **A.P. Monitoring:** Measurement of stack gases, Sampling methods, Difficulties in sampling, sampling of SPM, stack sampling techniques.
UNIT II	Air pollution meterology, stability class condition, plume behaviour, topographical effects on air pollution, wind profiles, windroses. Gaussian plume models, assumptions and limitations of GPM, problem on modelling.
UNIT III	SOX sources, ambient concentrations, test methods, SOX control techniques, effects of SOX on human, animal health, plants and on materials. NOX sources, ambient concentrations, test method control techniques, effects of NOX on human health, animal health, plants and on materials. Particulate size distribution, collection and removal mechanics.
UNIT IV	Major air pollution disaster episodes, special diseases caused by air pollution, symptoms of chronic air pollution. Mechanisms ofdeterioration in polluted atmospheres, effect of air pollution on art treasures in India.
UNIT V	Air quality criteria and emission standards, US and Indian standards, air pollution act, constitution, power and functions of the boards. Global effects of air pollution – Green house effect, acid rains, ozone layer depletion, etc.

Text Books

1. Environmental Engineering – Peavy& Rowe (Tata McGraw Hill, New Delhi).
2. Environmental Science and Engineering – Henry and Heinke (Pearson Education).

Reference Books:

1. Air Pollution – Henry C. Perkins, (McGraw Hill Kogakusha Ltd., Tokyo, Japan, 1974)
2. Air Pollution – Stern, Arthur C. (Academic Press, New York, USA, 1977)
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
4. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Solid and Hazardous waste management**	Code:	**D000815(020)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

UNIT I	**Sources of Solid and Hazardous Wastes:** Sources of solid and hazardous wastes - Need for solid and hazardous waste management - Legislations on management and handling of municipal solid wastes, hazardous wastes, and biomedical wastes.
UNIT II	**Waste Generation:** Waste generation rates - Composition - Hazardous Characteristics - TCLP tests - waste sampling- Source reduction of wastes - Recycling and reuse.
UNIT III	**Municipal Solid Wastes Collection:** Handling and segregation of wastes at source - storage and collection of municipal solid wastes - Analysis of Collection systems - Need for transfer and transport - Transfer stations.
UNIT IV	**Labeling and Handling of Hazardous Wastes:** Waste processing - processing technologies - biological and chemical conversion technologies – Composting,thermal conversion technologies - energy recovery-incineration - solidification and stabilization of hazardouswastes - treatment of biomedical wastes.
UNIT V	**Solid Wastes Disposal in Landfills:** Site selection - design and operation of sanitary landfills-secure landfills and landfill bioreactors - leachate andlandfill gas management - landfill closure and environmental monitoring - landfill remediation, Elements of integrated waste management.

Text Books

1. George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, Integrated Solid Waste Management, McGraw- Hill, New York, 1993
2. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000.

Reference Books:

1. Solid Waste Management, Van Nostrand Reinhold Co. 1975.
2. C.L. ell, Solid Waste Management, John Wiley, 1975.
3. P.W. Powers. How to dispose of toxic substances and industrial Waste, Noyes Data Corporation, England, 1976.

Course Outcomes:

1. The students will describe the solid and hazardous wastes.
2. The students will explain generation rates of solid and hazardous wastes.
3. The students will describe handling and segregation of waste at source.
4. The students will discuss various regulations about the management and handling of hazardous waste.
5. The students will design and monitor a SWM Landfill.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Natural language processing**	Code:	**D000816(022)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: Upon completion of this course, the undergraduate students will be able to grasp the significance of natural language processing in solving real-world problems. They will be able to map the appropriate processing technique and implement them for Information Retrieval and Information Extraction from Text and speech.

UNIT I	**Introduction** Origins and challenges of NLP, Human languages, models, problem of ambiguity, processing paradigms; Phases in natural language processing, applications such as information extraction, question answering, and machine translation.
UNIT II	**Syntactic Analysis** Context Free Grammars, Grammar rules for English, Normal Forms for grammar. Syntax Analysis: Parsing Natural Language, Representing text data - Part of speech tagging, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues
UNIT III	**Semantic Analysis** Semantics- Meaning representation, Syntax-Driven Semantic analysis, lexical semantics, WordNet based similarity- Shallow parsing - Semantic representation, Word Sense Disambiguation- Selectional restriction, machine learning approaches, dictionary based approaches.
UNIT IV	**Discourse Integration and Pragmatic Analysis** Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling.
UNIT V	**Speech Processing** Speech Fundamentals: Articulatory Phonetics – Production And Classification Of Speech Sounds; Acoustic Phonetics – Acoustics Of Speech Production; SPEECH-ANALYSIS: Features, Feature Extraction And Pattern Comparison Techniques: Speech Distortion Measures– Mathematical And Perceptual, SPEECH MODELING: Hidden Markov Models: Markov Processes, HMMs – Evaluation.

Text Books

1. Jurafsky, David, and James H. Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Upper Saddle River, NJ: Prentice-Hall, 2000. ISBN: 0130950696.
2. Christopher D. Manning and Hinrich Schutze, “Foundations of Statistical Natural Language Processing”, MIT Press, 1999.

Reference Books:

1. Nitin Indurkhya, Fred J. Damerau "Handbook of Natural Language Processing", Second Edition, CRC Press, 2010.
2. James Allen "Natural Language Understanding", Pearson Publication 8th Edition. 2012.
3. Alexander Clark, Chris Fox, Shalom Lappin, "The Handbook of Computational Linguistics and Natural Language Processing", Wiley-Blackwell, 2012
4. Siddiqui T., Tiwary U. S.. Natural language processing and Information retrieval, OUP, 2008

Course Outcomes:

1. Describe the fundamental concepts and techniques of natural language processing.
2. Verify the syntax of any sentences using parsing.
3. Apply proper method to perform semantic analysis of a sentence.
4. Analyze a sentence for discourse integration.
5. Apply appropriate method to analyse speech and related parameters of speech.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Cluster and Grid Computing**	Code:	**D000817(022)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. Understand how Grid computing helps in solving large scale scientific problems.
2. Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
3. Learn how to program the grid and the cloud.
4. Understand the security issues in the grid and the cloud environment.

UNIT I	**Introduction** Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards
UNIT II	**Grid Services** Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements –Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.
UNIT III	**Cluster Computing** Approaches to Parallel Computing, How to Achieve Low Cost Parallel Computing through Clusters, Definition and Architecture of a Cluster, What is the Functionality a Cluster can Offer? Categories of Clusters, Cluster Middle ware : Levels and Layers of Single System Image (SSI), Cluster Middleware Design Objectives, Resource Management and Scheduling, Cluster Programming Environment and Tools. Early Cluster Architectures, High Throughput Computing Clusters, Condor.
UNIT IV	**Programming Model** Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.
UNIT V	**Security** Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

Text Books

- Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

Reference Books:

1. Bart Jacob Michael Brown Kentaro Fukui Nihar Trivedi, "Introduction to Grid Computing", IBM Redbooks 1st edition.
2. Jason Venner, "Pro Hadoop- Build Scalable, Distributed Applications in the Cloud", APress, 2009
3. Tom White, "Hadoop The Definitive Guide", First Edition. O'Reilly, 2009
4. Bart Jacob (Editor), "Introduction to Grid Computing", IBM Red Books, Vervante, 2005
5. Ian Foster, Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", 2nd Edition, Morgan Kaufmann
6. Frederic Magoules and Jie Pan, "Introduction to Grid Computing" CRC Press, 2009
7. Daniel Minoli, "A Networking Approach to Grid Computing", John Wiley Publication,2005
8. Barry Wilkinson, "Grid Computing: Techniques and Applications", Chapman and Hall,CRC, Taylor and Francis Group, 2010

Course Outcomes:

At the end of the course, the student should be able to:

1. Apply grid computing techniques to solve large scale scientific problems.
2. Apply the concept of cluster computing.
3. Use the grid and cloud tool kits.
4. Apply the security models in the grid and the cloud environment.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Blockchain**	Code:	**D000818(022)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. The basics of cryptography used in Blockchain
2. Explain design principles of Blockchain.
3. Explain consensus algorithm used in distributed systems.
4. Explain the basic building blocks of Blockchain.
5. Explains the Blockchain system by sending and reading transactions.
6. Design, build, and deploy a distributed application.
7. Different real-life applications of Blockchain.

