

*Sixth Semester*

**Internal Marks: 40****L T P****External Marks: 60****3 1 0****Total Marks: 100****PART-A**

1. Introduction to Operating system, Role of Operating System as resource manager, function of kernel and shell, operating system structures, views of an operating system.

2. **Process management:** CPU scheduling, Scheduling Algorithms, PCB, Process synchronization, Deadlocks, Prevention, Detection and Recovery.

3. **Memory Management:** Overlays, Memory management policies, Fragmentation and its types, Partitioned memory managements, Paging, Segmentation, Need of Virtual memories, Page replacement Algorithms, Concept of Thrashing.

**PART-B**

4. **Device Management:** I/O system and secondary storage structure, Device management policies, Role of I/O traffic controller, scheduler.

5. **File Management:** File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security.

6. Brief study to multiprocessor and distributed operating systems.

7. **Case Studies:** LINUX / UNIX Operating System and Windows based operating systems.

**Suggested Readings/ Books:**

1. A Silberschatz and Peter B. Galvin, "Operating System Concepts" Addison Wesley Publishing Company
2. Dhamdhere, —Systems Programming & Operating Systems" Tata McGraw Hill
3. Gary Nutt, "Operating Systems Concepts", Pearson Education Ltd. 3rd Edition
4. Operating System by Madnick Donovan
5. Operating System by Stallings

**BTEC-601**

**MICROWAVE AND RADAR ENGINEERING**

**Internal Marks: 40**

**L T P**

**External Marks: 60**

**4 1 0**

**Total Marks: 100**

**Microwave Tubes:** Limitations of conventional tubes, construction, operation and properties of Klystron Amplifier, reflex Klystron, Magnetron, Travelling Wave Tube (TWT), Backward Wave Oscillator (BWO), Crossed field amplifiers.

**Microwave Solid State Devices:** Limitation of conventional solid state devices at Microwaves, Transistors (Bipolar, FET), Diodes (Tunnel, Varactor, PIN), Transferred Electron Devices (Gunn diode), Avalanche transit time effect (IMPATT, TRAPATT, SBD), Microwave Amplification by Stimulated Emission of Radiation (MASER).

**Microwave Components:** Analysis of Microwave components using s-parameters, Junctions (E, H, Hybrid), Directional coupler, Bends and Corners, Microwave posts, S.S. tuners, Attenuators, Phase shifter, Ferrite devices (Isolator, Circulator, Gyrator), Cavity resonator, Matched termination.

**Microwave Measurements:** Power measurements using calorimeters and bolometers, Measurement of Standing Wave Ratio (SWR), Frequency and wavelength, Microwave bridges.

**Introduction to Radar Systems:** Basic Principle: Block diagram and operation of Radar, Radar range Equation, Pulse Repetition Frequency (PRF) and Range Ambiguities, Applications of Radar.

**Doppler Radars:** Doppler determination of velocity, Continuous Wave (CW) radar and its limitations, Frequency Modulated Continuous Wave (FMCW) radar, Basic principle and operation of Moving Target Indicator (MTI) radar, Delay line cancellers, Blind speeds and staggered PRFs.

**Scanning and Tracking Techniques:** Various scanning techniques (Horizontal, vertical, spiral, palmer, raster, nodding), Angle tracking systems (Lobe switching, conical scan, monopulse), Range tracking systems, Doppler (velocity) tracking systems.

**Text books:**

1. Microwave devices and circuits: Samuel Liao; PHI
2. Microwave devices and Radar Engg: M. Kulkarni; Umesh Publications
3. Introduction to radar systems: Merill I. Skolnik

**Reference Books:**

1. Foundation of Microwave Engg. : R.E. Collin; McGraw Hill
2. Microwave Engg: K.C Gupta

**BTEC-602**

**WIRELESS COMMUNICATION SYSTEM**

**Internal Marks: 40**

**External Marks: 60**

**Total Marks: 100**

**L T P**

**3 1 0**

**Introduction:** A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog & digital cellular systems. Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems. Blue tooth and Zig Bee.

**Elements of Cellular Radio Systems Design:** General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems.

**Digital Communication through fading multipath channels:** Fading channel and their characteristics- Channel modeling, Digital signaling over a frequency non selective slowly fading channel. Concept of diversity branches and signal paths. Combining methods: Selective diversity combining, Switched combining, maximal ratio combining, Equal gain combining.

