# List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

**Department : *Electronics and Communication Engineering***

**Programme Name : *B.Tech.***

***Academic Year : 2021-22***

***List of Courses Focus on Employability/ Entrepreneurship/Skill Development***

| Sr. No. | Course Code | Name of the Course |
|---|---|---|
| 01. | MA201TBS01 | Mathematics-I |
| 02. | PH201TBS02 | Physics |
| 03. | EC201TES01 | Basic Electrical & Electronics Engineering |
| 04. | IT201TES02 | Introduction to Information Technologies |
| 05. | EN201THS01 | English Communication |
| 06. | PH201PBS01 | Physics Lab |
| 07. | ME201PES01 | Engineering Graphics |
| 08. | ME201PES02 | Workshop Technology & Practices |
| 09. | EC201PES03 | Basic Electrical Engineering Lab |
| 10. | MA202TBS03 | Mathematics-II |
| 11 | CY202TBS04 | Chemistry |
| 12 | CE202TES03 | Engineering Mechanics |
| 13 | CS202TES04 | Computer Programming |
| 14 | CM202TES05 | Basic Civil & Mechanical Engineering |
| 15 | CY202PBS02 | Chemistry Lab |
| 16 | CE202PES04 | Engineering Mechanics Lab |
| 17 | CS202PES05 | Computer Programming Lab |
| 18 | EC203TPC01 | Electronic Devices |
| 19 | EC203TPC02 | Digital Logic Design |
| 20 | EC203TPC03 | Network Theory |
| 21 | EC203TPC04 | Signals and Systems |
| 22 | EC203TBS05 | Mathematics-III |
| 23 | EC203THS02 | Engineering Economics |
| 24 | EC203PPC01 | Electronics Devices Lab |
| 25 | EC203PPC02 | Digital Logic Design Lab |
| 26 | EC204TPC05 | Analog Circuits |

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|---|---|---|
| 27 | EC204TPC06 | Analog Communication |
| 28 | EC204TPC07 | Control System |
| 29 | EC204TES05 | Data Structure with C++ |
| 30 | EC204TBS06 | Numerical Methods |
| 31 | EC204TMC02 | Environmental Sciences |
| 32 | EC204PPC05 | Analog Circuits Lab |
| 33 | EC204PES05 | Data Structure with C++ Lab |
| 34 | EC205TPC08 | LIC & its Application |
| 35 | EC205TPC09 | Digital Communication |
| 36 | EC205TPC10 | Digital Signal Processing |
| 37 | EC205TES06 | Electromagnetic Waves |
| 38 | EC205THS03 | Probability Theory & Random Process |
| 39 | EC205THS04 | Effective Technical Communication |
| 40 | EC205PPC06 | LIC Lab |
| 41 | EC205PPC07 | Analog and Digital Communication Lab |
| 42 | EC205PPC08 | Digital Signal Processing Lab |
| 43 | EC206TPC11 | CMOS Digital VLSI Design |
| 44 | EC206TPC12 | Data Communication & Computer Networks |
| 45 | EC206TPC13 | Microprocessor & Microcontroller |
| 46 | EC206TES07 | Electronic Measurements and Sensors |
| 47 | EC206TPE01 | Information Theory & Coding |
| 48 | EC206TPE02 | Advance Signal Processing |
| 49 | EC206TPE03 | Renewable Energy Sources |
| 50 | EC206TPE04 | Introduction to MEMS |
| 51 | EC206PPC09 | CMOS Digital VLSI Design Lab |
| 52 | EC206PPC10 | Data Communication & Computer Networks Lab |
| 53 | EC206PES06 | Electronic Measurement and Sensors Lab |
| 54 | EC07TPC14 | Fiber Optics Communication |
| 55 | EC07TPC15 | Embedded Systems |
| 56 | EC07TPC16 | Mobile Communication & Network |
| 57 | EC07TPE09 | Digital Image Processing |
| 58 | EC07TPE10 | Analog & Digital VLSI Design |
| 59 | EC07TPE11 | Estimation and Detection Theory |
| 60 | EC07TPE12 | Advanced Power Electronics |
| 61 | EC07TPE13 | Microwave Theory & Techniques |

