2021

Computer Science

[HONOURS]

(CBCS)

(B.Sc. Third Semester End Examination-2021)

PAPER-C5T

Full Marks: 60   ***Time: 03 Hrs***

The figures in the right hand margin indicate marks

*Candidates are required to give their answers in their own words as far as practicable*

Illustrate the answers wherever necessary

Group-A

Answer any TEN questions of the following: **2x 10=20**

1. Suppose *p, q* are two propositions. Show the truth table for the proposition $p \rightarrow q$.

2. What do you mean by tautology? Give an example of a formula which is tautology.

3. Suppose, X={1,2,3,4,5}, Y={2,4,6,8,9}. Find (X-Y).

4. Consider the word: "college". How many different strings can be formed with only these characters where every string is of 7-characters?

5. Find sum of degress of all the vertices of the following graph.

(2)
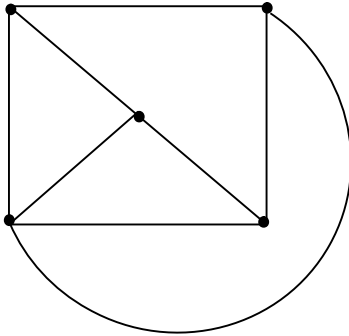
6. Define Ω notation.

7. What is Hamiltonian circuit?

8. What is Poset?

9. Obtain the principal disjunctive normal from of $qV(pV \sim q)$

10 Prove that $(A \cap B)^1 = A^1 \cup B^1$

11 If the function of $f : R \to R$ defined by $f(x) = x^2$ find $f^{-1}(4)$.

12 In a group of 13 children, there must be least how many who were born in the same month?

13 Define Eulerian and Hamiltonian graph

14 Construct truth table $pV \sim q \Rightarrow p$.

15 If A={0,1,2}, find all subsets of A.

(3)

Group-B

Answer any FOUR questions of the following: 5x4 = 20

1. Prove that $1+3+5+...+(2m-1)=m^2$ using principle of mathematical induction.

2. How many 5-digit numbers ≥ 45000 can be formed with 1,2,3,4,5,6,7 where repetation of digits are not allowed?

3. a) Consider the set D_{30} which contains all divisons of 30 and the divides relation. Draw the Hasse diagram of $\langle D_{30}, | \rangle$

   b) Find lub (3,5)

4. a) What do you mean by equivalence relation?

   b) Consider a relation R= {(1,2), (2,3), (1,3), (3,2), (3,3)}. Is R transitive? Explain your answer.

5. Find the solution of following recurrence relation. $y_n = y_{n-1} + y_{n-2}, n \geq 2, y_0 = 1, y_1 = 2$

6. Find a minimum spanning tree of the following weighted graph.
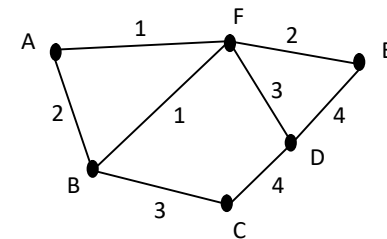
Group –C

Answer any TWO questions of the following: **10x2 = 20**

1. a) Write a short note on graph colouring.

    b) Given a complete graph of four vertices, how many colors we need to properly color this graph?

    c) What do you mean by planar graph? Give one example of non planar graph.   3+2+(3+2)

2. a) Prove or disprove the statement

    "$\left((P \to R) \vee (Q \to R)\right) \to \left((P \wedge Q) \to R\right)$ is a tautology"

    b) Explain injective function with example.

    c) Find characteristics roots of the recurrence relation:

    $b_n = 2b_{n-1} + b_{n-2}, n \geq 2, b_0 = 0, b_1 = 1$ 5+3+2

3. a) Out of 7 consonants and 4 vowels how many words of 3 consonants and 2 vowels can be formed.

    b) Consider the relation R defined as follows,

    Find the reflexive, symmetric and transitive closure of R using composition of relation

    R={(0,1), (1,2), (2,3)} on A={0,1,2,3}   5+5

4. a) Show that $x^2 + x + 1$ is $\theta\left(x^2\right)$.

    b) Show that the graph K_5 is non-planar.   5+5