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॥ अंतरी पेटवू ज्ञानज्योत ॥

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North Maharashtra University,
Jalgaon

Syllabus for S.Y.B.Sc.

ELECTRONICS

W.E. From June, 2003

NORTH MAHARASHTRA UNIVERSITY, JALGAON

Syllabus for S. Y. B. Sc. Electronics

(With Effect From June, 2003)

Paper I

Analog Circuits & Applications

- 1. Multistage Amplifiers: - (8p, 8m)**
Need of multistage amplifiers, important terms – gain, frequency response, decibel gain, bandwidth, two stage RC coupled amplifier, and Transformer coupled amplifier (operation, frequency response, advantages and disadvantages, applications)
Ref. No.-1, 2
- 2. Power Amplifiers: - (8p, 8m)**
General classification, class B push-pull power amplifier, cross over distortion, conversion efficiency, relation between maximum output power and load, heat sink.
Ref. No.-1,5
- 3. Feedback: - (6p, 6m)**
Concept of feedback, positive & negative feedback, voltage & current feedback, effect of negative feedback (derivations are not expected), Barkhusen criteria
Ref. No.-1
- 4. Oscillator: - (10p, 10m)**
Essentials of transistor oscillator, idea of tank circuit, types of oscillator-Colpitts oscillator, Hartely oscillator, phase shift oscillator, crystal oscillator.
Ref. No-1
- 5. Wave shaping circuits: - (6p, 6m)**
Need of wave shaping circuits, differentiator and integrator using RC circuits, clippers & clampers using diodes and batteries.
Ref. No-1, 6
- 6. Power supply: - (10p, 10m)**
Block diagram of unregulated and regulated power supply, load regulation, line regulation, Basic regulator theory - voltage regulator, series regulator and shunt regulator (Transistorised), Block diagram of three terminal voltage regulator, Fixed voltage regulator using 78XX and 79XX.
Ref. No.1, 7.

7. Differential Amplifier: - (10p, 8m)

Black box concept, CMRR configuration (mention types only), emitter coupled differential amplifier (dual input, balanced output), differential amplifier with constant current source, transfer characteristics.

Ref. No.4, 7.

8. Basic operational amplifier circuits: - (14p, 12m)

Block diagram, symbol, parameters-input impedance, out put impedance, open loop voltage gain, input bias, current, input offset voltage and slew rate, (defⁿ only), ideal characteristics, inverting amplifier, concept of virtual ground, non inverting amplifier, voltage follower, op-amp as adder, subtractor, integrator and differentiator.

Ref. No.- 7, 8, 9.

9. Applications of operational amplifier: - (22p, 22m)

Instrumentation amplifier using three op-amps, voltage to current converter with floating load and grounded load, active filter – advantages and limitations and types, 1st order low pass and high pass active filter (derivation of gain), log amplifier (using diode).

Voltage comparator, Schmitt trigger, precision half wave and full wave rectifiers, basic peak detector, sample and hold amplifier, wein bridge oscillator, Basic triangular wave and square wave generator, function of ICs - $\mu A741$, $\mu A760$, LM311, LM380.

Ref. No.- 4, 7, 8, 9.

10. Timer 555 and its applications: - (10p, 10m)

Functional block diagram, pin out diagram, concept of multivibrator, astable, bistable, monostable multivibrators, voltage control oscillator, frequency divider, pulse stretcher, ramp generator

Ref. No.- 7

Reference Books:

1. Principles of electronics. - V.K. Mehta.
2. Basic electronics & linear Circuits - N.N. Bhargav.
3. Electronics principles - Malvino.
4. Electronic devices & circuits – Milliman & Halkias.
5. Electronics device & circuits - Allen Mottorshed.
6. Basic electronics - D.C. Tayal.
7. Integrated circuits - K.R.Botkar.
8. Op-amps and liner integrated circuits – 2nd edition
Ramakant A Gayakwad
9. Operational Amplifiers - G.B Clayton

Paper II
Digital Electronics and Instrumentation

1. K – map: - (16p, 16m)

Revision of Boolean laws and theorems, Sum of product method, Truth table to k-map upto 4 variables, properties of K-map (pairs, quads, octet), k-map simplification, don't care condition, product of sum simplification. Design examples using K-map-half adder, full adder, half subtractor and full subtractor.

Ref. No.- 1(Chapter2), 2(article 5.8), 3.