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| 62 | EC07TPE14 | Radar & Satellite Comm |
| 63 | EC07TPE15 | Machine Learning |
| 64 | EC07PPC12 | Fiber Optics Communication Lab |
| 65 | EC07PPC13 | Design and Simulation Lab |
| 66 | EC07PPS01 | Seminar on Industrial Training |
| 67 | EC07PPS02 | Project - I |
| 68 | EC08TPC17 | VLSI Fabrication Technology |
| 69 | EC08TPE16 | Millimeter Wave Technology |
| 70 | EC08TPE17 | Video Processing |
| 71 | EC08TPE18 | Biomedical Electronics |
| 72 | EC08TPE19 | Neural Network & Fuzzy logic |
| 73 | EC08TPE20 | Next Gen. Comm. Technology |
| 74 | EC08TPE21 | Wireless Sensor Networks |
| 75 | EC08TOE05 | Intellectual Property Rights |
| 76 | EC08TOE06 | Principles of Management |
| 77 | EC08TOE07 | Introduction to IOT |
| 78 | EC08PPS03 | Project - II |
| 79 | EC08PPS04 | Comprehensive viva |
| 80 | ECPATT1 | Linear Algebra |
| 81 | ECPATT2 | Wireless Communication & Network |
| 82 | ECPATT3 | Optoelectronic Devices |
| 83 | ECPATP1 | ction to Signal Processing |
| 84 | ECPATP2 | Introduction to Embedded & IOT System |
| 85 | ECPATP3 | Microstrip Antenna |
| 86 | ECPATP4 | Estimation & Detection Theory |
| 87 | ECPATP5 | Digital Image Processing |
| 88 | ECPATP6 | Network Security & Cryptography |
| 89 | ECPATP7 | Modern Digital Communication |
| 90 | ECPATP8 | Antenna for Modern wireless Communication |
| 91 | ECPBTT1 | Advanced VLSI Fabrication |
| 92 | ECPBTT2 | Millimeter Wave Technology |
| 93 | ECPBTP1 | Machine Learning |
| 94 | ECPBTP2 | Optical Communication System |
| 95 | ECPBTP3 | Next Generation Communication Technologies |
| 96 | ECPBTP4 | Advanced Digital Signal Processing |

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|---|---|---|
| 97 | ECPBTP5 | Computer Vision |
| 98 | ECPBTP6 | Digital Communication Receiver |
| 99 | ECPBTP7 | Optical Instrumentation |
| 100 | ECPBTP8 | Satellite Communication |
| 101 | ECPCPT1 | Dissertation Stage–I |
| 102 | ECPDPT1 | Dissertation Stage–II |

विभागाध्यक्ष (इलें. एव संचार अभियांत्रिकी)
H.O.D. (Elect. & Comm. Engineering)
प्रौद्योगिकी संस्थान
Institute of Technology
गु. घा. वि., बिलासपुर (छ.ग.)
G. G. V. Bilaspur (C.G.)

## ADVANCED DIGITAL SIGNAL PROCESSING

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| ECPBTP4 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Objective:**

The objectives of the course are to make the students:

1. To impart knowledge about the sampling / reconstruction of signals and their analysis in frequency domain
2. To introduce the fundamental concepts for filter designs, and multi-rate processing.
3. To enable the students to understand the efficient algorithms and their use in real time implementation

**Unit-1**

**Multirate Digital Signal Processing:** Decimation and Interpolation, Applications of multirate signal processing, Digital filter banks, two channel quadrature mirror filter banks.

**Unit-2**
**Linear prediction and Optimum Linear Filters:** Random signals, Stationary Random Process. Forward and Backward Linear Prediction, The Levinson-Durbin Algorithm. Properties of the Linear Prediction-Error Filters.

**Unit-3**
**Adaptive filters:** Applications of Adaptive Filters-Adaptive Channel Equalization, Adaptive noise cancellation, Linear Predictive coding of Speech Signals, Adaptive direct form filters.

**Unit-4**
**Power Spectrum Estimation:** Parametric and Non parametric Methods for Power Spectrum Estimation, Methods for the AR Model Parameters, ARMA Model for Power Spectrum Estimation.

