PG/IS/ELC/104/23

M.Sc. 1st Semester Examination, 2023

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 : 4×2

1. Draw an AND gate using diode only. 2

2. Draw small signal Π model of a MOSFET. 2

3. Write two advantages of SMPS over linear regulated power supply. 2

4. Define common-mode rejection ratio (CMRR) of an op-amp. 2

5. Draw an inverter circuit using PMOS and N-MOS. 2

6. What are the necessary condition of an oscillator circuit ? 2

GROUP – B

Answer any **four** questions : 4×4

7. Draw a biased clipper circuit. Give input output waveforms. $2 + 2$

8. Draw four feedback topologies used in electronic circuits. $1 + 1 + 1 + 1$

9. Draw and explain series regulator circuit using op-amp. 2 + 2

10. How MOSFET acts as an amplifier and switch ? Show it by using voltage transfer curve. 2 + 2

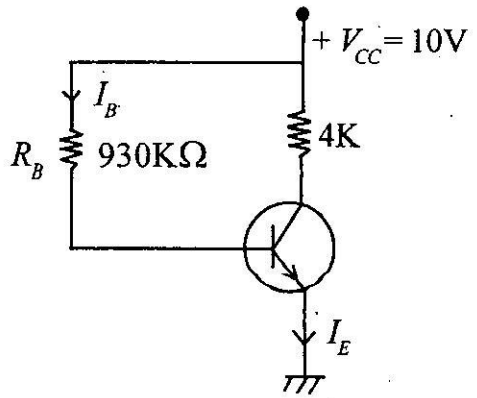
11. Explain the operation of a phase-shift oscillator with the help of a circuit diagram. 3 + 1

12. Describe the use of an op-amp as an integrator. 4

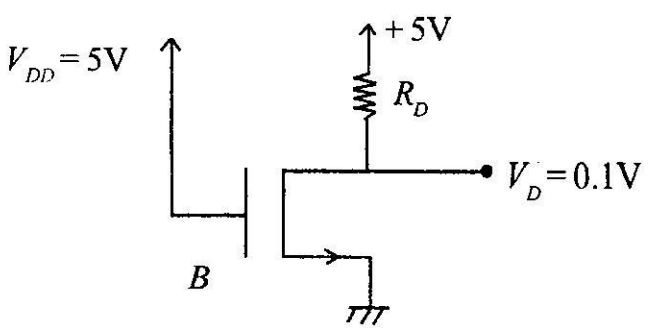
GROUP – C

Answer any **two** questions : 2 × 8

13. Define stabilization. What are the techniques of stabilization ? Figure below shows a silicon transistor with $\beta = 100$ and biased by base resistor method. Determine the operating point. 2 + 3 + 3



14. (*a*) A circuit is given below. What is the effective resistance between drain and source at the operating point. $V_t = 1$ V, $K_n'(W/L) = 1\text{mAV}^2$.



(*b*) Draw I_D - V_{DS} characteristics curve of a *n*-channel enhancement type MOSFET. Show the different operating regions. 4 + (1 + 3)

15. What is the Schmitt trigger circuit ? Draw schematically an op-amp Schmitt trigger and explain its operation. 2 + 2 + 4

16. What is Darlington connection ? Compare between an emitter follower and a Darlington pair. Discuss the high frequency effects in a transistor. 2 + 2 + 4

[Internal Assessment – 10 Marks]