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:

Fraidoon Mazda, Engineering Management-, Addison -Wesley
Koontz and O'Donnell, Essentials of Management, Mc Graw Hill
Kotlar P, Marketing Management, Prentice Hall India
Chandra P , Finance Management
Monks J.G Operations Management

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 702 DESIGN ESTIMATION & COSTING

Module I

Role of national electrical code in the design of electrical installation – electrical symbols and diagrams – design considerations of electrical installations – electric supply systems – protection and protective devices for electric installation against overload – short circuit and earth fault – electric services in building – service connections – service mains – reception and distribution of main supply – sub- circuits – neutral and earth wire – earth bus – guideline for installation of fittings – design and selection of bus bars and bus bar chambers –design, selection, layout, drawing and location of distribution boards and panel boards – control and switch gears – criteria for selection of HT and LT underground cables.

Module II

Design of illumination schemes – various types of light sources – different types of lighting arrangement – energy efficiency in lamps and illumination – design considerations of good lighting schemes – design of lighting schemes for various purposes – lighting calculations – design of flood lighting and street lighting – electrical aspects and considerations for lifts, escalator services and standby generators – design and safety aspects of electrical installations for residential buildings, hospitals, hotels, recreational and assembly buildings and cinema theatre.

Module III

Electrical installations of high rise buildings – design – schematic diagram – layout – estimation and testing of rising main – main supply board and distribution boards for high rise buildings including air conditioners and lift with provision for standby generators and its protection – lighting protection – electrical system design – estimation and costing of commercial buildings – design considerations of electrical installations in Industries – design, estimating and costing of electrical installations for small industries.

Module IV

Selection of EHV and HV power and distribution transformers and switchgears – case studies – design – layout – schematic diagram –estimation and costing – (a) 16MVA – 110/11KV outdoor substation having one or two incoming and 8 or less outgoing – (b) 11KV/415V outdoor substations upto 630KVA – (c) 11KV/415V indoor substation upto 630KVA – (d) bus bar trunking above 630KVA – design of earthing system – earthmat design – design of plate and pipe earthing – shielding of electrical system.

Reference books

Raina & Battacharya, *Electrical System Design, Estimation & costing*, Wiley Eastern
Gupta J.B, *Electrical Installating, Estimating & Costing*, Kataria & Sons
ISI, *National Electric Code*, Bureau of Indian Standard Publications
Cinema Regulation (Rules) & Act
IEEE Standards, IEEE
Relevant Indian Standard Specifiactions, IS Publications.

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 703 POWER SYSTEMS-II

Module I

Representation of power system – one line diagrams – impedance and reactance diagrams – per unit and percent quantities – primitive and interconnected networks and their performance equations – y-bus and z- bus matrices and their formulation – effect of off nominal transformer on y-bus – load flow studies – problem formulation – classification of buses – gauss-seidal method – Newton Raphson method and fast decoupled load flow method – line loss computation – voltage dependency consideration in load modeling.

Module II

Economic load dispatch – system constraints – economic dispatch of thermal plants neglecting line losses – optimum load dispatch including transmission line losses – exact transmission loss formula – automatic load dispatching – optimal load flow solution – speed governing mechanism – speed governing of turbo generator – load sharing and governor characteristics – transfer function model – load frequency – control of single and multi area systems – static analysis – automatic voltage regulation – IEEE type I excitation system transfer function model.

Module III

Short circuit studies – faults on power systems – three phase to ground faults – SLGF – DLGF – LLF faults – sequence impedance and sequence network – symmetrical component methods of analysis of symmetrical and unsymmetrical faults at the terminals of an unloaded generator – fault analysis using z-bus phase shift in star – delta transformer banks – faults through impedance – short circuit capacity of a bus and circuit breaker rating.

Module IV

Power system stability studies – steady stage dynamic and transient stability – electrical stiffness – swing equation – inertia constant – equal area criterion applied to the case of a sudden change in mechanical power input – multi machine stability analysis using forward euler method – basic assumptions and algorithms – factors affecting stability – voltage stability problem – causes and mitigation methods – introduction to HVDC and flexible ac transmission (FACTS) systems.