**Unit-5**
**Wavelet Transform:** Origin of Wavelets, Wavelets and other reality transforms History and future of wavelets, Short Time Fourier Transform, Continuous Wavelet, and Discrete Wavelet Transform

**Text/Reference Books:**

1. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", Pearson, Fourth edition, 2007.
2. S. Haykin, "Adaptive Filter Theory" Prentice Hall, Englewood Cliffs, NJ, 1991.
3. K P Soman, Ramachandran, Resmi, "Insight into Wavelets- from Theory to Practice", PHI, Third Edition, 2010.

## COMPUTER VISION

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| ECPBTP5 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Objective:**

The objectives of the course are to make the students:

1. To provide the fundamental concept of Computer Vision.
2. To develop understanding about stereo vision concepts.
3. To identify and analyze various features and its extraction techniques in an Image.
4. To study basic motion detection and object tracking.
5. To Design and develop vision based basic applications.

**Unit-I**

**Image Formation Models:** Fundamentals of Image processing and Linear algebra, 2-D Projective Geometry, Homography and Properties of homography, Camera Geometry.

**Unit-II**

**Stereopsis**: Camera and EpipolarGeometry; 3-D reconstruction framework; Camera-calibration, Stereo Vision.

**Unit-III**

**Image Descriptors and Features**: Texture, Colour, Edge, Histogram of Oriented Gradients (HOG), Scale Invariant Feature Transform (SIFT), Speeded up Robust, Features(SURF).

**Unit-IV**

**Motion Detection and Estimation**: Background Subtraction and Modelling, Optical Flow, Kanade–Lucas–Tomasi (KLT), Motion Tracking in Video. Mean Shift and Cam shift object Tracking. **Fundamental Pattern Recognition Concepts**: Classification & Clustering.

**Unit-V**

**Applications of Computer Vision:** Medical Images, Biometrics, Image Fusion, Document Image Processing, OCR. Deep Neural Architecture and Applications.

**Text Books/References:**

1. D. Forsyth and J. Ponce,"Computer Vision - A modern approach", 2nd Edition, Pearson Prentice Hall, 2012
2. Szeliski, Richard, "Computer Vision: Algorithms and Applications", 1st Edition, SpringerVerlag London Limited, 2011.
3. Richard Hartley and Andrew Zisserman, "Multiple View Geometry in Computer Vision", 2nd Edition, Cambridge University Press, 2004.
4. K. Fukunaga,"Introduction to Statistical Pattern Recognition",2ndEdition, Morgan Kaufmann, 1990.

## DIGITAL COMMUNICATION RECEIVER

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| ECPBTP6 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Objective:**

1. To gain knowledge about basic principles of digital communication techniques and Detection of BinarySignal in Gaussian Noise.
2. To gain knowledge about Coherent and Noncoherent Detection
3. To gain knowledge about receivers for AWGN channel and Fading channels.
4. To gain knowledge about concepts of synchronization and
5. To gain knowledge about concepts of adaptive equalization techniques.

**Unit-I**

**Review of Digital Communication Techniques**: Base band communication; signal space representation, linear and nonlinear modulation techniques, Error tracking and Spectral characteristics of digital modulation.

**Detection of Binary Signal in Gaussian Noise:** Detection of Binary signal in Gaussian Noise: Maximum Likelihood Receiver Structure, The Matched Filter, Correlation Realization of Matched Filter, Optimum error performance, Error performance of Binary Signaling.

**Unit-II**

**Coherent and Noncoherent Detection:** Coherent Detection: Coherent Detection of PSK,Sampled Matched Filter, Coherent Detection of Multiphase Shift Keying, Coherent Detection of FSK. Noncoherent Detection: Detection of Differential PSK, Binary Differential PSK example, Noncoherent Detection of FSK, Required Tone Spacing for Noncoherent Orthogonal FSK.

**Unit-III**

**Optimum Receivers for AWGN Channel:** Correlation demodulator, matched filter, maximum likelihood sequence detector, optimum receiver for CPM signals, M-ary orthogonal signals, envelope detectors for M-aryand correlated binary signals.

**Receivers for Fading Channels**: Characterization of fading multiple channels, statistical models, flat and frequency selective fading, diversity technique, Optimal receivers for data detection, coded waveform for fading channel.

**Unit-IV**

**Synchronization Techniques**: Carrier and signal synchronization, carrier phase estimation-PLL, Decision directed loops, symbol timing estimation, maximum likelihood and non-decision directed timing estimation, joint estimation.

