

Swami Ramanand Teerth Marathwada University, Nanded
B.Sc. Third Year Electronics Syllabus
Semester system
(To be Implemented from academic year 2011-2012)

Paper No.	Name of the paper	Theory Marks	Practical Marks	Periods per week
Semester-V				
XII	Communication Electronics-I	50	----	03
XIII-A OR XIII-B	Power Electronics-I OR Introduction to Microcontroller(8051)	50	-----	03
Semester-VI				
XIV	Communication Electronics-II	50	----	03
XV-A OR XV-B	Power Electronics-II OR 8051 Microcontroller and embedded Systems	50	----	03
Semester-V + VI (Annual)				
XVI	Practicals on paper XII & XIV(Compulsory)	----	50	03
XVII	Practicals on paper XIII(A) & XV(A) OR XIII(B) & XV(B)	----	50	03
		Total=200	Total=100	18

Total Theory marks =50+50+50+50=200

Total Practical marks =50+50=100

Total Theory + Practical =300

Scheme of marking:

Sem.-V	Paper-XII Theory + MCQ + IE (25 + 15 + 10)	Paper-XIII Theory + MCQ + IE (25 + 15 + 10)	100 Marks
Sem.-VI	Paper-XIV Theory + MCQ + IE (25 + 15 + 10)	Paper-XV Theory + MCQ + IE (25 + 15 + 10)	100 Marks
Practical (Annual)	Paper-XVI 50(Expt-35, Oral-10, Record Book-05)	Paper-XVII 50(Expt-35, Oral-10, Record Book-05)	100 Marks

Paper-XII: Communication Electronics-I

(50 Marks, 45 Periods)

Unit I:

Introduction to Communication Systems

(05 periods)

Introduction, Block diagram of communication System, Need for Modulation, Types of Modulation, Bandwidth.

Unit II:

Amplitude Modulation

(20 periods)

Amplitude Modulation Theory, Mathematical representation of AM wave, Modulation index, Frequency spectrum of AM wave, Bandwidth of AM, Power relations in AM wave, AM circuits: Basic circuit for BJT Collector modulation, Amplitude demodulator circuit

Unit III:

Frequency Modulation

(10 periods)

Theory of frequency modulation, Mathematical representation of FM wave, Bandwidth, Generation of FM, Direct method for FM generation, Transistor reactance modulator, Varactor reactance modulator.

Unit IV:

Pulse Modulation

(10 periods)

Introduction, Types: Pulse-Amplitude modulation (PAM), Pulse-Width modulation (PWM), Pulse-Position modulation (PPM), Pulse-Code modulation (PCM).

References:

1. Electronic Communications, Dennis Roddy and John Coolen (Fourth Edition), PHI Publication.
2. Electronic Communication Systems, George Kennedy, (Third Edition), Mc Graw Hill International Edition.
3. Communication Engineering, J.S. Katre, Technova Educational Publications, Pune.

Paper-XIII(A): Power Electronics-I

(50 Marks, 45 Periods)

Unit I:

Thyristor: Principles and Characteristics

(15 periods)

Thyristor family, principle of operations 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.

Unit II:

Gate triggering circuits

(08 periods)

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

Unit III:

Unijunction Transistor and Triggering circuits

(10 periods)

UJT basic operation, Circuit operation, UJT relaxation oscillator, The UJT as an SCR trigger

Unit IV:

Series and Parallel Operations of Thyristor

(12 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.

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.

Elective Paper-XIII(B): Introduction to Microcontroller (8051)
(50 marks, 45 periods)

Unit I:
Introduction to Microcontroller: (06 periods)

Block diagram of microcomputer, block diagram of microcontroller, comparison between microprocessor and microcontroller, embedded systems, microcontroller survey (8-bit, 16-bit, 32-bit)

Unit II:
Architecture of 8051 microcontroller: (15 periods)

Features, pin out diagram, internal block diagram, CPU registers, flags, PSW, SFRs, PC, Data Pointer, SP, Internal RAM/ROM, External memory, I/O ports.

