CS/EB/EC/EE/EI/IT 701 INDUSTRIAL ORGANIZATION AND MANAGEMENT

Module 1

Organisation: Introduction, definition of organization, system approach applied to organization, necessity of organization, elements of organization, process of organization, principles of organization, formal and informal organization, organization structure, types of organization structure .

Forms of business organization: Concept of ownership organization, types of ownership. Individual ownership, partnership, joint stock Company, private and public limited company, co-operative organizations, state ownership, public corporation

Module 2

Basic concept of management: Introduction, definitions of management, characteristics of management, levels of management, management skills

Management theory: Scientific management, contribution of Gilbreth. Gantt, Neo-classical theory, modern management theories

Functions of management: Planning, forecasting, organizing, staffing, directing, motivating, controlling, co-coordinating, communicating, decision making.

Module 3

Personnel management: Introduction, definition, objectives, characteristics, functions, principles and organization of personnel management

Markets and marketing: Introduction, the market, marketing information, market segmentation, consumer and indusial markets, pricing, sales, physical distribution, consumer behaviour and advertisement.

Financial management: the basics , financial accounts, inflation, profitability, budgets and controls, cost accounting, valuation of stock, allocation of overheads, standard costing ,marginal costing

Module 4

Productivity and production: Measurement of productivity, productivity index productivity improvement procedure

Materials management and purchasing: Objectives, functions, importance of materials management. Stores and storekeeping

Inventory control: Classification, functions, inventory models, inventory costs, EOQ, Materials requirement planning

References:

1. Fraidoon Mazda, Engineering Management-, Addison -Wesley
2. Koontz and O'Donnell, Essentials of Management, Mc Graw Hill
3. Kotlar P, Marketing Management, Prentice Hall India
4. Prsanna Chandra , Finance Management,TMH.5th ed.,
5. Monks J.G Operations Management ,MGH

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 702 RADIO COMMUNICATION

Module I

Fundamentals of Electromagnetic Radiation – Radiation Mechanism -Potential functions - Retarded potential. The Short dipole – short current element - near and far fields. Loop antenna. Basic antenna parameters -radiated power - radiation resistance - radiation efficiency - effective aperture area - radiation pattern - antenna beam width - directivity - gain **-** Frii's Transmission Equation

Module II

Antenna arrays:- Broad side - end fire arrays. Binomial array. Radiation pattern of two element and N-element point sources, Principle of pattern multiplication, Yagi-Uda antenna.
Microwave antennas:-rectangular aperture, circular aperture - horn antenna
Ref lector antennas:-corner-parabolic Reflector. Helical antennas (qualitative study only-construction, basic principle, pattern, gain) . Fundamentals of Microstrip patch antennas (structure, Radiation mechanism, pattern).
Antenna Measurements: - VSWR - Radiation pattern- Gain.

Module III

Propagation of radio waves:-Ground waves - Ref lection of radio waves by surface of the earth. Space wave propagation -considerations in space wave propagation- atmospheric effects, Duct propagation. Structure of Ionosphere and mechanism of ionospheric propagation- Refraction and Reflection of sky waves by ionosphere – ray paths – skip distance – virtual height-maximum usable frequency -vertical and oblique incidence.

Module IV

Introduction to RADAR:- RADAR range equation – pulse RADAR- applications of RADAR –accuracy and resolution – Doppler effect to find velocity – pulse repetition frequency – unambiguous range and velocity – factors affecting the performance of RADAR. Synthetic and Raw displays (concepts only). CW RADAR with non zero IF – FM CW RADAR - applications – MTI and Pulse Doppler RADAR
Tracking RADAR:-Sequential lobing- conical scanning- helical scanning- Monopulse tracking- SAR.(Basic concepts and Block diagrams only) Electronic counter measures – main beam jamming – side lobe jamming – passive ECM.