**Multiple Access Techniques for Wireless Communications:** Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, Space Division Multiple Access, Packet Radio Protocols; Pure ALOHA, Slotted ALLOHA.

**Wireless Systems & Standards:** AMPS and ETACS, United states digital cellular (IS- 54 & IS 136), Global system for Mobile (GSM): Services, Features, System Architecture, and Channel Types, Frame Structure for GSM, Speech Processing in GSM, GPRS/EDGE specifications and features. 3G systems: UMTS & CDMA 2000 standards and specifications. CDMA Digital standard (IS 95): Frequency and Channel specifications, Forward CDMA Channel, Reverse CDMA Channel, Wireless Cable Television.

**Future trends:** 4G mobile techniques, LTE-Advance systems

**Recommended Text Books:**

1. T.S.Rappaport, Wireless Communications: Principles and Practice, 2nd Edition, Pearson Education Asia, 2010.
2. William C Y Lee, Mobile Cellular Telecommunications, 2nd Edition, MGH, 2004.
3. Raj Pandya, "Mobile and Personal Communication systems and services", Prentice Hall of India, 2001.
4. Wireless and Digital Communications; Dr. Kamilo Feher (PHI)

## BTEC-603 ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT

<b>External Marks: 60</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Internal Marks: 40</b>	<b>3</b>	<b>1</b>	<b>0</b>
<b>Total Marks: 100</b>			

**Cost analysis:** Break-even analysis, two and three alternatives, graphical solution. Breakeven charts, effects of changes in fixed and variable costs. Minimum cost analysis, economics order quality. Effect of risk and uncertainty on lot size.

**Replacement Studies:** Reasons for replacement, factors to be considered in replacement Studies, discounted cash flow analysis, economic life of a project, challenger and defender.

**Economic Analysis Of Investment Alternatives :** Basic economy study patterns and their comparison, decision making in selection of alternative by present worth methods, rate of return method, payout period method and uniform annual cost method, economic analysis of new projects, effect of taxation on economic studies.

**Cost Estimation :** Difference between cost estimation and cost accounting, qualifications of an estimator. Estimating procedure, Estimate of material cost and labour cost. Estimation of cost in various manufacturing operations.

**Depreciation :** Types of depreciation and their Methods.

**Concepts of Industrial Management:** Concept, Development, application and scope of Industrial Management , Functions of Management, Evolution of Management Thought : Taylor's Scientific Management, Fayol's, Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne, Experiments, Herzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs'

**Productivity :** Definition, measurement, productivity index, types of production system, Industrial Ownership.

**Designing Organizational Structures:** Concept, Importance and characteristics of organization, Types of organization - Project, matrix and informal organization. Span of control, Delegation of authority.

**Materials Management-**Objectives, Inventory – functions, types, associated costs, Inventory Control Systems-Continuous review system-periodical review system. Stores Management and Stores Records. Purchase management, duties of purchase of manager, associated forms.

### TEXT BOOKS

1. O.P Khanna, Industrial Engineering.
2. T.N. Bhagooiwal Economics of Labour and Industrial Relations (Sahitya BhawanAgra)
3. Engineering Economy : Thuesen Prentice Hall

### REFERENCES

1. Minappa and Personnel Managements M.S. Saiyada (Tata Mc Graw Hill)
2. C.B. Mamoria Personnel Management (Himalaya publishing house Bombay)
3. Engg. Economics Analysis Bullinger
4. Introduction to Econometrics : Kliwen Prentice Hall

**Internal Marks: 40****L T P****External Marks: 60****4 1 0****Total Marks: 100**

**Introduction:** Introduction to Computer-aided design tools for digital systems. Hardware description languages, Introduction to VHDL, Data objects, Classes and data types, Operators, Overloading, and Logical operators. Types of delays, Entity and Architecture declaration Introduction to behavioral, dataflow and structural models

**VHDL Statements:** Assignment statements, Sequential Statements and Process, Conditional Statements, Case Statements, Array and Loops, Resolution Functions, Packages & Libraries, Concurrent Statements.

**Applications of VHDL:** Combinational Circuit Design such as such as Multiplexers, Encoders, Decoders, Code Converters, Comparators, and Implementation of Boolean functions etc., Sequential Circuit Design such as Shift registers, Counters etc.

**Review of MOS Devices:** MOS Structure, Enhancement & Depletion Transistor, Threshold Voltage, MOS device design equations MOS Transistor Models. NMOS, PMOS, CMOS.

