List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Electronics and Communication Engineering*

Programme Name : *B.Tech.*

Academic Year : 2017-18

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	ENATHS01	Professional Communication English
02.	CHATBS01	Engineering Chemistry
03.	MEATES01	Engineering Mechanics
04.	CSATES02	Fundamental of Computers
05.	EMATBS02	Engineering Mathematics-I
06.	CHALBS01	Engineering Chemistry Lab
07.	MEALES01	Engineering Mechanics Lab
08.	MEALES03	Engineering Drawing
09.	CHBTHS02	Environmental Studies
10.	MEBTES04	Engineering Thermodynamics
11	EEBTES05	Basic Electrical & Electronics Engineering
12	PHBTBS03	Engineering Physics
13	EMBTHS04	Engineering Mathematics-II
14	EEBLES05	Basic Electrical & Electronics Engineering Lab
15	PHBLBS03	Engineering Physics Lab
16	MEBLES06	Workshop Practices
17	EC3THS03	Engineering Economics
18	EC3TPC01	Signals and Systems
19	EC3TBS01	Engineering Mathematics-III
20	EC3TES01	Network Analysis And Synthesis
21	EC3TES02	Electronic Devices
22	EC3TPC02	Digital Logic Circuits
23	EC3PES02	Electronics Devices Lab
24	EC3PPC02	Digital Logic Circuits Lab
25	EC4TBS02	Numerical Analysis
26	EC4TPC03	Automatic Control Systems

27	EC4TPC04	Analog Circuits
28	EC4TPC05	Communication System-I
29	EC4TPC06	Electronics Measurements & Instrumentation
30	EC4PPC04	Analog Circuits Lab
31	EC4PPC05	Communication System-I Lab
32	EC4PPC06	Electronic Measurements & Instrumentation Lab
33	EC5TPC07	Lic & Its Application
34	EC5TPC08	Communication System- II
35	EC5TPC09	Electromagnetic Field Theory
36	EC5TPE01	Microprocessor & Its Application
37	EC5TPE02	Data Structure & Operating System
38	EC5TOE11	Computer Architecture
39	EC5TOE12	OOP in C++
40	EC5TOE13	Introduction to Information Security
41	EC5TOE14	Project Management
42	EC5TOE15	Rural Technology and Community Development
43	EC5PPC07	LIC & ITS APPLICATION Lab
44	EC5PPE01	Microprocessor & Its Application Lab
45	EC5PPC08	Communication System -II Lab
46	EC6TPC10	Digital Signal Processing
47	EC6TPC11	Antenna & wave propagation
48	EC6TPE03	Data Communication & Computer Networking
49	EC6TPE04	Fundamental of VLSI Design
50	EC6T0E21	UNIX, Operating System
51	EC6T0E22	Probability & Stochastic Process
52	EC6TOE23	Advanced Instrumentation
53	EC6T0E24	Knowledge management
54	EC6T0E25	Engineering System Design Optimization
55	EC6PPE02	VHDL Lab
56	EC6PPC06	Digital Signal Processing Lab
57	EC6PSP01	Seminar
58	ECETh4101	Wireless and Mobile Communication
59	ECETh4102	VLSI Design & VHDL
60	ECETh4103	Power Electronics
61	ECETh4104	Microwave Engineering

62	ECETh4105	Embedded System
63	ECETh4106	Multirate Systems and Filter Banks
64	ECETh4107	Speech Signal Processing
65	ECETh4108	Wireless Sensor Network
66	ECETh4109	Artificial Intelligence & Expert Systems
67	ECETh4110	Neural Network & Fuzzy Logic System
68	ECETh4111	Biomedical Instrumentation
69	ECETh4112	Semiconductor Devices Modeling & Simulation
70	ECEPr4101	Project-I
71	ECEPr4102	Seminar
72	ECEPr4103	VLSI Design & VHDL Lab
73	ECEPr4104	Microwave Engineering Lab
74	ECETh4201	Radar & Satellite Communication
75	ECETh4202	Principle of Management
76	ECETh4203	Optical Fiber Communication
77	ECETh4204	Digital Image Processing
78	ECETh4205	Cryptography & Network Security
79	ECETh4206	Radar Engineering
80	ECETh4207	Mobile Computing
81	ECETh4208	Nano Technology
82	ECETh4209	Vacuum Technology
83	ECETh4210	Optimization Techniques
84	ECETh4211	Stochastic Process
85	ECEPr4201	Project-II
86	ECEPr4202	Comprehensive Viva-voce
87	ECEPr4203	Circuit Simulation Lab
88	ECEPr4204	Optical Fiber Communication Lab
89	IT7100	Research Methodology in engineering
90	ECE7102	Vaccume Technology
91	ECE7103	Finite Element Method
92	ECE7104	Sensors Measurement Science & Technology
93	ECE7105	Artificial Intelligence

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

Sub Code	L	T	P	Duration	IA	ESE	Credits
Ec...h4203	3	1		3 hours	10	60	4

OPTICAL FIBER COMMUNICATION

UNIT - I

Introduction to optical communication. Principles of light transmission, optical fiber modes and configurations, mode theory for circular wave-guides, single-mode fibers, multimode fibers, numerical aperture, mode field diameter, V-number, fiber materials, fiber fabrication technique.