Text Books:

1. J.D.Kraus, R.J Marhefka and Ahmed S Khan ,*Antennas for all applications*, Tata Mc Graw Hill, 3rd edition
2. Jordan and Balmain, *Electromagnetic waves and Radiating systems*, Pearson Education, 2nd edition
3. Skolnik, , *Introduction to RADAR Systems* , McGraw Hill ,3rd edition

References:

1. C.A Balanis, *Antenna Theory, Analysis and design*, John Wiley student edition, 2nd edition
2. George Kennedy, *Electronic Communication systems*, Tata Mc Graw Hill,4th edition.
3. B.Somanathan Nair, *Microwave Engineering- Theory, Analysis and Applications*, Sanguine Technical Publishers, 2005.
4. G.S.N Raju, *Antennas and Wave Propagation*" Pearson education, 2004.
5. C.G.Christodoulou, Parveen F Wahid, *Fundamentals of Antennas: Concepts and Applications*, Prentice Hall of India.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 703 COMPUTER COMMUNICATION AND NETWORKS

Module I

Introduction to data communication: Transmission modes –serial and parallel transmission, synchronous and asynchronous, simplex, half duplex and full duplex communication. Interface standards: RS 232, RS 449, and X.21- Circuit switching and packet switching. Introduction to Computer networks: Evolution of computer networking and internet, Types of network. OSI reference model, TCP/IP reference model.

Module II

Application layer: WWW and HTTP- File transfer protocol: FTP, DNS, SMTP, SNMP, RPC

Security in Networks: Principles of cryptography- symmetric key, public key, authentication protocol, digital signature, firewall.

Module -III

Network Layer and Routing:- Network Service model – Datagram and Virtual circuit service-Routing principles-Link state routing-distant vector routing-hierarchical routing-multicast routing-IGMP Internet Protocol (IP): IPv4 addressing-routing and forwarding datagram-datagram format-datagram fragmentation- ICMP-DHCP- Network Address Translators (NATs)- IPv6 packet format-transition from IPv4 to IPv6-

Transport Layer: Transport Layer Services-Relationship between Transport Layer and Network Layer-Transport Layer in Internet-Multiplexing and De multiplexing. Connectionless Transport: UDP-Segment structure-Checksum- Connection Oriented Transport: TCP-TCP connection-TCP Segment Structure-Round trip Time estimation and Time out-Reliable Data transfer-Flow control-TCP connection Management. Congestion Control: Causes and costs of congestion- Approaches to congestion control- TCP congestion control: Fairness-TCP delay modeling.

Module IV

Link Layer and Local Area Networks: Service provided by data link layer-Error detection and correction Techniques-Elementary data link layer protocols - Sliding Window protocols - Data link layer in HDLC, Internet. Multiple Access protocols: Channel partitioning protocols: TDM-FDM-Code Division Multiple Access (CDMA) Random Access protocols : ALOHA, CSMA and CSMA/CD . Local area Network: LAN addresses- Address Resolution Protocol-Reverse Address Resolution Protocol. Ethernet: Ethernet Technologies-IEEE standards-Hubs-Bridges and Switches

Text Books:

1. James F. Kurose and Keith W. Ross, *Computer Networking – A Top-Down Approach Featuring the Internet,* 2nd edition, Pearson Education ,2003
2. F. Halsall, *Data Communication, Computer Networks and Open System*s, Addison Wesley, 1996

References:

1. Y Zheng, S Akhtar, *Networks for computer scientists and Engineers*, Oxford Press, 2004
2. S. Keshav, *An Engineering Approach to Computer Networkin*g, Pearson education ,2002
3. Uyless Black, *Computer Networks - Protocols, Standards and Interface*s, Prentice Hall India, New Delhi, 1994
4. Andrew S. Tanenbaum, *Computer Networks* , 4th edition, Pearson education, 2003
5. Behrouz A. Fourouzan ,*Data Communications and Networking,* 2nd edition ,Tata McGraw Hill,2000
6. Leon-Garcia and I. Widjaja, *Communication Network* s, Tata McGraw Hill, 2000
7. Bertsekas and Gallagar , *Data Network*s, 2nd edition, Prentice Hall India, 1992
8. Douglas Comer and David L. Stevens, *Internetworking with TCP/IP Vol. I, II, and III*,Prentice Hall, New York, 1990
9. Richard Stevens. W, *TCP/IP Utilities - Vol. I, The protocol*s, Addison Wesley, 1994
10. Sidnie Feit, *TCP/IP, Architecture, Protocols and implementatio*n, McGraw-Hill, New York, 1993

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 704 ELECTRONIC PRODUCT DESIGN

Module 1

From Requirement to Product : Engineering design as real life problem solving- Requirement analysis of Electronic products- Formulation of product requirement specifications and target specifications.

