Bachelor of Science (B.Sc.) Semester—III Examination

ELECTRONICS (OP-AMP & Power Supply)

Optional Paper—I

Time : Three Hours] [Maximum Marks : 50

Note :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw well labelled diagrams wherever necessary.

EITHER

1. (A) Compare a difference amplifier and conventional amplifier. Explain the construction and working of difference amplifier. 5+5

OR

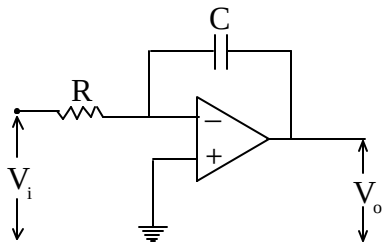
(B) Draw the block diagram of an OPAMP and Explain it. Define the terms — differential mode gain, common mode gain, CMRR, slew rate, input offset voltage with reference to OPAMP. 5+5

EITHER

2. (A) Compare the OPAMP as linear device and non-linear device. Explain the working of a OPAMP as Schmitt trigger. Draw the output waveforms of it, if the threshold voltage is ± 2V. What is unity gain amplifier ? 3+5+2

OR

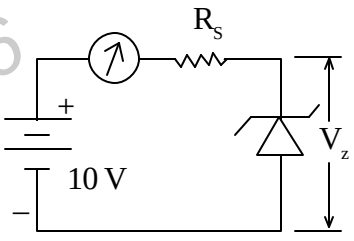
(B) Identify the circuit and explain its working, also derive the equation for output voltage. Draw and explain the working of OPAMP circuit with input V_1 given to R_1, V_2 given to R_2 and V_3 to R_3 with feedback resistor R_f. Derive the expression for V_0 if $R_1 = R_2 = R_3 = R_f = R$.



5+5

EITHER

3. (A) How a half wave, full wave and bridge rectifiers are different from each other ? How a zener diode is used as voltage regulator ? In given circuit, if $V_z = 6.5$ V calculate R_S if I = 75 mA.



6+4

OR

(B) Draw the block diagram of a regulated power supply, explain its working. Define the terms — Ripple factor, efficiency, line regulation, load regulation, PIV. 5+5

EITHER

4. (A) Draw the block diagram and explain the working of three terminal voltage regulator. Given a transformer of 15-0-15V/50mA, draw and explain how the regulated power supply of ±12V using three pin IC regulators can be designed. What are the limitations of linear regulators ? 4+4+2

OR

(B) State the principle of SMPS, draw and discuss the block diagram. Give its advantages and disadvantages. 10

5. Solve any **ten** :—

(1) Can a difference amplifier amplify dc signal ?

(2) State any two properties of an ideal OPAMP.

(3) What is offset balancing ?

(4) Draw circuit of a sign changer using OPAMP.

(5) What is a zero crossing detector ?

(6) What is differential mode gain ?

(7) What is virtual ground concept in OPAMP ?

(8) Give the symbol of OPAMP.

(9) State the stability factors of a voltage regulator.

(10) Give the drawbacks of regulated power supply.

(11) Give pin configuration of 79XX.

(12) What is short circuit protection ? 1×10