

Swami Ramanand Teerth Marathwada University, Nanded
B. Sc. Third Year Electronics Syllabus
(To be Implemented from Academic Year 2010-11)

Paper No.	Name of the paper	Theory Marks	Practical Marks	Period per week
VIII	Communication Electronics	100		03
IX-A OR IX-B	Power Electronics OR Microcontroller and embedded Systems	100		03
X	Practicals on Paper –VIII	---	100	03
IX(A) OR IX(B)	Practicals on Paper –IX(A) OR Practicals on Paper- IX(B)	---	100	03
		Total=200	Total=200	Total=12

Total Theory marks =200

Total Practical marks =200

Total Theory + Practical =400

VIII - Communication Electronics
(100 Marks, 80 Periods)

1. Types of Modulation (20 periods)

Introduction, expression for amplitude modulated voltage, Waveform of amplitude modulated voltage, Sideband produced in amplitude modulated wave, modulated power output, frequency modulation, expression for frequency modulated voltage, sidebands produced in frequency modulation, phase modulation, comparison of frequency modulated and phase modulated expressions, pulse modulation, sampling of analog signals, pulse amplitude modulation: Time division Multiplexing, pulse code modulation.

2. Amplitude Modulation and detection (12 periods)

Modulating circuits, collector modulation, square law diode modulation, balanced modulation, linear diode detector of AM signals

3. Frequency Modulation and detection (08 periods)

Pin diagram of IC 566 and IC 565, Frequency Modulation using IC566, Frequency demodulation using IC 565

4. Radio Receivers (10 periods)

Introduction, Tuned Radio Frequency (TRF) Receiver, Super heterodyne Receiver, AM receivers: RF section and characteristics: Sensitivity, Selectivity, Fidelity, Image frequency and its rejection

5. Radar System (10 periods)

Introduction, simple Radar system, Radar range equation, Moving target indication, CW Doppler radar.

6. Optical Fibers (20 periods)

Introduction, propagation of light in different media, propagation of light waves in an optical fiber, basic structure of an optical fiber and propagation of light wave through it, acceptance angle and acceptance cone of a fiber, numerical aperture, numerical aperture of a graded index fiber, modes of propagation, Meridional and skew rays, Number of modes and cut-off parameters of fibers, single mode propagation Stepped index fiber, graded index multi mode fibers

Problems on each unit.

References:

1. Electronic and Radio Engineering- M. L. Gupta
2. Op-Amps and Linear Integrated Circuits- Ramakant A. Gaikwad (Third edition) PHI Publications. (For unit 3 page no. 334-337, page no 437-441)
3. Optical Fibers and Fiber Optic Communication Systems- S.K. Sarkar, S.Chand and Company Ltd., New Delhi.
4. Electronic Communications- Dennis Roddy and John Coolen (Fourth Edition), PHI Publications.
5. Electronic Communication Systems- George Kennedy, (Third Edition), Mc Graw Hill International Edition.
6. Microwave Engineering- Sanjeev Gupta,

IX(A) -Power Electronics

(100 Marks, 80 Periods)

1. Thyristor: Principles and Characteristics (15 periods)

Thyristor family, principle of operation of SCR, static anode-cathode characteristics of SCR, the two transistor model of SCR, thyristor construction, gate characteristics of SCR, turn-on methods of a thyristor.

2. Gate triggering circuits (10 periods)

Firing of thyristor, pulse transformers in triggering circuits, optical isolators, gate trigger circuits,

3. Series and Parallel Operations of Thyristor (15 periods)

Series operations of thyristors, unequal distribution of voltage, equalizing networks design, parallel operations of thyristor, methods of ensuring proper current sharing, triggering of thyristor in parallel, string efficiency, derating.

4. Phase Control Rectifier (15 periods)

Phase angle control, single phase half-wave controlled rectifier (one quadrant),with resistive load, with inductive load, effect of freewheeling diode, single phase full-wave controlled rectifier (two quadrant), mid-point converters with resistive load and inductive load, single phase half-wave controlled bridge rectifier.

5. Thyristor control circuits (10 periods)

Phase control circuit for regulating temperature,remote temperature controller,light activated turn off circuit using Diac-Triac and LDR,off at dark circuit,automatic water level indicator using SCR

6. Inverters (05 periods)

Basic series inverters and basic parallel inverters,

7. Choppers (10 periods)

Introduction, Principle of chopper operation, chopper control strategies, time ratio control, current limit control,step up choppers, step down choppers.

References:

1. Power Electronics- By M.D. Singh and K.B. Khanchandani, TMH Pub.Co.Ltd.
2. Industrial Electronics & Control- By S.K.Bhattacharya and S.Chatterjee, TMH Pub.Co.Ltd.
3. Thyristors Theory and Applications(Second edition)- R.K. Sugandhi and K.K. Sugandhi Wiley Eastern Ltd.

**IX(B)- Microcontroller and Embedded Systems
(100 Marks, 80 Periods)**

- 1. Introduction to Microcontroller:** (05 periods)
Block diagram of microcomputer, block diagram of microcontroller, comparison between microprocessor and microcontroller, microcontroller survey (8-bit, 16-bit, 32-bit)
- 2. Architecture of 8051 microcontroller:** (15 periods)
Features, pinout diagram, internal block diagram, CPU registers, flags, PSW, PC, Data Pointer, SFR, SP, Internal RAM/ROM, External memory, I/O ports.
- 3. Instruction set of 8051:** (15 periods)
Data transfer, arithmetic, logical operation, JUMP, Loop and CALL instructions, single bit, stack and interrupt instructions.
- 4. 8051 Programming:** (10 periods)
Editor, assembler, linker, instruction syntax, data types and directives, Assembly language programming examples: simple data transfer, arithmetic, logical, single bit, looping and code conversion programs.
- 5. Timer and Counter in 8051:** (05 periods)
Timer modes, timer counter registers, programming the timers in various modes, counter programming.
- 6. Interfacing and applications:** (15 periods)
I/O port programming, demultiplexing of AD₀ - AD₇ bus, memory interface and expansion, interfacing LED, LCD display (alphanumeric), switch, relay, stepper motor, speed control of DC motor by PWM technique, interfacing D/A and A/D converters.
- 7. Programmable Logic Controllers (PLC):** (15 periods)
PLC system, internal architecture of PLC (CPU, bus, memory, I/O unit), PLC programming: ladder diagram, ladder programming, logic functions, latching, instruction lists, Boolean algebra, functional diagram, programming examples.

References:

1. The 8051 Microcontroller architecture, Programming & Applications- Kenneth J. Ayala (Penram international)
2. Th 8051 Microcontroller and Embedded Systems.- M. A. Mazadi, J. C. Mazadi (Pearson Education, Asia)
3. Microprocessor, microcontroller & applications- U. S. Shah (Tech-Max Publication Pune).
4. Programming and Customizing the 8051 Microcontroller- Mike Predko (TMH, New Delhi).
5. Programmable Logic Controllers An Introduction - W. Bolton

Paper X – Practical

100 Marks

Note: Perform at least ten experiments

1. Study of class – C amplitude modulation and measurement of efficiency, percentage modulation index.
2. Study of linear diode detector and measurement of detection efficiency.
3. Study of frequency response of two stage IF amplifier.
4. Study of frequency response of audio amplifier using CA 810
5. Study of class B push – pull amplifier using complimentary symmetry and determination of efficiency.
6. Study of RF mixer using BF 194 transistor
7. Study of FM modulation using IC 566
8. Study of FM demodulator using IC TBA 120/IC 565
9. Measurement of refractive index of an Optical Fiber (Use stepped index mono mode fiber)
10. Measurement of cut off wave length of optical fiber (Use stepped index Mono mode fiber)
11. Measurement of Numerical aperture of optical fiber
12. Study of the characteristics of Laser LED
13. Study of photo- diode detector characteristics (Use avalanche photo diode)
14. Study of transmission and reception through optical fiber

Paper XI(A)- Practical

100 Marks

Note: Perform at least ten experiments

1. Unijunction Transistor Characteristics
2. UJT relaxation oscillator
3. Firing characteristics of SCR.
4. Half wave gate controlled rectifier using one SCR
5. Firing of two SCRs by a UJT.
6. Characteristics of Diac
7. Firing characteristics of a Triac
8. Illumination control using Diac and Triac
9. Light activated turnoff circuit using LDR and SCR
10. Light activated turn off circuit using Diac-Triac and LDR
11. Inverter using SCR and measurement of frequency, output power.
12. Study of simple Chopper circuit/step-up chopper circuit and measurement of on-time, off-time , output voltage

Paper XI(B)- Practical

100 Marks

Note: Perform at least ten experiments

1. Program to study addressing modes of IC 8051.
2. Two programs on arithmetic operations.
3. Two programs on logical operations.
4. Program to convert Binary number to equivalent Gray number.
5. Program to unpack the packed BCD number.
6. Program to find Sum of series / to get average of given set of numbers.
7. Program to perform multiplication / division of two 8-bit numbers.
8. Program to move the block of memory to other area.
9. Program to get factorial of given number (factorial value < 255).
10. Program to flash LED connected to port P₃ with the time delay of 1 sec. using timer-1 in mode-2.
11. Program to generate square wave of 3 KHz on port P_{1,3} using timer-1 in mode-1.
12. Program to interface relay switch and make it ON/OFF repeatedly with the delay of 1 sec.
13. Program to interface 8-segment display unit to IC 8051 to generate desired character.
14. Program to interface stepper motor to rotate clockwise/anticlockwise with given number of steps per revolutions.