

Semester 7

Theory

S.no	Subject name	L	P	M
01	Automotive Electronics	4	0	100
02	Elective I	4	0	100
03	Engineering Management	4	0	100
04	Principles of Environmental Science and Engineering	4	0	100
05	Product Design and Development	4	0	100
06	Professional Ethics	4	0	100

Practical

S.no	Subject name	L	P	M
07	Comprehension	0	3	100
08	Design and Fabrication Project	0	3	100

List of electives for VII Semester

S.no	Subject name	L	P	M
01	Design of algorithms	4	0	100
02	Internet and java	4	0	100
03	Finite Element Techniques	4	0	100
04	Mechanical Vibrations	4	0	100
05	Design of manufacture	4	0	100
06	Composite Materials technology	4	0	100
07	Operations Research	4	0	100
08	Artificial Intelligence	4	0	100
09	Rapid prototyping	4	0	100
10	Statistical Quality Control	4	0	100
11	Embedded System and Design	4	0	100
12	Linear IC's and Applications	4	0	100
13	Electronics Manufacturing Technology	4	0	100
14	Communication Skills for Engineers	4	0	100

Semester VII

Principles of Environmental Science and Engineering

4 0 100

COMPONENTS OF ENVIRONMENT: (9)

Components - Water, air and land - Inter-relationship between components - Subcomponents; Ecosystem -Structure and functional components of ecosystem - Development and evolution of ecosystem - Energy flow and material cycling in ecosystem - Natural and man made impacts on water, air and land; Environment and development - Concept of sustainable development.

SCIENCE OF ENVIRONMENT (9)

Chemistry, Physics and biology of water, air and land; Stress on the Chemistry, Physics and Biology of water, air and land owing to the impacts; Environmental quality objective and goals - Policies on development projects and their impacts, with emphasis on the branch of engineering of the student.

CURRENT ENVIRONMENTAL ISSUES (9)

Current Environmental issues at Country level - management of municipal sewage, municipal solid waste, Hazardous waste and Bio-medical waste - Air pollution due to industries and vehicles; Global issues - Biodiversity, Climatic change, Ozone layer depletion.

ENGINEERING INTERVENTIONS TO REDUCE THE ENVIRONMENTAL STRESSES (9)

Minimisation of Stress - Principles of Physics, chemistry and biology in engineering interventions such as waste treatment - Flow sheets of engineering interventions relevant to the Engineering discipline of the student – Waste minimisation techniques - Clean technology options - Standards of performance of the interventions.

TOOLS FOR ENVIRONMENTAL MANAGEMENT (A) (9)

Environmental impact assessment; Precautionary Principle and Polluter Pays Principle; Constitutional provisions, Legal and economic instruments in Environmental Management; Role of Non-government organisations - Community participation environmental management works; International conventions and protocols; Pollution Control Boards and Pollution Control Acts.

(B) FIELD STUDY

In-depth study of environmental issues at least one environmentally sensitive site relevant to the discipline of the student and preparation of a report thereupon.

TOTAL HOURS:45

Text Books:

1. G.M.Masters, " Introduction to Environmental Engineering & Science ", Prentice Hall, New Delhi, 1997
2. J.G. Henry and G. W. Heike, " Environmental Science & Engineering ", Prentice Hall International Inc., New Jersey, 1996.

References:

1. S. K. Dhameja, Environmental Engineering and Management, S. K. Kataria and Sons, New Delhi, 1999.
2. State of India's Environment - A Citizen's Report, Centre for Science and Environment and Others, 1999.
3. Shyam Divan and Armin Rosencranz, Environmental Law and Policy in India, Cases, Materials and Statutes, Oxford University Press, 2001.

Semester VII

Automotive Electronics

4 0 100

UNIT I:

(9)

Introduction : Automotive component operation Electrical wiring terminals and switching Multiplexed wiring systems Circuit diagrams and symbols. Charging Systems and Starting Systems : Charging systems principles alternations and charging circuits New developments requirements of the starting system Basic starting circuit.

UNIT II:

(9)

Ignition systems: Ignition fundamental, Electronic ignition systems. Programmed ignition distribution less ignition direct ignition spark plugs. Electronic Fuel Control : Basics of combustion Engine fuelling and exhaust emissions Electronic control of carburation Petrol fuel injection Diesel fuel injection.

