



32323/C230

Reg. No.

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III Semester BCA 3 (U.G) Degree Examination, Nov./Dec. - 2019
DMS DISCRETE MATHEMATICAL STRUCTURES
(Repeater)
Paper : Theory (BCA 3)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. Scientific calculators are not allowed.
2. Simple calculators are allowed.

PART - AAnswer **any 10** questions:**(10×2=20)**

1. a) If $A = \{a, b, c, d\}$ and $B = \{a, c, e, f, g\}$ then compute
 - i. $A - B$
 - ii. $A \Delta B$ or $A \oplus B$
- b) State pigeonhole principle.
- c) Define negation with truth table.
- d) Find the truth value $q \rightarrow (p \vee q)$ given that p is true and q is false.
- e) Define well ordered principle.
- f) Write recursive formula for the sequence 3, 7, 11, 15, 19
- g) Find the G.C.D. of 540 and 504.
- h) List all the partitions of $A = \{1, 2, 3\}$.
- i) Define equivalence relation.
- j) Define permutation.
- k) Let function $f: R \rightarrow R$ defined by $f(x) = 2x^2 + x + 1$, determine images of the subset $A_1 = \{-1, 2\}$ of R .
- l) Consider the function f and g , defined by $f(x) = x^3$ and $g(x) = x^2 + 1$ find $g \circ f$.

PART - BAnswer **any 4** questions of the following:**(4×5=20)**

2. Explain any four set operations with Venn diagram.

P.T.O.



3. Let $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ compute:

i. $A \vee B$ ii. $A \wedge B$

4. Construct truth table of $(p \vee \sim q) \rightarrow \sim r$

5. Prove by method of mathematical induction $1 + 2 + 3 + \dots + n = n(n+1)/2$.

6. Find the GCD of 495 and 675. Express it in the form $495a + 675b$.

7. Let $A = \{a, b, c, d, e\}$ and $R = \{(a, a), (a, c), (a, d), (b, b), (c, d), (d, d)\}$ compute

i. \bar{R} ii. R^c

PART - C

Answer **any 4** questions of the following:

(4×10=40)

8. a) If one integer is selected at random from integers 1 to 15, if A is the event that a number selected is even and B is the event that a number selected is divisible by 3. Find $P(A \vee B)$.

b) Find the number of permutations of the letters of the word "ENGINEERING". In how many arrangements the 3E's are together? **(5,2+3)**

9. State any Five rules of inference along with their names. **(10)**

10. State and prove the fundamental theorem of Arithmetic. **(10)**

11. Explain the properties of Relations. **(10)**

12. a) Let $A = \{1, 2, 3\}$ and $P_1 = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$, $P_2 = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \end{pmatrix}$, $P_3 = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$ compute

i. P_1^{-1} ii. $P_3 \circ P_2$

b) Let $f(n) = 3n^3 - 2n^2$ and $g(n) = 2n^4$ be defined for positive integers n. Then show that f and g have the same order. **(5+5)**