Text Book:

Stevenson W.D Jr - *Elements of Power System Analysis* (TMH)
I.J Nagrath & D.P Kothari - *Modern Power System Analysis*, (TMH)

Reference:

1. S.L.Uppal - *Electrical Power* (Khanna Publication).
2. S.S Rao - *Switch gear & Protection* (Khanna Publication)
3. Soni, Guptha, Bhatnagar & - *A course in Electric Power* (Dhanapat Rai Sons).

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 704 CONTROL SYSTEMS II

Module I

Non-linear systems Characteristics Phase plane analysis liberalization and stability of equilibrium points. Isocline and delta method. Limits cycles of phase plane- stability of limit cycles. Bendixson's criteria.

Module II

Describing function methods and stability of non-linear systems, Harmonic linearisation, describing function method, filter hypothesis- describing function for single valued and double valued non – linear elements- Limit cycles amplitude and frequency- Stability of non-linear systems. Lyapunov's method for non-linear systems. Popov's criterion.

Module III

Discrete time systems, sampling theorem, hold circuits and data reconstruction- z transforms, inverse z transforms, pulse transfer- state variables description of discrete time systems- time domain analysis, stability using Jury's test and Lyapunov's method.

Module IV

Elements of stochastic control- stochastic processes- autocorrelation and cross correlation, power spectral density, ergodicity – Gauss, Markov processes- Wiener filter, introduction to Kalman filter and state estimation.

Reference Book

1. Benjamin.C.Kuo - *Digital Control systems*, Prentice Hall Inc, 1980
2. Hassan.K.Khalil - *Non-linear systems*, Prentice Hall International (UK) 1996.
3. A.Isidori - *Non-linear Control Systems*, Springer verlag New York 1995.
4. S.Wiggins - *Introduction to Applied Non- linear Dynamical Systems and chaos*, Springer Verlag New York 1990.
5. Gene.F.Franklin and David Powel- *Digital Control of Dynamic Systems*, Addison Wesley, 2000.

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EB/EE 705(A) COMPUTER COMMUNICATIONS

Module 1

Introduction to computer networks – Types of Networks - Layered architecture- OSI reference model, TCP/IP reference model –Internet Protocol Stack – Network Entities in Layers- Connection oriented and Connection less services. Transmission media - description and characteristics - base band and broad band transmission - synchronous and asynchronous transmission - full duplex and half-duplex links. MODEMS serial communication standards - X-21 digital interface.X.25 Networks.

Module 2

Need for data link layer - Error detection and correction Techniques- Elementary data link layer protocols-sliding window protocols - Multiple Access protocols -Random Access protocols: ALOHA-CSMA and CSMA/CD. Terminal handling - polling, multiplexing and concentration. Local area Network: LAN addresses- Address Resolution Protocol-Reverse Address Resolution Protocol. Ethernet: Ethernet Technologies-IEEE standards- Hubs-Bridges and Switches.

Module 3

Network Layer: Virtual circuits and data grams -Datagram and Virtual circuit service-Routing - different types of congestion control – IP protocol – Subnets – Multicasting - Network layer in ATM.

Transport layer – Transport layer services - design issues – Elements of transport Layer – Internet Transport Protocols (TCP and UDP).

Module 4

Session layer - design issue - data exchange – dialogue management - synchronisation - remote procedure call - client server model.

Application layer - network security and privacy - cryptography – Domain Name System (DNS)- SMTP – SNMP - virtual terminal and file transfer protocols - electronic mail - WWW and HTTP.

References:

Andrew S Tannenbaum, *Computer Networks*, Prentice hall of India Pvt. Ltd, 2003.

Uyless Balack, *Computer Networks, Protocols Standards & Interfaces*, Prentice hall of India Pvt. Ltd, 2000.

Zheng, S Akhtar, *Networks for computer scientists and Engineers*, Oxford Press, 2004

S. Keshav, *An Engineering Approach to Computer Networkin*g, Pearson education, 2002

Uyless Black, *Computer Networks - Protocols, Standards and Interface*s, PHI Ltd., 1994

Stalling , *Local and Metropolitan Area Networks* Prentice Hall; 6th edition (April 15, 2000)

Jean Walrand *Communication networks,* Richard D Irwin (May 1991) *2nd Edition*

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 705(B) HIGH VOLTAGE DC TRANSMISSION

Module I

DC power transmission – comparison of AC and DC transmission – Economics of Power transmission – Technical performance – Advantages and disadvantages of DC transmission – Reliability – Application of DC transmission. Types of DC links. Converter Station – Converter Units. Planning for HVDC transmission – Choice of voltage level –Modern trends in DC transmission.

