

"अंतरी पेटवु ज्ञानलोक"

NORTH MAHARASHTRA UNIVERSITY, JALGAON

SYLLABUS- ELECTRONICS (WITH EFFECT FROM JUNE 1993)

S.Y.B.S.C. PAPER-I

LINEAR AND DIGITAL ELECTRONICS

First Term - LINEAR ELECTRONICS

1. POWER AMPLIFIERS- Need of power amplifiers, operating conditions, power relations, transformer equivalent circuit, the a.c. load line and output considerations, constant power hyperbola, power conversion efficiency, derating curve, nonlinear distortion, efficiency calculation for class A only, study of class A, Class B and class C power amplifiers class B push pull amplifier, idea of heat sink, phase inverters for push pull input, class C resonant load amplifier, resonant load requirements, neutralizing circuits.

(18 periods)

2. OSCILLATORS- Feedback requirements for oscillations, circuit requirements for oscillations, frequency stability (Niquist criterion), Wein bridge oscillator, Hartley oscillator, crystal oscillator (only qualitative ideas and transistorised oscillators are expected), multivibrators (Astable Monostable and Bistable using OP-AMF 741)

(12 periods)

3. WAVE SHAPING CIRCUITS- Differentiation and integration using R-C circuits, clipping and clamping circuits using diodes.

(6 periods)

4. TRANSDUCERS: Classification of transducers, p-n junction, thermocouple, thermistor, photocell, photomultiplier, photodiode, phototransistor, photovoltaic cell, LED, LDR, VDR, LVDT optocouplers.

(12 periods)

REFERENCES:

1. Electronic Fundamentals and Applications (5th edition)- John D. Ryder (Prentice Hall of India)
2. Semiconductor Pulse Circuits - Mitchel.
3. Principles of Electronics - V.K.Mehta (Khanna Publishers)
4. Transducers and Display Devices - B.S.Sonde (TMH Publications)
5. Electrical and Electronic instrumentation and Measurements - A.K.SAWhney
6. Basic Electronics - B.L.Thereja
7. OPAMPS - G.B.Clayton
8. Electronic Devices and Circuits - Allen Mottershead
9. Linear Integrated circuits and OP-Amps - Ramakant Gayakwad.

SECOND TERM - DIGITAL ELECTRONICS - II

1. COUNTERS- Asynchronous, synchronous, updown counters, modified counters (mod-3, mod-5) (STUDY OF 4 BIT COUNTERS IS EXPECTED) IC-7490 block diagram and scaler operations (2,3,4,5,8, and 10) logic diagrams and timing diagrams of 7493, 74191 and 74192.

(14 periods)

2. SHIFT REGISTERS- Serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out, left shift, right shift (STUDY OF 4 BIT REGISTERS IS EXPECTED), timing diagrams of 7494, 7491, 7495.

(8 periods)

3. DATA PROCESSING CIRCUITS- Multiplexers, demultiplexers, encoders and decoders, study of 7447, 74150, 74155, 74147 (Pin connections, features and applications)

(10 periods)

4. SEMICONDUCTOR MEMORIES- Volatile and nonvolatile memories, memory devices, comparison between semiconductor and magnetic memories, semiconductor memory types- RAM, DRAM, ROM, PROM, EAROM, EAROM, meanings of the terms - memory word, word size, memory address, implementation of ROM and RAM memories, memory module, RAM chip memory size, RAM and ROM addresses, memory content and its interpretation as a pure data, as a character code and as an instruction code, memory cell-bipolar, NMOS and CMOS, memory using diode matrix.

(16 periods)

REFERENCES:

1. Digital Principles and Applications - Malvino and Leach (Tata MacGraw Hill publications)
2. Integrated Circuits - K.R.Botkar (Khanna publishers)
3. Introduction to microcomputer (Vol.1) - Adam Osborne
4. Digital Electronics - R.P.Jain
5. Digital Electronics - Gothman
6. Microprocessor Architecture, programming and applications } Gaonkar

