2013

DIGITAL ELECTRONICS AND INTEGRATED CIRCUITS

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) The binary equivalent number of $(25 \cdot 75)_{10}$ is

a) 11001·110 b) 11001·011

c) 11001·111 d) 11001·000.

ii) The hexadecimal equivalent number of $_{10}(348 \cdot 35)$ is

a) 15C·668 b) 15C·599

c) 15B·599 d) 15A·599.

iii) The decimal equivalent number of $(1101 \cdot 11)_2$ is

a) 13·25 b) 13·75

c) 13·5 d) 13·00.

iv) The decimal equivalent number of $(427 \cdot 35)_8$ is

a) 279·456732 b) 279·4567789

c) 279·432167 d) 279·453125.

v) The decimal equivalent number of $(6ABC \cdot 2A)_{16}$ is

a) 27324·125 b) 27325·678

c) 27324·164 d) 27324·654.

vi) The binary equivalent number of $(155 \cdot 52)_8$ is

a) 001101101·101010 b) 001101101·101101

c) 001101101·110000 d) 001101101·110011.

vii) The binary equivalent number of $(1CEF \cdot 2B)_{16}$ is

a) 1110011101111·00101011

b) 1110011101111·00111011

c) 1110011101111·1101011

d) 1110011101111·1001001.

viii) The hexadecimal equivalent number of $(7324 \cdot 456)_8$ is

a) ED4·87 b) ED4·47

c) ED4·57 d) ED4·97.

ix) The result of subtraction of the binary bits

11101 – 1101 is

a) 00001 b) 10000

c) 10001 d) 10011.

x) The result of addition of the binary bits 1101 + 11101 is

a) 00001 b) 10000

c) 10001 d) 10011.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Convert :

a) $ABC + AD$ into standard SOP format.

b) $(A + B + C)(A + D)$ into standard POS format. 2 × 2½

3. Design and implement a full-adder circuit using decoder.

4. Describe the operation of successive approximation type ADC. How many clock pulses are required in worst case for each conversion cycle of an 8-bit SAR type ?

5. Construct :

a) EX-OR using NAND

b) EX-NOR using NOR. Why are NAND and NOR gates called universal gates ?

6. What is 'lock out' in counter ? Explain race around condition in *J-K* flip-flop. 2 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. What is propagation delay ? What is noise immunity ? Describe the advantages and disadvantages of totem pole output configuration. How can the logic gates of TTL family and CMOS family be interfaced ? 2 + 3 + 5 + 5

8. a) Explain the operation of weighted register 4-bit D/A converter. Derive the expression of the output voltage.

b) Implement a 16 : 1 MUX using only 4 : 1 MUX. Write down the proper truth table.

9. a) What is register ? Name different types of registers. Explain any one in detail.

b) Design a BCD to Excess-3 code converter using PROM.

2 + 2 + 5 + 6

10. a) What is the difference between synchronous and asynchronous counters ?

b) Realize a 4-bit Ring counter using *JK* flip-flops. Develop the state table. Can this circuit be used to realize a frequency divider ? 3 + (4 + 3) + 5

11. Write short notes on any *three* of the following : 3 × 5

a) Quine McCluskey method

b) Odd parity generator

c) TTL NAND gates

d) EEROM

e) Carry look ahead adder.

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