UNIT – II

Optical sources, LED's, LASER diodes, Model reflection noise, Power launching and coupling, Population Inversion, Fiber Splicing, Optical connector, Photo detector, PIN, Avalanche detector, response time, avalanche multiplication noise.

UNIT – III

Signal degradation in optical fibers, attenuation losses, signal distortion in optical waveguides, material dispersion, wave guide dispersion, chromatic dispersion, inter-modal distortion, Pulse broadening in graded index fiber, mode coupling, advanced fiber designs: dispersion shifted, dispersion flattened, dispersion compensating fibers, design optimization of single mode fibers.

UNIT – IV

Coherent optical fiber communication, modulation techniques for homodyne and heterodyne system, optical fiber link design, Rise time budget and link power budget long haul systems, bit error rate, line coding, NRZ, RZ, Block codes, eye pattern.

UNIT – V

Advanced system and techniques, wavelength division multiplexing, optical amplifiers, semiconductor amplifier, EDFA; Comparison between semiconductor and optical amplifier. Gain bandwidth, photonic switching, optical networks, optical fiber bus, ring topology, star architecture, FDDI.

SUGGESTED BOOKS & REFERENCE:-

1. *Optical fiber communication, G Keiser*
2. *Optical communication, J Frames & V K Jain*
3. *Optical communication, A K Ghatak & K Thyagarajan*

LIST OF ELECTIVE SUBJECTS

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh420-	3	1		3 hours	40	60	4

1. DIGITAL IMAGE PROCESSING

UNIT-I

Introduction and Fundamentals: Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization

Image Enhancement in Spatial Domain: Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification, Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter, Sharpening – The Laplacian

UNIT-II

Image Enhancement in Frequency Domain: Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass, Correspondence Between Filtering in Spatial and Frequency Domain: Smoothing Frequency Domain Filters – Gaussian Lowpass Filters, Sharpening Frequency Domain Filters – Gaussian Highpass Filters, Homomorphic Filtering

Image Restoration: A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter; Max and Min filters, Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT-III

Color Image Processing: Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening.

UNIT-IV

Registration: Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth.

Segmentation: Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

UNIT-V

Feature Extraction: Representation, Topological Attributes, Geometric Attributes.

Description: Boundary-based Description, Region-based Description, Relationship

Object Recognition: Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

SUGGESTED BOOKS & REFERENCE:-

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Prentice Hall, Upper Saddle River, NJ

2. CRYPTOGRAPHY & NETWORK SECURITY

UNIT I

Introduction to security attacks, Services, Mechanisms, Classical encryption techniques: Substitute and Transposition techniques, Steganography. Simplified DES, Block cipher principles. The data encryption standard, the strength of DES, Differential and linear Cryptanalysis. Block cipher design principles. Block cipher modes of operation, evaluation criteria for AES, The AES cipher. Triple DES, blowfish

UNIT II

Principle of public key cryptosystem, Public key cryptosystems. Application for public key cryptosystem, requirement for public key cryptography, public key crypto analysis. The RSA algorithm, computational aspects .The security of RSA, Key managements, Distribution of public key, public key distribution of secret keys, s security requirements for signature scheme.

UNIT III

Elliptic curves cryptography message, authentication and hash function, authentication requirement, authentication functions, message authentication code security of hash function. Hash and Mac algorithm. MDS message digest algorithm, secure hash algorithm(SHA-1)

UNIT IV

Authentication applications – Kerberos – X.509 authentication service – Electronic mail security – PGP – S/MIME – IP security – Web security.

UNIT V

Intruders:-Intrusion techniques, Intrusion detection, Honey pots, firewall design principles, firewall characteristics, Type of firewall, fire wall configurations.

Web security:-Web security threats, web traffic security approaches, SSL architecture, SSL record protocol, change cipher spec protocol, Alert protocol, Handshake Protocol, Cryptographic Computations, Transport layer security, Secure Electronic Transaction.