UNIT I	**Introduction to Blockchain:** Need for Distributed Record Keeping,Blockchain architecture, blockheader detailed design, Abstract Models for Blockchain, Proof of Work (PoW), liveness and fairness, Proof of Stake (PoS) based Chains, Hybrid models (PoW + PoS); Types of Blockchain..
UNIT II	**Blockchain Consensus:** Blockchain Consensus Algorithm challenges and solutions, Modeling faults and adversaries, Byzantine Models of Fault tolerance;Zero Knowledge proofs and protocols in Blockchain
UNIT III	**Introduction to cryptographic basics for cryptocurrency:** A short description of Hashing, digital signature schemes, encryption schemes and elliptic curve cryptography, verifiable random functions.
UNIT IV	**Blockchain 2.0:** Introduction to Ethereum, Ethereum Virtual Machine (EVM), Wallets for Ethereum, Solidity, Smart Contracts, Attacks on smart contracts, The Turing Completeness of Smart Contract Languages and verification challenges. Blockchain 3.0: Hyperledger implementation on Ethereum,the plug and play platform and mechanisms in permissioned blockchain.
UNIT V	**Application of Blockchain:** Bitcoin: Bitcoin consensus, Wallet, Bitcoin Blocks, Merkley Tree, hardness of mining, transaction verifiability, anonymity, forks, double spending, mathematical analysis of properties of Bitcoin. Altcoins. Medical record management systems.

Text Books

1. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guilde to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, 'Bitcoin and cryptocurrency technologies: a comprehensive introduction', Princeton University Press, 2016.
3. Kumar Saurabh, AshutoshSaxena, 'Blockchain Technology: Concepts and Applications', Wiley, 2020
4. Dr. Sumit Kumar Mishra, Dr. Siddhartha Choubey , Dr. P. John Augustine, Mr. Mrutyunjaya S Yalawar ,' BLOCKCHAIN TECHNOLOGY' SIPH 2022.

Course Outcomes:

At the end of the course, the student should be able to:

1. Understand the basic technology used in Blockchain
2. Understand the working principle of Blockchain systems (mainly Bit coin and Ethereum).
3. Able to understand and design any application specific consensus algorithm
4. Design, build and deploy Smart Contracts and distributed applications,
5. integrating the Blockchain technology into their own applications/ projects

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Data Compression**	Code:	**D000819(022)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. Student will understand the important issues in data compression.
2. Student will have knowledge of variety of data compression techniques.
3. Student will be able to apply techniques for compression of binary programmes, data, sound and image.
4. Student will learn techniques for modelling data and the issues relating to modelling.
5. Student will learn techniques for data analysis and synthesis.

UNIT I	**Information theoretic foundations:** Compression techniques, Modeling and coding, Mathematical preliminaries for lossless compression, Basic concepts of Information Theory, Algorithmic information theory, Minimum description length principle. Coding: uniquely decodable codes, Prefix codes.
UNIT II	**Lossless Coding:** Physical Models, Probability Models, Markov Models, Composite Source Model, Coding : Uniquely Decodable Codes, Prefix Codes, The Kraft-McMillan Inequality. Algorithmic Information Theory, Minimum Description Length Principle.Huffman Coding. Arithmetic Coding. Dictionary Techniques. Context-Based Compression.Lossless Image Compression.
UNIT III	**Lossy Coding:** Distortion Criteria, Conditional Entropy, Average Mutual Information, Differential Entropy, Rate Distortion Theory. Scalar Quantization. Vector Quantization. Differential Encoding.
UNIT IV	**Transforms, Subbands, and Wavelets:** Vector Spaces, Fourier Series, Fourier Transform, Linear Systems, Sampling, Discrete Fourier Transform, Z-Transform. Transform Coding. Subband Coding. Wavelet- Based Compression. Audio Coding.
UNIT V	**Analysis/Synthesis:** Speech Compression, Wideband Speech Compression, Fractal Compression, Video Compression, ITU-T Recommendation H.261, ITU-T Recommendation H.263, ITU-T Recommendation H.264, MPEG-4 Part 10, Advanced Video Coding, ATM Networks

Text Books

1. Sayood, Khalid, Introduction to Data Compression, 3rd Edition, Morgan Kaufmann, 2006
2. Anderson, J.B. and Mohan, S., Source and Channel Coding, Kluwer, 1991.

Reference Books:

1. Gersho, A. and Gray, R.M., Vector Quantization and Signal Compression, Kluwer, 1992.
2. Netravali, A.N., Digital Pictures, Representation and Compression, Plenum, 1989.
3. Rao, K.R. and Yip, P., Discrete Cosine Transform, Academic Press, 1990.

Course Outcomes:

At the end of the course, the student should be able to:

1. Understand the theoretical foundations of Data compression.
2. Understand the mathematical basis of Lossless coding.
3. Understand the mathematical basis of Lossy coding.
4. Understand the mathematical basis Transforms, Subbands and Wavelets.
5. Understand the foundations of Analysis and Synthesis.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Power Plant Engineering**	Code:	**D000820(025)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. Illustrate the working of Coal Based Thermal Power Plants.
2. Explain the Gas Turbine and Combined Cycle Power Plants.
3. Explain the functioning of Nuclear Power Plants.
4. Distinguish and classify Renewable Energy sources.
5. Evaluate related to plant economics, and propose pollution control techniques

UNIT I	**Coal Based Thermal Power Plants:** Layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam and heating rates, subsystems of thermal power plants, fuel and ash handling, draught system feed water treatment, binary cycles and cogeneration systems.
UNIT II	**Gas Turbine and Combined Cycle Power Plants:** Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.
UNIT III	**Nuclear Power Plants:** Basics of nuclear energy conversion, Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.
UNIT IV	**Renewable Energy system:**Power from Renewable Energy Hydroelectric power plants, classification, typical layout and components, principles of Wind, Tidal, Solar PV and Solar Thermal, Geothermal, Biogas and Fuel Cell power systems.
UNIT V	**Energy and Environmental impacts:**Energy, Economic and Environmental Issues of Power Plants Energy, economic and environmental issues, power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

Text Books

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. Tanmoy Deb 2017 , Electrical Power GenerationConventional and Renewable, Khanna Publication.
3. Elliot T.C., Cen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

Reference Books:

1. B.R. Gupta, G eneration of Electrical Energy,7th edn, S. Chand Publishing, 2017.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Utilization of Electrical Energy and Electric Traction**	Code:	**D000821(025)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

- This course provides an introduction to the principles of electrical drives and their applications.
- This course deals with the fundamentals of illumination and its classification.
- This course provides knowledge on electrical traction systems.

UNIT I	**ELECTRIC DRIVES:** Introduction concept of electric drives, Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent, and variable loads, load equalization.
UNIT II	**ELECTRIC HEATING, WELDING & ELECTROLYTIC PROCESS**: Advantages and methods of electric heating, resistance heating, induction heating, and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding. Principle, Faraday's laws of electrolysis, current efficiency, energy efficiency.
UNIT III	**ILLUMINATION:** Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Discharge lamps, MV and SV lamps comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.
UNIT IV	**ELECTRIC TRACTION – I** :System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking – plugging, rheostatic braking and regenerative braking. Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.
UNIT V	**ELECTRIC TRACTION – II** :Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion

Text Books

1. Utilization of Electrical Energy - by E. Opens haw Taylor, University Press.
2. Art & Science of Utilization of Electrical Energy - by H.Partab , 3rd Edition, Pritam Surat & Sons. 1980.

Reference Books:

1. Utilization of Electrical Power and Electric Traction – by J.B.Gupta, 10th Edition, S.K.Kataria& Sons, 2012.
2. Utilization of Electrical Power and Electric Traction - by G. C .Garg Khanna Publishers, 2004.

Course outcomes:

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading condition.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.

