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2015

Part I 3-Tier

COMPUTER SCIENCE

PAPER—II

(Honours)

Full Marks : 90

Time : 4 Hours

The figures in the right hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Group—A

Answer any *two* questions. 2×15

1. (a) Derive the expression for resonance frequency in series L-C-R circuit ? 5

(b) Draw the CE mode input characteristic of a transistor. Explain qualitatively the nature of the curve. 7

(c) Why MOSFET Commercially more important than a FET ? 3

2. (a) Design a logic circuit to implement binary to excess 3 code converter. Use truth table for both and show the k-map simplification. 8

(b) Explain briefly, how a J-K flip flop can be used for parallel data transfer. 7

3. (a) Draw the circuit diagram of a two stage R-C coupled amplifier. Explain the nature of frequency response characteristic. 8

(b) Explain the operation of dual slope A/D converter with diagram. 7

4. (a) Explain the operation of clocked R-S flip-flop. 5

(b) Draw circuit diagram of a monostable multivibrator and explain its operation. 5

(c) Design a synchronous 3-bit up down counter using J-K flip flops. 5

Group—B

Answer any *five* questions. 5×8

5. Explain BCD to Decimal decoder. 8

6. Contruct Moore machine equivalent to mealy m/c shown below :

Mealy m/c

Present State	Next			
	q = 0		q = 1	
	State	Output	State	Output
q_1	q_1	0	q_2	1
q_2	q_3	1	q_4	0
q_3	q_2	1	q_1	1
q_4	q_3	0	q_4	1

8

7. Discuss the reverse bias characteristic of a Zener diode. Why this characteristic is very much useful in some application. What is Zener breakdown. 8

8. (a) Explain how two 8 : 1 mux and one 2 : 1 mux can be used to make a 16 : 1 mux. 4

(b) Explain 16 bit ripple counter with example. 4

9. (a) Explain S-R flip flop with diagram. 4

(b) Discuss how full adder can be contructed using half adders. 4

10. Reduce using k-map the expression
$f(A, B, C, D) = \Sigma m (0, 1, 2, 4, 5, 7, 8, 9, 10, 12, 13)$ and implement the ral minimal expression in universal logic. 5+3

11. (a) What are the Moore and Mealy machine ? Compare thems. 3+3

(b) State 'state equivalence theorem'. 2

Group—C

Answer any *five* questions. 5×4

12. Define bandwidth and channel capacity. What is S/N Ration ? 1+1+2

13. Distinguish between ROM, PROM and EPROM. 4

14. What is PLA ? What is gray code ? 2+2

15. Explain de-Morgan's law with example. 4

16. Define NFA & DFA with example. 4

17. Explain 'BCD Code' and 'ASCII Code'. 4

18. Implement the Boolean function f(A, B, C) = $\Sigma m(0, 5, 6, 7)$ with a PLA. 4

19. A frequency modulated voltage wave is given by

$e = 12 \cos(6\ 10^8 t + 5 \sin 1250t)$

Find (i) Carrier frequency, (ii) Signal frequency and (iii) Modulation index. 4

20. Use MUX to generate

$F = A'BC' + A'B'CD + AB'C'D.$ 4

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