SUGGESTED BOOKS & REFERENCE:

1. *Cryptography and Network Security, Principles and Practice, William Stallings, PHI*
2. *Cryptography Theory and Practice, Douglas R. Stinso, Chanpan & hall/CRC*
3. *Applied Cryptography, Bruce Schiener, John Wiley & Sons.*
4. *Network Security & Cryptography, Bernard Menezes, Cengage Learning*
5. *Introduction to Cryptography, Johannes A Buchmann, Springer-Verlag.*
6. *Network Security: Private Communication in public world, Charlie Kaufman, R Perlman, M Speciner, Prentice Hall.*

3. RADAR ENGINEERING

UNIT-I

The Radar Equation: Introduction, Radar block diagram and operation, radar frequencies. The simple form of radar equation. Prediction of range performances, minimum detectable signals, receiver noise, Integration of radar pulses, Pulse repetition frequency, Antenna parameters

UNIT-2

CW and frequency modulated Radar: The Doppler effect, CW Radar. Frequency modulated CW radar, Air bone Doppler Navigation. Multiple Frequency CW Radar.

UNIT-3

MTI and PULSE DOPPLER RADAR: Introduction, Delay line canceller, Staggered PRFs, Doppler Frequencies, Range gated Doppler filter,MTI Delay Line, Non recursive MTI, Pulse Doppler Radar, MTI from a moving plat form, Radar display

UNIT – 4

TRACKING RADAR: Tracking with radar, Sequential lobbing, Conical Scan, Mono pulse Tracking radar, Target reflection characteristics with angular Accuracy, tracking in range, Acquisition, Comparison of trackers, tracking with surveillance radar

UNIT – 5

Radar Cross Section: Cross section for small targets, scattering cross section, Effect of polarization on Cross section, Examples of Target cross section, sphere, flat rectangular plate, flate circular plate, circular cylinder, straight wire, complex target shapes, Rayleigh model, Fading model, Chi square model, weibull model, long normal model.

SUGGESTED BOOKS & REFERENCE:-

1: *Radar Principles by Peyton Z. Peebles ,Jr. John Wiley &Sons ,INC.*
2. *Introduction to radar System Merrill I. Skolnik Mc- Graw Hill*

4. MOBILE COMPUTING

UNIT – I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, Hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

UNIT – II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

UNIT -III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

UNIT -IV

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment

UNIT -V

Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

SUGGESTED BOOKS & REFERENCE:-

1. J. Schiller, Mobile Communications, Addivan Wesley.
2. A. Mehrotra , GSM System Engineering.
3. M. V. D. Heijden, M. Taylor, Understanding WAP, Arteeh House.
4. Charles Perkins, Mobile IP, Addison Wesley.
5. Charles Perkins, Ad hoc Networks, Addison Wesley.

5. NANOTECHNOLOGY

UNIT-I

Introduction to Nanotechnology. Essence of Nanotechnology. Some details like Brief account of nano clusters, semiconductor nano particles.

UNIT-2

Nano Material- Metal and Semiconductor Nanomaterials. Quantum dots, Wells, Wires, Molecule to bulk transitions.

UNIT-3

Carbon Nano Structures :Introduction. Carbon molecules. Carbon clusters. Carbon nanotubes. Applications of carbon nanotubes.

UNIT-4

Synthesis Of Nanomaterials :Top-down (Nanolithography, CVD), Bottom up (Sol-gel processing, chemical synthesis). Wet Depositiontechniques, Self-assembly (Supramolecular approach). Molecular design and modeling.

UNIT-5

Application: Solar energy conversion and catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems,Linear and nonlinear optical and electrooptical properties, Applications in displays and other devices. Advanced organic materials for data storage, Photonics, Plasmonics, Chemical and biosensors,Nanomedicine and Nanobiotechnology

SUGGESTED BOOKS & REFERENCE:-

1. *Nanotechnology by Richard Booker, Earl Boysen, Wiley Publishing Inc., 2006.*
2. *Introduction to Nanotechnology by Charles P. Poole Jr., Frank J. Owens, John Wiley & Sons Publications, 2003.*
3. *Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2002*

6. VACUUM TECHNOLOGY

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 flow, Conductance, Flow calculations.

UNIT-2

Vacuum generation: Diaphragm pump, Rotary pump, Diffusion pump, Cryogenic pump, Turbomolecular 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.

SUGGESTED BOOKS & REFERENCE:-

1. *Vacuum Science and Technology, V V Rao, T B Ghosh, K L Chopra*
2. *Vacuum Journal, Science direct, Elsevier Publication*

7. OPTIMIZATION TECHNIQUES

UNIT-I

Linear Programming - General Problem of Linear Programming various definitions in brief statement of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, its problem, and its solution. Assignment problem and its solution. Graphical Method Formulation Linear Programming Problem

UNIT-II

Queuing Theory - Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory, Generalization of steady state M/M/1 queuing models(Model-I, Model-II)

UNIT-III

Replacement Theory - Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement

UNIT-IV

Inventory Theory - Cost involved in inventory problem- single item deterministic model economies long size model without shortage and with shorter having production rate infinite and finite.