Thyristor valve – valve firing – valve design consideration – Grading and damper circuit design – valve protection. Valve tests – Dielectrical and operational tests.

Module II

HVDC Converters – Analysis, Pulse number. Choice of Converter configuration – valve rating – transformer rating .Graetz circuits (simplified analysis only) - with and without overlap. Analysis of 2&3 valve conduction mode and 3 &4 valve conduction mode . Converter bridge characteristics – Rectifier and Inverter characteristics of a 6 pulse and 12 pulse converter.

Module –III

Principles of DC link control. Converter control characteristics – modification of control characteristics – system control hierarchy- firing angle control- individual phase control – equidistant pulse control. Current and extinction angle control. Starting and stopping of Dc link – power control. Stabilization of AC ties. Converter faults and protection – Converter faults, protection against over current and voltages in a converter station – Surge arrestor- protection against over voltage.

Module - IV

Smoothing reactors – DC lines – DC line insulators – DC breakers – basic concept, characteristics, types and applications. Sources of reactive power- static VAR systems- Thyristor controlled reactor – Types of AC filters (Basic concept only)- DC filters – Carrier frequency and RI noise. Multiterminal DC system –Potential. Application and type. Modeling of DC network.

Simulation of HVDC system – system simulation – philosophy and tools only.

Text Books:-

1. K.R.Padiyar, " HVDC Power Transmission Systems"- Willy Eastern Ltd
2. C.L W adhawa – " HVDC Power nTransmission "

References:-

1. E.W .Kimbark, " Direct Current Transmission " , Vol I (New york)- John Wiley
2. E.Uhaman, "Power Transmission by Direct Current" (Berlin) Spinger – Verlag
3. J.Arrillaga, "High Voltage Direct Current Transmission" (London) Peter Peregrinus.

EE 705(C) NEURAL NETWORK AND FUZZY LOGIC

Module I

Introduction to artificial neural networks – biological neurons – Mc Culloch and Pitts modals of neuron – types of activation function – network architectures – knowledge representation learning process – error-correction learning – supervised learning – unsupervised learning – single unit mappings and the perceptron – perceptron convergence theorem (with out proof) – method of steepest descent – least mean square algorithms – adaline/medaline units – multilayer perceptrons – derivation of the back-propagation algorithm.

Module II

Radial basis and recurrent neutral networks – RBF network structure – covers theorem and the separability of patterns – RBF learning strategies – K-means and LMS algorithms – comparison of RBF and MLP networks – recurrent networks – Hopfield networks – energy function spurious states – error performance – simulated annealing – the Boltzman machine – Boltzman learning rule – the mean field theory machine – MFT learning algorithm – applications of neutral network – the XOR problem - traveling salesman problem – image compression using MLPs – character retrieval using Hopfield networks.

Module III

Fuzzy logic – fuzzy sets – properties – operations on fuzzy sets – fuzzy relations – operations on fuzzy relations – the extension principle – fuzzy measures – membership functions – fuzzification and defuzzification methods – fuzzy controllers – Mumdani and Sugeno types – design parameters – choice of membership functions – fuzzification and defuzzification methods – applications.

Module IV

Introduction to genetic algorithm and hybrid systems – genetic algorithms – natural evolution – properties – classification – GA features – coding – selection – reproduction – cross over and mutation operators basic GA and structure.

Introduction to Hybrid systems – concept of neuro-fuzzy and neuro-genetic systems.