PAPER - IIELECTRONIC INSTRUMENTATION I & IIFirst Term - ELECTRONIC INSTRUMENTATION

1. BASIC ANALOG METERS: PMMC movement, equivalent circuit of practical ammeter and voltmeter, multirange ammeters and voltmeters, voltmeter sensitivity, loading effect, series and shunt type ohm-meters, Electronic analog VOM (study of SIMPSON 260M model), FET input VOM (Voltage and resistance measurements), electro-dynamometer, power meter (single phase). (12 periods)
2. SIGNAL GENERATORS: Block diagram of signal generator, attenuator, performance characteristics (frequency range, power output, dial resolution and accuracy, frequency and amplitude stability, output impedance, distortion), applications, concept of precision, accuracy and resolution and examples, Pulse and square wave generators, function generator, sweep generator. (10 periods)
3. POWER SUPPLY: Basic elements of power supply, block diagram of regulated and unregulated power supply, study of power supply w.r.t. load and line regulations, voltage regulator, series and shunt regulators, IC 723 pin connections and internal block diagram, design of variable regulated power supply using IC 723 (upto 37 volts/100mA) Three terminal IC voltage regulators, block diagram, regulated power supply using IC 7805 & IC 7905, dual power supply using IC 7815 & 7915, merits and demerits of IC 7805 OVER IC 723. (14 periods)
4. CATHODE RAY OSCILLOSCOPE- Block diagram, CRO front panel controls (CRT connections), types of coupling, idea of CRO probe, time base generator, synchronization and synchronised sweep, triggered sweep generator and trigger level, sources of trigger, mode of trigger, slope, basic ideas of dual trace and dual beam CROs. (12 periods)

REFERENCES:

1. Electronic instruments and Measurement Techniques- W.D.Cooper
2. Instrumentation Devices and Systems - Rangan, Mani & Sharma
3. Electrical and Electronic Instrumentation & Measurements- A.K.Sawhney
4. Linear Integrated Circuits & OPAMPs- Ramakant Gayakwad
5. Power Supplies - B.S.Sonde
6. Integrated Circuits - K.R.Botkar

SECOND TERM - ELECTRONIC INSTRUMENTATION - II

1. 555 TIMER - Pin connections and internal block diagram of IC 555, applications of IC 555 as astable, monostable and bistable multivibrators, idea of duty-cycle. (10 periods)
2. DATA CONVERTERS- DAC, weighted binary and binary ladder types, ADC, dual slope integration, successive approximation and counter type, properties such as resolution and accuracy. (10 periods)
3. DIGITAL FREQUENCY METER- Principle of operation, block diagram and working of DFM. Block diagram of Universal Counter-Timer, Time-base decade counting units and decimal display, various measurement modes such as totalising, frequency measurement, frequency ratio measurement, period measurement, time-interval measurement, pulse-width measurement and Timing diagrams for these measurement modes, gating error, resolution, use of scaler in time-base. (16 periods)
4. DIGITAL MULTIMETER- Block diagram, dual slope integration type ADC, autoranging, autozeroing, current to voltage conversion, resistance to voltage conversion, accuracy of DMM.

Study of Digital Panel Meter (DPM), advantages of DPM over analog meters.

(12 periods)

REFERENCES:

1. Electronic Instruments and Measurement Techniques-W.D.Cooper
2. IC 555 Timer and Applications-M.C.Sharma(B.P.B.Publications)
3. Digital Electronics for Scientists-Malmsdat and Enke
4. Digital Instrumentation Courses (Vol.I, II & III)A.J.Bouwens
5. Electrical and Electronic Instrumentation and Measurements-A.K.Sawhney

- NOTE:
- i. Out of 10 experiments, any 8 experiments must be performed in EACH TERM.
 - ii. Unless the student produces his/her Laboratory report/Journal duly certified by the concerned authority, he/she will not be permitted to appear for practical examination.
 - iii. For students of S.Y.B.Sc. (Electronics) knowledge of soldering is essential for practical work. However, the same is not expected from the F.Y.B.Sc. (Electronics) students.

FIRST TERM

1. Design, build and test emitter-follower circuit.
2. Design, build and test monostable multivibrator using IC 741
3. Build and test waveshaping circuit.
 - i. Clipping and clamping circuits
 - ii. Integration and differentiation using RC circuit.
4. Build crystal oscillator and test its stability w.r.t. temperature.
5. Design, build and test phase-shift oscillator (Transistorised)
6. Measurement of temperature using p-n junction.
7. Optocoupler using LED & LDR.
8. Build and test square and triangular wave generator using IC 741, (Measurement of frequency and amplitude)
9. Design, build and test electronically regulated power supply using IC 723. (Load and line regulation)
10. Build and test dual power supply using ICs 7815 & 7915.

SECOND TERM

1. Design, build and test astable multivibrator using IC 555. (Measurement of frequency, duty cycle, pulse height and pulse width)
2. Build and test D to A converter using R-2R network (4 bit.)
3. Temperature to frequency converter using IC 555 (Use of DFM is expected)
4. Use of 7490 as a scaler (For all possible modes)
5. Study of 7 segment display (Static and dynamic)
6. Study of shift register 7495 (4 bit register-left shift and right shift)
7. Build and test 4 to 1 multiplexer and 1 to 4 demultiplexer.
8. Diode matrix encoder (4 bit.)
9. Study of IC tester (Testing of 7400, 7408, 7490 plus any two ICs)
10. Study of updown counter 74192.