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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** |
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| **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 |
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| 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 |
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| 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 |
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