

| Category of Course | Course Title    | Course Code | Credits- 4C |   |   | Theory Papers (ES)                                   |
|--------------------|-----------------|-------------|-------------|---|---|------------------------------------------------------|
| EC<br>EC 6301      | Control Systems | EC 6301     | L           | T | P | Max. Marks -70<br>Min. Marks- 30<br>Duration- 3 Hrs. |
|                    |                 |             | 3           | 1 | 0 |                                                      |

**Unit –I**

Introduction to control problem- Industrial Control examples. Transfer function. System with dead-time. System response. Control hardware and their models: potentiometers, synchros, LVDT, dc and ac servomotors, tacho-generators, electro hydraulic valves, hydraulic servomotors, electro pneumatic valves, pneumatic actuators. Closed-loop systems. Block diagram and signal flow graph analysis.

**Unit –II**

Feedback control systems- Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness. proportional, integral and derivative systems. Feedforward and multi-loop control configurations, stability concept, relative stability, Routh stability criterion.

**Unit –III**

Time response of second-order systems, steady-state errors and error constants. Performance specifications in time-domain. Root locus method of design. Lead and lag compensation.

**Unit –IV**

Frequency-response analysis- Polar plots, Bode plot, stability in frequency domain, Nyquist plots. Nyquist stability criterion. Performance specifications in frequency-domain. Frequency domain methods of design, Compensation & their realization in time & frequency domain. Lead and Lag compensation. Op-amp based and digital implementation of compensators. Tuning of process controllers. State variable formulation and solution.

**Unit –V**

State variable Analysis- Concepts of state, state variable, state model, state models for linear continuous time functions, diagonalization of transfer function, solution of state equations, concept of controllability & observability. Introduction to Optimal control & Nonlinear control, Optimal Control problem, Regulator problem, Output regulator, tracking problem. Nonlinear system – Basic concept & analysis.

**Text/Reference Books:**

1. Gopal. M., "Control Systems: Principles and Design", Tata McGraw-Hill, 1997.
2. Kuo, B.C., "Automatic Control System", Prentice Hall, sixth edition, 1993.
3. Ogata, K., "Modern Control Engineering", Prentice Hall, second edition, 1991.
4. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw Hill, 1984.
5. Nagrath & Gopal, "Modern Control Engineering", New Age International, New Delhi.

# Department of Electronics and Communication Engineering

Ujjain Engineering College, Ujjain

**B. Tech. VI Sem**

**Branch Electronics and Communication Engineering**

## Course Contents

| Category of Course   | Course Title     | Course Code | Credits- 4C |   |   | Theory Papers (ES)                                   |
|----------------------|------------------|-------------|-------------|---|---|------------------------------------------------------|
| EC<br><i>EC 6302</i> | Computer Network | EC 6302     | L           | T | P | Max. Marks -70<br>Min. Marks- 30<br>Duration- 3 Hrs. |
|                      |                  |             | 3           | 1 | 0 |                                                      |

### Unit –I

Introduction to computer networks and the Internet: Application layer: Principles of network applications, The Web and Hyper Text Transfer Protocol, File transfer, Electronic mail, Domain name system, Peer-to-Peer file sharing, Socket programming, Layering concepts.

### Unit –II

Switching in networks: Classification and requirements of switches, a generic switch, Circuit Switching, Time-division switching, Space-division switching, Crossbar switch and evaluation of blocking probability, 2-stage, 3-stage and n-stage networks, Packet switching, Blocking in packet switches, Three generations of packet switches, switch fabric, Buffering, Multicasting, Statistical

### Unit –III

Multiplexing. Transport layer: Connectionless transport - User Datagram Protocol, Connection oriented transport – Transmission Control Protocol, Remote Procedure Call. Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call.

### Unit –IV

Congestion Control and Resource Allocation: Issues in Resource Allocation, Queuing Disciplines, TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

### Unit –V

Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, addressing, Ethernet, Hubs, Switches.

### Text/Reference Books:

1. J.F. Kurose and K. W. Ross, "Computer Networking – A top down approach featuring the Internet", Pearson Education, 5th Edition
2. L. Peterson and B. Davie, "Computer Networks – A Systems Approach" Elsevier Morgan Kaufmann Publisher, 5th Edition.
3. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4<sup>th</sup> Edition
4. Andrew Tanenbaum, "Computer networks", Prentice Hall
5. D. Comer, "Computer Networks and Internet/TCP-IP", Prentice Hall
6. William Stallings, "Data and computer communications", Prentice Hall

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|--------------------|--------------------------|-------------|-------------|---|---|------------------------------------------------------|
| ECEL<br>EC 6321    | Antennas and Propagation | EC 6315     | L           | T | P | Max. Marks -70<br>Min. Marks- 30<br>Duration- 3 Hrs. |
|                    |                          |             | 3           | 0 | 1 |                                                      |

### Unit –I

Fundamental Concepts- Physical concept of radiation, Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

### Unit –II

Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

Aperture and Reflector Antennas- Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and cassegrain antennas.

### Unit –III

Broadband Antennas- Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas. Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

### Unit –IV

Antenna Arrays- Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of antenna arrays using Schelkun off polynomial method, Woodward-Lawson method.

### Unit –V

Basic Concepts of Smart Antennas- Concept and benefits of smart antennas, fixed weight beam forming basics, Adaptive beam forming. Different modes of Radio Wave propagation used in current practice.

### Text/Reference Books:

6. J.D. Kraus, Antennas, McGraw Hill, 1988.
7. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 1982
8. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
9. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw ill, 1984.
10. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980.
11. R.E. Crompton, Adaptive Antennas, John Wiley.

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|------------------------|-----------------------------|-------------|-------------|---|---|------------------------------------------------------|
| OELC<br><i>CS 6351</i> | Data Base Management System | CS 6304     | L           | T | P | Max. Marks -70<br>Min. Marks- 30<br>Duration- 3 Hrs. |
|                        |                             |             | 3           | 0 | 0 |                                                      |

### Unit –I

DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach. Review of file organization techniques. Database schemas and Instances, Data independence. Database users, functions of DBA and database Designer. Various data models, basic concepts of Hierarchical data model, Network data model, and Relational data model, Comparison between the three types of models.

### Unit –II

ER data model: Entities and attributes, Entity types, Defining the E-R diagram, Concept of Generalization, Aggregation, and Specialization. transforming the ER diagram into the tables. Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database schemas, Integrity constraints, Referential integrity, Intension, and Extension.

### Unit –III

Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations. Relational Query languages: SQL- DDL, DML, Complex queries, various joins, indexing, triggers and views.

### Unit –IV

C Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation, and lossless join. Transaction Processing Concepts: Transaction System, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log-based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: - Concurrency Control, locking Techniques for concurrency control, time- stamping protocols for concurrency control, validation based protocol, Recovery with the concurrent transaction.

### Unit –V

Data Storage and indexing: Single level and multi level indexing, Dynamic Multi level indexing using B Trees and B+ Trees, Query processing and Query Optimization, Introduction to database security, data mining and data warehousing.

### Text/Reference Books:

1. Date C J, "An Introduction to Database System", Pearson Educations

2. Korth S, "Database System Concepts", McGraw Hill