Third Semester B. Sc. Examination

ELECTRONICS (OP-AMP AND POWER SUPPLY)

Paper – I

Time : Three Hours] [Max. Marks : 50

N. B. : (1) All questions are compulsory and carry equal marks.

(2) Draw neat and well labelled diagrams wherever necessary.

EITHER

1. (A) What is DC amplifier ? State its drawbacks. How all the drawbacks of DC amplifier are eliminated in difference amplifier ? Explain.

Explain in brief with respect to OP-AMP –

(i) CMRR.

(ii) Slew rate.

(iii) Closed loop gain. Open loop gain.

(iv) Input offset voltage. 5+5

OR

(B) What is OP-AMP ? Explain the characteristics of an ideal OP-AMP.

Draw the block diagram of OP-AMP and explain the function of each block in brief. 5+5

EITHER

2. (A) Draw a circuit diagram for OP-AMP as an integrator and derive the expression for its output. Show its output waveform if input applied is a square wave. State its limitations.
Find the output voltage of an OP-AMP integrator after 1 sec, 1.5 sec. and 2 sec., if R = 20 KΩ, C = 50 μF, Vi = 2 Volt (d.c.) and initial charge on capacitor is zero. 4+1+2+3

OR

(B) Discuss the operation of an OP-AMP as a adder. How can it be used as scaling amplifier and averaging amplifier ? Explain.
Explain with the help of circuit diagram and mathematical expression, how an OP-AMP can be used for subtraction of two input voltages V_1 and V_2. 6+4

EITHER

3. (A) What is voltage regulator ? Draw the block diagram of regulated power supply and explain the function of each block in brief.
Explain the working of voltage regulator using zener diode. State its drawbacks. 1+5+3+1

OR

(B) Explain the working of voltage regulator using series pass transistor. Discuss with the help of circuit diagram, how short circuit protection is provided in a transistorized series voltage regulator. 6+4

EITHER

4. (a) What are the advantages of three terminal IC regulators ?
Draw functional block diagram of three terminal IC voltage regulator and explain the function of each block in brief.
Draw the pin connections of LM 317 and state its important features. 2+5+1+2

OR

Explain basic principle and working of Switch Mode Power Supply (SMPS) with suitable circuit diagram. State its advantages and disadvantages. 10

5. Solve any **Ten** :—

(a) Define CMRR.

(b) Write any two ideal characteristics of OP-AMP.

(c) Write any two disadvantages of DC amplifier.

(d) Draw a circuit to use OP-AMP as subtractor.

(e) An OP-AMP used in inverting mode has feedback resistance of 10 kΩ and input resistance of 3 kΩ. Find its gain.

(f) What is virtual ground ?

(g) Define ripple factor.

(h) Define line regulation.

(i) Draw half wave rectifier circuit.

(j) What is LDO ?

(k) What does SMPS stands for ?

(l) Write any two limitation of linear regulator.

10 x 1=10