- To understand the basic principle of electric traction including speed– time curves of different traction services.
- To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Introduction to Micro-electromechanical systems (MEMS)**	Code:	**D000822(025)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

- Have a concept on the scope and development of advances in of microelectromechanical systems
- Gain knowledge about the fabrication process and design of MEMS devices.
- Gain knowledge about the MEMS sensors, actuators and their applications in real world.

UNIT I	**History of MEMS** Development, Intrinsic characteristics of MEMS- miniaturization- scaling laws, microelectric integration, Mass fabrication with precision., Applications of Microelectromechanical systems, MEMS Materials and their Properties.
UNIT II	**Microsystem fabrication processes:** Photolithography, Ion Implantation, Diffusion, Oxidation. Thin film depositions; Etching techniques: Dry and wet etching, electrochemical etching; Micromachining: Bulk Micromachining, Surface Micromachining,; LIGA process, Microelectronics fabrication process flow; Packaging.
UNIT III	**MEMS Sensors:** Electrostatic sensing and actuators; parallel plate capacitor and their applications, inter digitated finger capacitors; thermal sensors and applications: inertia sensor, infrared sensor; piezo resistive sensors and applications; Acoustic sensors, Vibratory gyroscope, Biomedical sensors and biosensors.
UNIT IV	**Microactuation:** Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals, Actuation using Electrostatic forces (Parallel plate, Torsion bar, Comb drive actuators), Micromechanical Motors and pumps, magnetic actuators. Case study: Comb drive actuators and their applications.
UNIT V	**Polymers in MEMS:** polymide-SU-8 liquid crystal polymer(LCP)-PDMS-PMMA-Parylene- Flurocorbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

Text Books

1. Foundations of MEMS, Chang Liu, Pearson International Edition, 2012
2. Mems & Microsystems Design & Manufacture, Tai–Ran Hsu, Tata Mcgraw Hill, 2002.
3. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhat, V. K. Aatre, Micro and Smart Systems, Wiley India, 2012.

Reference Books:

1. Gaberiel M.Rebiz, "RF MEMS Theory,Design and Technology", John Wiley & Sons,2003
2. Charles P.Poole, Frank J.Owens, "Introduction to nanotechnology" John Wiley & sons, 2003.
3. Julian W.Gardner, Vijay K Varadhan,, Osama O. Awadelkarim "Microsensors, MEMS and Smart devices", John Wiley & sons, 2001
4. S. E.Lyshevski, Nano-and Micro-Electromechanical systems: Fundamentals of Nano-and Micro engineering (Vol. 8). CRC press, (2005).

Course outcomes:

- Interpret the basics of micro electromechanical systems, MEMS materials including their applications.

- Analyze micro fabrication processes and describe the micro fabrication process flow..
- Analyze the performance aspects of electromechanical transducers including sensors and actuators
- Design and model MEMS device.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Management Concepts & Technique**	Code:	**D000823(076)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

- To develop skill of project planning and management amongst student.
- To understand the significance of human recourse and its proper utilization for the growth of organization.
- Students will learn to minimize the project cost by using effective management technique.

UNIT I	**Basic management and techniques:** Definition and nature of management, Function of management, nature, purpose and objectives of planning, organizing and staffing, authority and responsibility, controlling, process of controlling, control techniques. **Human resource management:** nature and scope of human resource planning, training and development, recruitment and selection, motivation and its types, need of motivation, reward and punishment, models of motivation, performance appraisal, leaders, types of leaders, leadership styles, roles and functions of leaders.
UNIT II	**Marketing management:** Marketing environment, customer markets and buyer behaviour, marketing mix, advertising and sales promotion, channels of distribution. **Financial management and accounting concepts:** book keeping, financial statements analysis, financial ratios, capital budgeting, and breakeven analysis.
UNIT III	**Production/operations management:** planning and design of production and operations systems, facilities planning, location, layout and movement of materials, materials management and inventory control, maintenance management, PERT and CPM.
UNIT IV	**Management information systems:** Role of information in decision making, information system planning, design and implementation, evaluation and effectiveness of the information system, statistical quality control, total quality management and ISO certificate.
UNIT V	**Social and ethical issues in management:** ethics in management, social factors, unfair and restrictive trade practices. Strategic and technology management: need, nature, scope and strategy SWOT analysis, value chain concept.

Text Books

1. Principles of Management by Ankur chhabra, sun india publications
2. Principles and practice of Management by L.M. Prasad
3. Human Resource Management by V.S.P Rao. 2nd Edition.

Reference Books:

1. Industrial engineering and production management, MartandTelsang, S. Chand
2. Management science, Ramchandra, TMH.
3. Management theory and practice, Chandan, Vikas Pbs

Course outcomes:

- Students can successfully design and execute project.
- Students will be capable of understanding the correlation between physical, market and human resources.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Operational Research**	Code:	**D000824(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. To introduce use quantative methods and techniques for effective decisions–making; model formulation and applications those are used in solving business decision problems.
2. To model decision making problems using major modeling formalisms of artificial intelligence and operations research, including propositional logic, constraints, linear programs and Markov processes,
3. To evaluate the computational performance of search, satisfaction, optimization and learning algorithms.
4. To apply search, satisfaction, optimization and learning algorithms to real world problems

UNIT I	**Linear Programming:** LP formulations, Graphical method for solving LP with 2 variables, Simplex method, Application of simplex method for maximization and minimization of LP problems, Artificial variable technique for finding the initial basic feasible solution, The Big-M method, Degeneracy in simplex method, Duality theory in LP, Dual simplex method.
UNIT II	**Transportation Model:** North – West comer rule, Least cost method, Vogel's Approximation method, Modi Method, Assignment problem, Dynamic Programming: Basic concepts, Bellman's optimality principle, Dynamic programming approach in decision making, Optimal subdivision problem.
UNIT III	**Inventory Model:** Introduction to the inventory problem, Deterministic models, The classical EOQ (Economic order quantity) model, Purchasing model with no shortage, Manufacturing model with no shortage, purchasing model with shortage, Manufacturing model with shortage, Inventory models with probabilistic demand.
UNIT IV	**Sequencing and Queuing Theory:** Sequencing problem, Johnson's algorithm for processing N-jobs through 2 machine problem, N-jobs through 3 machine problem, 2- job through N machine by graphical method, Characteristics of queuing system- steady state M/M/1, M/M/1K and M/M/C queuing models.
UNIT V	**CPM and PERT:** Arrow network, Time estimates – Earliest expected time, Latest allowable occurrence time and slack, Critical path, Probability of meeting scheduled date of completion of project, Calculation on CPM network, Various floats for activities, Critical Path, Updating project, Operation time cost trade off curve & project time cost trade off curve, selection of schedule based on cost analysis.

Text Books

1. . Operation Research, Panneerselvam, Prentice Hall of India
2. Operation Research: An Introduction - Hamdy a. Taha, Prentice Hall of India

Reference Books:

1. 1. Gillett B.E, Introduction to Operation Research- A Computer Oriented algorithmic approach, Mc Graw Hill.
2. Kanti Swarup, Gupta. P.K.,Man Mohan, Operations Research, Sultan Chand & Sons.
3. Vohra N.D., Quantitative Techniques in Managemental, T.M.H.
4. Zoints. S.,Linear & Integer Programming, Prentice Hall

Course outcomes:

1. Identify and develop operational research models from the verbal description of the real system.
2. Understand the mathematical tools that are needed to solve optimization problems.
3. Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Android Apps Development**	Code:	**D000825(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. learn the set up and installation of Android
2. learn Android App development
3. learn user interfaces and Controls.

UNIT I	**Installation and Setup on Android :**Environment Setup – Installation & Setup of SDK tools on Windows; Installing platforms and samples; Creating an Android Virtual Device (emulator); Installing Eclipse on a Windows machine; Installing the Android Development Tools; Preparing an Android device for development.
UNIT II	**Android App Development :** Overview of Android development; Understanding project creation and structure; Working with the AndroidManifest.xml file; Creating and managing activities; Using explicit intents; Using implicit intents; Creating and using resources; Understanding security and permissions; Debugging an app.
UNIT III	**User interface and Controls :** Understanding units and layout; Using layout managers; Working with text controls; Building button controls; Building list controls; Building custom list layouts; Other interesting controls.
UNIT IV	**Graphics and Animation :** Creating and using styles; Creating and using themes ; Creating icons; Creating NinePatch drawables, Setting up frame-by-frame animation; Showing tween animation; Working in 2D graphics.
UNIT V	**Supporting Multiple Screens :** Understanding screen size and density; Providing alternate layouts

Text Books

1. Mobile Apps for Android (IBM ICE).

Reference Books:

1. David Tainar – Mobile Computing: Concepts Methodologies, Tools & Applications.
2. Barbara L Ciaramtaro – Mobile technology consumption.