**Basic Electrical Properties and Circuit Concepts:** The NMOS Inverter and Transfer Characteristics pull up and pull down ratios of NMOS, alternative forms of pull up the CMOS Inverter and transfer characteristics. CMOS Inverter Delays. Driving large Capacitive loads, Propagation delays and effect of wiring capacitance.

**Circuit Characterization and Performance Estimation:** Estimation of R, C, L, Switching Characteristics-delay models. Power dissipation. Scaling of MOS circuits. Effect of device scaling on circuit performance.

**Recommended Text Books:**

1. "A VHDL Primer": Bhasker; Prentice Hall 1995.
2. Weste and Eshraghian, "Principle of CMOS VLSI Design" Pearson Education, 2001.
3. Pucknell D A and Eshraghian K, "Basic VLSI Design", Prentice Hall India, New Delhi (2003).
4. *Fundamentals of Digital Logic with VHDL Design*: Brown and Vranesic; TMH(2000)
5. S. M. Kang, Y. Lebiebici, "CMOS digital integrated circuits analysis & design" TMH, 3rd Edition.

**BTEC-605**

**LAB VLSI**

**Internal Marks: 30**

**L T P**

**External Marks: 20**

**0 0 2**

**Total Marks: 50**

**List of Experiments:**

**Combinational Design Exercises**

1. Design of basic Gates: AND, OR, NOT.
2. Design of universal gates
3. Design of 2:1 Mux using other basic gates
4. Design of 2 to 4 Decoder
5. Design of Half-Adder, Full Adder, Half Subtractor, Full Subtractor
6. Design of 3:8 Decoder
7. Design of 8:3 Priority Encoder
8. Design of 4 Bit Binary to Grey code Converter
9. Design of 4 Bit Binary to BCD Converter using sequential statement
10. Design an 8 Bit parity generator ( with for loop and Generic statements)
11. Design of 2's Complementary for 8-bit Binary number using Generate statements

**Sequential Design Exercises**

12. Design of all type of Flip-Flops using ( if-then-else) Sequential Constructs
13. Design of 8-Bit Shift Register with shift Right, Shift Left, Load and Synchronous reset.
14. Design of Synchronous 8-bit Johnson Counter.
15. Design of Synchronous 8-Bit universal shift register ( parallel-in, parallel-out) with 3- state output ( IC 74299)
16. Design of 4 Bit Binary to BCD Converter using sequential statement.
17. Design counters (MOD 3, MOD 5, MOD 8, MOD 16)
18. Design a decimal up/down counter that counts up from 00 to 99 or down from 99 to 00.
19. Design 3-line to 8-line decoder with address latch

**BTEC-606**

**LAB MICROWAVE ENGINEERING**

**Internal Marks: 30**

**External Marks: 20**

**Total Marks: 50**

**L T P**

**0 0 2**

**List of Experiments:**

1. Study of microwave components and instruments.
2. Measurement of crystal characteristics and proof of the square law characteristics of the diode.
3. Measurement of klystron characteristics.
4. Measurement of VSWR and standing wave ratio.
5. Measurement of Dielectric constants.
6. Measurement of Directivity and coupling coefficient of a directional coupler.
7. Measurement of Q of a cavity.
8. Calibration of the attenuation constant of an attenuator.
9. Determination of the radiation characteristics and gain of an antenna.
10. Determination of the phase-shift of a phase shifter.
11. Determination of the standing wave pattern on a transmission line and finding the length and position of the short circuited stub.



**BTEC 901                      RELATIONAL DATABASE MANAGEMENT SYSTEM**

**Internal Marks: 40**

**L T P**

**External Marks: 60**

**3 1 0**

**Total Marks: 100**

**Introduction to Database Systems:**

File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence.

**Physical Data organization:** File Organization and Indexing, Index Data Structures, Hashing, B-trees, Clustered Index, Sparse Index, Dense Index, Fixed length and Variable length Records.

**Data Models:** Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Database Design with ER Model, Comparison of Models.

**The Relational Model:** Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus. querying Relational Data.

**Relational Query Languages:** SQL: Basic SQL Query, Creating Table and Views, SQL as DML, DDL and DCL, SQL algebraic Operations, Nested Queries, Aggregate Operations, Cursors, Dynamic SQL, Integrity Constraints in SQL, Triggers and Active Database, Relational Completeness, Basic query Optimization Strategies. Algebraic Manipulation and Equivalences. [

**Database Design:** Functional Dependencies, Reasoning about Functional Dependencies, Normal Forms, Schema Refinement, First, Second and Third Normal Forms, BCNF, Multi-valued Dependency, Join Dependency, Fourth and Fifth Normal Forms, Domain Key Normal Forms, Decompositions.

