BE- 501 - Microprocessors & Microcontrollers

UNIT 1:
Microprocessor 8086
Introduction to 16-bit 8086 microprocessors, architecture of 8086, Pin Configuration, interrupts, minimum mode and maximum mode, timing diagram, Memory interfacing, Comparative study of Salient features of 8086, 80286 and 80386.

UNIT 2:
Microprocessor 8086 programming
Instruction set of 8086, Addressing mode, Assembler directives & operations, assembly and machine language programming, subroutine call and returns, Concept of stack, Stack structure of 8086, timings and delays,

UNIT 3:
Input-Output interfacing: Memory Mapped I/O and Peripherals I/O. PPI 8255 Architecture and modes of operation, Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, Programmable interval timer 8254, USART 8251, 8 bit ADC/DAC interfacing and programming.

UNIT 4:
Microcontroller 8051
Intel family of 8 bit microcontrollers, Architecture of 8051, Pin description, I/O configuration, interrupts; Interrupt structure and interrupt priorities, Port structure and operation, Accessing internal & external memories and different mode of operations, Memory organization, Addressing mode, instruction set of 8051 and programming.

UNIT 5:
8051 Interfacing, Applications and serial communication
8051 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051 based data acquisition system 8051 connections to RS-232, 8051 Serial communication , Serial communication modes, Serial communication programming, Serial port programming in C.

BOOKS:
1. Hall Douglas V.,Microprocessor and interfacing, Revised second edition 2006, Macmillan, McGraw Hill .
2. A.K. Ray & K.M.Bhurchandi, Advanced Microprocessors and peripherals- Architecture, Programming and Interfacing, Tata McGraw – Hill, 2009 TMH reprint..
3. Kenneth J. Ayala**,** The 8086 microprocessor: programming and interfacing the PC, Indian - edition , CENGAGE Learning.
4. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson education, 2005.
5. Kenneth J. Ayala**,** The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
6. V.Udayashankara and M.S.Mallikarjunaswamy, 8051 Microcontroller: Hardware, Software & Applications, Tata McGraw – Hill, 2009.
7. McKinlay, The 8051 Microcontroller and Embedded Systems – using assembly and C, PHI, 2006 / Pearson, 2006.

BE- 502 – Operating System

Unit - I

Introduction to Operating Systems, Operating system services, multiprogramming, time sharing system, storage structures, system calls, multiprocessor system.
Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling I/0 devices organization, I/0 devices organization, I/0 devices organization, I/0 buffering.

Unit - II

Process concept, process scheduling, operations on processes, threads, inter-process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

Unit - III

Concepts of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, paging combined with segmentation.

Unit - IV

Concepts of virtual memory, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation. Security threads protection intruders-Viruses-trusted system.

Unit - V

Disk scheduling, file concepts, file access methods, allocation methods, directory systems, file protection, introduction to distributed systems and parallel processing case study.

Suggested Instructions

1. Class room lectures.
2. Seminar on various operating systems with special reference to their CPU scheduling, memory management, 1/0
management and file systems.
3. Minor project.

Suggested further readings

Operating System by Silberschatz
Operating System by Deitel
Modern operating system by Tanneubaum.

BE- 503 – Communication Engineering

Unit-1. Fourier series, Fourier Transform and its properties, Probability, random variables & their moments, their significance, convolution, auto correlation, cross Correlation & power spectral density, Gaussian & Rayleigh probability density Function, mean, variance & standard deviation, central limit theorem, voltage & Power decibel scales. Signal Processing : Types of signal, deterministic & random, periodic & non Periodic, analog & discrete, energy & power signals, Representation of sinusoid in different forms & their conversion

Unit-2 Need of modulation in a communication system, block schematic of a typical Communication system. AM modulation system, modulation index, generation & detection of AM wave, side bands & power content in an AM wave, DSB-SC, SSB, their methods of generation & detection, vestigial side Band modulation, AM transmitter block diagram, comparison of various AM system, modulation & demodulation circuits. Relationship between phase & freq. modulation, FM wave & its spectrum, phasor diagram of a narrow band FM signal, wide band FM, methods of generation & detection of FM, discriminators, pre-emphasis & de-emphasis, Stereophonic FM broadcasting, FM transmitters.

Unit-3 TRF receiver & its limitations, necessity of heterodyning, super heterodyning Receivers, IF amplifiers, selection of intermediate frequency. RF amplifiers, detectors, AGC, AVC, FM receivers, AFC.

Unit-4 Nyquist sampling theorem, TDM, pulse modulations & PCM, quantization error, necessity of non linear quantizer, A-law, μ-law, FSK & PSK, QPSK, QAM. Source of noise, noise figure, noise bandwidth, effective noise temperature, performance of AM, FM & digital system in presence of noise.

Unit-5 Satellite system block diagram, satellite freq. bands, satellite multiple access Format like TDMA, FDMA, transponders, earth station & satellite eclipses, Link calculation

References:

1. Taub & shilling, Communication System, TMH
2. Singh & Sapre, Communication System, TMH
3. B.P. Lathi, Modern Digital and ana communication system,
4. Simon Haykins, Communication System. John Willy
5. Wayne Tomasi, Electronic Communication system.
6. Schaum outline Series, Analog and digital communication
7. Martin S. Roden, Analog & Digital Communication System., Discovery Press.
8. Frank R. Dungan, Electronic Communication System, Thomson/Vikas
9. John G. Prokis,Masoud Salehi, Gerhard Bauch, Contemporary communication sytems using MATLAB, Cengage learning 2004.

