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**Question Paper Code : 27292**

**5 Year M.Sc. DEGREE EXAMINATION, MAY/JUNE 2016**

**First Semester**

**Computer Technology**

**ECT 011/ESE 012/EIT 021 – DIGITAL PRINCIPLES**

**(Common to : 5 year M.Sc. Information Technology and 5 Year M.Sc. Software Engineering)**

**(Regulations 2010)**

**Time : Three Hours**

**Maximum : 100 Marks**

**Answer ALL questions.**

**PART – A (10 × 2 = 20 Marks)**

1. What is a digital system ?
2. What is the decimal number that can be represented with 10 binary digits ?
3. Differentiate between sequential and combinational logic circuits.
4. Define encoder.
5. What is a state table ?
6. What is data lockout flip-flop ?
7. What is the function of registers ?
8. Define ring counter.
9. Distinguish between synchronous and asynchronous sequential logic circuits.
10. What are hazards in asynchronous sequential logic circuits ?

**PART – B (5 × 16 = 80 Marks)**

11. (a) (i) Convert the following :
- (1)  $(F2EC)_{16} = ( )_2$
- (2)  $(637)_8 = ( )_{10}$ .
- (ii) Explain about laws of Boolean algebra.
- OR**
- (b) (i) Explain in detail about number conversions with example.
- (ii) Design a logic circuit to convert the BCD code to Excess – 3 code.
12. (a) (i) Simplify the following Boolean function F, together with the don't Care conditions d, and then express the simplified function in sum of Minterms.  
 $F(A, B, C, D) = \sum(1, 3, 5, 7, 9, 15)$ ,  $d(A, B, C, D) = \sum(4, 6, 12, 13)$ . **(8)**
- (ii) Simplify the given Boolean function using Map method  $F(w, x, y, z) = \sum(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$ . **(8)**
- OR**
- (b) Simplify the following functions, and implement them with two level NOR gate circuits.
- (i)  $F = wx' + y'z' + w'yz'$  **(8)**
- (ii)  $F(w, x, y, z) = \sum(5, 6, 9, 10)$ . **(8)**
13. (a) Discuss how synchronous sequential logic circuits are analysed highlighting the role of state table, state diagram and state equations in the analysis ?
- OR**
- (b) Discuss the various types of flip flops in detail.
14. (a) Explain the function of 4-bit shift registers.
- OR**
- (b) Discuss in detail about the function of Synchronous Counters.
15. (a) Design an asynchronous circuit that has two input lines X and Y and one output line Z. If  $X = Y$ , then Z is to change so that it is the same as X and Y. Otherwise, Z does not change. In other words Z changes if it is different from all of its inputs. It does not change if it agrees with at least one of its inputs.
- OR**
- (b) Each of the following specifications describes a fundamental mode sequential circuit with two inputs  $x_1$ , and  $x_2$  and one output z. Derive a primitive and a reduced flow table for each circuit.
- (i) When  $x_2 = 1$ , the value of the output z is equal to the value of  $x_1$ ; when  $x_2 = 0$ , the output remains fixed at its last value prior to  $x_2$  becoming zero.
- (ii) The output z is equal to 0 whenever  $x_1 = 0$ . The first change in input  $x_2$ , occurring while  $x_1 = 1$ , causes z to become 1 thereafter z remains 1, until  $x_1$  returns to 0.