

**S.D.E.**  
**B.C.A. (2004 Course Sem- I : WINTER - 2018**  
**SUBJECT : MATHEMATICAL FOUNDATIONS**

Day : Tuesday  
Date : 04/12/2018

**W-2018-4505**

Time : 02.00 PM TO 05.00 PM  
Max. Marks : 80

**N.B.:**

- 1) Attempt **ANY FIVE** questions from Section – I and attempt **ANY TWO** questions from Section – II.
- 2) Answers to both the sections should be written in **SEPARATE** answer books.
- 3) Use of logarithmic table and pocket **CALCULATOR** is allowed.
- 4) Figures to the right indicate **FULL** marks.

**SECTION – I**

- Q.1** a) Prepare a truth table for the logical statement. [05]  
 $((p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow (p \rightarrow r)$
- b) Find the value of  $|AB|$  if  $A = \begin{vmatrix} 4 & 6 \\ 3 & 1 \end{vmatrix}$  and  $B = \begin{vmatrix} 2 & 1 \\ -3 & 4 \end{vmatrix}$ . [05]
- Q.2** a) Define One-to-One and Invertible function. [05]
- b) Draw Venn Diagrams for: [05]  
i)  $A - (B \cup C)$                       ii)  $(A - B) \cap (A - C)$
- Q.3** a) Explain 'Pigeonhole Principle'. [05]
- b) Find  $\bar{a} \times \bar{b}$  if  $\bar{a} = \bar{i} + 3\bar{j} - 5\bar{k}$  and  $\bar{b} = 2\bar{i} + 4\bar{j} - 2\bar{k}$ . [05]
- Q.4** a) Prove that,  $p \rightarrow (q \vee r) = (p \rightarrow q) \vee (p \rightarrow r)$ . [05]
- b) Find the value of x if  $\log 2 + \log (x + 3) - \log (3x - 5) = \log 3$ . [05]
- Q.5** a) Find the values of  ${}^{10}C_4$  and  ${}^{13}P_5$ . [05]
- b) Discuss with suitable examples: i) Sample space    ii) Events [05]
- Q.6** a) Write a note on Mathematical Induction. [05]
- b) Write different partition of the set  $A = \{1, 3, 4, 6, 9\}$ . [05]
- Q.7** a) If  $P(A) = 0.5$ ,  $P(B) = 0.8$  and  $P(A \cup B) = 0.9$ . Find [05]  
i)  $P(A \cap B)$                       ii)  $P(A \cap B)'$
- b) Describe Division Algorithm with appropriate working. [05]

**P.T.O.**

**SECTION – II**

**Q.8 a)** What is the probability of getting 53 Sundays in a leap year? **[10]**

**b)** Find the inverse of  $\begin{bmatrix} 4 & 3 \\ 8 & 2 \end{bmatrix}$ . **[05]**

**Q.9 a)** Solve the following equations by using elementary row operations of matrix. **[10]**

$$x + 2y + z = 8$$

$$2x + 3y + 2z = 14$$

$$3x + 2y + 2z = 13$$

**b)** Elaborate concept of 'Complexity of Algorithm' with their types. **[05]**

**Q.10 a)** Out of 200 students appearing in an examination 130 passed in Mathematics and 110 passed in Statistics. If 40 of them failed in both Mathematics and statistics. Find the number of students who passed in both the subjects. **[10]**

**b)** Find the 8<sup>th</sup> term in the expansion of  $\left(\frac{1}{x} + 2y\right)^{12}$ . **[05]**

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