

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**  
**Hanuman Vyayam Prasarak Mandals's**  
**College of Engineering & Technology, Amravati**  
**Course: Information Technology**  
**BE Four year Semester (Information technology) Summer 2020 Exam**  
**Subject: 3IT03 Discrete Structures**  
**Assignment for ONLY BACKLOG STUDENTS**

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**Instructions**

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

**QI) Solve the following**

- 1) Write inverse, converse and contra-positive of  $A \rightarrow B$  [1M]
- 2) Define:
  - i. Intersection [1M]
  - ii. Union [1M]
- 3) What is coset ? Find the left coset of  $\{[0], [4]\}$  in group  $(\mathbb{Z}_7, +_7)$ . [2M]
- 4) Draw the Lattice diagram of  $D_{60}$  [2M]
- 5) 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]
- 6) Construct DFA for divisible by 5 acceptor. [2M]

**Q II) Solve the following**

1)

Show that  $A \rightarrow (P \vee C) \Leftrightarrow (A \wedge \neg P) \rightarrow C$  [2M]

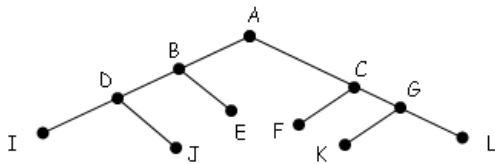
2) Explain with example: i. Proper subset ii. Universal set [2M]

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

4) Prove the Boolean identities

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

5) Traverse the following with three techniques: inorder, preorder and post order.



[1M]

6) Define Deterministic Finite Automata(DFA) [2M]

**QIII) Solve the following**

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

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

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

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

5) Give the directed tree representation of the following formula  $(P \vee (\neg P \wedge Q)) \wedge ((\neg P \vee Q) \wedge \neg R)$  [1M]

6) Define Non Deterministic Finite Automata [1M]

**QIV) Solve the following**

- 1) Truth table result of statement formula  $((P \wedge Q) \rightarrow R) \vee R$
- |                |               |
|----------------|---------------|
| (i) TFTFTTTT   | (ii) TFFTFFFF |
| (iii) TFFTFFFF | (iv) TFTFTFTF |
- [2M]
- 2) Let  $P = \{ \langle 1, 2 \rangle, \langle 2, 4 \rangle, \langle 3, 3 \rangle \}$  and  $Q = \{ \langle 1, 3 \rangle, \langle 2, 4 \rangle, \langle 4, 2 \rangle \}$ .  
Find  $P \cup Q, P \cap Q, D(P), D(Q), R(P), R(Q)$  [2M]
- 3) Explain: i. Group  
ii. Monoid [2M]
- 4) For the function  $f = x+y+z$  Give  
i) The circuit diagram representation. ii) The truth table representation. [2M]
- 5) 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]
- 6) Give Difference between NFA and DFA [1M]