Unit III:
Instruction set of 8051: (15 periods)

Addressing modes, Data transfer, arithmetic, logical operations, JUMP, Loop and CALL instructions, single bit operations, stack and interrupt instructions

Unit IV:
8051 Programming: (09 periods)

Assembly language programming, instruction syntax, assembler, compiler, simple programs on data transfer, arithmetic and logical operations.

References

1. The 8051 Microcontroller architecture, Programming & Applications- Kenneth J. Ayala (Penram international)/Cengage Learning India Pvt. Ltd, (Patparganj), New Delhi
2. The 8051 Microcontroller and Embedded Systems-M. A. Mazadi, J. C. Mazadi (Pearson Education, Asia)
3. 8051 Microcontroller: Hardware, Software and Applications- V. Udayshankara, M. S. Mulikarjun Swami-McGraw Hill.
4. Microprocessor, microcontroller & applications- U. S. Shah (Tech-Max Pune).
5. Microcontroller (Theory and Applications) - Ajay V. Deshmukh- McGraw Hill.
6. Microcontroller & Applications-A. P. Godse, Technical Publications, Pune

Paper-XIV: Communication Electronics-II

(50 Marks, 45 Periods)

Unit I:

Radio Receivers

(10 periods)

Introduction, Tuned Radio Frequency (TRF) Receiver, Super Heterodyne Receiver, Characteristics of Radio receivers, Sensitivity, Selectivity, Fidelity, Image frequency and its rejection, Double spotting, Basic block diagram of communication receiver.

Unit II:

Microwaves

(10 periods)

Introduction, Reflex Klystron-Operation, Mathematical analysis, Modes, Gunn effect and Gunn diode.

Unit III:

Radar System

(10 periods)

Basic principles, Block diagram of basic pulsed radar system, Radar range equation, Moving target indication, CW Doppler radar.

Unit IV:

Introduction to Optical Fibers

(15 periods)

Propagation of light in different media : Propagation of light in an optical fiber, Basic structure and optical path of an optical fiber, Acceptance angle and acceptance cone, Numerical aperture (NA) (General), Modes of propagation, Meridional and skew rays, Number of modes and cut-off parameters of fibers Stepped index fibre, Stepped index monomode fibres, Graded index multimode fibres.

References:

1. Electronic Communications, Dennis Roddy and John Coolen (Fourth Edition), PHI Publication.
2. Electronic Communication Systems, George Kennedy, (Third Edition), Mc Graw Hill International Edition.
3. Microwave Engineering-Sanjeeva and Gupta
4. Microwave Devices and Circuits-Liao, PHI
5. Optical Fibers and Fiber Optic Communication Systems, S.K. Sarkar, S.Chand and Company Ltd., New Delhi.
6. Communication Engineering, J.S. Katre, Technova Educational Publications, Pune.

XV(A): Power Electronics-II

(50 Marks, 45 Periods)

Unit I:

Phase Control Rectifier

(20 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 restive load and inductive load, single phase half-wave controlled bridge rectifier.

Unit II:

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

Unit III:

Inverters

(05 periods)

Basic series inverters and basic parallel inverters,

Unit IV:

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.

Elective Paper-XV(B): 8051 Microcontroller and Embedded Systems
(50 marks, 45 periods)

Unit I:

8051 Programming: (08 periods)

Assembly language programming examples: arithmetic, logical, single bit, branching, looping and code conversion programs.

Unit II:

Timer and Counter in 8051: (08 periods)

Timer modes, timer counter registers, programming the timers in various modes, counter programming.

Unit III:

Interfacing and applications: (14 periods)

Interfacing of LEDs, LCD, switches, relays, stepper motor, interfacing DAC and ADC converters.