The design process: Product conceptualization- Product architecture- Product synthesis- Design analysis- Portable Electronic Design Factors-Computer Aided Design.

Representation of development tasks using standard tools showing timing and dependencies- Product Life Cycle.

Module II

Product Design and documentation: Various dimensions of Electronic Product Design- Industrial design and Engineering design- DFx methodologies in product design- Quality by design analysis- Sketches and Engineering drawing of Electronic products. Aesthetics and Ergonomics- Inputs, control and display interface.

Electronic interconnection and Packaging of components, Integrated circuits, Printed circuits and Functional products- Cables and connectors- Design, Engineering and Test Documentation – Component Specification/ Bill of materials.

Module III

Thermal Considerations in Electronic Product Design: Heat generation and modes of heat transfer in Electronic products- Selection of Power Semiconductor Devices based on thermal considerations- Selection/Design of Heat Sinks- Factors affecting the design of heat sinks and its cooling effectiveness- Assembly of components on heat sinks- Electrical analogue of thermal circuits- Enclosure design of Electronic Equipments and thermal considerations- Design guidelines for Ventilations- Forced cooling- Heat pipes for electronic cooling applications- Cooling of power intensive IC chips.

Module IV

EMI/EMC Considerations in Electronic Product Design: Sources of EMI, inter/intra system EMI- Noise performance of passive components- Cabling, Shielding and Grounding - Cables, Connectors, components and equipments for interference suppression/minimization- Intrinsic noise sources and their management- EMI standards and Regulations.

PCB design: PCB design process-Design rules for analog, digital, high-frequency, power-electronic and MW PCBs-PCB design guidelines for EM compatibility-Designing PCBs for manufacturability- Design considerations for power efficiency-Thermal Considerations in PCB design.

Introduction to SPICE simulation of circuits- Circuit description- Modeling of active and passive circuit elements - DC, AC, Transient and Parametric circuit analysis.

Module V (Tutorial Only-No questions from this module for University Examination)

Electronic Design Automation Tools: Introduction to PC based Electronic Design Automation Tools: Schematic Capture, Circuit Simulation, Layout Design etc. features like EMI analysis, Thermal analysis, 3d visualization etc. of such packages with reference to EDA tools such as Orcad, EDWIN XP etc. (As assignment, each student shall design and simulate an electronic product following the above syllabus using EDA tools.)

Reference:

1. Karl T. Ulrich & Steven D. Eppinger, *Product Design and Development,* Tata Mc Graw Hill, New Delhi, 2004
2. *Thermal Design of Electronic Equipment*- Monogram by CEDT, IISc., Bangalore.
3. Henry W. Ott, *Noise Reduction Techniques in electronic systems*, John Wiley, NY, 1988
4. Mohammed H. Rasheed, *Spice for circuits & Electronics using Pspice*, Prentice Hall India

5. V. Prasad Kodali, *Engineering Electromagnetic Compatibility-Principles, Measurements, and Technologies,* S.Chand & Company Ltd., New Delhi, 2000
6. Walter C. Bosshart, *Printed Circuit Boards- Design and Technology*, Tata Mc Graw Hill, New Delhi, 1988
7. Kim. R. Fowler, *Electronic Instrument Design*, OXFORD University Press, 2004
8. Kevin Otto, Kristin Wood, *Product Design- Techniques in Reverse Engineering and New Product Development*, Pearson Education, New Delhi, 2004
9. Richard Stillwell, *Electronic Product Design for Automated Manufacturing*, Marcel Dekker Pub
10. Bert Haskell, *Portable Electronics Product Design and Development*, Mc Graw Hill

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 705A INTELLIGENT SYSTEMS

Module I

Artificial Intelligence: History & Applications, Knowledge representation, reasoning, issues & acquisition, search techniques. Introduction to PROLOG & LISP, Expert Systems.

Module II

Artificial Neural Networks: Biological aspects, Pitt's Neuron Model, Perception model, Learning algorithm – supervised & unsupervised multilayer perception, Back propagation algorithm, Associative memory, Feed back networks, Applications of Neural Networks.

Module III

Fuzzy Systems: Fuzzy sets, Measures of fuzziness, Fuzzification, Fuzzy relations, Linguistic descriptions and their analytical forms, Defuzzification methods, Application of fuzzy logic, Fuzzy Neural Networks.