UNIT III:

(9)

Instrumentation Systems: Introduction to instrumentation systems Various sensors used for different parameters sensing Driver instrumentation systems vehicle condition monitoring trip computer different types of visual display

UNIT IV:**(9)**

Electronic control of braking and traction introduction and discription control elements and control methodology Electronic control of Automatic Transmission: Introduction and description Control of gear shift and torque converter lockup Electric power steering Electronic clutch.

UNIT V:**(9)**

Engine Management Systems: Combined ignition and fuel management systems Exhaust emission control Digital control techniques Complete vehicle control systems Artificial intelligence and engine management Automotive Microprocessor uses.
Lighting and Security Systems: Vehicles lighting Circuits Signaling Circuit Central locking and electric windows security systems Airbags and seat belt tensioners Miscellaneous safety and comfort systems

TOTAL HOURS:45**TEXT BOOK:**

- 1.DON KNOWLES, Automotive Electronic and Computer controlled Ignition Systems, Don Knowles, Prentice Hall, Englewood Cliffs, New Jersey 1988.
2. WILLIAM, T.M., Automotive Mechanics, McGraw Hill Book Co.,
3. WILLIAM, T.M., Automotive Electronic Systems, Heiemann Ltd., London ,1978.
4. Ronald K Jurgen, Automotive Electronics Handbook, McGraw Hill, Inc, 1999.

REFERENCES

1. TOM DENTON, Automobile Electrical and Electronic Systems, Edward Arnold pb., 1995

Elective

Design of Algorithms

4 0 100

1. Advanced Algorithms

9

Polynomials - Evaluation - Matrices - Multiplication - FFT and Convolution - Binary matrices – Transitive closure - Number theoretic Algorithm - Chinese remainder theorem - RSA Public - Key crypto system.

2. DIVIDE AND CONQUER

9

General method - Typical problems - Finding the minimum and maximum - Strassen's matrix multiplications - Convex Hull.

3. GREEDY METHOD

9

General method - Knapsack problem - Tree vertex splitting - Job sequencing with deadlines.

4. DYNAMIC PROGRAMMING

General method - 0/1 knapsacks - Traveling salesman problem - Flow shop scheduling.

5. BACKTRACKING AND BRANCH AND BOUND TECHNIQUES

9

General method - 8 Queens Problems - Graph coloring - Branch and bound method - 0/1 Knapsack - Traveling Salesman.

TOTAL HOURS:45

Text Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "Introduction to Algorithms", Prentice Hall of India Pvt.Ltd., 1998.

References:

1. Sara Baase, "Computer Algorithms - Introduction to Design and Analysis", Addison - Wesley Publishing Company, 1989.
2. Ellis Horowitz, Sartaj Sahni, Sanuthevar Rajasekaran, "Computer Algorithms ", Galgotia Publications Pvt. Ltd, 1999.
3. S.Sahni, "Data Structures, Algorithms and Applications in C++", McGraw Hill, 1998.

Embedded System and Design (Elective)

UNIT I: BASICS OF EMBEDDED SYSTEMS AND HARDWARE

REQUIREMENTS:

9

Introduction - Examples of embedded systems: Telegraph - Cordless bar - Code scanner - Laser printer -Underground tank monitoring - Nuclear Reactor monitor. Advanced hard wares: Programmable array logic; Application Specific Integrated circuits (ASIC) and Field Programmable Gate arrays (FPGA) - Watch dog timers- Built - Ins on the microprocessor - Interrupt.

UNIT II: EMBEDDED SOFTWARE ARCHITECTURE:

9

Round robin - Round robin with interrupts - Function Queue scheduling Architecture - Real time operating systems Architecture - Selecting architecture.

UNIT III: REAL TIME OPERATING SYSTEM:

9

Tasks and Task states - Tasks and Data - Semaphore and shared data - Message queues, mail boxes and pipes -Encapsulating semaphores and queues - Timer functions - Events - Memory management - Interrupt routines in an RTOS Environment.

UNIT IV: BASIC DESIGN USING A REAL TIME OPERATING SYSTEM:

9

Overview - Principles - Design of an embedded system (Underground tank monitoring System).

UNIT VI: EMBEDDED SOFTWARE DEVELOPMENT TOOLS AND DEBUGGING:

9

Linker/Locators for embedded software - embedded software in to the target system - Testing on host machine: Basic techniques - more advanced techniques - Limitations and shortcomings Instruction set simulators - The assert macro - Testing using laboratory tools.