UNIT-V

Job Sequencing - Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines

SUGGESTED BOOKS & REFERENCE:-

1. *Gillet B.E. "Introduction to Operation Research"*
2. *Taha H.A. "Operation Research - an introduction"*
3. *Kanti Swarup "Operation Research"*
4. *S.D.Sharma "Operation Research"*
5. *Hira & Gupta "Operation Research"*

8. STOCHASTIC PROCESS

UNIT-I

Probability Theory Refresher: Axiomatic construction of probability spaces, random variables and vectors, probability distributions, functions of random variables; mathematical expectations, transforms and generating functions, modes of convergence of sequences of random variables, laws of large numbers, central limit theorem.

UNIT-II

Introduction to Stochastic Processes (SPs). Definition and examples of SPs, classification of random processes according to state space and parameter space, types of SPs, elementary problems.

UNIT-III

Discrete-time Markov Chains (MCs): Definition and examples of MCs, transition probability matrix. Chapman-Kolmogorov equations; calculation of n-step transition probabilities, limiting probabilities, classification of states, ergodicity, stationary distribution, transient MC; random walk and gambler's ruin problem, applications. Continuous-time Markov Chains (MCs): Kolmogorov-Feller differential equations, infinitesimal generator, Poisson process, birth-death process, Applications to queueing theory, inventory analysis, communication networks, finance and biology.

Brownian Motion: Wiener process as a limit of random walk; first -passage time and other problems, application to finance.

UNIT-IV

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,McBum.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.

PhD course work subjects:

1. Vacuum Technology

SUB CODE	L	T	P	DURATION	ESE	CREDITS
ECE7102	3	1	0	3 HOURS	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 flow, Conductance, Flow calculations.

Unit-2: Vacuum generation: Diaphragm pump, Rotary pump, Diffusion pump, Cryogenic pump, Turbomolecular 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:

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

2. Finite Element Method

SUB CODE	L	T	P	DURATION	ESE	CREDITS
ECE7103	3	1	0	3 HOURS	100	4

Unit I: Basic Principles of Structural Mechanics: Equations of equilibrium, Strain displacement relations, Stress strain relations, Plane stress and Plane strain problems, Boundary Conditions. Different steps involved in finite element method (FEM)

Unit II: Element Properties: Displacement models, Shape functions, Stiffness matrices, One dimensional bar element, two dimensional truss elements, two dimensional beam elements.

Unit III: Lagrangian interpolation, Pascal's triangle, Convergence criteria. Plane Stress and Plane Strain Problems: Analysis of plates using triangular CST elements, Rectangular elements, axy-symmetric elements.

Unit IV: Isoparametric Elements: four node, eight node elements, Numerical integration.

Unit V: Bending of plates by rectangular elements, triangular elements and quadrilateral elements.

References

1. R. D. Cook, Concepts and Applications of Finite Element Analysis, John Wiley& Sons, New York
2. C. S. Krishnamoorthy, Finite Element analysis-Theory and Programming, Tata McGraw Hill.
3. O. C. Zienkiewicz and R. L. Taylor, The Finite Element Method, McGraw Hill Publishing
4. J. N. Reddy, An introduction to Finite Element Method, Tata-Mc Graw Hill, New Delhi.
6. T. R. Chandrupatla & A. D. Belegundu, Intro. to Finite Elements in Engg,Prentice Hall of India Pvt. Ltd.,

3. Sensors & Measurement Science and Technology

SUB CODE	L	T	P	DURATION	ESE	CREDITS
ECE7104	3	1	0	3 HOURS	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 Measurement: Methods of Force Measurement, Elastic Force Transducers, Torque Measurement on Rotating Shafts, Shaft Power Measurement, Vibrating-Wire Force Transducers.

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 O 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

4. Artificial Intelligence

SUB CODE	L	T	P	DURATION	ESE	CREDITS
ECE7105	3	1	0	3 HOURS	100	4

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

Unit-2: Cognitive perspective of pattern recognition- Template Matching, Prototype matching, feature based approach, Computational approach; Cognitive models of memory- Atkinson-Shiffrin's model, Tulving's model, Parallel distributed processing approach; Understanding of problem; Cybernetic view to cognition.

Unit-3: Production rules, Working memory, Control Unit/Interpreter, Conflict Resolution strategies, Types of production systems-Commutative 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 theorem 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: