B.Tech Odd Semester (CBCS) Exam.,
December—2016

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

(3rd Semester)

Course No. : ETC-304

(Digital Electronics Circuit)

Full Marks : 75
Pass Marks : 30

Time : 3 hours

Note :
1. Attempt **one** question from each Unit.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the margin indicate full marks for the questions.

UNIT—I

1. *(a)* State and prove De Morgan's theorem. 5

(b) Minimize the following logic function using K-map and implement it using logic gates : 10

$$Y(A, B, C, D) \quad m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$$

2. *(a)* For the function

$$f \quad ABC \quad BC\,D \quad ABC$$

(i) express f in standard SOP form;

(ii) simplify f using K-map;

(iii) realize f using NAND gates only. 8

(b) Prove the following Boolean theorems : 4

(i) $A \quad AB \quad A$

(ii) $A \quad BC \quad (A \quad B)(A \quad C)$

(c) Simplify the following Boolean equation : 3

$$Y(A, B, C) \quad AC \quad ABC$$

UNIT—II

3. *(a)* Explain the working of a two-input TTL NAND gate with the help of a circuit diagram. 7

(b) Explain the following terms : 8

(i) Propagation delay

(ii) Fan-out

(iii) Power dissipation

(iv) Figure of merit

4. *(a)* Explain the operation of a two-input NAND gate using NMOS in brief. 7

(b) Explain the following : 8

(i) I^2L NAND gate

(ii) I^2L NOR gate

UNIT—III

5. *(a)* Design a 2-bit comparator using logic gates. 8

(b) Design a half-adder using NAND gate. 7

6. *(a)* Draw and explain the function of 8 1 multiplexer. 7

(b) Design a combinational circuit with four input variables that will produce logic 1 output when the number of 1 in the inputs is even. 8

UNIT—IV

7. *(a)* Design a 4-bit binary up/down ripple counter. 8

(b) With a suitable example, explain Moore and Mealy circuits. 7

8. *(a)* Convert *S-R* flip-flop to *J-K* flip-flop and design the logic diagram. 7

(b) Explain the following : 8

(i) SISO

(ii) SIPO

UNIT—V

9. *(a)* Explain the classification of semi-conductor memories. 7

(b) Explain about MOSFET RAM cell and dynamic RAM cell in brief. 8

10. *(a)* Explain PLA and PAL using the logic diagram for explanation. 8

(b) Write short notes on PROM, EPROM and EEPROM. 7

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