Module IV

Genetic algorithms and Evolutionary programming: Genetic algorithms – operators, working, Genetic algorithm based machine learning classifier system. Swarm Intelligent Systems: Ant Colony Systems (ACO): Biological concept, artificial systems - Applications, Particle Swarm Intelligent Systems – PCO method, Applications.

Text Book:

N.P Padhy, *Artificial Intelligence and Intelligent Systems*, Oxford University Press, 2005.

REFERENCES:

1. Rajasekharan & Pai Neural Networks, Fuzzy Logic and Generic Algorithms, PHI
2. Elaine Rich, Kevin Knight, Artificial Intelligence, Tata McGraw Hill, 2006
3. Yegnanarayana, Artificial Neural Netowrks, PHI, 1999
4. E.Cherniak, D. McDermott, Introduction to Artificial Intelligence, Addison – Wesley Pub. 1987
5. Jean – Louis Ermine, Expert Systems : Theory & Practice, PHI, 1999
6. H.J Zimmermann, Fuzzy set theory and its Applications, Kluwer Academic Publishers, 2ed., 1991

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 705B FUNDAMENTALS OF RF DESIGN

Module I

Passive Components for RF: Behavior at High Frequencies: Wire, Resistors, Capacitors, Inductors, Toroids and their winding, Impedance Transformation, Coupling of resonant circuits.
Active RF components: RF diodes, RF transistors; The Transistor at Radio Frequencies: Equivalent Circuit, Y-Parameters, S-Parameters, and other relevant two-port parameters, RF Transistor Data Sheets.
Computer-Aided Design and Analysis Interconnection of networks Analysis techniques, Optimization Use of SPICE (Practical assignments using HSPICE is recommended)

Module II

Microwave Printed Circuits & Microwave Solid State Devices: Bipolar Microwave Transistor, MESFET, MODFET/HEMT Microwave IC's, Microwave Diodes, and MODAMPs, Strip lines, Micro strips, Printed Microwave Components, Surface Acoustic Wave device.
Amplifiers: High frequency Amplifier Design, Small Signal RF Amplifier Design- Biasing, Designs using Y and S Parameters, Broadband Amplifiers, Single Stage, Multistage designs. Gain and stability analysis using S parameters. Wide Bandwidth Design Fundamental limitations on matching Transmission line transformers. Use of feedback in RF amplifier design. Design for specified gain, bandwidth, and SWR.

Module III

RF Power Amplifiers: RF Power Transistor Characteristics, Biasing, Design, Matching to Coaxial Feed lines Large Signal Amplifiers Amplifier classes and efficiency Dynamic range Inter modulation distortion Third-order intercept Design of large signal linear amplifiers. Design of large-signal class-C amplifiers Design of switch-mode amplifiers. Power combiners ,Directional couplers Hybrids.

Module IV

Oscillators and Mixers: Basic oscillator model, Oscillator, Synthesizer, Phase-locked loop, Phase noise, PLL structures & Architectures. Direct Digital Synthesis; Mixer- basic concepts, single ended, single balanced and double balanced mixers. Software Radio and DSP in Radio communication.

References:

1. Smith J, *Modern Communication Circuits*, McGraw Hill, 1986
2. Bowick, *RF Circuit Design*, H W SAMS, 1994
3. Chung & Levien, *Microwaves Made Simple: Principles & Applications*, Artech House ,1985
4. M N Radmanesh, *RF and Microwave electronics illustrated*, Pearson Education,
5. R S Carson, *High Frequency Amplifiers* ,Wiley, 1982, 2nd edition.
6. G Vendelin, *Design of amplifiers and Oscillators by the S-parameter Method*, Wiley, 1982
7. Reinhold Ludwig, Pavel Bretchko, *RF circuit Design: theory and practice*, Prentice Hall, 2000
8. Herbert L Krauss, Charles W Bostian & Frederick H Raab, *Solid State Radio Engineering,*John Wiley & Sons, 1980
9. Liao S.Y, *Microwave Devices & Circuits*, Prentice Hall , 3rd edition, 1990
10. Meyr et al, *Digital Communication Receivers, Synchronisation, Channel Estimation & Signal Processing*, Wiley, 1997.
11. Jeffrey H. Reed, *Software Radio, a modern approach to Radio Engineering*, Prentice Hall , 2002

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 705C HARDWARE MODELING

Module I

Introduction: Hardware Abstraction- Basic Terminology- Entity Declaration- Architecture Body- Configuration Declaration- Package Declaration- Package Body- Model Analysis- Simulation- Basic Language Elements – Identifiers- Data Objects- Data Types- Operators. Example designs: Basic Combinational Circuits.

