

19. (a) Simplify the Boolean equation $Y=AB + A(B+C) + B(B+C)$ using Boolean laws.

Or

- (b) Explain the working of a multiplexer circuit with neat diagram.
20. (a) Enumerate the working principle of a SR latch with neat truth table.

Or

- (b) Design a sequential circuit using PAL.

SECTION C — ($3 \times 10 = 30$)

Answer any THREE questions.

21. Explain the construction features of depletion and enhancement type MOSFET.
22. Explain a Colpitts oscillator and derive an equation for its output frequency.
23. Derive an equation to find the gain of an Instrumentation amplifier.
24. Simplify the using K-Map
 $Y = \sum (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15)$
25. Design a decade counter and explain it.

S.No. 6401

P 22 ELCC 11

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Electronics

ANALOG AND DIGITAL CIRCUITS DESIGN

Time : Three hours

Maximum : 75 marks

SECTION A — (20 marks)

Answer ALL questions

- I. (A) Multiple Choice questions: ($5 \times 1 = 5$)
1. In a transistor if $\beta = 100$ and collector current is 10mA, then I_E is _____
- (a) 100 mA (b) 100.1 mA
(c) 110 mA (d) 110.1mA
2. An RC network provides _____ degree phase shift.
- (a) 60 (b) 90
(c) 45 (d) 30
3. The ideal OP-AMP is supposed to have _____
- (a) Zero input impedance
(b) infinite bandwidth
(c) zero gain
(d) all the above

4. The expression of identity law is _____
 (a) $A+0=A$ (b) $A+A=A$
 (c) $A+B=A$ (d) $A+AB=A$
 5. The inputs in the PLD is given through _____
 (a) NAND gates (b) OR gates
 (c) NOR gates (d) AND gates
 (B) Fill in the blanks questions: $(5 \times 1 = 5)$
 6. A MOSFET uses the electric field of a _____ to control the channel current.
 7. The negative feedback amplifier _____ voltage gain.
 8. The pin numbers _____ and _____ in IC 741 is used for offset null voltage.
 9. _____ number of OR gates are required for Octal to Binary encoder.
 10. The output of the _____ circuit depends upon Present input and present state.
- II. Descriptive type questions : $(5 \times 2 = 10)$
11. Define a in a transistor.
 12. State Barkhausen criteria.

13. Define CMRR of an OP-AMP.
14. State Duality's theorem.
15. What is synchronous counter?

SECTION B — $(5 \times 5 = 25)$

Answer ALL questions, choosing either (a) or (b)

16. (a) Compare the BJT and FET.
 Or
 (b) Explain the working of FET as a variable resistor.
17. (a) Explain the Darlington amplifier circuit with neat diagram.
 Or
 (b) Derive an equation to find the output frequency of a Wien bridge oscillator.
18. (a) How the offset voltage is nullified in an op-amp?
 Or
 (b) Explain Voltage follower circuit with neat circuit diagram.