**Transaction Management:**

ACID properties, Serializability, Two-phase Commit protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read problem, Read-Write Locks, Deadlocks Handlins. 2pL protocol.

**Database Protection:**

Threats, Access Control Mechanisms, Discretionary Access Control, Grant and Revoke, Mandatory Access Control, Bell laPadula Model, Role Based Security, Firewalls, Encryption and Digital Signatures.

**Suggested ReadingyBooks:**

1. Ramez Elmasri, Shamkant Navathe ,Fundamentals of Database Systems, Fifth Edition, pearson education, 2007.
2. C.J. Date , An Introduction to Database Systems, Eighth Edition, Pearson Education
3. Alexis leon, Mathews Leon , Database Management Systems, Leon Press.
4. S. K. Singh, Database Systems Concepts, Design and Applications, Pearson Educaton.

**BTEC 902**

**MICRO ELECTRONICS**

**Internal Marks: 40**

**External Marks: 60**

**Total Marks: 100**

**L T P**

**3 1 0**

**INTRODUCTION:** Advantages of IC's, General classification of IC's(Linear/Digital IC's ,Monolithic/ Hybrid IC's), Basic IC fabrication steps.

**CRYSTAL GRTOWTH AND EPITAXY:** Starting material for formation of crystal, Horizontal Bridgeman Method, Czochralski growth, Distribution of dopants, Zone refining, Silicon Float Zone process, Si-Wafer preparation, Epitaxial growth, Techniques used for epitaxial growth(LPE,VPE,MBE)

**SILICON OXIDATION:** Thermal oxidation process (Kinetics of growth , Thin oxide growth), Effect of impurities on the oxidation rate, Preoxidation Cleaning, Various oxidation techniques, Masking properties of SiO<sub>2</sub> , IV PHOTOLITHOGRAPHY AND ETCHING, Pattern generation/Mask making, Contact and Proximity printing, Photoresistsl, Photolithography Process(Lift off technology , Fine line photolithography), Wet/Dry etching, Reactive Plasma etching techniques and applications

**DIFFUSION AND ION IMPLANTATION:** Basic diffusion process(Diffusion equation, Diffusion profiles), Extrinsic diffusion, Lateral Diffusion, Ion Implantation Process (Ion distribution , Ion Stopping), Implant Damage and Annealing process (Furnace and RTA), VI IC PACKAGING, Isolation Techniques, Testing of the Chip, Wire Bonding techniques, Flip Chip technique, Various Packaging methods and Materials, VII FABRICATION OF MONOLITHIC COMPONENTS, Fabrication of Diodes, Resistors, capacitors and inductors, Fabrication of BJT and FET, Fabrication of MOS Devices , CMOS fabrication techniques(nwell and p-well process sequences), Introduction to MEMS.

**Recommended Text Books:**

1. Fundamental of Semiconductor Fabrication:Gray S.May and Simon M.Sze
2. VLSI Technology : Sze.

**Reference Books:**

1. Microelectronics: Jacob and Millman

**BTEC 903**

**INDUSTRIAL ELECTRONICS**

**Internal Marks: 40**

**External Marks: 60**

**Total Marks: 100**

**L T P**

**3 1 0**

**Characteristics of Selected Devices:** Fast recovery diodes, Schottky diode, SCR, gate trigger and commutation circuits, series and parallel connection of SCRs, Diac, Triac, UJT, Power MOSFETs.

**Controlled Rectifier:** Half wave and full wave with resistive & R-L-E and resistive-inductive loads. Free-wheeling diode, three phase rectifiers, Bridge rectifiers -half controlled and fully controlled.

**Inverter, Chopper and Cyclo converter:** Voltage driven, current driven, bridge, parallel, SCR versions, control of output voltage-PWM schemes, harmonic reduction

**Motor Control:** D.C. and A.C. motor control, reversible drives, closed loop control, commutator less D.C. motor control.