## OPTICAL INSTRUMENTATION

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| ECPBTP7 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Objective:**

1. To understand the measuring methods and instruments of electrical quantities.
2. To understand the concept of optical instrumentation.
3. To get the concept of optical switching and various instruments.
4. •To get the concept of optical fiber sensors.
5. To get the measurement concept of optical instrumentation.

**UNIT-I**

**Performance characteristics of instruments:** Instrument characteristics - accuracy, resolution, precision, expected value, error and sensitivity. Errors in measurement, speed of response, fidelity, lag and dynamic error.

**UNIT-II**

**Optical Instruments**: Interferometric configurations, MachZender, Michelson and FabriPerot configurations components and construction, OTDR and applications.

**UNIT-III**

**Fiber optic components and devices** : Direction couplers, beam splitters, switches modulations, connectors, polarizer, polarization controllers, amplifiers, wavelength filters, wavelength division multiplexers, fiber optic isolators.

**UNIT-IV**

**Fibre optic sensors**: General features, intensity sensors, simple fibre-based sensors for displacement, temperature and pressure. Fibre Bragg grating based sensors.

**UNIT-V**

**Measurements methods in optical fiber** : General experimental consideration, pulse dispersion and bandwidth, Cut off wavelength, mode field diameter and birefringence of single mode fiber.

**Text/Reference Books:**

1. B. P. Pal : Fundamentals of Fibre Optics in Telecommunication and Sensor Systems, New Age, New Delhi.
2. A. K. Ghatak and K. Thyagarajan, Introduction to Fiber Optics, Cambridge.

## SATELLITE COMMUNICATION

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| ECPBTP8 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Objective:**

1. To know the evolution of Satellite communication and its concept
2. To know the orbital mechanism and different satellite subsystems.
3. To know the role of different factors affecting satellite and link budget equation.
4. To know the various types of multiple access techniques for satellite communication.
5. To know the basics and details of Earth station.

**UNIT-I**

An overview of satellite communication, Satellite orbits, Kepler's law, Orbital Elements, Eclipse effect, Sun transit outage, Placement of a satellite in a geostationary orbit, Station keeping and Stabilization.

**UNIT-II**

Satellite Link Design: Basic transmission theory, Friss transmission equation, EIRP, Completion Link design, System noise temperature G/T ratio, Noise figure and Noise temperature.

**UNIT-III**

Communication Satellite Subsystems: Space Platform (Bus) and Communication Subsystem (Payload), Satellite Antennas, Frequency reuse Antennas.

**UNIT-IV**

Earth Stations: Earth station antennas, Tracking, Equipment for earth stations, Equipment Reliability and Space qualification

**UNIT-V**

Analogue Satellite Communication Vs Digital Satellite Communication, Multiple Access Techniques : FDMA Concept, MCPC & SCPC, TDMA frame efficiency and super frame structure, Frame Acquisition and Synchronisation, CDMA concept, PN system, Spread spectrum, DSSS, DS CDMA, FHSS, FH CDMA.

**Text/Reference Books:**

5. "Satellite Communication", T. Pratt & C. W. Bostian.
6. "Digital Satellite communication", Tri T. Ha, McGraw Hill.

## BUSINESS ANALYSIS

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| MSPBTO1 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

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

1. Students will demonstrate knowledge of data analytics
2. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
3. Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
4. Students will demonstrate the ability to translate data into clear, actionable insights.

**Syllabus Contents:**

- Unit1: Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.
- Unit 2: Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.
- Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.
- Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.
- Unit 5:Decision Analysis: Formulating Decision Problems, Decision Strategies with the

## INDUSTRIAL SAFETY

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| IPPBTO2 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Outcomes:**

At the end of the course, students will be able to

1 Apply the knowledge of Safety Measures

2 Plan for Engineering maintenance.

3 Determine the wear &Corrosion and apply methods for their prevention.

4 Trace the Fault of machine tools and equipment

5 Plan and implement the periodic and preventive maintenance for machines/equipment.

**Syllabus Contents:**

- 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.
- 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.
- 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.
- Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding 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.
- Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components,

## OPERATIONS RESEARCH

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| IPPBTO3 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Outcomes:**

At the end of the course, students will be able to

1 Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.

