BICS-008

B. Tech. VIEP COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

June, 2019

BICS-008 : DISCRETE MATHS STRUCTURE

Time : 3 Hours *Maximum Marks : 70*

Note :Attempt any five questions. All questions carry equal marks.

1. (a) What do you mean by functionally complete sets ? List out some functionally complete sets. 4

    (b) Show that the following formulae are Tautologies : 5

    (i) $((P \to Q) \to R) \to ((P \to Q) \to (P \to R))$

    (ii) $(P \to Q) \leftrightarrow (nQ \to nP)$

    (c) Obtain the principal conjunctive normal form for the following formula : 4

    $$(P \wedge Q) \vee (nQ \wedge R)$$

2. (a) Let Z be the set of integers. Show that the relation $R = \{(a, b) : a \equiv b \pmod{m}, a, b \in Z\}$ is an equivalence relation. 7

   (b) Let $f : R \to R$ be a real valued function defined by $f(x) = x^2, x \in R$. Is f onto and invertible ? Give reasons. 7

3. (a) Show that the set of even integers forms a ring under usual operations of addition and multiplication. 8

   (b) Define cyclic group and normal sub-group with examples. 6

4. (a) Find the truth table for a circuit whose Boolean sum-of-product expression is : 7

   $$t = xyz + xy'z + x'y$$

   (b) Find the Boolean expression corresponding to the truth table T(E) = 00010001. 7

5. (a) Show that $(P \vee Q) \wedge \rceil Q \to P$ is a logical implication. 7

   (b) Write the conjunctive normal form of the function : 7

   $$f(x, y, z) = (x + y)(x + z')$$

6. (a) Convert the DNF : 7

$$xyz + xy'z + x'yz' + xy'z' + x'y'z'$$

into CNF.

  (b) Simplify the Boolean function : 7

$$F(x, y, z, w) = \Sigma\ (0, 1, 2, 3, 13, 15)$$

7. (a) Define path, walk, connected graph, tree with examples. 7

  (b) Prove that the pentagonal lattice is not modular. 7