Reference:

1) Haykins S - "*Neutral Network a – Comprehensive Foundation*", Macmillan College, Proc, Con, Inc.
2) Zurada J.M - " *Introduction to Artificial Neural Systems*", Jaico Publishers.
3) Driankov D - Hellendoorn H. & Reinfrank M, " *An Introduction to Fuzzy Control*", Norosa.
4) Ross T.J - "*Fuzzy Logic with Engineering Applications*", McGraw Hill.
5) Goldberg D.E - " *Genetic Algorithms in Search Optimisation and Machine Learning*", Addison Wesley.
6) Bart Kosko - " *Neural Network and Fuzzy Systems*", Prentice Hall, Inc., Englewood Cliffs.
7) Suran Goonatilake & Sukhdev Khebbal (Eds) - " *Intelligent Hybrid Systems*", JohnWiley.

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 705 (D) OPTIMAL CONTROL THEORY

Module I
Introduction, optimal control problem, formulation, performance measures for optimal control problems.

Module II
Calculus of variations- fundamental concepts, functional of single function, Euler-language equation. Transversality conditions, vector case with various boundary conditions, Piecewise, smooth extremals, constrained extremisation of functional.

Module III
Variational approach to optimal control problems. Necessary conditions for optimal control with different boundary conditions. Linear regulator problem, Tracking problems, pontryagin minimum principle, state in equality constrains, minimum time problems, minimum control effort problems.

Module IV
Dynamic programming, principle of optimality, application to multistage decision making, optimal control example, Recurrence relation of dynamic programming, curse of dimensionality, discrete linear regulator problem, Heamilton-Jacobi Bellman equation, continuous linear regulator problems.

Reference:

1. Donald.E.Kirk - *Optimal Control Theory an introduction*, Prentice Hall Inc. 1970.
2. A.P.Sage - *Optimum Systems Control*, Prientice Hall 1977.
3. HSU & Meyer - *Modern Control, Principles & Applications*, Mc Graw Hill 1968.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.

EE 706 ELECTRICAL MACHINES LABORATORY II

Synchronous Machines
Regulation of alternator by direct loading
Regulation of alternator by emf and mmf methods.
Regulation of alternator by potier and ASA methods
Slip test and regulation of salient pole alternator using two - reaction theory
Synchronizing of alternator to mains by dark lamp & bright lamp method and control of reactive power.

Induction machines
Variation of starting torque with rotor resistance in slip ring induction motor.
Direct load test on induction motor.
Pre determination of Characteristic and equivalent circuit of induction motor from no load and blocked rotor test.
Synchronous induction motor V- curves, pre determination of field current.
Pre determination of characteristic of pole changing motor
Test on Induction generator. Determination of rotor hysterisis.

Special experiments
V/f control of induction motor.
Characteristic of single-phase induction motor.
Complete torque slip characteristic of induction motor.
Characteristic of double cage induction motor.
Slip power recovery schemes:
Cascade operation of induction motor. Determination of slip and load shared by each motor and overall efficiency of the test.
Methods using converter/inverter operations
From the above list, maximum number of experiments may be conducted subject to facility available.

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

EE 707 ADVANCED ELECTRICAL ENGINEERING LAB

MATLAB – I – experiments using MTLAB toolbox.
Determination of transfer function of DC motor (a) armature control (b) field control.
Study and experiments on (a) DC servo motor (b) AC servomotor.
Experiments on synchros (a) characteristics (b) data transmission (c) error detection (d) differential synchro.
Determination of transfer function of the amplidyne and load characteristics.
Design and experimental determination of frequency response determination of lag, lead and lag-lead networks.
Magnetic amplifier – characteristics and control circuits.
Static and dynamic performance evaluation of transducer (a) resistance thermometer (b) vibration pick up (c) pH meter.
Study and performance evaluation of transducers (a) strain gauge (b) inductive pick up (c) capacitive pick up (d) LVDT.
Study and experiments on pneumatic control system.
Microprocessor based generation of non-linear functions using proper interfacing and display devices.
PSPICE simulation of single-phase and three-phase diode bridge rectifiers.
PSPICE simulation of three-phase thyristor bridge rectifier.
Power flow analysis of the system with the given single line diagram, using the given power flow analysis package.
Fault analysis of the system with given single line diagram, using the given fault analysis package. Obtain the sub-transient fault currents for DLFG, DLFG, LLF faults at leach bus.
Determination of relay characteristics.

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

EE 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 of 3 teachers based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report.

EE 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.*