Course outcomes:

1. gain knowledge of set up and installation of Android
2. gain App development knowledge
3. gain knowledge of user interfaces on Mobile Apps.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Digital Switching & Multiplexing**	Code:	**D000826(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. To understand the knowledge of telecommunication networks and its different services.
2. To analyze and evaluate fundamental telecommunication traffic models, packet switching• services and statistical time division multiplexing.
3. To describe the characteristics of the telephone systems and make use of the parameters • in designing telephone switches.
4. To describe the performance of a digital telephone switch.
5. To evaluate integrated broadband access using telecommunications systems and SONET• multiplexing..

UNIT I	**Introduction:** Evolution of telecommunication, basics of switching system, step-by-step switching, design considerations. Principles of crossbar switching, electronic space division switching, stored program control, software architecture, switching functions.
UNIT II	**Digital Transmission:** Frequency division multiplexing, time division multiplexing, statistical division multiplexing, switching hierarchy, synchronous digital hierarchy both USA and European standards. Message switching, circuit switching and packet switching, space division switching, time division switching. Two dimensional switching, grade of service, non-blocking, digital cross connect, concentrators, expanders and distributors, two stage networks, three stage networks, n-stage networks.
UNIT III	**Time Division Switching:** Time division space switching, time division time switching, time multiplexed space switching. Time multiplexed time switching, space-time combination switching, three stage combination switching, n-stage combination switching, signaling techniques.
UNIT IV	**Telecommunication Traffic:** Units of traffic, network traffic load and parameters, grade of service and blocking probability, traffic measurement, mathematical model, incoming traffic and service time characteristics, blocking models and loss estimates, delay systems. Digital subscriber access– ISDN, high data rate digital subscriber loops, digital loop carrier systems, fibre in the loop, voice band modems, digital satellite services, broadband switching systems.
UNIT V	**Network Synchronization Control and Management:** Timing, timing inaccuracies, network synchronization, network control and management. SONET/SDH – SONET multiplexing overview, frame formats, operation, administration and maintenance, frequency justification and payload framing, virtual tributes, DS3 payload mapping, E4 payload mapping, SONET optical standards, SONET rings and networks.

Text Books

1. Viswanathan, Thiagarajan, Bhatnagar, Manav, Telecommunication Switching Systems and Networks, 2/e, Prentice Hall of India, 2015.
2. John C. Bellamy, Digital Telephony, 3/e, Wiley Student Edition, 1999

Reference Books:

1. J E Flood, Telecommunications Switching, Traffic and Networks, Pearson Education, 2004.
2. Gokhale, Introduction to Telecommunications, 2/e, Cengage Learning, 20
3. Robert G. Winch, Telecommunication Transmission Systems, 2/e, Tata McGraw Hill, 2004.

Course outcomes:

1. Understand the characteristics of the telephone systems, network synchronization and management.
2. Explain telephone transmission systems, evaluate PSTN and electromechanical switching system.
3. Evaluate fiber based wide area networks, model and estimate the telecom traffic.
4. Design and test telecom switching systems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Optimization Techniques**	Code:	**D000827(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. The basic concepts of Optimization.
2. The emphasis of this course is on different classical Optimization techniques linear programming and simplex algorithms.
3. About optimality of balanced transportation Problems.
4. About Constrained and unconstrained nonlinear programming.
5. About principle of optimality and dynamic programming.

UNIT I	**Introduction and Classical Optimization Techniques:** Statement of an Optimization problem – design vector – design constraints – constraint 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 – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions – Numerical examples.
UNIT II	**Linear Programming :** Standard form of a 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 – Numerical examples.
UNIT III	**Nonlinear Programming** – One Dimensional Minimization methods Introduction, Unimodal function, Elimination methods- Unrestricted Search, Exhaustive Search, Dichotomous Search, Fibonacci Method, Golden Section Method and their comparison; Interpolation methods - Quadratic Interpolation Method, Cubic Interpolation Method and Direct Root Methods – Numerical examples.
UNIT IV	**Unconstrained & Constrained Nonlinear Programming** **Unconstrained Optimization Techniques:** Introduction- Classification of Unconstrained Minimization Methods, General Approach, Rate of Convergence, Scaling of Design Variables; Direct Search methods- Random Search Methods, Grid Search Method, Pattern Directions, Powell's Method and Simplex Method **Constrained Optimization Techniques:** Introduction, Characteristics of a Constrained Problem, Direct Search Methods - Random Search Methods, Basic Approach in the Methods of Feasible Directions, Rosen's Gradient Projection Method, Generalized Reduced Gradient Method and Sequential Quadratic Programming.
UNIT V	**Dynamic Programming** Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution – Numerical examples.

Text Books

1. S. S. Rao, "Engineering optimization": Theory and practice 3rd edition, New Age International (P) Limited, 1998.
2. H.S. Kasana & K.D. Kumar, "Introductory Operations Research Springer (India)", 2004

Reference Books:

1. R Fletcher, "Practical Methods of Optimization" , 2 nd Edition, Wiley Publishers, 2000.
2. Jorge Nocedal and Wright S, "Numerical Optimization Springer", 1st Edition, 1999.
3. by K.V. Mital and C. Mohan, "Optimization Methods in Operations Research and systems Analysis" 3 rd Edition, New Age International (P) Limited, 1996.
4. by S.D. Sharma, "Operations Research", Kedar Nath, 2012.
5. by H.A. Taha, "Operations Research", 9 th Edition, An Introduction Pearson, 2010.
6. G. Hadley, "Linear Programming", Narosa, 2002..

Course outcomes:

1. Basic methods, principles in optimization
2. Formulation of optimization models, solution methods in optimization
3. Finding initial basic feasible solutions.
4. Methods of linear and non-linear (constrained and unconstrained) programming.
5. Applications to engineering problems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Business Intelligence**	Code:	**D000828(033)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. Expose with the basic rudiments of business intelligence system
2. Understand the modeling aspects behind Business Intelligence
3. Understand of the business intelligence life cycle and the techniques used in it
4. Exposed with different data analysis tools and techniques

UNIT I	**Introduction to Business Intelligence:** BI concept, BI architecture, BI in today's perspective, BI Process, Applications of BI like Financial analysis, statistical analysis, sales analysis, CRM, result pattern and ranking analysis, Balanced Scorecard, BI in Decision Modelling: Optimization, Decision making under uncertainty. Ethics and business intelligence.
UNIT II	**Data Science:** The concept, process and typical tools in data science. Example of different algorithms i.e segmentation, classification, validation, regressions, recommendations. Exercises using Excel and R to work on histograms, regression, clustering and text analysis. Correlation between Algorithm and Code in data science
UNIT III	**Data Visualization and Dashboard Design, Performance Dashboard:** Responsibilities of BI analysts by focusing on creating data visualizations and dashboards. Importance of data visualization, types of basic and composite charts. Measuring, Monitoring and management of Business, KPIs and dashboard, the types of dashboards, the common characteristics of Enterprise dashboard, design of enterprise dashboards, and the common pitfalls of dashboard design.
UNIT IV	**Modelling and Analysis:** Exploring Excel Modeling capabilities to solve business problems, summarize and present selected data, introduction to business metrics and KPIs, creating cubes using Microsoft Excel.
UNIT V	**Future of Business Intelligence:** Emerging Technologies, Machine Learning, Predicting the Future with the help of Data Analysis, BI Search & Text Analytics – Advanced Visualization – Rich Report, and Future beyond Technology.