Module II

Behavioural Modelling: Entity Declaration- Architecture Body-Process Statement- Variable Assignment Statement- Signal Assignment Statement- Wait Statement- If Statement - Case Statement- Null Statement- Loop Statement- Exit Statement- Next Statement- Assertion Statement- Report Statement- Other Sequential Statements- Multiple Processes- Postponed Processes - Dataflow Modelling: Concurrent Signal Assignment Statement- Concurrent versus Sequential Signal Assignment- Delta Delay Revisited- Multiple Drivers- Conditional Signal Assignment Statement- Selected Signal Assignment Statement- the UNAFFECTED Value- Block Statement- Concurrent Assertion Statement- Value of a Signal. Modelling Basic Binary Arithmetic Circuits, Sequential Circuits, Registers.

Module III

Structural Modelling: Component Declaration- Component Instantiation- Resolving Signal Values - Generics and Configurations: Generics- Configurations- Configuration Specification- Configuration Declaration- Default Rules - Conversion Functions - Direct Instantiation- Incremental Binding. Subprograms and Overloading: Subprograms- Subprogram Overloading- Operator Overloading- Signatures- Default Values for Parameters - Packages and Libraries. Models of RAM, Dual-Port RAM, and FIFO.

Module IV

Advanced Features: Entity Statements- Generate Statements- Aliases- Qualified Expressions- Type Conversions- Guarded Signals- Attributes- Aggregate Targets- Shared Variables- Groups - Model Simulation: Simulation- Writing a Test Bench- Converting Real and Integer to Time- Dumping Results into a Text File- Reading Vectors from a Text File- A Test Bench Example- Initialising a Memory- Variable File Names- Hardware Modelling Examples: Modelling Entity interfaces- Modelling Simple Elements- - Different Styles of Modelling- Modelling Regular Structures- Modelling Delays- Modelling Conditional Operations- Modelling Synchronous Logic- State Machine Modelling- Interacting State Machines- Modelling a Moore FSM- Modelling a Mealy FSM.

Text Book:

1. J. Bhasker, *VHDL Primer*, Pearson Education Asia, 3rd edition.

Reference:

1. Sudhakar Yakmandhiri , *Introducing VHDL from simulation to synthesis*, Pearson Education Asia
2. Stephen Brown and Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, Mc-Graw-Hill ,2nd edition
3. K. C. Chang, *Digital Design and Modeling with VHDL and Synthesis* , IEEE Computer Society Press, I edition
4. Charles H.Roth Jr., *Digital Systems Design Using VHDL*, Thomson Learning, 2006

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EB/EC/EI 705D MECHATRONICS

Module I

Introduction to Mechatronics- Elements of Mechatronic Systems.
Sensory System: Sensors & Transducers- Performance measure, static and dynamic characteristics- Sensing displacement, position, proximity, velocity and motion, force, pressure, flow, level, range, temperature and Light.
Signal Conditioning and Date Acquisition: Signal Conditioning Elements- amplification, attenuation, impedance matching, linearization, digitization, level shifting, filtering, error compensation, etc. Data acquisition and presentation in mechatronic systems- signal measurement and calibration- Design Considerations

Module II

Actuation System: *Pneumatic & Hydraulic Systems*: Process Control Valves, Directional and Pressure Control valves, Linear and Rotary actuators.
Mechanical Actuation Systems: Translational and Rotational motions, Kinematic Chains, Cams, Gear Trains, Ratchet and Pawl, Belt and Chain drives, Bearings.
Electrical Actuation Systems: Mechanical and Solid State Relays, Solenoids, DC & AC motors, Servo & Stepper motors- Specifications and Selection considerations.
Power sources for mechatronic Systems

Module III

Mathematical modeling of Engineering Systems: System Building blocks for Mechanical, Electrical, Fluid and Thermal systems.
General Engineering System Modeling: Rotational_Translational, Electromechanical, Hydraulic_Mechanical systems- System Transfer Function- Dynamic response of systems for standard test signals (Detailed mathematical analysis not required).
MEMS: Internal Structure, advantages, manufacturing, applications- Fibre Optic Devices in Mechatronics
(For this module assignments on Simulation studies using computer software such as MATLAB with SIMULINK is recommended)

Module IV

Mechatronic System Controllers: ON/OFF, P, I, D, PI and PID Controllers, Digital controllers, Intelligent Controllers in Mechatronics.
Programmable Logic Controllers: Structure, I/O processing, Programming, applications – Selection Criteria.
Typical Mechatronic Systems: Robotic Systems, CNC machines, FMC, FMS, AGV etc.

