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[22-HKPD1SN-23A]

DCA/PGDCA/MScIT 1st Semester (New) Exam. 2022 (W)

(*Digital Techniques*)

[PGCA/SCIT S1-02]

Full Marks : 70/80

Time : 3 hours

The figures in the right-hand margin indicate marks.

[Learners admitted in and after 2020 need to answer only Q.No. 1 to Q.No. 4 (total 70 marks)]

1. Answer any *five* of the following questions : $2 \times 5 = 10$

   (a) Differentiate between combinational and sequential circuit specifying the block diagram of each case.

   (b) State the truth table for full adder.

   (c) Mention the different approaches of representing a fixed point binary number.

   (d) Add two BCD numbers 00100011 and 00010001.

   (e) What are the formats to represent a floating point number in IEEE standard ?

   (f) Write the purpose of cache memory.

2. Answer any *four* of the following questions : $3 \times 4 = 12$

   (a) What is shift registers ? Mention different categories of shift registers.

(*b*) Express the Boolean function $xy + xz' + y'$ in a sum of minterms.

(*c*) Write the purpose of using 4-bit binary parallel adder. Draw a 4-bit binary parallel adder.

(*d*) Give the differences between asynchronous and synchronous counter. What do you mean by modulus of a counter ?

(*e*) Mention the steps to convert a binary number into Gray Code.

3. Answer any *four* of the following questions : $6 \times 4 = 24$

(*a*) Define flip-flop. Discuss JK flip-flop with a block diagram.

(*b*) Convert a binary number $(1011.011)_2$ into (*i*) Octal, (*ii*) Decimal and (*iii*) Hexa-decimal format.

(*c*) Discuss about different categories of RAM.

(*d*) What is de-multiplexer ? With the suitable diagram explain 1-to-16 de-multi-plexer.

(*e*) Simplify the Boolean function with K-map :

$$F = A'B'C' + B'CD' + A'BCD' + A'BC'$$

4. Answer any *three* of the following questions : $8 \times 3 = 24$

(*a*) Convert a decimal number $(860.12)_{10}$ to a 32-bit single precision floating point binary no.

(*b*) What is logic family ? Discuss briefly about Resistor Transistor Logic.

(*c*) Why are NAND and NOR gates called universal gates ? Explain the operation of 2-input XOR gate and realise it using NAND/NOR gates.

(*d*) Add 27 and -35 in binary using 7 bit register in 2'S complement form.

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(Q. No. 5 is only for learners admitted before 2020)

5. Answer any *one* of the following questions : $10 \times 1 = 10$

(a) Design a 3-to-8 decoder with its truth table.

(b) Discuss how a semiconductor RAM is arranged. Draw the block diagram of a RAM chip.