Unit IV:

Programmable Logic Controllers (PLC): (15 periods)

PLC system, internal architecture of PLC (CPU, bus, memory, I/O unit), Ladder & Functional Block programming: Ladder diagrams, PLC ladder programming, logic functions, latching, Boolean algebra, functional blocks, and program examples.

References:

1. The 8051 Microcontroller architecture, Programming & Applications- Kenneth J. Ayala (Penram international)/Cengage Learning India Pvt. Ltd, (Patparganj), New Delhi.
2. The 8051 Microcontroller and Embedded Systems-M. A. Mazadi, J. C. Mazadi (Pearson Education, Asia)
3. 8051 Microcontroller: Hardware, Software and Applications-V. Udayshankara, M. S. Mulikarjun Swami, McGraw Hill.
4. Programmable Logic Controllers-W. Bolton - 4 th Edition, Elsevier India Pvt. Ltd. Gurgaon, Harayana.
5. Microcontroller (Theory and Applications) - Ajay V. Deshmukh- McGraw Hill.
6. Microprocessor, microcontroller & applications- U. S. Shah (Tech-Max Pune).
7. Microcontroller & Applications-A. P. Godse, Technical Publications, Pune

Paper XVI – Practical(Communication Electronics Laboratory)
(Marks-50)

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. Reflex Klystron characteristics
9. Gunn diode characteristics
10. Study of FM demodulator using IC TBA 120/IC 565
11. Study of Pulse amplitude modulation
12. Study of Pulse position modulation
13. Study of Pulse Width modulation
14. Study of Pulse code modulation
15. Measurement of refractive index of glass slab using laser source
16. Measurement of cut off wave length of optical fiber (Use stepped index Mono mode fiber)
17. Measurement of Numerical aperture of optical fiber
18. Determination of diameter of an optical fiber.
19. Study the bending loss of an optical fiber.
20. Study of the characteristics of Laser LED.
21. Study of photo- diode detector characteristics (Use avalanche photo diode)
22. Study of transmission and reception through optical fiber

Paper XVII(A)- Practical(Power Electronics Laboratory)

(Marks-50)

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 single SCR using UJT
6. Firing of two SCRs by a UJT.
7. Phase control circuit using SCR
8. Characteristics of Diac
9. Firing characteristics of a Triac
10. Illumination control using Diac and Triac
11. Light activated turnoff circuit using LDR and SCR
12. Light activated turn off circuit using Diac-Triac and LDR
13. Inverter using SCR and measurement of frequency, output power.
14. Study of simple Chopper circuit/step-up chopper circuit and measurement of on-time, off-time , output voltage

Paper-XVII (B): Elective Practicals(Microcontroller Lab)

(Marks-50)

Note: Perform at least ten experiments

1. Programs to study addressing modes of IC 8051.
2. Addition of two 8 bit numbers & 16 bit numbers.
3. Subtraction of two 8 bit numbers & 16 bit numbers
4. Multiplication of two 8 bit numbers.
5. Division of two 8 bit numbers.
6. 1's and 2's complement of 8 bit number/16 bit numbers.
7. Two programs on logical operations.
8. Program to convert Binary number to equivalent Gray number.
9. Program to unpack the packed BCD number.
10. Program to move the block of memory to other area.
11. Program to flash LED connected to port P_{3.1} with the time delay of 1 sec. using timer-1 in mode-2.
12. Program to find Sum of series / to get average of given set of numbers.
13. Program to generate square wave of 3 KHz on port P_{1.3} using timer-1 in mode-1.
14. Program to interface relay switch and make it ON/OFF repeatedly with the delay of 1 sec.
15. Program to interface 7-segment display unit to IC 8051 to generate desired character.
16. Program to interface stepper motor to rotate clockwise/anticlockwise with given number of steps per revolutions.
17. Interfacing with DAC 0808.
18. Interfacing with ADC 0808.
19. Smallest of two numbers
20. Largest of two numbers