Text Books

1. R. N. Prasad, Seema Acharya , "Fundamentals of Business Analytics", ISBN: 978-81-256-3203-2, Wiley-India, January 2011.
2. Wolfgang Jank , "Business Analytics for managers", ISBN-13 : 978-1461404057, Springer; August 2011.
3. Jeffrey Camm, James Cochran, Jeffrey Ohlmann, David Anderson, Dennis Sweeney, Thomas Williams. Michael Fry, "Essentials of Business Analytics", ISBN-13 : 978-1305627734, South-Western College Publishing; 2nd edition, February 2016

Reference Books:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, Pearson, 9th Edition, 2011.
2. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Manager‟s Guide”, Second Edition, 2012.
3. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2003
4. Carlo Vercellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley Publications, 2009.
5. Ralph Kimball, Margy Ross , The Kimball Group Reader: Relentlessly Practical Tools for Data Warehousing and Business Intelligence, Wiley Publications, 2010

Course outcomes:

1. Explain the fundamental concepts, processes of business intelligence.
2. Link data science with business intelligence and apply data science practices and methodologies to visualize information from raw data.
3. Implement BI techniques by using various tools and Create data visualization.
4. Describe various techniques for descriptive, predictive and prescriptive analytics and apply business intelligence methods
5. Apply various modeling techniques to solve real-world data analysis problems to various situations.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Game Theory**	Code:	**D000829(033)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. To applying game theory in a diverse set of situations.
2. To understanding and analysing problems in disciplines such as economics, business and political science etc.

UNIT I	Introduction to combinatorial games, the game of Nim, sums of games. Equivalent games, sums of Nim heaps, Poker Nim and the mex rule, equivalence of combinatorial games to Nim, finding Nim values.
UNIT II	A quick tour of game theory, games as trees and in strategic form, backward induction, reduced strategies. Nash Equilibrium, subgame perfect Nash Equilibrium, examples: The Threat Game, The Prisoner's Dilemma, Matching Pennies, Rock-Paper-Scissors.
UNIT III	Mixed strategy Nash equilibria. Inspection games, bimatrix game payoffs, best response condition, the "difference trick", the upper envelope method, degenerate games. Mixed strategy Nash equilibria continued. Brouwer's fixed point theorem, proof of existence of Nash equilibria, finding mixed equilibria, zero-sum games, the minimax theorem.
UNIT IV	Geometric representation of equilibria, Lemke-Howson algorithm for efficient calculation of equilibria, odd number of Nash equilibria. Game trees with imperfect information. Information sets, perfect recall, behavior strategies, Kuhn's Theorem, subgames and subgame perfect equilibria, signally games. Bargaining. Bargaining sets and bargaining axioms, the Nash bargaining solution, splitting the UNIT pie, the ultimatum game and stationary strategies, relation between the Nash bargaining solution and the ultimatum game.
UNIT V	Coalitional games with transferable utility. Definition, examples: simple games, weighted majority games. Solution concepts, imputations, the core. The Bondareva-Shapley Theorem, market games, the Shapley value.

Text Books

1. B. von Stengel, Game Theory Basics
2. M. Maschler, E. Solan and S. Zamir: Game Theory, CUP, 2013

Reference Books:

1. K. Binmore, Playing for Real: Game Theory CUP, 2007
2. E. Mendelson, Introducing Game Theory and Its Applications, CRC 2004.
3. M. J. Osborne and A. Rubinstein, A Course in Game Theory, MIT press, 1994
4.

Course outcomes:

1. Understand the working of combinatorial games
2. Understand the fundaments of game Theory
3. Design strategy for game playing
4. Represent equilibrium conditions in game playing
5. Differentiate various games with their working

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Optimization Design and Techniques**	Code:	**D000830(033)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. Understand the overview of optimization techniques, concepts of design space, constraint surfaces and objective function.
2. Review differential calculus in finding the maxima and minima of functions of several variables.

UNIT I	**Introduction:** Statement of an Optimization problem , design vector , design constraints , constraint surface , objective function , objective function surfaces , classification of Optimization problems. **Classical Optimization Techniques:** Single variable Optimization, Multi variable Optimization with and without constraints, Multivariable Optimization with equality constraints , solution by method of Lagrange multipliers, Multivariable Optimization with inequality constraints , Kuhn – Tucker conditions.
UNIT II	**Linear Programming:** Various definitions, statements of basic theorems and properties, Advantages, Limitations and Application areas of Linear Programming, Graphical method of Linear Programming problem. **Simplex Method: Phase** I and Phase II of the Simplex Method, The Revised Simplex method, Primal and Dual Simplex Method, Big –M method.
UNIT III	**Transportation Problem:** Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method , testing for optimality of balanced transportation problems. (Including assignment and travelling salesman problems) (No degeneracy problems) **Queuing Models :** Essential features of queuing systems, operating characteristics of queuing system, probability distribution in queuing systems, classification of queuing models, solution of queuing M/M/1 : ¥ /FCFS,M/M/1 : N/FCFS, M/M/C : ¥/FCFS, M/M/C : N/FCFS.
UNIT IV	**Dynamic Programming: Dynamic** programming multistage decision processes , types , concept of sub optimization and the principle of optimality , computational procedure in dynamic programming , examples illustrating the calculus method of solution , examples illustrating the tabular method of solution. **Integer Programming:** Pure and mixed integer programming problems, Solution of Integer programming problems , Gomory's all integer cutting plane method and mixed integer method, branch and bound method, Zero-one programming.
UNIT V	**Simulation Modeling:** Introduction, Definition and types, Limitations, Various phases of modeling, Monte Carlo method, Applications, advantages and limitations of simulation

Text Books

1. Engineering optimization: Theory and practice"-by S.S.Rao, New Age International (P) Limited.
2. Operations Research: An Introduction" by H A Taha, 5th Edition, Macmillan, New York.

3. Operations Research by NVR Naidu, G Rajendra, T Krishna Rao, I K International Publishing house, New Delhi.

Reference Books:

1. Optimization Methods in Operations Research and systems Analysis" – by K.V. Mittal and C. Mohan, New Age, International (P) Limited, Publishers
2. Operations Research – by S.D.Sharma, Kedarnath Ramanath & Co
3. Linear programming, G. Hadley, Narosa Publishing House, New Delhi.
4. Industrial Engineering and Production Management, M. Mahajan, Dhanpat Rai& co

Course outcomes:

1. Formulate real-life problems with Linear Programming.
2. Solve the Linear Programming models using graphical and simplex methods.
3. Formulate real-life transportation, assignment and travelling salesman problems to find the optimum solution using transportation algorithms
4. Analyze the Queuing model for effective customer satisfaction
5. Apply dynamic programming to optimize multi stage decision problems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Software Metrics and Quality Assurance**	Code:	**D000831(033)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

1. To gain basic knowledge about metrics, measurement theory and related terminologies
2. To introduce the basics of software reliability and to illustrate how to perform planning, executing and testing for software reliability
3. To explore various metrics and models of software reliability
4. To compare various models of software reliability based on its application

UNIT I	**What Is Software Quality:** Quality Popular Views, Quality Professional Views, Software Quality, Total Quality Management, and Summary. Fundamentals Of Measurement Theory: Definition, Operational Definition, And Measurement, Level Of Measurement, Some Basic Measures, Reliability And Validity, Measurement Errors, Be Careful With Correlation, Criteria For Causality, Summary. Software Quality Metrics Overview: Product Quality Metrics, In Process Quality Metrics, Metrics for Software Maintenance, Examples for Metrics Programs, Collecting software Engineering Data.
UNIT II	**Applying The Seven Basic Quality Tools In Software Development:** Ishikawa's Seven Basic Tools, Checklist, Pareo Diagram, Histogram, Run Charts, Scatter Diagram, Control Chart, Cause, and Effect Diagram. The Rayleigh Model: Reliability Models, the Rayleigh Model Basic Assumptions, Implementation, Reliability and Predictive Validity.
UNIT III	**Complexity Metrics and Models:** Lines of Code, Halstead's Software Science, Cyclomatic Complexity Syntactic Metrics, An Example of Module Design Metrics in Practice .Metric And Lessons Learned for Object Oriented Projects: Object Oriented Concepts And Constructs, Design And Complexity Metrics, Productivity Metrics, Quality And Quality Management Metrics, Lessons Learned For object oriented Projects.
UNIT IV	**Availability Metrics:** Definition and Measurement of System Availability, Reliability Availability and Defect Rate, Collecting Customer Outage Data For Quality Improvement, In Process Metrics For Outage And Availability. Conducting Software Project Assessment: Audit Ad Assessment, Software Process Maturity Assessment And Software Project Assessment, Software Process Assessment A Proposed Software Project Assessment Method.
UNIT V	**Dos And Don'ts Of Software Process Improvement :**Measuring Process Maturity, Measuring Process Capability, Staged Versus Continuous Debating Religion, Measuring Levels Is Not Enough, Establishing The Alignment Principle ,Take Time Getting Faster, Keep it Simple Or Face DE complexification, Measuring The Value Of Process Improvement ,Measuring Process Compliance , Celebrate The Journey Not Just The Destination. Using Function Point Metrics to Measure Software Process Improvement: Software Process Improvement Sequences, Process Improvement Economies, Measuring Process Improvement a Activity Levels.

