

SEMESTER VII

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

MODULE I

Organization, 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 II

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-ordinating, communicating, decision making

MODULE III

Personal management, Introduction, definition, objectives, characteristics, functions, principles of organization of personal management, Markets and marketing : Introduction, the market, marketing information, market segmentation, consumer and industrial markets, pricing, sales, physical distribution, consumer behavior 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 IV

Productivity and production, measurement of productivity, productivity index, productivity improvement procedure, Materials management and purchasing : objectives, functions, importance of materials management, stores and store keeping, Inventory control : classification, functions, inventory models, inventory cost, 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. Prasanna Chandra , Finance Management, TMH.5th ed.,
5. Monks J.G Operations Management ,MGH

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 702 PROCESS CONTROL INSTRUMENTATION II

MODULE I

Need for process control – mathematical model of first – order level, pressure and thermal processes – higher order process – interacting and non-interacting systems – continuous and batch process – self-regulation – servo and regulator operation.

Basic control actions – characteristics of on-off, proportional, single-speed floating, integral and derivative control modes – P+I, P+D and P+I+D control modes – pneumatic and electronic controllers to realize various control actions.

MODULE II

Optimum controller settings : Evaluation criteria – IAE, ISE, ITAE and $\frac{1}{4}$ decay ratio – determination of optimum settings for mathematically described processes using time response and frequency response – tuning – process reaction curve method – Ziegler Nichols method – damped oscillation method.

MODULE III

Multi loop Control : Feed forward control – ratio control- cascade control – inferential control – split range control – introduction to multivariable control – examples from distillation column and boiler systems.

MODULE IV

Final control element : I/P converter – pneumatic and electric actuators – valve positioner – control valves – characteristics of control valves – inherent and installed characteristics – valve body – commercial valve bodies – control valve sizing – cavitation and flashing – selection criteria.

TEXT BOOKS

1. Stephanopoulis, G, Chemical Process Control, Prentice Hall of India, New Delhi, 1990.
2. Eckman. D.P., Automatic Process Control, Wiley Eastern Ltd., New Delhi, 1993.

REFERENCES

1. Pollard A.Process Control, Heinemann educational books, London, 1971.
2. Harriott. P., Process Control, Tata McGraw-Hill Publishing Co., New Delhi, 1991.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 virtual circuit service, routing principles, link state routing – distant vector routing hierarchical routing, multicast routing, IGMP internet protocol, IPv4 addressing, routing and forwarding datagram, - datagram format, datagram fragmentation – ICMP – DHCP – network address translators, 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 Timeout – 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 Networks: 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, Pearson Education, 2nd Ed.
2. F. Halsall, Data Communication, Computer Networks and Open Systems, 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 Networking, Pearson Education, 2002
3. Uyless Black, Computer Networks – Protocols, Standards and Interfaces, PHI Ltd, 1994
4. Andrew S. Tanenbaum, Computer Networks, Pearson Education/PHI Ltd. 4th ed.
5. Behrouz A. Fouruzan, Data Communications and Networking, Tata McGraw Hill, 2nd ed.
6. Leon-Garcia and I.Widjaja, Communication Networks, Tata McGRawHill, 2000
7. Bertsekas and Gallagar, Data Networks, Prentice Hall India, 2nd ed.
8. Douglas Comer and David L.Stevens, Internetworking with TCP/IP Vol.I(5th edn).II(3rd edn), and III(2nd edn),Prentice Hall India Ltd.
9. Richard Stevens. W, TCP/IP Utilities – Vol.I, The Protocols, Addison Wesley, 1994
10. Sidnie Feit, TCP/IP Architecture, Protocols and implementation, McGraw Hill, Newyork, 1993

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 704 ANALYTICAL INSTRUMENTATION

MODULE I

PH CONDUCTIVITY & DISSOLVED SYSTEMS ANALYSER

Sampling systems – ion selective electrodes – conductivity meters – pH meters – dissolved oxygen analyser – sodium analyser – silica analyser – moisture measurement.

MODULE II

Gas Analyser : Oxygen analyser – CO monitor – NO₂ analyser – H₂S analyser – dust and smoke measurement – thermal conductivity type – thermal analyser – industrial analysers.

Chromatography Gas chromatography – Liquid chromatography – Principles, types and applications – high pressure liquid chromatography – detectors

MODULE III

Spectro photometers : Spectral methods of analysis – Beer's Law – UV – Visible spectrophotometers – single beam and double beam instruments – sources and detectors – IR spectrophotometers – sources and detectors – FTIR spectrometers – atomic absorption spectrophotometers – flame emission spectrophotometers – sources of flame photometry – applications.