TOTAL HOURS:45

Text Book:

1. David E. Simon, an embedded software primer, Addition - Wesley 1999. Indian Edition Reprint 2000, Second Edition Reprint 2001, Published by Addition - Wesley Longman (Singapore) Pte.Ltd, Indian Branch 482, FIE Patparganj, New Delhi - 110 092.

1. INTERNET WORKING WITH TCP / IP

9

Review of network technologies, Internet addressing, Address resolution protocol (ARP / RARP), Routing IP data grams, Reliable stream transport service (TCP) TCP/IP over ATM networks, Internet applications - E-mail, Telnet, FTP, NFS, Internet traffic management.

2. INTERNET ROUTING

9

Concepts of graph theory, Routing protocols, Distance vector protocols (RIP), Link state protocol (OSPP), Path vector protocols (BGP and IDRP), Routing for high-speed multimedia traffic, Multicasting, Resource reservation (RSVP), IP switching.

3. WORLD WIDE WEB

9

HTTP protocol, Web browsers Netscape, Internet explorer, Web site and Web page design, HTML, XML, Dynamic HTML, CGI.

4. JAVA PROGRAMMING

9

Language features, Classes, Object and methods, Sub classing and dynamic binding, multithreading, Overview of class library, Object method serialization, Remote method invocation, Java script.

5. MISCELLANEOUS TOPICS

9

E-Commerce, Network operating systems, Web Design case studies.

TOTAL HOURS:45***Text Books:***

1. Douglas E.Comer, " Internetworking with TCP/IP ", Vol I: 3rd edition, Prentice Hall of India, 1999.
2. Eric Ladd and Jim O'Donnell, " Using HTML 4, XML and Java 1.2 ", Que Platinum edition, Prentice Hall of India, 1999.

References:

1. William Stallings, " High Speed Networks ", Prentice Hall Inc., 1998.
2. Margaret Levine Young, " Internet: The Complete References: ", Tata McGraw-Hill, 1999.
3. Balagurusamy.E, " Programming with JAVA, A primer ", Second edition, Tata McGraw-Hill, NewDelhi, 1999.

UNIT - I

9

Operational Amplifier: Functional block diagram symbol characteristics of an ideal operational amplifier circuit schematic of A741. Operational Amplifier Characteristics: Open loop gain - CMRR Input bias and offset currents - Input and Output offset voltages- Offset compensation techniques - Frequency response characteristics - Stability - Limitations- Frequency compensation - Slew rate - Transfer characteristics.

UNIT - II

9

Linear Applications of Operational Amplifiers: Inverting and Non-inverting amplifiers - Voltage follower - Summing amplifier - Differential amplifier- Instrumentation amplifier - Integrator and Differentiator - Practical considerations - Voltage to Current and Current to Voltage converters - Phase changers - Sinusoidal oscillators - Active filters - Design of low pass, high pass, wide band pass and band stop butter worth filters - Narrow band pass and notch filters. Non Linear Applications of Operational Amplifiers: Comparator - Regenerative comparator - Zero crossing detector- Sample and hold circuit - Precision diode - Half wave and full wave precision rectifiers - Active peak detector, Clipper and Clamper - Logarithmic and Exponential amplifiers - Square and Triangular wave form generators.

UNIT -III

9

IC Voltage Regulators: Block diagram of 723 general purpose voltage regulator - Circuit configurations - Current limiting schemes. Output current boosting - Fixed and adjustable three terminal regulators. Special Function ICs: 555 Timer Functional block diagram and description - Monostable and Astable operation - Applications - 566 Voltage controlled Oscillator - Analog Multiplexer - Comparator ICs - Function generator ICs.

UNIT - IV

9

Phase Locked Loop: Functional Block diagram - Principle of operation - Building blocks of PLL - Characteristics - Derivations of expressions for Lock and Capture ranges- Applications- Frequency synthesis - Frequency translation - AM and FM detection - Motor speed control.

UNIT - V

9

A-D & D-A Converters: Digital to Analog Converters: Binary weighted and R-2R Ladder types - Analog to digital converters: Continuous, Counter ramp, Successive approximation, Single, Dual slope and Parallel types - DAC/ADC performance characteristics.