2 Students should able to apply the concept of non-linear programming

3 Students should able to carry out sensitivity analysis

4 Student should able to model the real world problem and simulate it.

**Syllabus Contents:**

- Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models
- Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming
- Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT
- Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.
- Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

**References:**

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

## COST MANAGEMENT OF ENGINEERING PROJECTS

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| CEPBTO4 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Outcomes:**

At the end of the course, students will be able to

1 Discuss the cost concepts in the cost management process.

2 Able to handle the projects by the application of project cost control methods.

3 Determine all types of costing and carryout the analysis of pricings for profitability.

4 Application of PERT/CPM for cost management.

**Syllabus Contents:**

- Introduction and Overview of the Strategic Cost Management Process
- Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.
- Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non-technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process
- Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.
- Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

**References:**

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting

## COMPOSITE MATERIALS

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| MEPBTO5 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Outcomes:**

At the end of the course, students will be able to

1 Explain and also implement the composite materials for the required performance based on the characteristics.

2 Adopt the composite materials as reinforcements.

3 Implement the methods of manufacturing of metal matrix composites

4 Adopt the methods of manufacturing of polymer matrix composites

5 Evaluate the strength of laminates.

**Syllabus Contents:**

- INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.
- REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.
- Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.
- Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.
- Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations

**References:**

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by

## WASTE TO ENERGY

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| CHPBTO6 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Outcomes:**

At the end of the course, students will be able to

1 Classify the waste for fuel and identify the devices for conversion of waste to energy.

2 Implement the Biomass Pyrolysis

3 Evaluate the methods of Biomass Gasification and implement their applications.

4 To design, construct and operation the Biomass Combustion devices.

5 Classify biomass, apply the bio energy systems design and construction.

**Syllabus Contents:**

- Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors
- Biomass Pyrolysis: Pyrolysis – Types, slow, fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.
- Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.
- Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.
- Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

**References:**

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

## INTERNET OF THINGS

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| ECPBTO7 | 3 | 0 | 0 | 3 hours | 40 | 60 | 100 | 3 |

**Course Outcomes:**

At the end of the course, students will be able to

1 Understand the concepts of Internet of Things.

2 Analyze basic protocols in wireless sensor network.

3 Design IoT applications in different domain and be able to analyze their performance

4 Elaborate the need for Data Analytics and Security in IoT.

5 Understand the concepts of Internet of Things.

**Syllabus Contents:**

Review of computer communication concepts (OSI layers, components, packet communication, Networks, TCP-IP, subnetting, IPV4 addressing and challenges). IPV6 addressing. IoT architecture reference layer. Characteristics IoT sensor nodes, Edge computer, cloud and peripheral cloud, single board computers, open source hardware, Examples of IoT infrastructure.

**IoT and M2M**

Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

**IOT protocols and Communication Technologies**

MQTT, UDP, MQTT brokers, publish subscribe modes, HTTP, COAP,XMPP and gateway protocols, IoT Communication Pattern, IoT Protocol Architecture, Selection of Wireless technologies ( 6LoWPAN, Zigbee, WIFI, BT, BLE,SIG,NFC, LORA, Lifi, Widi).

**Data and Analytics for IoT**

An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of IOT Security, Common Challenges in IOT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.

**IoT Physical Devices and Endpoints**: Introduction to Arduino and Raspberry Pi- Installation,

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## ENGLISH FOR RESEARCH PAPER WRITING

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| ELPBTX1 | 2 | 0 | 0 | 2 hours | 40 | 60 | 100 | 2 |

**Course Outcomes:**

At the end of the course, students will be able to

1. Understand that how to improve your writing skills and level of readability.
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title
4. Ensure the good quality of paper at very first-time submission

**Syllabus Contents:**

- Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness
- Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction
- Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check
- Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a useful phrases, how to ensure paper is as good as it could possibly be the first- time submission review of the Literature.
- skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions
- useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

**References:**

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

## STRESS MANAGEMENT BY YOGA

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| PEPBTX2 | 2 | 0 | 0 | 2 hours | 40 | 60 | 100 | 2 |

**Course Outcomes:**

At the end of the course, students will be able to

1. Develop healthy mind in a healthy body thus improving social health also.
2. Improve efficiency

**Syllabus Contents:**

- Definitions of Eight parts of yog. ( Ashtanga ).
- Yam and Niyam, Do's and Don't's in life, i) Ahinsa, satya, astheya, bramhacharya and aparigraha, ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.
- Asan and Pranayam, i) Various yog poses and their benefits for mind &body, ii) Regularization of breathing techniques and its effects-Types of pranayam.