Text Books

1. Norman E-Fentor and Share Lawrence Pflieger.” Software Metrics”. International Thomson Computer Press, 1997.
2. Stephen H Khan: Metrics and Models in Software Quality Engineering, Pearson 2nd edition 2013.

2.

Reference Books:

1. S.A. Kelkar, “Software quality and Testing, PHI Learning, Pvt., Ltd., New Delhi 2012.
2. Watts S Humphrey, “Managing the Software Process”, Pearson Education Inc, 2008.
3. Mary Beth Chrissis, Mike Konrad and Sandy Shrum, “CMMI”, Pearson Education (Singapore) Pvt. Ltd., 2003
4. Philip B Crosby, " Quality is Free: The Art of Making Quality Certain ", Mass Market, 1992

Course outcomes:

1. Identify and apply various software metrics, which determines the quality level of software
2. Identify and evaluate the quality level of internal and external attributes of the software product
3. Compare and Pick out the right reliability model for evaluating the software
4. Evaluate the reliability of any given software product
5. Design new metrics and reliability models for evaluating the quality level of the software based on the requirement.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Energy Management & Audit**	Code:	**D000833(037)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

To impart knowledge on sources of energy, energy utilization and energy conversion system, energy balance, energy action planning, energy audit, economics and finance.

UNIT I	**Energy Sources** Introduction, Sources of energy – conventional and non-conventional, elasticity of demand and application, concepts to energy, Indian energy scene, energy storage, solar energy, water, battery and mechanical storage Systems.
UNIT II	**Energy Utilization and Conversion System** Classification of furnaces, controlled atmosphere in furnaces, furnace fuels, efficient use of energy in furnaces, thermal efficiency, reducing heat losses. **Combined Power and Heating System** Characteristics of prime movers, heat and Power requirements, economics of a CHP System.
UNIT III	**Material and Energy balance** Facility as an energy system, methods for preparing process flow, material and energy balance diagrams. **Energy Action Planning** Key elements, force field analysis, energy policy purpose, perspective, contents, formulation, ratification, organizing –location of energy management, top management support, managerial function, roles and responsibilities of energy manager, accountability, motivation, Information system – design barriers, strategies, marketing and communicating-training and planning.
UNIT IV	**Energy Audit** Energy Management information system, thirty nine steps for energy management, types of energy audit, preliminary energy audits, and technical assistance in energy audit, energy accounting and analysis, Instruments used in Energy auditing.
UNIT V	**Economics and Finance** Introduction, economics, discounted cash flow, loans, investments, option identification and analysis, optimization, conflict correction, constructing the optimal target investment schedule, project management, monitoring against the target financial schedule.

Text Books

1. Engineering Economics & Engineering Management – R. Raju – Anuradha Agencies.
2. Energy Engineering & Management - Chakrabarti – PHI, Delhi

Reference Books:

1. Energy Management – W.R. Murphy, G. Mckay – Elesvier, Gudgaon.
2. Energy Management – Paul O'Callaghan – McGraw Hill – New Delhi.
3. Principles of Energy Conversion – Archie W. Culp — McGraw Hill,Delhi.
4. Energy Management in illuminating System – Kao Chen – CRC Publishers.

5. Industrial Energy Recovery - D.A. Reay – Wiley Publishers.
6. Thermal Energy Recovery – T.L. Boyer – Wiley Publishers.
7. Energy Conservation through Control – E.G. Shinskey – Academic Press.
8. Economics of Solar Energy & Conservation Systems, Vol-I & II – F. Kreith & R.E. West – CRC Press

Course outcomes:

1. Describe sources of energy and energy storage systems.
2. Describe energy utilization and energy conversion system.
3. Explain material and energy balance and describe energy action planning**.**
4. Demonstrate the significance of energy audit, types of instruments required for energy audit and procedure to conduct energy audit.
5. Apply different methods used for the economic analysis of energy projects.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Cyber Security and Information Security**	Code:	**D000834(033)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives: The student should be made to:

The main objective of the course is to introduce students to cyber security concepts and techniques and foster their abilities in designing and implementing solutions for real-world problems.

UNIT I	**Security Policies and Management:** Security Policy Design, Designing Security Procedures, Risk Assessment Techniques, Security standards. Security Models - Biba Model, Chinese Wall, Bell La Pedula Model, Physical and Environmental Security, Server Room Design, Firefighting equipment, Temperature/humidity Control etc
UNIT II	**Application Security:** Databases, Email and Internet etc, Communications and Operations Management: Network Architecture, Network Operations Security Devices (Firewalls, IDS/IPS, Antivirusetc), Routers/Switches.
UNIT III	**Business Continuity Planning and Management:** Business Impact Analysis, Business Continuity/Disaster Recovery Plans, Access Control - Logical and physical access Control
UNIT IV	**Software Development, Maintenance and Support:** Security in development methodology, Security testing, Segregation of duties
UNIT V	**Cyber Forensics:** Introduction to forensic tools, Evaluation of crime scene and evidence collection, Usage of tools for disk imaging and recovery processes. Introduction to Information Security Standards - ISO 27001, PCI DSS .Compliance - IT Act, Copy Right Act, Patents etc

Text Books

1. Security Engineering: A Guide to Building Dependable Distributed Systems - Ross J. Anderson - John Wiley, New York.
2. Computer Security: Art and Science - Matt Bishop - Addison Wesley, Boston, MA

Reference Books:

Online Textbook Materials www.securityplusolc.com

Course outcomes:

1. Demonstrate an understanding of security policies and management
2. Demonstrate a basic understanding of application security
3. Demonstrate an understanding of business continuity planning and management
4. Demonstrate an understanding of software development, maintenance and support
5. Demonstrate an understanding of cyber forensics.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Nanotechnology**	Code:	**D000835(067)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

UNIT I	**Introduction to nanotechnology:** background, definition , basic ideas about atoms and molecules, physics of solid state, review of properties of matter and quantum mechanics
UNIT II	**Preparation of Nano structured Materials :** Lithography : nano scale lithography, E-beam lithography, dip pen lithography, nano sphere lithography. Sol gel technique Molecular synthesis, Self-assembly, Polymerization
UNIT III	**Characterization of Nano structured materials :** Microscopy: TEM, SEM, SPM techniques, confocal scanning microscopy,, Raman microscopy-Basic principles, applicability and practice to colloidal, macromolecular and thin film systems. Sample preparation and artifacts. Polymer fractionation techniques: SEC, FFF, Gel electrophoresis.: Basic theory, principles and practice. **Thermal analysis:** Basic principles, theory and practice. Micro DSC in the study of phase behavior and conformational change. **Mass spectrometry of polymers:** MALDI TOF MS – Basic theory, principles and practice. Applicability to proteins, polyethers, controlled architecture systems
UNIT IV	**Cross-cutting Areas of Application of Nanotechnology :** Energy storage, Production and Conversion. Agriculture productivity enhancement Water treatment and remediation. Disease diagnosis and screening. Drug delivery systems. Food processing and storage. Air pollution and remediation. Construction. Health monitoring..Vector and pest detection, and control. Biomedical applications. Molecular electronics. Nanophotonics. Emerging trends in applications of nanotechnology
UNIT V	**Industrial Implications of Nanotechnology :** Development of carbon nanotube based composites. Nanocrystalline silver Antistatic conductive coatings. Nanometric powders. Sintered ceramics. Nanoparticle ZnO and TiO2 for sun barrier products. Quantum dots for biomarkers. Sensors. Molecular electronics. Other significant implications

Text Books

1. Guozhong Cao, "Nanostructures and Nanomaterials", Imperial College Press, London
2. Mark Ratner and Daniel Ratner, "A Gentle Introduction to Next Big Thing", Pearson Education 2005

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Supply Chain Management**	Code:	**D000836(022)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objective

The objective of this module is to provide the participants with a good knowledge on supply chain management and how these topics can be related with the organization and their business needs.

