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| **P.V.P Siddhartha Institute of Technology** | | | | | | | | | |
| **Department of Computer Science and Engineering** | | | | | | | | | |
| **Course: B.Tech** | | **Year: II** | **Semester: I** | **Descriptive: I** | **A.Y:2024-25** | | | | |
| **Subject Code: 23BS1305** | | **Subject Name: Discrete Mathematics and Graph Theory (DM&GT)** | | | **Regulation:PVP23** | | | | |
| **Duration:1 hr 30 min** | | **Maximum Marks:30Marks** | | | **Date:17/09/2024** | | | **Session: F.N** | |
| **Answer one from each either-or type of Questions.**  **Each Question carries 10 Marks**  **3×10M=30M** | | | | | | | | | |
|  | | | | | | | | | |
| **Q.No** |  | | | | | **Marks** | **CO** | | **Level** |
| 1.(a) | Show that  is a tautology. | | | | | 5M | CO1 | | L2 |
| (b) | Construct the CNF for the following statement formulae:  ¬ (P∨ *Q)* ⟷ (P∧ *Q).* | | | | | 5M | CO2 | | L3 |
| **(OR)** | | | | | | | | | |
| 2.(a) | Show that following equivalence without constructing the truth table  ¬ (P∧ *Q)* → (¬*P* ∨ (¬ *P* ∨ *Q)*) ⇔ (*P* → *Q)*. | | | | | 5M | CO1 | | L2 |
| (b) | Construct the Principal Disjunctive Normal Form (PDNF) for the following formula: (∼P → *R)* ⋀ (Q ⟷ P). | | | | | 5M | CO2 | | L3 |
|  | | | | | | | | | |
| 3.(a) | Show that (RVS) follows logically from the premises  CVD, (CVD) 🡪~H, ~H 🡪(A∧~B) and (A∧~B)🡪(RVS) using rules of inference. | | | | | 5M | CO1 | | L2 |
| (b) | Using rule of Specification and Generalization, Show that  (Ǝx) (P(x)∧Q(x)) ⇒ (Ǝx) P(x) ∧( Ǝx) Q(x) | | | | | 5M | CO2 | | L3 |
| **(OR)** | | | | | | | | | |
| 4.(a) | Using rules CP, Show that P🡪S can be derived from the premises ∼P VQ, ∼QVR and R🡪S. | | | | | 5M | CO2 | | L3 |
| (b) | Apply the rule of Specification and Generalization, Symbolize the following argument and check for its validity:  **Premises:** Every living thing is a plant or an animal.  John’s goldfish is alive and it is not a plant.  All animals have hearts.  **Conclusion:** Therefore, John’s goldfish has a heart. | | | | | 5M | CO2 | | L3 |
|  | | | | | | | | | |
| 5.(a) | Show the converse, inverse, and contrapositive of the following implication: If it snows today then I will ski tomorrow. | | | | | 5M | CO1 | | L2 |
| (b) | Construct the truth table for the following statement formulae:  (P↑Q ↑R). | | | | | 5M | CO2 | | L3 |
| **(OR)** | | | | | | | | | |
| 6.(a) | Show the symbolic form for the following sentences:   1. All birds have wings 2. Some men are good 3. Nothing is good 4. Something is not good 5. No men are good | | | | | 5M | CO1 | | L2 |
| (b) | Using indirect method of proof, Show that the following set of premises are inconsistent:  P🡪Q, Q🡪R, ~(P∧R), (PVR) ⇒ R | | | | | 5M | CO2 | | L3 |
|  |  | | | | |  |  | |  |