**References:**

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata.

## DISASTER MANAGEMENT

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| CEPBTX3 | 2 | 0 | 0 | 2 hours | 40 | 60 | 100 | 2 |

**Course Outcomes:**

At the end of the course, students will be able to

1 Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

2 Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives

3 Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations

4 Critically understand the strengths and weaknesses of disaster management approaches,

planning and programming in different countries, particularly their home country or the countries

they work in

**Syllabus Contents:**

- Introduction Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.
- Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.
- Disaster Prone Areas in India, Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with special reference to Tsunami; Post-Disaster Diseases and Epidemics.
- Disaster Preparedness and Management: Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and other agencies, Media Reports: Governmental and Community Preparedness.
- Risk Assessment: Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk

## CONSTITUTION OF INDIA

| Sub Code | L | T | P | Duration | IA | ESE | Total | Credits |
|---|---|---|---|---|---|---|---|---|
| LAPBTX4 | 2 | 0 | 0 | 2 hours | 40 | 60 | 100 | 2 |

**Course Outcomes:**

At the end of the course, students will be able to

1 Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

2 Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

3 Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

4 Discuss the passage of the Hindu Code Bill of 1956.

**Syllabus Contents:**

- History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working).
- Philosophy of the Indian Constitution: Preamble, Salient Features
- Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.
- Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, appointment and Transfer of Judges, Qualifications, Powers and Functions.
- Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.
- Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

**References:**

## RESEARCH METHODOLOGY IN ENGINEERING

| SUB CODE | L | T | P | DURATION | ESE | CREDITS |
|---|---|---|---|---|---|---|
| ET7100 | 03 | 01 | 0 | 3 HRS | 100 | 4 |

**Introduction:** Definition and objectives of Research — Types of research. Various Steps in Research process, Mathematical tools for analysis, developing a research question-Choice of a problem.

**Literature review**, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation. interpretation. Research Purposes, Ethics in rc.scarch APA Ethics code.

**Quantitative Methods for problem solving:** Statistical Modeling and Analysis. Time Series Analysis. Probability Distributions. Fundamentals of Statistical Analysis and Inference, Multivariate methods.

**Concepts of Correlation and Regression_** Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis.

**Tabular and graphical description of data:** Tables and graphs of frequency data of one variable. Tables and graphs that show the relationship between two variables Relation between frequency distributions and other graphs, preparing data for analysis.

**Use of statistical sothvare,SPSS in research**. Structure and Components of Research Report. Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing.

**Reference Books**

1. kothari, Research Methodology Methods and Techniques. 2/c, Vishwa Prakashan, 2006

2, Donald 1-1,McBurn.cy, Research Methods, 5th Edition, Thomson Learning, ISEIN:31-3 L5- 0947-0, 2006

3, Donald R. Cooper, Pamela S. Schindler, Business Research Methods. &le, rata McGraw-Hill Co_ Ltd_ 2006.

## Vacuum Technology

| SUB CODE | L | T | P | DURATION | ESE | CREDITS |
|---|---|---|---|---|---|---|
| ECE 102 | 03 | 01 | 0 | 3 HRS | 100 | 4 |

**Unit-1:** Fundamentals of Vacuum Technology: vacuum nomenclature and definitions, Gas properties, Molecular process and Kinetic theory, Throughput, Pumping speed, Evacuation rate. Outgassing rate, Leak rate, Gas How, Conductance, Flow calculations.

**Unit-2:** Vacuum generation: Diaphragm pump, Rotary pump. Diffusion pump, Cryogenic pump, Turbomotecular pump, Sputter-ion pump and Getter pumps

**Unit-3:** Vacuum Measurement scale, Gauges and Leak detection: U.H.V. techniques, Mass Spectrometer.

**Unit-4:** Surface Physics and its Relation to Vacuum Science: Adsorptions, Chemisorptions, Isotherms, Desorptions and Photoactivation.

**Unit-5:** Materials for Vacuum tubes, Chemical and Thermal Cleaning. Sputtering Techniques. Brazing. Spot, Arc, Electron beam and Laser weldings. Vacuum and Protected Atmosphere Furnaces. Jigs and Tools Processing of Electron-Beam Devices.

