SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
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B.E Four year Semester IV (Computer Science & Engineering) Summer 2020 Exam Subject: 3KS04 Discrete Structures Assignment for ONLY BACKLOG STUDENTS

Instructions
1) Solve ANY TWO Questions
2) Each Question Carries 10 marks

Q I) Solve the following

1) Show that $A \to (P \lor C) \Leftrightarrow (A \land \neg P) \to C$ [2M]

2) Show that, $(G \lor H)$ is a valid conclusion for $(B \land C)$, $(B \land C) \to (H \lor G)$. [2M]

3) Explain with example: i. Proper subset ii. Universal set [2M]

4) Explain: i. Group ii. Subgroup [2M]

5) Prove the Boolean identities

i. $a * (a' \oplus b) = a * b$ **ii.** $(a * b) \oplus (a * b') = a$ [1M]

6) Traverse the following with three techniques: inorder, preorder and post order. [1M]

QII) Solve the following

1) Write inverse, converse and contra-positive of **A $\to$ B** [1M]

2) Show that $(\exists x)M(x)$ follows logically from the premises $(x)(H(x) \to M(x))$ and $(\exists x)H(x)$. [2 M]

3) Define: i. Intersection ii. Union [1M]

4) What is coset ? Find the left coset of $\{[0], [4]\}$ in group $(Z_7, +_7)$. [2M]

5) Draw the Lattice diagram of D_{30} [2M]

6) Show that the sum of indegrees of all the nodes of a simple diagraph is equal to the sum of out degrees of all its nodes and that sum is equal to the number of edges of the graph. [2M]

QIII) Solve the following

1) Truth table result of statement formula **((P∧Q)$\to$R)v R**

(i) TFTFTTTT (ii) TFTTTTTT

(iii) TFFTTTTT (iv) TFTFTFTF [2M]

2) Show that, $(C \lor D)$ is a valid conclusion for $(A \land B)$, $(A \land B) \to (C \lor D)$. [1M]

3) Let P = {<1, 2>, <2, 4>, <3, 3>} and Q = {<1, 3>, <2, 4>, <4, 2>}.

Find P $\cup$ Q, P $\cap$ Q, D(P), D(Q), R(P), R(Q) [2M]

4) Explain: i. Group ii. Monoid [2M]

5) For the function f = x+y+z Give

i) The circuit diagram representation. ii) The truth table representation. [2M]

6) Prove that let G = {V, E} be a graph the sum of the degrees of all the nodes in V is twice the number of edges in E. [1M]

QIV) Solve the following

1) What is statement formula? What are the rules for generating well-formed formula? [2M]

2) Show that, $(C \lor D)$ is a valid conclusion for $(A \land B)$, $(A \land B) \rightarrow (C \lor D)$. [1M]

3) Explain with example: i. Set, ii. Subset [2M]

4) Show that if every element in a group is its own inverse, then the group must be Abelian. [2M]

5) Find the complement of every element of the lattice $\langle S_n, D \rangle$ for $n = 75$. [2M]

6) Give the directed tree representation of the following formula

$(P \lor (\neg P \land Q)) \land ((\neg P \lor Q) \land \neg R)$ [1M]