Text Books:

1. Bulton. N, *Mechatronics- Electronic Control systems in Mechanical and Electrical Engineering*, Pearson Education, 2006
2. Devadas Shetty, *Richard A. Kolk, Mechatronics System Design*, Thomson, New Delhi, 2007
3. S. R. Deb, *Robotics Technology and Flexible Automation*, Tata Mc Graw Hill, New Delhi, 2004

References:

1. M.D. Singh, J.G. Joshi, *Mechatronics*, Prentice Hall India, New Delhi, 2006
2. Dradly. D.A, Dawson.D, Burd N.C and Loader A.J, *Mechatronics – Electronics in Products & Processes*, Chapmen & Hail, 1993.
3. *Mechatronics*, HMT Limited, Tata McGraw Hill, 1998.
4. James Harter, *Electromechanics- Principles concept and Devices,* Prentice Hall, 1995.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC /EI 706 SIGNAL PROCESSING LABORATORY

1. Familiarization of Signal processing tool box-MATLAB
2. Familiarization of DSP trainer kit (Sampling & reconstruction of signals)

List of experiments to be implemented

1. Generation of basic input signals (both discrete & continuous)
2. DFT and spectral analysis computation of DFT, properties of DFT
3. Convolution
4. Correlation
5. Digital filter design- FIR & IIR Filters
6. FFT
7. Spectral estimation

Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.

EC 707 COMMUNICATION LABORATORY II

PART A (compulsory)

1. Sampling and reconstruction of signals
2. PCM generation
3. Differential PCM generation
4. Implementation of Delta modulator and demodulator
5. Matched filter receiver for rectangular pulse
6. Generation and detection of BASK and BFSK signals
7. Generation and detection of BPSK signals
8. Generation and detection of QAM using IC multipliers
9. Microwave Communication (Any 2 Experiments from)
   (a) Study of Klystron source-Power, mode and impedance, SWR, guide wave length
   (b) Gunn Source-Characteristics, Hybrid T, Directional coupler, Circulator
   (c) FET M/W source-SWR, Impedance, Guide wavelength, Tees
   (d) Study of Microwave links
10. Antenna characteristics- Radiation pattern and beam width, gain measurements.

PART B (*)

1. Communication system simulation using software tools
2. DAS using Microprocessors
3. Experiments on Computer communication
4. Development of an optical fiber communication transmitter and receiver module.
5. A small project work using ANN, image processing or biomedical instrumentation.

* At least two topics from part B has to be covered

Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.

EC 708 SEMINAR

Students shall individually prepare and submit a seminar report on a topic of current relevance related to the field of Electronics & Communication Engineering. The reference shall include standard journals, conference proceedings, reputed magazines and textbooks, technical reports and URLs. The references shall be incorporated in the report following IEEE standards reflecting the state-of-the-art in the topic selected. Each student shall present a seminar for about 30 minutes duration on the selected topic. The report and presentation shall be evaluated by a team of internal experts comprising of3 teachers based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report.

EC 709 PROJECT DESIGN

Each batch comprising of 3 to 5 students shall identify a project related to the curriculum of study. At the end of the semester, each student shall submit a project synopsis comprising of the following.

- Application and feasibility of the project
- Complete and detailed design specifications.
- Block level design documentation
- Detailed design documentation including circuit diagrams and algorithms / circuits
- Bill of materials in standard format and cost model, if applicable
- Project implementation action plan using standard presentation tools

Guidelines for evaluation:

i)	Attendance and Regularity	10
ii)	Quality and adequacy of design documentation	10
iii)	Concepts and completeness of design	10
iv)	Theoretical knowledge and individual involvement	10
v)	Quality and contents of project synopsis	10
	Total	50 Marks

Note: *Points (i)-(iii) to be evaluated by the respective project guides and project coordinator based on continuous evaluation. (iv)-(v) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.*