References:

Vacuum Science and Technology, V V Rao, T B Ghosh, K L Chopra 2.
Vacuum Journal, Science direct. Elsevier Publication
. Journal of Vacuum Science and Technology A, IEEE Transaction 4.
Journal of Vacuum Science and Technology B, IEEE Transaction

## Sensors & Measurement Science and Technology

| SUB CODE | L | T | P | DURATION | ESE | CREDITS |
|---|---|---|---|---|---|---|
| ECE 104 | 03 | 01 | 0 | 3 HRS | 100 | 4 |

**Unit.1:** Generalized Configurations and Functional Descriptions of Measuring Instruments: Functional elements Transducers, Analog and Digital modes of operation, Input-Output configuration of Instruments and Measurement systems, Static and Dynamic Characteristics of Instruments, Static calibration.

**Unit-2:** Motion Sensor and Measurement Fundamental Standards, Relative Displacements-Translational & Rotational, Relative Velocity, Relative Acceleration Measurements, Seismic Displacement Pickups, Seismic Velocity Pickups, Seismic Acceleration Pickups,

**Unit-3:** Force, Torque and Power Measuremeni• Methods of Force Measurement, Elastic Force Transducers, Torque Measurement on Rotating Shafts, Shaft Power Measurement, Vibrating. WireForce Trahsducers.

**Unit-4;** Pressure Measurement: Methods of Pressure Measurements, Deadweight Gages, Manometers, Elastic Transducers, Vibrating Cylinder and other Resonant Transducers, Dynamic Testing of Pressure measuring Systems, High and Low Pressure Measurement systems.

**Unit-5:** Temperature Measurements: Standards and Calibration, Thermal-Expansion Methods, Thermoelectric Sensors, Electrical-Resistance Sensors, Junction Semiconductor Sensors, Digital Thermometers, Radiation Methods.

References:

1. Measurement Systems, E Doebelin, D N Manik, McGraw Hill Publication
2. Sensor Technology Handbook, Jon S Wilson, Elsevier, 2004, ISBN-10: 0750677295
3. Journal of Sensors and Actuators, Science direct, Elsevier Publication
4. Journal of Sensors and Actuators A:Physical, Science direct, Elsevier Publication,

**Artificial Intelligence**

| SUB CODE | L | T | P | DURATION | ESE | CREDITS |
|---|---|---|---|---|---|---|
| ECE 105 | 03 | 01 | 0 | 3 HRS | 100 | 4 |

Unit-1: Definition of Al, Brie( history of Al, General problem Solving Approaches in Al-Learning Systems, Knowledge representation and reasoning, Planning, Knowledge Acquisition, Intelligence search, Logic Programming, Sort computing, Applications of Al techniques, Characteristic requirement for the realization of intelligent system. Programming languages for Al. Architecture for Al machine.

Unit-2: Cognitive perspective of pattern recognition- Template Matching, Prototype matching. feature based approach, Computational approach; Cognitive models of memoryAtkinson-Shiffrin's model, Tuiving's model, Parallel distributed processing approach: Underslariding of problem; Cybernetic view to cognition_

Unit-3: Production rules, Working memory, Control Unit/Interpreter, Conflict Resolution strategies, Types of production systems-Commutalive Production system, Decomposable Production system, Forward verses Backward reasoning, Merits of a Production system-Isolation of knowledge and control strategy, Direct Mapping onto State-space, Modular Structure of Production rules, Knowledge base Optimization in production system

Unit-4: Production Solving by Intelligent Search General problem solving approaches-Breadth first search, depth first search. Iterative deepening search, Hill Climbing; Simulated annealing; Heuristic Search- for OR Graph, Iterative deepening algorithm, AND-OR Graph, Adversary Search- MINIMAX algorithm, Alpha-Beta heuristics,

Unit•5: Logic of Propositions and Predicates- Formal definition. Propositional Logic-Semantic method for Ilworern proving. Syntactic method for theorem proving, Resolution in Propositional Logic, Predicate Logic. Unification of Predicates, Robinson's Interference Rule, Types of Resolution, Soundness and Completeness of Logic,

References:

1, Artifival Intelligence and Soft Computing, Amil Konar
2. Journal of Artificial Intelligence, ScienceDirect, Elsevier Publication 3, IEEE Transaction on Computational Intelligence and Al