Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – June / July 2021
II Semester

Class : I UG **Time : 3 Hours**
Major : Information Technology **Max. Marks : 100**

18BITI02 DSE-II Discrete Mathematics

Part A **10 x 1 = 10**
Choose the Correct Answer

1. Write this statement in symbolic form " Savan is rich and Saranya is not happy."
   a. $\sim p \wedge q$ b. $p \wedge q$ c. $p \vee q$ d. $p \wedge \sim q$

2. Identify the valid conclusion from the premises $PvQ, Q \rightarrow R, P \rightarrow M, \neg M$.
   a. $P \wedge (R \vee R)$ b. $P \wedge (P \wedge R)$ c. $R \wedge (P \vee Q)$ d. $Q \wedge (P \vee R)$

3. If A and B are said to be equivalent to each other if and only if _____ is a tautology.
   a. $A \leftleftarrows B$ b. $A \leftrightarrows B$ c. $A \Rightarrow B$ d. $A \uparrow B$

4. $p -> q$ is logically equivalent to:
   a. $\neg p \vee \neg q$ b. $p \vee \neg q$ c. $\neg p \vee q$ d. $\neg p \wedge q$

5. Any graph which contains some parallel edges and loop is called as _____graph.
   a. Trivial Graph b. Multi Graph c. Mixed Graph d. Not a Graph

6. A vertex of degree one is called a
   a. pendent vertex b. isolated vertex
   c. common vertex d. incident vertex

7. A _____ graph of order n is a graph with n vertices and no edges.
   a. connected b. bipartite c. multiple d. null

8. A Hamiltonian graph is a graph containing a _____ cycle.
   a. bipartite b. hamiltonian c. null d. hamiltonian path

9. A tree is a connected, undirected, simple _____ graph.
   a. no cycles b. acyclic c. tree d. rooted tree

10. An undirected graph G has a spanning tree $\Leftrightarrow G$ is _____.
    a. connected b. circuit c. node d. cycle

Part B **5 x 6 = 30**

Answer ALL questions
Each answer should not exceed 400 words or two pages

11.a. Write the following statements in symbolic form with statements :
P = Sathya is smart
Q = Aruna is smart
(i) Sathya is smart and Aruna is not smart
(ii) Sathya and Aruna are both smart
(iii) Neither Sathya nor Aruna are smart
(iv)It is not that Sathya and Aruna are both smart.

(or)

11.b. Define the following with truth table.
(i) Conditional statement
(ii) Disjunction (iii) Conjunction.

12.a Verify $(P \wedge (P \leftrightarrows Q) \rightarrow Q)$ is tautology using truth table.

(or)

12.b. Obtain a disjunction normal form of $\sim (P \vee Q) \leftrightarrows (P \wedge Q)$

13.a. Let G be an undirected graph with $|E|$ edges and $|V| = n$ vertices. Prove that $\sum_{i=1}^{n} \deg(v_i) = 2|E|$.

(or)

13.b. Explain some special types of graphs.

14.a. Explain about operation on graphs.

(or)

14.b. Explain about some basic rules for constructing Hamiltonian path and cycles.

15.a. Prove that every tree contains exactly one central vertex or two adjacent central vertices.

(or)

15.b. Describe about the special trees.

Part C **5 x 12 = 60**

Answer ALL questions
Each answer should not exceed 800 words or four pages

16.a. Construct the truth table for the following:
$(i)(\sim P \vee Q) \wedge (\sim Q \vee P)$ $(ii)\ (P \wedge Q) \rightarrow (P \vee Q)$.

(or)

16.b. Describe the connectives and represent of truth table with example.

17.a. (i) Obtain a conjunctive normal form of $[Q \vee (P \wedge R)] \wedge \sim [(P \vee R) \wedge Q]$.
(ii) Find the PDNF of $P \rightarrow [(P \rightarrow Q) \wedge \sim (\sim Q \vee \sim P)]$.

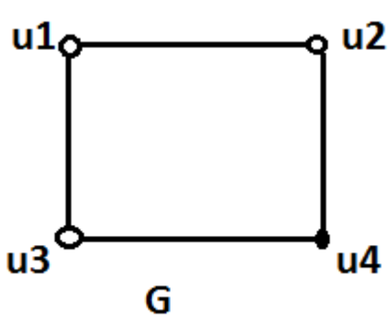
(or)

17.b. (i) Derive the PDNF from PCNF of S: $P \vee \left(\sim P \rightarrow \left(Q \vee (\sim Q \rightarrow R)\right)\right)$.

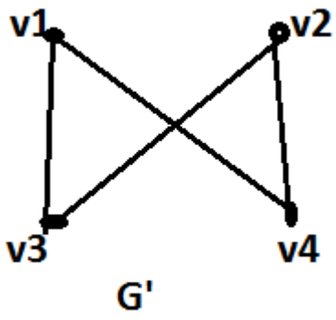
18.a. (i) In a simple digraph $G(V, E)$, prove that every vertex of the diagraph lies in exactly one strong component.
(ii) Prove that the edge connectivity of a conneted graph G can't exceed the minimum degree of G. $(ie)\ \lambda(x) \leq \delta(x)$.

(or)

18.b. Show that the following graphs G and G' are isomorphic:



G



G'

19.a. A nondirected multigraph has an Euler path if and only if it is connected and has 0 or exactly two vertices of odd degree.

(or)

19.b. Define the following and give an example.

(i) Eulerian Cycle (ii) Hamiltonian Cycle .

20.a. Describe the minimum spanning tree construction using the Kruskal Algorithms (or) Prim's Algorithm with diagram.

(or)

20.b. Explain in detail about trees and their properties. Illustrate with examples.

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