BE- 504 – Power Electronics

Unit I

Power, Semiconductor Devices

Classification of Power semiconductor devices, characteristics, construction, application and theory of operation of power diode, power transistor, thyristors. Device specifications and ratings, working of Diac, Triac, IGBT, GTO and other power semiconductor devices. Turn-on / Turn-off methods and their circuits.

Unit II

Rectifiers

Review of uncontrolled rectification an its limitations, controlled rectifiers, half wave, Full wave configurations, multiphase rectification system, use of flywheel diode in controlled rectifier configurations.

Unit III

Inverters and Choppers

Classification of inverters, Transistor inverters, Thyristor inverters, Voltage and Current Communicated inverters, PWM inverters, Principle of Chopper, Chopper classification and types of regulators.

Unit IV

***A. C.* Voltage Controllers and Cyclo-converters**

Classification and operation of a.c. voltage and cyclo-converters, their circuit analysis for different type of load.

Unit V

Industrial Applications

Solid-state switching circuits, Relays, Electronic Timer, battery charger, Sawtooth generator, applications in Industrial process control, Motor drive applications, Electronic regulators, etc., Induction heating, Dielectric Heating, Resistance welding and welding cycle.

Suggested List of Strategies

1.Input cum discussion of unit wise
2.Lab work
3.Self study

Suggested Instructional Experiments

1. To draw the V-1 characteristics of thyristor.
2. To draw the V-1 characteristics of triac.
3. To draw the V-1 characteristics of diac.
4. Study of light dimmer using Triac and Diac, find out the firing angle and draw the wave forms across load and Triac.
5. Study the operation of an SCR automatic speed control circuit and see the waveforms on CRO
6. To draw the V-1 characteristics of IGBT.

Suggested further readings

1. Power electronics, converters, applications & design - Need Mohan et.al.
2. Power Electronics Circuits, devices & applications - M.H. Rashid
3. Power Electronics -P.C.Sen
4. An introduction Thyristors & their applications - M. Rammurthy
5. Power Electronics & its applications, Alok Jain, Penram Publicatio

BE- 505 Analytical & Industrial Instrumentation

Unit I

Difference between analytical and other instruments. Gas Analysis: Gas chromatography, Thermal conductivity method, Heat of reaction method. Estimation of oxygen, hydrogen, methane, carbon dioxide, CO, etc. in binary or complex gas mixtures. Zirconia-probe oxygen analyser. Paramagnetic oxygen meters, Electrochemical reaction method.

Unit II

Ultraviolet and visible spectro photometry : Radiation sources, detectors, read outmodules, filters, monochromators. Instruments for absorption photometry. Fundamental laws of photometry. Infrared Spectrophotometry : Basic components of IR spectrophotometers, sample handling, Types of spectrophotometers, Fourier transform infrared spectroscopy.

Unit III

Mass spectrometry: Basic mass spectrometer, components of mass spectrometers, types of mass spectrometers resolution and applications. X-Ray methods. Production of X-Rays & X-Ray spectra, Instrumental units, detectors for the measurement of radiation, direct X-Ray methods, X-Ray absorption methods, X-Ray fluorescence methods, X-Ray diffraction, Applications Spectroscopy, ESR Spectroscopy.

Unit IV

Chemical composition Analysis : Measurement of Viscosity, turbidity, metes consistency, pH and redox potential, electrical conductivity. Techniques of density measurement Solids, liquids and gases.

Unit V

Environmental Pollution Monitoring Instruments : Air pollution monitoring instruments carbon monoxide, sulphur dioxide, Nitrogen oxides, Hydrocarbons, Ozone, Automated wet chemical air analysis. Water pollution monitoring instruments.

Suggested Instructional Strategies

1.Input cum discussions
2.Lab Work
3.Demonstration
4.Self study
5.Seminar presentation
6.Mini project

Suggested list of Experiments

1. Study of Gas chromatograph
2. Study of X-Ray Spectrometer
3. Study of Ultraviolet & Visible Spectrophotometer
4. Study of Mass spectrometer
5. Viscosity measurement
6. Turbidity measurement

Suggested Books

Patranabis D-Principles of Industrial Inst. TMH Publication
Merritt W H W, Dean LL and Settie JA - Instrumental Methods of Analysis.
Skoog DA and West DM - Principles of Instrumental Analysis.
Hand book of Analytical Instrument Technology, Vol-11, Analysis Instruments, Butter worths Scientific Publication, London.

BE- 506 Matlab Lab

MATLAB Windows
MATLAB Basics – Variables and Arrays, initializing Variables in MATLAB, Multidimensional Arrays, Sub Arrays, Displaying Output data, Data files, Scalar and Array Operations, Introduction to Plotting Branching Statements and Program Design Loops
User Defined Functions
Input/Output Functions
Handling Graphics
Toolboxes and simulation using Simulink environment

Reference Books

1. Basic of MATLAB by Rudhra Pratap
2. A Guide to MATLAB for Beginners and Experienced Users – Hunt Lipsman & Rosenberg
3. An introduction to programming and numerical Methods in MATLAB – S.R. Otto & J.P.Denier
4. Essential MATLAB for Engineers and Scientists – Brian D. Hahn & Deniel T. Valentine
5. Introduction to MATLAB – Sikander M. Mirza
6. Introduction to Simulink with Engineering Applications – Steven T. Karris