Total No. of printed pages = 3

CAI-303/DC/3rd Sem/2013/M

# DIGITAL CIRCUITS

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. (a) Convert the following : 2×3=6

(i) $65_{10}$ into BCD code

(ii) $11101101_2$ into Gray code

(iii) 30 (decimal to Excess-3 code).

(b) Define and give the truth tables for OR, EXOR and NOR gates. What type of gate is equivalent to a NAND gate followed by an inverter ? 8

[Turn over

2. (a) Reduce the following Boolean expressions :

(i) $\overline{A}\,\overline{B}\,\overline{C} + \overline{A}B\overline{C} + A\overline{B}\overline{C} + AB\overline{C}$

(ii) $A\overline{B}C + B + B\overline{D} + AB\overline{D} + \overline{A}C$ 3+3=6

(b) Describe the operation of following arithmetic circuits : 5+3=8

(i) Full adder

(ii) Half subtractor.

3. (a) Reduce the following expression using K-map and implement it. 5

$\sum m(5, 6, 7, 9, 10, 11, 13, 14, 15)$

(b) What do you understand by even and odd parity ? 2

(c) What is an even parity generator ? 3

(d) What are SOP and POS forms of Boolean expression ? 4

4. (a) What do you mean by combinational circuit ? Describe the operations performed by the following circuits : 10

(i) Decoder

(ii) Encoder.

(b) Design a circuit for a demultiplexer and explain its working. 4

5. (a) Explain the difference between a sequential system and combinational systems giving example of each. 5

(b) Describe the working of a RS flip-flop. How it differs from D flip-flop ? 5

(c) Explain the working of a JK flip-flop. 4

6. (a) What do you understand by a register ? Explain the working of a serial-in-serial out shift register. 2+5=7

(b) What is a counter ? What is MOD of a counter ? Draw a MOD-3 binary counter. 2+2+3=7

7. Write short notes on any *two* : 7×2=14

(i) PROM

(ii) Multiplexer

(iii) DTL

(iv) CMOS.