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| **P.V.P SIDDHARTHA INSTITUTE OF TECHNOLOGY (AUTONOMOUS)** |
| **BRANCH : Computer Science and Engineering** | **REGULATION : PVP23** |
| **Course: B.Tech** | **SUBJECT : Discrete Mathematics & Graph Theory** |
| **SubjectCode:23BS1305** | **Year and Semester: II Year / I Sem** | **Section: I/II/III** |
| **Academic Year:2024-25 (Semester-I)** |
| **ASSIGNMENT-I** |

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| **Q.NO** | **QUESTION** | **CO** | **LEVEL** |
| **1.** | **A).** Show that **[ (A → B) ∧ A ] → B** is a tautology. **B).** Obtain the Disjunctive normal form(DNF) and conjunctive normal form (CNF) of the following expression: | **1** | **L2** |
| **2.** | **A).** Construct the truth table for the following proposition.**B).** What is Principle Conjunctive Normal Form (PCNF)? Construct the PCNF of **(¬ A → B)∧ ( C ↔ A)** | **1** | **L3** |
| **3.** | **A).** Express the converse, inverse, contra positive of **‘If you work hard**  **then you will be rewarded’.****B).** Construct Principal of Conjunctive Normal Forms(PCNF) and Principal of Disjunctive Normal Forms (PDNF) of the formula.**( ¬ A ∨¬ B ) → ( A ↔ ¬ B )** | **1** | **L2,L3** |
| **4.** | **A).** Prove that the following equivalent formulas by using truth tables.**B).** Find the principal conjunctive normal form of the following expression. | **1** | **L2** |
| **5.** | **A).** Let **p :** Jupiter is a planet **and  q :** India is an island be any two simple statements. Identify with verbal sentence describing each of the following statements.**(i) ¬*p* (ii) *p* ∨ ¬*q*  (iii) ¬*p* ∨ *q* (iv) *p* → ¬*q* (v) *p* ↔ *q*****B).** Show that **(P ⋁ Q) ⋀ (∼P ⋀ (∼P ⋀ Q)) ⬄ (∼P ⋀ Q).** | **1** | **L2** |
| **6.** | **A).**Using rules of inference, show that **‘S’** is a valid inference from the premises **P→ ¬Q, Q∨ R, ¬S → P and ¬R** **B).** Using Indirect method of Proof, Show that | **2** | **L3** |
| **7.** | **A).**Using rules inference, Verify the validity of the following argument.**Premises :** If the patient has a virus, then he must have a temperature  above 99o . The patient’s temperature is not above 99o .**Conclusion :** The patient has a virus.**B).** Translate the following expression in to Symbolic Notation **“All the World Loves a Lover".** | **2** | **L3,L2** |
| **8.** | **A).** Prove that the premises a→(b→c), d→(b Ʌ ℸ𝑃) and (aɅd) are inconsistent.**B).** Let Q(x) be the sentence that **"x=x+1"** , What is the truth value of the  quantification **∃ x Q(x**) where the universe of discourse is the set of real number? | **2** | **L2** |
| **9.** | **A).** Using rules inference,Verify the validity of the following argument.  **Premises :** All fathers are males.  Some students are fathers.  **Conclusion :** All students are males.**B).** Show that R→ S can be derived from the premises **P→ (Q→S), ┐RVP** **and Q** using Rule CP if necessary | **2** | **L3,L2** |
| **10.** | **A).** Show that **R ∧ (P ∨ Q )** is a valid conclusion from the premises **P ∨ Q , Q → R , P → M , and ¬ M.****B).** Prove or disprove the validity of the following argument. Lions are dangerous animals. There are lions. Therefore, there are dangerous animals. | **2** | **L2** |