TOTAL HOURS:45

TEXT BOOK

1. Gayakwad. A.R., - OP-Amps and Linear Integrated circuits -, Prentice Hall of India, Third Edition, New Delhi 1993.

REFERENCES

1. Coughlin. FR., and Driscoll. F.F., -Operational Amplifiers and Linear Integrated Circuits -, Prentice Hall of India, fourth edition, New Delhi 1997.
2. Millman, and Halkias, -Integrated Electronics : Analog and Digital Circuits and Systems -, McGraw Hill, Ninth Reprint, 1955.
3. Roy Choudhury, and Shail Jain, - Linear Integrated Circuits -, Wiley Eastern Ltd., 1991.

1. MICROELECTRONIC PROCESSES:

9

Atomic structure. Wafer preparation by growing, machining, and polishing. Diffusion. Microlithography. Etching and cleaning. Energy beam processes using photon, electron and ion. Ion implantation. Chemical vapor deposition. Physical vapor deposition. Epitaxial process. Applications to microchips and micro electrical mechanical devices.

2. INTERCONNECTIONS AND PRINTED WIRING BOARD MANUFACTURE:

9

Through-hole components. Surface-mount components. Component manufacturing. Wire Bonding Technology. Tape Automated Bonding. Multiple Chip Modules. PWB types. Substrate materials. Fabrication procedures. Image Transfer. Plating. Plated-Through Holes. Etching. Solder-masking. Multi-layer board.

3. SOLDERING AND CLEANING:

9

Wave soldering. Adhesive and solder paste application. Solder materials. Solder system variables. Soldering temperature profile. Reflow theory and alternatives. Soldering quality and defects. Post solder cleaning and selection. Measurement of cleanliness levels.

4. AUTOMATIC ASSEMBLY FOR PCB

9

Assembly process variations. Component handling. Automated component placement/insertion. Surface Mount Technology (SMT). Robotic marking and assembly. Placement accuracy requirements. Machine vision, X-ray and laser inspection

5. INSPECTION, TEST AND REWORK FOR PCB:

9

Inspection philosophy and techniques. Component placement and joining quality. Concept of yield. In-circuit test. Functional test. Environment stress screening. Design for testability. Design for reparability. Repair process. Field repair strategy.

TOTAL HOURS:45

TEXT BOOKS:

- 1) ULSI technology / edited by C.Y. Chang, S.M. Sze. Call Number : TK7874.76.U46,
Publisher : New York ; Singapore:
McGraw-Hill, c1996 (Call Number: TK7874.76.U46)

REFERENCES:

- 1) Microchip Fabrication--a practical guide to semiconductor processing, by Peter Van Zant,
4th Ed. McGraw Hill, 2000
(Call Number: TK7871.85.V217)
- 2) Electronics Manufacturing Processes, by Tomas L. Landers, al et. Prentice Hall
- 3) Packaging of Electronic Systems: A Mechanical Engineering Approach, by James W. Dally,
McGraw-Hill
- 4) Prasad R. P., "Surface Mount Technology: Principles and Practice", New York: Chapman &
Hall, 1997, (Call Number: TK7868.P7P911 1997)

Semester VII

Professional Ethics

4 0 100

ENGINEERING ETHICS (9)

Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy - professions and professionalism – professional ideals and virtues - theories about right action - self-interest - customs and religion - uses of ethical theories

ENGINEERING AS SOCIAL EXPERIMENTATION (9)

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the Challenger case study

ENGINEER'S RESPONSIBILITY FOR SAFETY (9)

Safety and risk - assessment of safety and risk - risk benefit analysis - reducing risk - the Three Mile Island and Chernobyl case studies.

RESPONSIBILITIES AND RIGHTS (9)

Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - intellectual property rights (IPR) - discrimination.

GLOBAL ISSUES (9)

Multinational corporations - environmental ethics - computer ethics - weapons development - engineers as managers - consulting engineers - engineers as expert witnesses and advisors - moral leadership - sample code of conduct

TOTAL HOURS:45

Text Book:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York 1996.

References :

1. Charles D. Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. Laura Schlesinger, "How Could You Do That: The Abdication of Character, Courage, and Conscience", Harper Collins, New York, 1996.
3. Stephen Carter, "Integrity", Basic Books, New York, 1996.
4. Tom Rusk, "The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life", Viking, New York, 1993.

