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S. No. of Question Paper : 1538

Unique Paper Code : 222461

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Name of the Paper : Digital Electronics (ELPT-404)

Name of the Course : B.Sc. Physical Sciences

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *Five* questions.

All questions carry equal marks.

1. Attempt any *five* parts (all parts carry equal marks) :

(a) Convert into binary equivalent :

(i) $(444.456)_{10}$

(ii) $(72.45)_{10}$

(b) Convert into decimal equivalent :

(i) $(10111.1011)_2$

(ii) $(1101111.101)_2$

(c) Convert into BCD equivalent :

(i) $(140)_{10}$

(ii) $(60)_{10}$

P.T.O.

(d) Convert into gray codes :

(i) 325

(ii) 457.

(e) Convert into octal numbers :

(i) 199.3

(ii) 64.2.

(f) Multiply :

(i) 1011 and 1101

(ii) 100110 and 1001.

(g) Subtract $(19)_{10}$ from $(28)_{10}$ using 2's complement method.

3×5=15

2. Simplify the following expressions and implement their logic circuits :

(i) $Y = AB + A'C' + AB'C(AB + C)$

(ii) $Y = (A + B) (A'C' + C) (B' + AC)'$

Where A' , B' , etc. are the complements of A, B respectively :

(iii) Realize two input XOR gate using two input NAND gates only.

5×3=15

3. (a) Minimize the following logic expression and draw the simplified logic circuit using NAND gates only : $F(A, B, C, D) = \sum m(1, 3, 5, 7, 11, 15) + d(0, 2, 6)$.

(b) Draw the logic diagram for a 4-bit binary adder/subtractor and explain its working.

7½.7½.

4. (a) Distinguish between a multiplexer and an encoder. Using block diagrams realize a 16×1 multiplexer using two 8×1 multiplexers and OR gate. Explain its functioning.
- (b) Draw the circuit diagram of a 3-to-8 decoder and explain its working. Explain the working of a simple BCD-to-decimal decoder. 7½, 7½
5. (a) Explain the working of a R-S flip-flop and draw its truth table. Show how it can be converted into a D flip-flop.
- (b) What is the race around condition in a J-K flip-flop ? How can this condition be eliminated by using a Master Slave J-K flip-flop ? Explain with the help of the circuit diagram. 7½, 7½
6. (a) Draw the circuit diagrams for a serial-in, serial-out and serial-in, parallel-out. shift registers and explain their working.

Draw the waveform to shift the number 0100 into the 4-bit serial input shift register: 5+2½=7½

- (b) How many minimum number flip-flops are required to construct mod-3 and mod-6 counters ? Explain the construction and working of an asynchronous mod-6 counter. 2½+5=7½

7. Write short notes on any *two* :

(i) Ring counter

(ii) EROM and PROM

(iii) R-2R ladder network based on D/A convertor.

(iv) Digital Logic families.

7½, 7½