**A.C. Voltage Controllers:** Types of AC Voltage Controllers, Integral cycle control, single phase voltage controller, Sequence control of AC voltage (Transformer tap changers)

**Books Recommended:**

1. Power Electronics - P.C. Sen, Tata McGraw Hill Publishing Co., Ltd., 1987.
2. Power Electronics and Control - S.K. Dutta, Prentice Hall of India Pvt. Ltd., 1986.

**BTEC 904**

**DIGITAL SYSTEM DESIGN**

**Internal Marks: 40**

**External Marks: 60**

**Total Marks: 100**

**L T P**

**4 1 0**

**Combinational Logic:** Review of adders, Subtractor, Multipliers, Multiplexers, ROM, PLA, PAL and PLD.

**Synchronous Sequential Logic:** Flip-flops, Triggering of flip-flops, Analysis of clocked sequential circuits, State reduction and assignment, Flip-flop excitation tables, Design procedure, Design of counters,

**Finite State Machines:** Finite state model, Memory elements and their excitation functions, Synthesis of Synchronous sequential circuits, Capabilities and limitations of FSM, Design, Modeling and Simulation of Moore and Mealy machines.

**Algorithmic State Machines:** ASM chart, Timing considerations, Control implementation, Control Design with multiplexers, PLAs, etc.

**Asynchronous Sequential Logic:** Analysis Procedure, Circuits with latches, Design procedure, Reduction of state and flow tables, Race-free state assignment, Hazards, Design examples.

**Designing with Programmable Logic Devices and Programmable Gate Arrays:** Read only memories, Programmable logic arrays, Programmable array logic, Designing with FPGAs, Xilinx series FPGAs

**TEXT BOOKS:**

1. VHDL – 3rd Edition – Douglas Perry – TMH
2. Fundamentals of Digital Logic with VHDL design – Stephen Brown, Zvonko Vranesic – TMH.
3. Digital Design Principles – William I Fletcher.

**REFERENCE BOOKS:**

1. Digital System Design Using VHDL – Chales H. Roth.
2. Digital System Design – John Wakerley.
3. VHDL – Zainalabedin Navabbi.
4. VHDL – D. Smith.

## **BTEC-905 INTELLECTUAL PROPERTY RIGHTS AND PATENT SYSTEMS**

Internal Marks: 40

L T P

External Marks: 60

4 1 0

Total Marks: 100

### **Basic of intellectual property Rights**

Introduction, Justification and Classification of intellectual property Rights, Classification of Treaties relating to intellectual property Rights, Stranded setting treaties, Global protection system treaties, and Classification treats.

### **Patent System**

History of the patent system, Patent on genetic resources, patents on chemicals, designs, patent based on software, business methods, internet patent, Exception to exclusive rights conferred to a patent holder, Remember for infringement of a patent.

### **Copyrights and related rights**

Nature and scope of protection of copyrights and related rights, Protection of copyrights in the digital media. Defense of fair use, Moral rights of the author, Copyrights societies, Remedies for infringement of Copyrights.

### **Design rights**

Nature and scope of protection of design rights, protection of layout designs (topographies) of integrated circuits, protection of undisclosed information, protection of trademarks, domain names and geographical indications.

### **Practical aspects of a patent**

Drafting of a patent, Few Exercises on the preliminary rules on preparing an application seeking a patent.

### **Recommended Text Books:**

1. Cornish W.R., Intellectual property: patents, copyright, trademarks and allied rights, sweet and Maxwell 2007.
2. P. Narayana, Intellectual property law, eastern law house 2nd ed., 2001.
3. Robin Jacob and Daniel Alexander, a guide book to Intellectual property patent trademarks, Copy rights and design, sweet and Maxwell 4th ed., 1993.

## **BTEC-906      INTELLIGENT INSTRUMENTATION**

**Internal Marks: 40**  
**External Marks: 60**  
**Total Marks: 100**

**L T P**  
**4 1 0**

### **INSTRUMENTATION**

Introduction about Instrumentation systems, Types of Instrumentation systems, Data acquisition system (DAS) and its uses in intelligent Instrumentation system, Detailed study of each block involved in making of DAS, Signal Conditioners: as DA, IA, Signal Converters (ADC & DAC), Sample and hold, Designing of Pressure, Temperature measuring instrumentation system using DAS, Data logger.

### **AUTOMATION**

Introduction about Automation system, Concepts of Control Schemes, Types of Controllers, Components involved in implementation of Automation system i.e., DAS, DOS, Converter ( I to P ) and Actuators: Pneumatic cylinder, Relay, Solenoid (Final Control Element), Computer Supervisory Control System (SCADA), Direct Digital Control's Structure and Software.