2. Shift Registers: - (12p, 12m)

Types of Registers, serial in – serial out, serial in – parallel out, parallel in - serial out, parallel in - parallel out, ring counter, IC 7491, IC74164, IC7495 (Functions only).

Ref. No.- 1(Chapter10)

3. Counters: - (12p, 12m)

Asynchronous counter, decade counter, synchronous counters, modulus of counter, mod -3, mod-5, presettable counter, shift counter, up-down counter, function of IC 7493

Ref. No.- 1(Chapter11- articles from 11.1 to 11.7 Note; fig. 11.13, 11.15, 11.25, 11.28 are not expected)

4. Data Converters: - (12p, 10m)

Digital to Analog converter- variable resistor network, binary ladder D/A, accuracy and resolution.

Analog to Digital converter- simultaneous, single slope, dual slope and successive approximation.

Function of ICs 0808 and 7109.

Ref. No.- 1,4(chapter-11 part of article 11.3)

5. Basic analog meters: - (10p, 10m)

PMMC movement, DC ammeter and voltmeter, Loading effect, sensitivity of a voltmeter. Design of multirange ammeter and voltmeter, series type ohmmeter, idea of multimeter.

Ref. No.- 5, 6, 8

6. Signal Generator: - (10p, 8m)

Block diagram of standard signal generator, Performance characteristics - dial resolution and accuracy, amplitude and frequency stability, Block diagram of function generator.

Ref. No.- 5, 6, 8

7. Cathode Ray Oscilloscope: -

(16p,16m)

Block diagram, CRT controls.

Vertical deflection system - CRO probe, input selector, Vertical amplifier, function of delay line.

Horizontal deflection system - Time base generator, synchronization condition, triggered sweep generator, sync selector, triggered pulse circuit (trigger level & slope), modes of trigger.

Ref. No.- 5, 6, 8.

8. Digital Frequency Meter: -

(10p, 10m)

Block diagram and working of DFM, Measurement modes such as frequency and period, Time base generator in DFM.

Ref. No.- 5, 6, 8.

9. Digital multimeter: -

(6p, 6m)

Block diagram of DMM, current to voltage conversion, resistance to voltage conversion, auto ranging and auto zeroing.

Ref. No.- 5,7.

Reference Books:

1. Digital principles and applications - A. P. Malvino & D. P. Leach
2. Modern digital electronics - R. P. Jain (chapter5 article 5.8)
3. Digital Electronics - William Gothman
4. Digital fundamentals (3rd Edition)- Thomas Floyd
5. Electronic instrument and Measurement techniques - W. D. Cooper
6. Electronic instrumentation - H. S. Kalsi
7. Digital instrumentation vol. 1,2&3 - A. J. Bouwens.
8. Electrical & Electronic measurements & instrumentation - A. K. Sawhney

Practical : Paper-III

(First Term)

A) Any four

1. Study of clipping and clamping circuits using diodes, battery, R and C.
2. Study of R-C integrator and differentiator circuits.
3. Build and test dual P/S using 78xx & 79xx (line & load regulation).
4. Build and test differential amplifier using transistors.
5. Study of single stage R-C coupled amplifier with and without feedback.
6. Design & test phase shift oscillator-using transistors.

B) Any four

7. Study of IC 7490 as scalar.
8. Studies of shift register IC 7495 in its various modes.
9. Verify 4-bit ring counter action and to draw waveforms using IC 7476
10. Build and test DAC using (R – 2R ladder) and using DAC 0808
11. To construct and simplify logic circuit using K-map of a given truth- tables (three/ four variables) and verify truth table
12. Study of basic operation of counter type ADC using DAC

(Second Term)

A) Any four

1. Study characteristics of OP-AMP (Offset null, I/P and O/P impedance)
2. Build and test adder and subtractor using OP-AMP.
3. Design, build and test first order high pass/ low pass active filter.
4. Study of log amplifier using OP-AMP(diode based).
5. Design, build and test astable / monostable multivibrator using IC 555.
6. Design, build and test V/I converter using OP-AMP.

B) Any four

7. Design, build and test Wein bridge oscillator using OP-AMP.
8. Design, build and test square wave and triangular wave generator using OP-AMP.
9. Study of static display using IC 7447
10. Interpolation oscillator for frequency measurement using CRO
11. Measurement of unknown frequency using lissajous figures.
12. Design and verify of multirange ammeter, voltmeter-using PMMC.

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