**TDC (CBCS) Odd Semester Exam., 2018**

# COMPUTER APPLICATION

**( 1st Semester )**

Course No. : BCACC–102T

**( Discrete Structures )**

*Full Marks* : 70
*Pass Marks* : 28

*Time* : 3 hours

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

## UNIT—I

**1.** Answer any *two* questions : 2×2=4

*(a)* Define tautology and contradiction.

*(b)* Write the truth tables of logical connectives 'conjunction' and 'disjunction'.

*(c)* Define well-formed formula.

2. *(a)* Determine the validity of the following argument : 5

If I study, then I will pass.

If I do not go to a movie, then I will study.

I will fail.

Therefore, I went to a movie.

*(b)* Obtain the truth table for

$$\alpha = (P \vee Q) \wedge (P \Rightarrow Q) \wedge (Q \Rightarrow P)$$ 5

**OR**

3. *(a)* Show that $P \Rightarrow (Q \vee R)$ and $(P \Rightarrow Q) \vee (P \Rightarrow R)$ are logically equivalent. 5

*(b)* Prove that the following argument is valid : 5

$$p \to \neg q,\ r \to q,\ r \vdash \neg p$$

UNIT—II

4. Answer any *two* questions : 2×2=4

*(a)* Define injective and bijective functions.

*(b)* What do you mean by domain and range of a set?

*(c)* Define partial order.





5. *(a)* Briefly describe about reflexive, symmetric and transitive relations with examples. 5

*(b)* Let $R$ and $S$ be the relations on

$A = \{1, 2, 3\}$, and

$R = \{(1, 1), (1, 2), (2, 3), (3, 1), (3, 3)\}$

$S = \{(1, 2), (1, 3), (2, 1), (3, 3)\}$

Find $ROS$ and $SOS$. 5

**OR**

6. *(a)* Show that $f : R \to R - \{1\}$ given by $f(x) = (x+1)/(x-1)$ is onto. 5

*(b)* Define grammar. If

$$G = (\{S\}, \{0, 1\}, \{S \to 0S1, S \to \lambda\}, S)$$

find language of the grammar, $L(G)$. 5

UNIT—III

7. Answer any *two* of the following : 2×2=4

*(a)* Define bounded lattice and distributive lattice.

*(b)* Define duality with an example.

*(c)* What do you mean by prime implicants?

8. *(a)* Find the prime implicants and a minimal sum of products form for the following expression : 5

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

*(b)* Express the Boolean expressions

$$E_1(x, y, z) = y(x + yz)'$$

and $E_2(x, y, z) = z(x' + y) + y'$

as a sum of products. 5

**OR**

9. *(a)* Let $L$ be a bounded distributive lattice. Then show that the complements of any element is unique if they exist. 5

*(b)* Let $D_m$ denote the positive divisor of $m$ ordered by divisibility. Draw the Hasse diagram of *(i)* $D_{12}$ and *(ii)* $D_{36}$. 5

UNIT—IV

10. Answer any *two* of the following : 2×2=4

*(a)* Define graph.

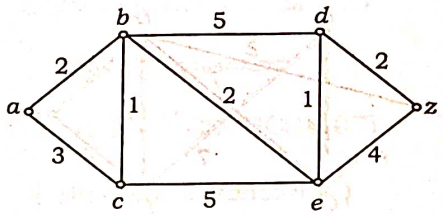
*(b)* What do you mean by degree of a vertex and simple path?

*(c)* Write on bipartite graph.





11. *(a)* Find the shortest path in the following graph from the vertex $a$ to $z$. 5




*(b)* Write short notes on Eulerian graph and Hamiltonian graph. 5

**OR**

12. *(a)* Discuss travelling selesman problem with an example. 5

*(b)* Define adjacency matrix, isomorphic graph and subgraph with examples. 5

UNIT—V

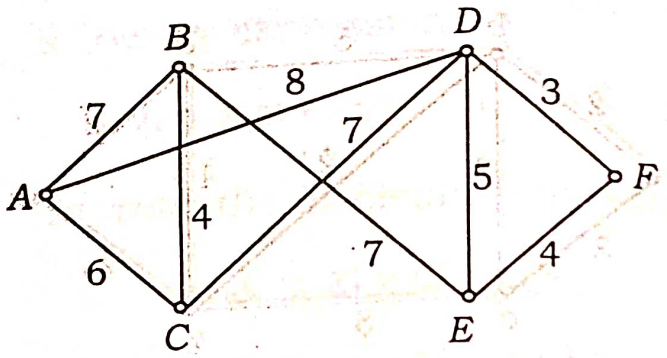
13. Answer any *two* of the following : 2×2=4

*(a)* Define cut-set and cut-vertex.

*(b)* Define spanning tree with an example.

*(c)* What do you mean by binary tree?

**14.** *(a)* Find minimum spanning tree of the following graph : 5




*(b)* What is tree? Write the properties of a tree. 5

**OR**

**15.** *(a)* Write Kruskal's algorithm to find minimum cost spanning tree. Draw the graph corresponding to the following adjacency matrix : 5

$$A = \begin{bmatrix} 1 & 3 & 0 & 0 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$$

*(b)* Write depth-first search algorithm with an example. 5

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