UNIT I	**FUNDAMENTALS OF SUPPLY CHAIN MANAGEMENT** Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.
UNIT II	**SCM STRATEGIES, PERFORMANCE** Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.
UNIT III	**PLANNING AND MANAGING INVENTORIES** Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models**.**
UNIT IV	**DISTRIBUTION MANAGEMENT** Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning,
UNIT V	**STRATEGIC COST MANAGEMENT IN SUPPLY CHAIN** The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

Text Books

1. David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi Designing and Managing the Supply Chain: Concepts,Strategies, and Case Studies, Second Edition, , McGraw-Hill/Irwin, New York, 2003. 31
2. Sunil Chopra and Peter Meindel. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India,2002.
3. Sunil Chopra & Peter Meindl, Supply Chain Management , Prentice Hall Publisher, 2001
4. Robert Handfield & Ernest Nichols, Introduction to Supply Chain Management , Prentice hall Publishers, 1999.

Course outcomes:

On completion of this program student will know how the Supply chain management is essential to company success and customer satisfaction and also how SCM knowledge and capabilities can be used to support medical missions, conduct disaster relief operations, and handle other types of emergencies. SCM also plays a role in cultural evolution and helps improve our quality of life.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Electrical Estimation and Costing**	Code:	**D000837(024)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objective

1. To give exposure to basic concepts estimating and costing.
2. To impart knowledge about material requirements for various Electrical installations.
3. To provide guidelines for preparation of Electrical drawings for residential and commercialbuildings, , distribution substation, grid substation, overhead Lines

UNIT I	**Principles of Estimation and Residential Building Electrification** Introduction to estimation and costing, Electrical Schedule. Determination of cost materialand labor Contingencies. Overhead charges. General Rules guidelines for wiring of residential installation and positioning of equipments**,** Principles of circuit design in lighting and power circuits. Procedures for designing the circuits and deciding the number of circuits, Method of drawing single line diagram. Selection of type of wiring and rating of wires and cables Load calculations and selection of size of conductor, Selection of rating of main switch Distribution board, protective switchgear and wiring accessories, Preparation of detailed estimates and costing of residentialinstallation.
UNIT II	**Electrification of Commercial Installation** Design considerations of electrical installation system for commercial building, Load calculation and selection of size of service connection and nature of supply, Deciding the size of the cables, bus bar and bus bar chambers, Mounting arrangements and positioning of switchboards, distribution boards main switch etc, Earthing of the electrical installation,Selection of type wire, wiring system and layout, Preparation of detailed estimate and costing of commercial installation.
UNIT III	**Service Connection, Power Circuits, Inspection and Testing of Installation** Concept of service connection, Types of service connection and their features, Method of installation of service connection, Estimates of underground and overhead service connections, Inspection of internal wiring installations, Inspection of new installations,testing of installations, testing of wiring installations, Important considerations regarding motor installation wiring, Determination of rating of cables Determination of rating of fuse, Determination of size of Conduit, distribution Board main switch and starter.

UNIT IV	**Design of Overhead Transmission and Distribution Lines** Introduction, Typical AC electrical LT system, Main components of overhead lines, Line supports. Factors governing height of pole, Conductor materials, Cross arms, Pole brackets and clamps, Guys and Stays, Conductors configuration spacing and clearances, Conductors configuration spacing and clearances, Span lengths, Overhead line insulators, Insulator materials, Types of insulators, Lightning Arrestors, accessories, Erection of supports, setting of stays, Fixing of cross arms, Fixing of insulators, Conductor erection, Repairing and jointing of conductor, Dead end clamps, Positioning of conductors and attachment to insulators Jumpers, Tee-offs, Earthing of transmission lines. Guarding of overhead lines, Clearances of conductor from ground Spacing between conductors.
UNIT V	**Design and Estimation of Substation** Introduction, Classification of substation, Indoor substations, Outdoor substations, Selection and location of site for substation, Main Electrical Connections, Graphical symbols for various types of apparatus and circuit elements on substation main connection diagram. Key diagram of typical substations. Equipment for substation and switchgear installations, Substation auxiliaries supply, Substation Earthing

Text Books

1. Electrical Installation Estimating & Costing, J.B.Gupta,VIII Edition S.K.Katria & Sons NewDelhi.
2. Electrical Design Estimating and Costing, K.B.Raina S.K.Bhattacharya, New Age

Reference Books:

1. Electrical Wiring Estimating and Costing, S.L.Uppal, G.C Garg, Khanna Publishers

Course outcomes:

1. Explain general principles of estimation & residential building electrification
2. Preparation of detailed estimates and costing of residential and commercial installation.
3. Design and estimate of overhead transmission & distribution lines, Substations.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Data mining and warehousing**	Code:	**D000838(022)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objective

To understand the overall architecture of a data warehouse.

- The different data mining models and techniques will be discussed in this course.
- Evaluate different models used for OLAP and data pre-processing;
- Design and implement systems for data mining and evaluate the performance of different data mining algorithms;
- Propose data mining solutions for different applications.
- Differentiate Online Transaction Processing and Online Analytical processing

UNIT I	**Overview and Concepts**: Need for data warehousing, basic elements of data warehousing, Trends in data ware housing. Planning and Requirements: Project planning and management, Collecting the requirements. Architecture And Infrastructure: Architectural components, Infrastructure and metadata.
UNIT II	**Data Design And Data Representation**: Principles of dimensional modeling, Dimensional modeling advanced topics, data extraction, transformation and loading, data quality.
UNIT III	**Information Access and Delivery**: Matching information to classes of users, OLAP in data warehouse, Data warehousing and the web. Implementation And Maintenance: Physical design process, data warehouse deployment, growth and maintenance.
UNIT IV	**Data Mining:** Introduction: Basics of data mining, related concepts, Data mining techniques Data Mining Algorithms: Classification, Clustering, Association rules. Knowledge Discovery: KDD Process.
UNIT V	**Web Mining**: Web Content Mining, Web Structure Mining, Web Usage mining. Advanced Topics: Spatial mining, Temporal mining. Visualization : Data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, Mining class comparisons: Discriminating between different classes, Mining descriptive statistical measures in large databases Data Mining Primitives, Languages, and System Architectures: Data mining Primitives, Query language, Designing GUI based on a data mining query language, Architectures of data mining systems Application and Trends in Data Mining: Applications, Systems products and research prototypes, Additional themes in data mining, Trends in data mining

Text Books

1. Data warehousing- concepts, Techniques, Products and Applications by Prabhu, Prentice hall of India

2. Insight into Data Mining: Theory & Practice by Soman K P, Prentice hall of India.

3. Data Mining Introductory and Advanced Topics by M.H. Dunham, Pearson Education

Reference Books:

1. Data Warehousing Fundamentals by Paulraj Ponniah, John Wiley.

2. Introduction to Data mining with Case Studies by Gupta, PHI.

3. The Data Warehouse Lifecycle toolkit by Ralph Kimball, John Wiley.

4. Introduction to Building the Data warehouse, IBM, PHI.

Course outcomes:

- Design a data warehouse for an organization
- Develop skills to write queries using DMQL
- Extract knowledge using data mining techniques
- Adapt to new data mining tools.
- Explore recent trends in data mining such as web mining, spatial-temporal mining.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Industrial Safety Engineering**	Code:	**D000839(095)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives

- To Know safety philosophy and principles of accident prevention
- To know the safety rules, regulations, standards and codes
- To achieve an understanding of principles of safety management.
- To learn about various functions and activities of safety department.
- To study various mechanical machines and their safety importance

UNIT I	**Industrial Safety:** Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.
UNIT II	**Fundamentals Of Maintenance Engineering:** Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.
UNIT III	**Wear And Corrosion And Their Prevention:** Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, Corrosion prevention methods.
UNIT IV	**Fault Tracing:** Fault tracing-concept and importance, decision tree concept, need and applications, sequence of faultfinding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.
UNIT V	**Periodic And Preventive Maintenance:** Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: i. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

Text Books

1. Nagpal, D.R., Electrical safety, S.P.I., Delhi (2007)
2. Kulkarni, K.T., Industrial safety: Concepts and practice, Pune (2012)
3. Bhattacharjee, S.K., Safety Management in Construction, Khanna Pub. New Delhi (2014)
4. Ray, Siddhartha, Maintenance engineering,New age, New Delhi(2017)
5. Eckman, Donald P., Industrial instrumentation,CBS, New Delhi (2004) Sundram, K. Shanmuga, Hydraulic and pneumatic controls, S. Chand, New Delhi (2016)

Reference Books:

1. Joseph E. Bowles, Foundation analysis and design, Mcgraw hill (2016)
2. Sundram, K. Shanmuga, Hydraulic and pneumatic controls, S. Chand, New Delhi (2016)
3. Nakra, B.C. &Chaudhry, K.K.,Instrumentation measurement and analysis, McGraw Hill, Chennai (2017)
4. Rao, S., Jain, R.K. &Saluja, H.L., Electrical Safety, Fire Safety Engineering And Safety Management, Khanna Pub., New Delhi (2018)

Course outcomes:

- Ability to understand the functions and activities of safety engineering department.
- Apply knowledge of safety engineering specialization for hazard identification, risk assessment and control of occupational hazards.
- Communicate effectively on health and safety matters among the employees and with society at large

.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Fiber Technology**	Code:	**D000840(095)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives

- To Understand various types of fiber
- To know the methods of spinning
- To aware about the sretching of fibers and their modification
- To aware for dying of fibers and its quality control.

UNIT I	Evolution of Manufactured Fiber, Synthetic Fibreand their Clasification, Raw materials manufacture. DMT,TPA,MEG, caprolactum, adipic acid, hexamethylene diamine, acrylonitrile. Molecular size and interaction, Molecular orientation and crystallinity in fibres, Polymers as fibres, Molecular Weight Differences between Fibresand Plastics, Fibre morphology.
UNIT II	Melt Spinning - melt spinning equipment - high speed spinning - spin drawprocesses –role of critical parameters in spinning. Solution Spinning:Wet ,dry and Gel spinning and their comparison. Development of structure and morphology during solution spinning, Spin Finishes - Role of spin finishes, components, Spin finish application techniques, spin fininsh for staple fiber production and processing, spin finish for filament yarn. Effect of spin finish on dyeing.
UNIT III	Drawing importance, conditions of drawing - machines for draw warping - texturing - false twist process -draw texturing- staple fibre production, melt spinning - drawing, heat setting - crimping in fibre line -Hollow - Low pilling -flame retardant- bicomponentfibres - Mass coloration and their techniques – mass colouration of Nylon and polyolefins fiber. Dye ability of synthetic fibres-polyester.
UNIT IV	Fiber production for polyethylene terephthalate, Nylon 6 & Nylon 6,6, Acrylic and their properties and applications. Fiber modification- physical and chemical techniques, Modification of nylon and polyester fiber.
UNIT V	Testing of manufactured fibres : Fineness, Fibre crimp, Tensile properties, Evenness testing, Frictional properties, Shrinkage behavior, Entanglement testing, Energy conservation – pollution control.

Text Books

1. V. B. Gupta, V. K. Kothari, Manufactured Fibre Technology, Chapman & Hall, 1997
2. Synthetic fibers – Nylon, Polyester, Acrylic, polyolefin Edited by J. E. Mclntyre, CRC Press

3. Wearherhead, R.G., FRP Technology: Fiber Rain Forced Resin Systems, Allied , London,

Reference Books:

1. Fred w. Billmeyer, Text Book of Polymer Science, Wiley India Pvt.Ltd, New Delhi (2015)
2. Fourne, Franz, "Synthetic Fibres, Machines and Equipment, Manufacture, Properties", Hanser Publishes, 1999.4. Corbman, Bernard P, "Textiles fibre to fabric", Sixth Edition, McGraw Hill, 1983.
3. A.A. Vaidya, Production of synthetic fibres, Prentice Hall of India Pvt. Ltd., New Delhi,

Course outcomes:

- The Student will be able to understand the type of different fibers.
- The Student will be able to understand the Spinning.
- The Student will be able to understand the drawing of fiber
- The Student will be able to select the suitable testing parameter to judge the performance of fiber.
- The Student will be able to understand the modification in fiber

.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Fiber Technology**	Code:	**D000840(095)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives

- To Understand various types of fiber
- To know the methods of spinning
- To aware about the sretching of fibers and their modification
- To aware for dying of fibers and its quality control.

UNIT I	Evolution of Manufactured Fiber, Synthetic Fibreand their Clasification, Raw materials manufacture. DMT,TPA,MEG, caprolactum, adipic acid, hexamethylene diamine, acrylonitrile. Molecular size and interaction, Molecular orientation and crystallinity in fibres, Polymers as fibres, Molecular Weight Differences between Fibresand Plastics, Fibre morphology.
UNIT II	Melt Spinning - melt spinning equipment - high speed spinning - spin drawprocesses –role of critical parameters in spinning. Solution Spinning:Wet ,dry and Gel spinning and their comparison. Development of structure and morphology during solution spinning, Spin Finishes - Role of spin finishes, components, Spin finish application techniques, spin fininsh for staple fiber production and processing, spin finish for filament yarn. Effect of spin finish on dyeing.
UNIT III	Drawing importance, conditions of drawing - machines for draw warping - texturing - false twist process -draw texturing- staple fibre production, melt spinning - drawing, heat setting - crimping in fibre line -Hollow - Low pilling -flame retardant- bicomponentfibres - Mass coloration and their techniques – mass colouration of Nylon and polyolefins fiber. Dye ability of synthetic fibres-polyester.
UNIT IV	Fiber production for polyethylene terephthalate, Nylon 6 & Nylon 6,6, Acrylic and their properties and applications. Fiber modification- physical and chemical techniques, Modification of nylon and polyester fiber.
UNIT V	Testing of manufactured fibres : Fineness, Fibre crimp, Tensile properties, Evenness testing, Frictional properties, Shrinkage behavior, Entanglement testing, Energy conservation – pollution control.

Text Books

3. V. B. Gupta, V. K. Kothari, Manufactured Fibre Technology, Chapman & Hall, 1997
4. Synthetic fibers – Nylon, Polyester, Acrylic, polyolefin Edited by J. E. Mclntyre, CRC Press

3. Wearherhead, R.G., FRP Technology: Fiber Rain Forced Resin Systems, Allied , London,

Reference Books:

4. Fred w. Billmeyer, Text Book of Polymer Science, Wiley India Pvt.Ltd, New Delhi (2015)
5. Fourne, Franz, "Synthetic Fibres, Machines and Equipment, Manufacture, Properties", Hanser Publishes, 1999.4. Corbman, Bernard P, "Textiles fibre to fabric", Sixth Edition, McGraw Hill, 1983.
6. A.A. Vaidya, Production of synthetic fibres, Prentice Hall of India Pvt. Ltd., New Delhi,

Course outcomes:

- The Student will be able to understand the type of different fibers.
- The Student will be able to understand the Spinning.
- The Student will be able to understand the drawing of fiber
- The Student will be able to select the suitable testing parameter to judge the performance of fiber.
- The Student will be able to understand the modification in fiber

.