MODULE IV

Nuclear magnetic resonance and radiation techniques

NMR – basic principle – NMR spectrometers – applications – introduction to mass spectrophotometers – nuclear radiation detectors – GM counter – proportional counter – solid state detectors – introduction to x- ray spectroscopy

TEXT BOOKS

1. Willard, H.H., Merrit L.L., Dean J.A Seattle F.L., 'Instrumental Methods of Analysis', CBS Publishing and Distribution, 1995
2. Robert D.Braun, Introduction to Instrumental Analysis, McGraw–Hill, Singapore, 1987.

REFERENCES

1. Skoog, D.A. and West D.M., Principles of Instrumental Analysis, Holt Sounder Publication, Philadelphia, 1985
2. Ewing G.W., Instrumental Methods of Analysis', McGraw-Hill, 1992
3. Mann C.K. Vickers, T.J. and Guillick W.H Instrumental Analysis, Harper and Row Publishers, New York, 1974.
4. Liptak, B.G, Process Measurement and Analysis, Chilton Book Company, 1995
5. Frank A.Settle, Handbook of Instrumental Techniques for Analytical Chemistry, Prentice Hall, New Jersey, 1997

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Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 705A INTELLIGENT SYSTEMS

MODULE I

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

MODULE II

Artificial Neural Networks: Biological aspects, Pitts Neuron Model, Perception model, Learning algorithm – supervised & unsupervised multilayer perception, Back propagation algorithm, Associative memory, Feedback 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 – PSO method, Applications

TEXT BOOKS:

1. 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 Networks, 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 Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 705 B. TELEMETRY AND REMOTE CONTROL

MODULE I

Fundamental concepts: Functional blocks of telemetry and tele control systems, Methods of telemetry -Electrical, pneumatic and optical telemetry, telemetry standards.

Landline telemetry: Electrical telemetry -Current, Voltage, synchro and position

MODULE II

Radio telemetry : Transmission and receiving techniques, RF modulation demodulation - AM, FM, PM, PCM, FSK, Delta and adaptive modulation multiplexing and demultiplexing -Digital coding.

MODULE III

Optical telemetry: Optical fibres for signal transmission -source for fibre transmission - Optical detectors. Trends in fibre optic device develop Examples of optical telemetry system.

MODULE IV

Analog and digital techniques in telectrol, Remote transmission, signalling adjustment, guidance and regulation reliability of telectrol installations. Design of telectrol installations. .

Satellite telemetry and telecontrol system.

REFERENCES:

1. E.L. Gruenberg- Handbook of telemetry and remote control- McGraw Hill.
2. R.E. Young- Telemetry Engineering- Little Book Ltd., J.K.
3. G. Swoboda -Telecontrol methods and applications of telemetry and re control- Reinhold Publishing Company, U.K.
3. R.k Rajangam - Industrial telemetry-Lecture notes, IISc., Bangalore.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 705 C. POWR PLANT INSTRUMENTATION

Module I

An overview: Brief survey of methods of power generation – Hydro, thermal, nuclear, solar, wind etc. dependence of instrumentation on the method of power generation, power plant general structure. Pulverizers and burners, fans, dampers and actuators, Super heaters, steam traps, economizers, recuperates and regenerators, cooling towers, feed water, generator turbine cooling systems. Importance of instrumentation and control.

Reading and drawing of Instrumentation diagrams : Flow sheet symbols – ANSI symbols for lines, valves, heat transfer, dryer, material handling equipment, storage handling equipment, storage vessels, flow sheet codes and lines. Graphical symbol for pipe fitting, valves and piping, instrumentation symbols, standards specifications – One line diagram for typical measurement and control schemes for flow, temperature. One line diagram of typical pneumatic, hydraulic and electrical instrumentation system.

Module II

Parameters and measurements : Electrical measurements – Current, Voltage, Power, frequency – no electrical parameters, flow of feed water, fuel, air and steam with correction factors for temperature – pressure level. Radiation detectors – Smoke density measurement.

Module III

Control loops and interlocks: Combustion control – Control of pressure, air/fuel ration, furnace draught and excess air control, drum level (three element) control. Main and reheat steam temperature control. Burner tilting up, by pass damper - Super heater spray and gas recirculation control – BFP recirculation control – hot well and aerator level control – interlock MFT turbine trip conditions – Pulverizer control.

Module IV

Turbine Monitoring and Control: Consenser vacuum control – Gland steam exhaust pressure control – speed, vibration, shell temperature monitoring – Lubricating oil temperature control. H₂ generator cooling system. Nuclear reactor control loops – Description – Function – Safety measures in nuclear reactor control.

