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[19-HRPGKOW-M1S(N) 20M]

PGDCA 1st Semester (New) Exam., 2019 (W)

DIGITAL TECHNIQUES

[PGCA/ScIT S1–02]

Full Marks : 80

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. *(a)* Answer the following questions : 1×8=8

(i) What is duality principle of Boolean algebra?

(ii) Write the truth table for NOR gate.

(iii) Convert a decimal number $(65.25)_{10}$ into its binary equivalent.

(iv) Define multiplexer.

(v) Write the alternative name for minterm.

(vi) What is flash memory?

(vii) Represent the decimal number $(6.8)_{10}$ into 8-bit floating-point format.

(viii) Write the function of full-adder.

(b) Choose the correct answer of the following : 1×4=4

(i) Counters are

(1) sequential digital circuit

(2) combinational digital circuit

(3) opposite to multiplexer

(4) None of the above

(ii) A 16-to-1 multiplexer has

(1) 2 control lines

(2) 3 control lines

(3) 4 control lines

(4) 5 control lines

(iii) In master-slave flip-flop, master changes state

(1) before the slave

(2) after the slave

(3) with the slave at the same time

(4) None of the above

(iv) Which Boolean expression contains OR terms?

(1) Minterm

(2) Maxterm

(3) Binary variable

(4) None of the above

(Continued)

(c) Fill in the blanks of the following : 1×4=4

(i) ROM uses _____ to minimize the number of address lines.

(ii) Asynchronous counters are also known as _____ counter.

(iii) EBCDIC uses _____ bits per character.

(iv) 9's complement of 127 is _____.

2. Answer any *five* questions from the following : 2×5=10

(a) What is BCD number? Convert a decimal number 245 into BCD code.

(b) Subtract 15 from 7 using 2's complement form.

(c) Define combinational and sequential digital circuit with examples.

(d) Write the use of Karnaugh map.

(e) What are shift registers?

(f) Mention the use of don't care condition.

3. Answer any *four* questions from the following : 3×4=12

(a) Draw a 16-to-1 multiplexer.

(b) Give the truth table and logic diagram of a full-adder circuit.

(c) Differentiate between SRAM and DRAM.

(d) Convert the decimal number $(0.65)_{10}$ to a 32-bit single precision floating-point binary number.

(e) Write the working principle of a *J-K* flip-flop.

4. Answer any *three* questions from the following : 6×3=18

(a) Draw and explain the operation of a 4-bit parallel adder.

(b) Simplify the following Boolean functions in SOP form :

(i) $F(a, b, c) = (2, 3, 6, 7)$

(ii) $ab'c + abc' + a'bc + abc$

(c) Design a clocked *D* flip-flop.

(d) Convert a binary number $(101.1101)_2$ into *(i)* decimal, *(ii)* octal and *(iii)* hexadecimal forms.

(Continued)

5. Answer any *three* questions from the following : 8×3=24

(a) How can a floating-point number be normalized to represent in computer? What are overflow and underflow? 6+2=8

(b) Discuss about different types of ROM. 8

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

(d) *(i)* Describe ASCII code with example. 4

(ii) Write the basic theorems and postulates of Boolean algebra. 4

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