### **PLC**

Introduction of Programmable logic controller, Principles of operation, Architecture of Programmable controllers, Programming the Programmable controller.

### **INTELLIGENT CONTROLLER**

Introduction to Intelligent Controllers, Model based controllers, Predictive control, Artificial Intelligent Based Systems, Experts Controller, Fuzzy Logic System and Controller, Artificial Neural Networks, Neuro-Fuzzy Controller system.

#### **Reference Text Books:**

1. "Process Control Instrumentation Technology" 6/e, by Curtis D Johnson, Pearson Ed.
2. "Electrical and Electronics Measurement and Instrumentation" by A. K. Swahney.
3. "Electronics instrumentation" by H. S. Kalsi [TMH]
4. "Computer-Based Industrial Control", by Krishna Kant, PHI.
5. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed

**BTEC 907**

**INFORMATION THEORY & CODING**

Internal Marks: 40

L T P

External Marks: 60

4 1 0

Total Marks: 100

**Basic Concepts of Information Theory :** The concept of Amount of Information, Average Information, Entropy, Information rate, Shannon's Theorem, Mutual information; Channel capacity; BSC and other channels, Capacity of a Gaussian Channel, Bandwidth – S/N Trade-off, Introduction to Channel Capacity & Coding, Channel Models, Channel Capacity Theorem, Shannon Limit. Huffman source coding algorithm, Lempel Ziv source coding algorithm.

**Introduction to Error Control Coding:**

**Linear Block Codes:** Introduction to Linear Block codes, Syndrome and Error detection, Minimum distance of block code, Hamming Code.

**Cyclic Codes:** Description of Cyclic codes, Generator and parity check matrices of cyclic codes, error detection decoding of cyclic codes.

**BCH Codes:** Description of codes, Decoding of BCH codes, Implementation of error connection.

**Convolution Codes:** Encoding of convolution codes, structural properties of Convolution codes, Distance Properties of convolution codes.

**Automatic Repeat Request Strategies:** Stop and wait, Go back and selective repeat ARQ strategies, Hybrid ARQ Schemes.

**Recommended Books:**

1. F.M Reza: Information Theory, Mc Graw Hill
2. ShuLin & J Costeib: Error Control Coding, PHI
3. Dass, Mullick & Chatterjee: Digital Communication, John Wiley, Ed. 1992
4. Information Theory and Reliable Communication: Robert G. Gallanger Mc Graw Hill, 1992
5. Related IEEE/IEE publications

**Internal Marks: 40**

**External Marks: 60**

**Total Marks: 100**

**L T P**

**3 1 0**

**1. The software Engineering Problem**

The software engineering problem and software products, All of the software engineering activities, The concept of software product like cycle model

**2. Software evolution**

The concept of a software like cycle, The various forms of a software product form initial conception through development and operation to retirement, Controlling activities and disciplines to support evolution, Planned and unplanned events that affect software evolution, The role changing technology.

**3. Technical Communication**

Fundamentals of technical communication Oral and Written communications, preparing oral presentation and supporting material, Software project documentation of all kinds, ISO/Other, e.g. IEEE .

**4. Software Configuration management**

Concept of configuration management, Its role in controlling software evolution, Maintaining Product integrity, Changing control and version control, Organization structure for configuration

**5. Software Quality Assurance**

Software quality assurance as a controlling discipline, Organizational structures for quality assurance, Independent verification and validation teams, Test and evaluation teams , Software technical reviews , Software quality assurance plans : ISO 9000, ANSI/IEEE

**6. Standards**

Introduction to standards - ISO 9002 and ISO 9003 - Quality system development, SO 9000 standard for software, Understanding ISO 900-3 clauses, SEI model - capability Maturity model - Five levels Bootstrap method, Implementing ISO 9000, Analysis the Quality system, Documenting & Auditing quality system, ISO 9000 registration process & Accreditation System, Total Quality Management

**7. Software Project organizational and management issues**

Staffing - development, organizations, quality assurance teams , project planning - choice of process model, project scheduling and milestones, resource allocation

**8. Software project economics**

Cost estimation, risk analysis for software projects, factors that affect cost.

**REFERENCES**

1. S/W Engineering - Somerville (Addison Wesley) .
2. S/W Engineering-Pressmen.
3. S/W Engineering -Jalota