Computer in power plant : Load dispatching coputer, generation station computer, supervisory, DDC, DAS, DCC.

References:

1. Modern power station practice, Volume 6, instrumentation, Control and Testing – Pergamon Press, Oxford.
2. E.L Wakil MM – Power Plant Technology – McGraw Hill
3. Richard Dolezal and Ludrik Varcop – Process dynamics(Automatic control of steam generation plant), - Elsevier Publishing Company Ltd.
4. J. Balasubramanian and R. K Jain - Modern power plant engineering – Khanna Publishers
5. Stephen Michoel and Anthony Lawrence Kohal – Standard Boiler Operations Questions and Answers – Tata McGrawHill
6. B.G Liptak – Instrumentation in Processing industries – Chilton Book Co.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EB/EC/EI 705 D 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 Data 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: Hydraulic Pumps, Process Control Valves, Directional and Pressure Control Valves, Linear and Rotatory 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 requires).

MEMS : Internal structure, advantages, manufacturing, applications, Fiber 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 : Structure, I/O processing, Programming, applications – Selection criteria. Typical Mechatronic Systems: Robotoc 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 McGraw Hill, New Delhi, 2004

REFERENCES:

1. Godfrey C. Onwubolu, Mechatronics Principles and Applications, Elsevier India Pvt. Ltd., Delhi, 2006
2. M.D Singh, J.G Joshi, Mechatronics Principles and Applications, Elsevier India Pvt. Ltd, Delhi 2006
3. Dradly. D. A, Dawson. D, Burd N.C and Loader A.J, Mechatronics – Electronics in Products & Processes, Chapman & Hailm 993
4. Mechatronics , HMT Limited, Tata McGraw Hill, 1998
5. James Harter, Electromechanics – Principles concept and Devixes – Prentice Hall India Ltd, 2nd ed.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 705 E. ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

Module I

AI and Expert System – Introduction, components of Expert system – Construction Methodology and Tools for Building – Expert Systems, Characteristics of E.S. Hill climbing Techniques, knowledge representation, Predicate calculus, Resolution, Robot Programming Languages

Module II

Robotics Basic concepts, power sources and sensors – Definition and origin of botics, Different types of robots, Degree of freedom. Asimov's laws of robotics, dynamic stabilization of robots, Determination of H.P of motor and gearing ration, variable speed arrangement, Lead acid and nickel cadmium batteries, path determination, vision, ranging, laser, acoustics and tactile sensors

Module III

Manipulators, actuators and grippers – Constructin of manipulators, Manipulator dynamics and force control, Electronics and pneumatic manipulator, control circuits, pneumatic hydraulic and electric actuators, and effectors, various type osf grippers, design considerations.

Module IV

Kinematics – Homogeneous co-ordinates, solution of inverse. Kinematic problem, multiple solutions Jacobians, Work envelope.

References:

1. Mikell P. Groover, Michell Weiss, Roger N. Nagel and Bnicholas G. Odery – Industrial Robotics Technology Programming and Applications – McGraw Hill.
2. E.L Stafford – Complete Handbook of Robotics – Tab Books
3. K. Shimon – Handbook of Industrial Robots – John Wiley
4. John J. Grey – Introction to Robotics, Mechanics and Control – Addison Wesley. Ro

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 706 SIGNAL PROCESSING LABORATORY

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

Experiments

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

The above experiments should be done using MATLAB and DSP Trainer Kit. The student should be able to apply the above tools in a small application.

EI 707 PROCESS CONTROL LABORATORY

1. Study of different types of Process stations
 - a) Temperature Process Control trainer
 - b) Level process control Trainer
 - c) Pressure process control trainer
 - d) Flow process control trainer

2. Study of various types of linear controllers
 - a) Characteristics of ON – OFF control
 - b) Characteristics of P control
 - c) Characteristics of I control
 - d) Characteristics of D control
 - e) Characteristics of P+I control
 - f) Characteristics of P+D control
 - g) Characteristics of P+I+D control

3. Studies of cascade control
4. Studies of feed forward control
5. Characteristics of control valve
6. Use of programmable logic controller and DCS
7. Characteristics of devices connected with process control systems
 - a) Characteristics of thermocouple
 - b) Characteristics of signal conditioner
 - c) Characteristics of RF capacitance type level sensor
 - d) Characteristics of I/P and P/I converters
 - e) Characteristics of IR type flow sensor

8. Studies of ratio control
9. Supervisory control – SCADA package
10. Non linear plant control – pH conductivity

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.

EI 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.

EI 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 evaluation team comprising of 3 internal examiners including the project guide.