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B. Sc. (Graphics & Web Designing) (Semester – 1st)

MATHEMATICS

Subject Code: BGWDS1101

Paper ID: [21132601]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) Let $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5, 6, 7\}$, $C = \{2, 3, 8, 9\}$. Then find the sets:
 $A \cap B, A \cup C, B \cup C, B \cap C$.
- b) If $N = \{1, 2, 3, \dots\}$, Then list the elements of sets :
 - a) $B = \{x \in N \mid x \text{ is even and } x < 11\}$
 - b) $C = \{x \in N \mid 4 + x = 3\}$
- c) Determine the power set $P(A)$ of $A = \{a, b, c, d\}$ and also write the value of $n(P(A))$.
- d) Let p be “It is cold” and let q be “It is raining”. Give a simple verbal sentence which describes each of the following statements: (a) $\neg p$ (b) $p \wedge q$ (c) $p \vee q$ (d) $q \vee \neg p$
- e) Construct the truth table of $\neg p \wedge q$.
- f) Let
$$u = [1 \quad -2 \quad 3 \quad 3 \quad 2 \quad -1], v = [3 \quad 0 \quad 2 \quad -2 \quad 3 \quad -1] \text{ and } w = [3 \quad 0 \quad 2 \quad -2 \quad 3 \quad -1].$$
Find (a) $3u - 4v$ (b) $2u + 3v - 5w$.
- g) Let $A = [2 \quad 3 \quad 0 \quad -1]$ and $B = [-1 \quad 2 \quad -3 \quad 3 \quad 2 \quad 1]$. Then calculate a) AB b) BA .
- h) Let $A = [2 \quad 0 \quad 0 \quad -1]$. Then find the value of $f(A)$, where $f(x) = x^2 + 2x - 11$.
- i) Write down the first five terms of the AP with first term 8 and common difference 7.
- j) Find the 7th term of the GP: 2, - 6, 18, ...,

Section – B**(5 marks each)**

- Q2. State and prove De Morgan's law.
- Q3. Construct the truth table to show that $\neg(p \wedge q) \vee (\neg p \wedge q) = \neg p$
- Q4. Let $A = \begin{bmatrix} 3 & -2 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & 3 & 5 & -7 & 2 \end{bmatrix}$. Perform the operations AB and $B^t A$.
- Q5. Find the sum of the series: $1 + 3.5 + 6 + 8.5 + \dots + 101$.
- Q6. How many terms in the geometric progression $1, 1.1, 1.21, 1.331, \dots$ will be needed so that the sum of the first n terms is greater than 20?

Section – C**(10 marks each)**

- Q7. Show that the propositions $\neg_{(p \wedge q)} \neg_p \vee \neg_q$ are logically equivalent.
- Q8. An arithmetic progression has 3 as its first term. Also, the sum of the first 8 terms is twice the sum of the first 5 terms. Find the common difference.
- Q9. Find x, y, z, t , where $3 \begin{bmatrix} x & y & z & t \end{bmatrix} = \begin{bmatrix} x & 6 & -1 & 2t \end{bmatrix} + \begin{bmatrix} 4x & +y & z & +t & 3 \end{bmatrix}$.