Semester VII

Engineering Management

4 0 100

ENGINEERING ECONOMICS

(9)

Introduction - Demand and Revenue Analysis - Demand Forecasting - Production Analysis - Cost and Supply Analysis, Price and output Determination - Investment Analysis - Plant Location - Economic Optimization.

MANAGEMENT OF WORK

(9)

Types of Business Organisation, Forms, Planning - Organising - Designing effective organisations -Coordination.

THE MANAGEMENT OF ENGINEERS

(9)

Human Resource Development - Motivating individuals and workgroups - Leadership for Managerial Effectiveness - Team working and Creativity - Managerial Communication - Personal Management - Time Management - Stores Management - Career Planning.

THE MANAGEMENT OF ENGINEERING

(9)

Financial Management - Product development - Management techniques in product development - Nature of controlling - Operations Management - Just-in-Time.

CONTEMPORARY MANAGEMENT ISSUES

(9)

Managing World Economic Change - The global environment - Multinational Strategies - Economic Cycles and Director Investment - Change and Organisation Development - Managerial Ethics and Social responsibilities.

TOTAL HOURS:45

Text Books:

1. Gail Freeman - Bell and Janes Balkwill, " Management in Engineering - Principles and Practice ", Prentice Hall of India Pvt.Ltd., 1998.
2. Gene Burton and Manab Thaker, " Management Today Principles and Practice ", Tata McGraw Hill, 1995.

References:

1. M. Joesph, Putti Management - " A Functional Approach ", McGraw Hill, 1999.
2. R.R. Barathwal, " Engineering Economics ", McGraw Hill, 1997.

Semester VII

Product Design and Development

4 0 100

CREATIVE THINKING AND ORGANIZING FOR PRODUCT INNOVATION (9)

The product-design function. The process design function. Locating ideas for new products. Selecting the right product. Qualifications of the production design engineer, Creative thinking curiosity and imagination.

CRITERIA FOR PRODUCT SUCCESS

(9)

Areas to be studied preparatory to design market research functional design. The value of appearance -Principles and laws of appearance - Incorporating quality and reliability into the design. Man Machine considerations-Designing for ease of maintenance.

COST AND PRODUCT DEVELOPMENT

(9)

Sources of funds for development cost - Product costs - Estimating product costs - Kinds of cost procedures- Value Engineering - Cost reduction.

PATENTS

(9)

Classes of exclusive rights-Patents-Combination versus aggregation-Novelty and Utility- Design patents-patent disclosure-patent application steps-Patent office prosecution- Sales of patent rights-Trade marks-Copy rights.

QUALITY CONTROL AND RELIABILITY

(9).

Quality Control procedure-Inspection and test equipment- Statistical quality control Techniques-Manufacturing Reliability-Probability the tool of reliability- Reliability operations- Developing a quality-control and reliability programme.

TOTAL HOURS:45

Text Book:

1. BENJAMIN W.NIEBEL and ALAN B.DRAPER-Product Design and Process Engineering-McGraw Hill Book Company.

References:

1. S.DALELA and MANSOOR ALI, Industrial Engineering and Management Systems, Standard PublishersDistributors, 1997.
2. A.ZAIDI, SPC Concepts, Methodologies and Tools, Prentice Hall of India Pvt.Ltd., 1995.
3. PRADHEEPH.N. KANDWALA, Fourth Eye.

Semester VII

Comprehension

0 3 100

The objective of " Comprehension " is to provide opportunity for the student to apply knowledge acquired during the academic program to real-life problems which he/she may have to face in future as an engineer.

Three periods per week shall be allotted in the time table for this activity and this time shall be utilized by the students to receive guidance from the members of faculty on solving real-life problems, practice solving these problems and on group discussions, seminar presentations, library reading as assigned by the faculty member in-charge. For internal assessment, there will be 3 or 4 written tests covering all the courses studied in previous semesters.

The written tests may be of objective type of questions, short answer questions, etc.

TOTAL HOURS:45

Semester VII

Design and Fabrication Project

0 3 100

The Main objective is to give the students hands on training in the fabrication of one or more component of a complete working model which has been designed by them. The students may be grouped into small groups and work under a Project supervisor. The components to be fabricated may be decided in consultation with the Supervisor and if possible with in industry.

TOTAL HOURS:45