Second Semester B.C.A. Degree Examination
October / November - 2022
(2021-22 CBCS NEP Scheme)
(NBB 0230) DISCRETE MATHEMATICAL STRUCTURES

Time : 2 Hours   Max. Marks : 60

Note : Student can use Simple calculator.

I.   Select the most appropriate answer from the options provided.   (10x1=10)

i   The Logical connective used for conjunction operation is
     (a) OR   (b) AND   (c) Not   (d) if then

ii   The compound proposition $-(p \wedge q)$ is logically equivalent to
     (a) $\sim p \wedge \sim q$ (b) $\sim p \vee \sim q$ (c) $p \wedge q$ (d) $\sim p \wedge q$

iii A function f A → B is said to be bijective function if it is
     (a) One-One   (b) Onto   (c) Not one-one   (d) Both 'A' & 'B'

iv   If one event occur in n different ways & another event can occur independently in 'n' different ways then two events together can occur in _____ way.
     (a) m + n   (b) m - n   (c) m × n   (d) None of the above

v   If n = 5 and r = 3 then np is _____
     (a) 60   (b) 12   (c) 120   (d) 20

vi   The third term of the expansion $(a+b)^4$ is _____
     (a) $4a^3b$ (b) $6a^2b^2$ (c) $4ab^3$ (d) $10a^2b^2$

vii A Relation R A → B is said to be an equivalence relation if it is
     (a) Reflexive & Transitive   (b) Symmetric & Transitive
     (c) Reflexive, Transitive & Symmetric (d) Symmetric & Reflexive

viii A Graph G = (V E) is a null graph if _____
     (a) E = 0   (b) E = 1   (c) E = 0   (d) E = d

ix   A graph in which all the vertices are of equal degree is
     (a) Order & Size of graph   (b) Adjacent edges
     (c) Adjacent verties   (d) Regular graph

x   A walk in which no edges is repeated is called _____
     (a) Trial   (b) Path   (c) Cycle   (d) Circuit

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II. **Write a short notes on any FIVE of the following.** (5x3=15)

2. Show that $p \to q$ and $\sim p \lor q$ are propositionally equvalent.

3. Define quantifier and explain typs of quantifier.

4. Explain pigeonhole principle.

5. Explain Divide & Conquer Algorithm.

6. If $A = \{1.2.3\}$ and $R = \{(1.1), (2.2), (1.2), (2.3), (3.2) (3.1), (3.3)\}$ find digraph of R and R^{-1}.

7. Explain Degree of Vertex.

8. Define a tree & list propertes of trees.

9. Explain Hamilton Graph.

III. **Answer any THREE question from the following.** (3x5=15)

10. What are the application of propositional logic?

11. Prove that $ac_0 + (a + d) c_1 + (a+2d) c_2 + \ldots\ldots + (a+nd) c_n = (2a + nd)2^{n-1}$.

12. Explain strong induction.

13. Define graph & explain 6 types of graphs.

14. Explain the Breadth first search Algorithm in shortest path.

IV. **Answer the following.** (2x10=20)

15. a) Find the solution set of $x^2 - 3x + 2 > 0$ with replacement set is 'z'

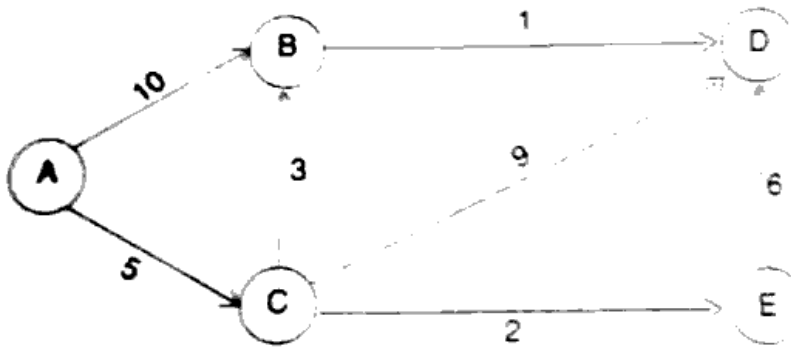 b) Prove that $T(\sim p(x)) = \{T [p(x)]\}'$. https://www.kuvempuonline.com (5+5)

OR

 a) Find 5th term of $(2a - b^2)^7$ using Binomial theorem.

 b) Explain Application of Recurrance Relation. (5+5)

16. a) Prove by Mathematical induction $p(n) = 1^2 +2^2 + 3^2 + \ldots\ldots + n^2$.

 b) Explain recursive definitions & solve 'f' is defined recurisvely by $f(0) = 3$, F $n \geq 1$, $f(n+1) = 2f(n) + 3$, find $f(1), f(2), f(3), f(4)$. (5+5)

OR

 a) Explain incidence matrix of graph.

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b) **Apply Dijkstra's algorithm** to the graph given below & find the shortest path from A to D. (5+5)

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