Government College of Engineering, Aurangabad

(An Autonomous Institute of Government of Maharashtra)

S.E.(ECT) Examination

ESE – NOV 2016

ET 245 : DIGITAL ELECTRONICS

23 NOV 2016

Time: 03 Hours *Max. Marks: 60*

N.B.

1. Solve All Questions Figure to the right indicate Marks

2. Assume suitable data if necessary and state it clearly

3. Write answers very precisely

4.Programmable/Non Programmable calculators are not allowed

Question 1 Solve Any Twelve **Marks: 12**

Q. No. 1.1	Specify the decimal equivalent of the following binary numbers expressed in the 2's complement format: (a) 00001110; (b) 10001110.	1
Q. No. 1.2	Identify the binary equivalent of $(333.26)_8$ and the octal equivalent of $(1000100.0000111)_2$	1
Q. No. 1.3	State the binary equivalent of (17E.FF)16 and the hex equivalent of (1001001110.011011100)2.	1
Q. No. 1.4	The 7's complement of a certain octal number is 5264. Determine the binary and hexadecimal equivalents of that octal number.	1
Q. No. 1.5	How many bits would be required to encode decimal numbers 0 to 9999 in straight binary and BCD codes?	1
Q. No. 1.6	Specify the excess-3 equivalent of $(1111.0011)_2$	1
Q. No. 1.7	What would be the BCD equivalent of decimal 21 in 16-bit representation?	
Q. No. 1.8	Find the Gray code equivalent of decimal 11	1
Q. No. 1.9	State the importance of ASCII code	1
Q. No. 1.10	Point the purpose of Hamming's Code with example	1
Q. No. 1.11	Find out whether 16-bit 2's complement arithmetic can be used to add 14 276 and 18 490	1
Q. No. 1.12	Subtract (a) (−54)10 from (+31)10 and Use 2's complement arithmetic.	1
Q. No. 1.13	How do you implement a four-input EX-NOR function using only two-input EX-NOR gates?	1
Q. No. 1.14	Prove AND – OR configuration is equivalent to NAND-NAND configuration	1
Q. No. 1.15	Simplify the following 1. $A\,BCD + A\,\overline{C}\,D$ 2. $(A + 1)(A + \overline{B})$	1
Q. No. 1.16	Prove $A + \overline{A}\,B + A\,\overline{B} = (A + B)$	1
Q. No. 1.17	List advantages of Analog to Digital converter	1
Q. No. 1.18	How many bits are needed to represent decimal values ranging from 0 to 10000?	1

Question No. 2 Attempt any two **Marks : 10**

Q 2.1 Discuss the operation of 4 –bit bidirectional shift register

Q. 2.2 Design a 4-bit asynchronous counter using a JK flip flop Explain the operation and draw the waveform.

Q. 2.3 Design a 3 - bit synchronous counter Use JK flip flops

Q. 2.4 What are shift registers? What are different types? Illustrate PISO & PIPO registers.

Question No. 3 Attempt Any four **Marks : 10**

Q. 3.1 A staircase light is controlled by two switches, one at the top of the stairs and another at the bottom of stairs

a. Make a truth table for the system
b. Write the logic expression in SOP form
c. Realize the circuit using AND, OR gates
d. Realize the circuit only using NAND gates

Q. 3.2. Design a Excess -3 to BCD code converter using minimum number of NAND gates.

Q. 3.3. Design a BCD to seven segment decoder to display only " a " segment

Q3.4 . Minimize the following logic function using K-map and implement it using logic gates

$$f(A,B,C,D) = \pi M (1,2,3,5,6,7,9,11,13,14,15))$$

Q. 3.5 Represent algorithm for performing addition using subtractor

Q 3.6 Discuss in detail ALU 74181 and its applications

Q 3.7 Represent 2-bit comparator using Minimum Gates

Question No. 4 Attempt any three(03) **CO3** **Marks : 12**

Q. 4.1 Explain Resolution, Linearity, accuracy, settling time and temperature sensitivity of D/A converters.
Q 4.2. With Neat diagram explain Dual Slope A/D converter
Q 4.3 Discuss in detail internal organization of a memory chip.
Q. 4.4 Demonstrate various Rom Configurations.
Q. 4.5 Compare & Contrast Various Memories
Q. 4.6 Illustrate with necessary diagram working of R/2R digital to analog converter

Question 5 **CO4** **Marks : 16**

Q. 5.1 Explain General Moore machine model and compare with Mealy machine model with necessary diagram.
Q. 5.2 Illustrate in detail sequential machine synthesis procedure
Q. 5.3 Design a sequential circuit using T flip flop for the state diagram shown below.