M.Sc. 1st Semester Examination, 2024

ELECTRONICS

(*Analog Electronics*)

PAPER – ELC-104

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP – A

Answer any **four** questions : 2×4

1. Define Q point.

2. Write two advantages of MOSFET.

3. What is thermal runaway ?

4. What is Miller effect ?

5. Write the concept of virtual ground of an OPAMP.

6. Write the advantages of an SMPS over linear regulated power supply.

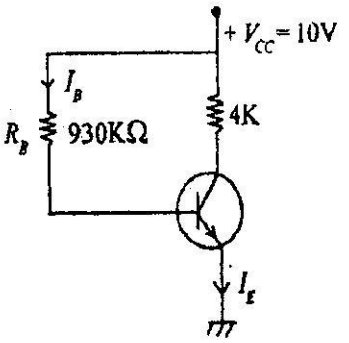
GROUP – B

Answer any **four** questions : 4×4

7. Draw and explain positive clipper circuit. Give input and output waveform. $(1+2)+\left(\frac{1}{2}+\frac{1}{2}\right)$

8. Draw voltage transfer curve for BJT and indicate different operating regions. $2 + 2$

9. A circuit is shown in figure below. It uses silicon transistor. Given that $\beta = 100$. Determine its operating point. 4



10. Draw and explain inverting comparator circuit using OPAMP with input and output waveforms. 2 + 2

11. Draw four feedback topologies used in electronic circuits. 1 + 1 + 1 + 1

12. Draw three configurations of MOSFET. Draw PI model of a MOSFET. 3 + 1

GROUP – C

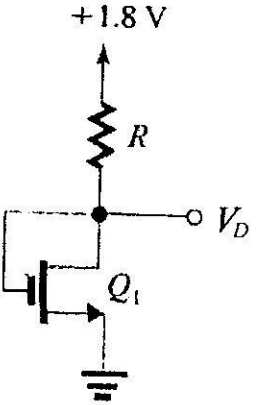
Answer any **two** questions : 8 × 2

13. Draw small signal equivalent circuit of a

common emitter amplifier. Derive voltage gain, input impedance and output impedance of the circuit. 2 + 2 + 2 + 2

14. Draw and explain instrumentation amplifier using three OPAMP configurations. 2 + 6

15. Write down channel length modulation phenomenon of MOSFET. For the circuit shown in below, find the value of R that results in $V_D = 0.8$ V. The MOSFET has $V_{th} = 0.5$ Volt. $\mu_n C_{ox} = 0.4$ mA/V^2, W/L = 0.72 μm/0.18 μm, $\lambda = 0$. 4 + 4



(*Continued*)

16. Draw and explain triangular wave generator circuit. Give input and output waveforms.

$(2 + 4) + (1 + 1)$

[Internal Assessment — 10 Marks]
