Sanjay Ghodawat University, Kolhapur

2020-21

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EXM/P/09/00

Year and Program: S.Y B.Sc. | **School of Science** | **Department: Mathematics**

Course Code: MTS203 | **Course Title: Logic and Sets** | **Semester : III**

Day : | **End Semester Examination** | **Time : 2 Hrs.**

Date : | | **Max Marks : 50**

Question Paper

Instructions: 1) All Questions are compulsory.
2) Figures to the right indicates full maks.

		Marks	Bloom's Level	CO
Q.1	**Answer the following (any Two)**–			
a)	Develop the truth tables for following compound statements, if p, q, r are primitive statements. i) $(p \to q) \to r$ ii) $q \to (\sim p \vee \sim q)$	8	L_3	CO1
b)	If p,q,r are primitive statements. Show that by using Laws of logic $\sim[\sim[(p \vee q) \wedge r] \vee \sim q] \equiv q \wedge r$	8	L_1	CO1
c)	Let $p(x), q(x)$ denotes the following open statements. $p(x): x \leq 3$ And $q(x): x+1$ is odd. If the universe consists of all integers. What are the truth values of following statements? i) $p(7) \vee q(7)$, ii) $p(3) \wedge q(4)$, iii) $p(3) \vee q(1)$, iv) $p(6) \wedge q(1)$	8	L_3	CO2
Q.2	**Answer the following (any two)** –			
a)	Define power set of A. If set A contains n number of elements then power set of A contains how many elements? Let $A = \{1, 2, 3, 4\}$ then write power set of A and $\lvert A \rvert$.	8	L_3	CO2
b)	For any Universe U and $A, B, C \subseteq U$ prove that i) $(A \cup B) \cap C = (A \cap B) \cup (A \cap C)$	8	L_4	CO3

ii) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

c) For universe $U = \{1,2,3,4,5,6,7,8,9,10\}$, $A = \{1,2,3,4,5\}$, $B = \{1,2,4,8\}$, $C = \{1,2,3,5,7\}$ and $D = \{2,4,6,8\}$. Determine each of the following. 8 L_3 CO3

i) $(A \cup B) \cap C$ ii) $A \cup (B \cap C)$

iii) $(A \cup B) - C$ iv) $(A \cup B) - (C \cap D)$

Q.3 Answer the following (any three) –

a) If $\Re$ is relation on Z^+ where $a \Re b$, if $a^3 + b^3$ is even. Determine whether the given relation $\Re$ is reflexive, symmetric, antisymmetric or transitive. 6 L_2 CO4

b) If $A = \{1,2,3,4\}; B = \{2,5\}; C = \{3,4,7\}$, then show that $A \times (B - C) = (A \times B) - (A \times C)$ 6 L_1 CO4

c) If $A = \{1,2,3,4,5,6,\}$ 6 L_1 CO5

Define

$\Re = \{(1,1),(1,2),(2,1),(2,2),(2,3)(3,3)(4,4)(4,5)(5,4)(5,5)(6,6)\}$

show that $\Re$ is an equivalence relation on A.

d) If $\Re$ is relation on Z where $a \Re b$, if $a + b$ is odd .Determine whether the given relation $\Re$ is reflexive, symmetric, antisymmetric or transitive. 6 L_1 CO5

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