

**S.S.DEMPO COLLEGE OF COMMERCE AND ECONOMICS**  
**CUJIRA, ST. CRUZ – GOA**  
**Semester I Supplementary Examination, June – 2017**  
**MATHEMATICAL TECHNIQUES**  
**(Revised Course)**

Duration: 2 Hours

Marks: 80

- Instructions: 1) *All questions are compulsory.*  
2) *Figures to the right indicate full marks.*  
3) *Use of calculator is not allowed.*

**Q.1. Answer the following.**

**(5X4=20)**

- a) Prove that  $(p \rightarrow q) \leftrightarrow (\sim p \vee q)$  is a tautology.
- b) If the sum of three numbers in an Arithmetic Progression is 27 and their product is 648, find the numbers.
- c) Solve the following equations using Cramer's rule.  
 $x + 2y - z = 3, 3x - y + 2z = 1, 2x - 2y + 3z = 2$
- d) What number must be added to each of the numbers 3, 4, 13 and 16 so that the results may be in proportion?

**OR**

**Q.I. Answer the following.**

**(5X4=20)**

- w) Construct the truth table for  $(p \leftrightarrow q) \vee (q \wedge r)$ .
- x) If the 5<sup>th</sup> term of an Arithmetic Progression is 35 and its 9<sup>th</sup> term is 59, find its n<sup>th</sup> term.

y) Find x if 
$$\begin{vmatrix} 6 & -5 & 1 \\ 4 & 2 & -1 \\ 14 & -1 & x \end{vmatrix} = 0$$

z) If  $2x - 1$ ,  $5x - 6$ ,  $6x + 2$  and  $15x - 9$  are in proportion, find the value of  $x$ .

**Q.2. Answer the following.**

**(5X4=20)**

a) If  $A = \begin{bmatrix} 2 & -3 \\ 1 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} -3 & 0 \\ 5 & -1 \end{bmatrix}$ ,

find the matrix  $X$  such that  $2X + 3A - B = 0$ .

b) If the seventh and fourth terms of a G.P. (Geometric Progression) are 192 and 24 respectively, find the first term and common ratio.

c) From 2000 literate individuals of a town 60% read news paper A, 55% read newspaper B and 20% read neither A nor B. How many individuals read both the newspapers?

d) In a class of 8 boys and 5 girls a committee of 5 students is to be formed. Find the number of committees with at least 3 boys.

**OR**

**Q. II. Answer the following.**

**(5X4=20)**

w) Find  $AB$  and  $BA$  whenever they exist where

$$A = \begin{bmatrix} 2 & -3 \\ 0 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & -1 & 2 \\ 3 & 0 & -4 \end{bmatrix}$$

x) Find three numbers in Geometric Progression such that their product is 27 and their sum is 13.

y) In a certain examination 53% students passed in Economics, 61% in Accountancy, 60% in Mathematics, 24% in Economics and Accountancy, 35% in Accountancy and Mathematics, 27% in Economics and Mathematics and 5% students passed in none of the subjects. How many students passed in all the three subjects?

z) Find  $n$ , if  ${}^n C_4 = 5 \times {}^n C_3$

**Q.3. Answer the following.**

**(5X4=20)**

- a)  $X = \{x \mid x \text{ is an even integer between 3 and 23}\}$  is the universal set.  
 $A = \{6, 8, 12, 14\}$ ,  $B = \{10, 16, 22\}$ , verify that  $(A \cup B)' = A' \cap B'$ .
- b) How many different words can be formed with letters of the word 'ARTICLE'? How many of them begin with I?
- c) A firm allows 15% trade discount on list price and a further discount for cash payment at 5% rate. Find the list price of an article with a net selling price of ₹ 3800.

d) If  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ , show that  $A^2 - 4A$  is a scalar matrix.

**OR**

**Q. III. Answer the following.**

**(5X4=20)**

- w) Test the validity of the following argument.  
"If the sun is shining, he will play tennis. Sun was not shining.  
Therefore he did not play tennis."
- x) In how many ways 6 gents and 2 ladies can be arranged in a row if 2 ladies never sit together.
- y) A shopkeeper sold an article with ₹ 50,000 as the list price at 8% discount. Find the net selling price.
- z) If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ , show that  $A^2 - 5A + 7I$  is a zero matrix where  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  is an identity matrix.

**Q.4. Answer the following.**

**(5X4=20)**

- a) Two numbers are in the ratio 2:3. If 7 is added to each number the ratio of these numbers is 3:4. Find the numbers.
- b) Find the sum of the following series  
 $3 + 33 + 333 + \dots$  to n terms.
- c) Find n if  ${}^n P_5 = 20 \times {}^n P_3$
- d) For an Arithmetic Progression 3, 7, 11, ..... Find  $S_n$  and  $S_{20}$ .

**OR**

**Q. IV. Answer the following.**

**(5X4=20)**

- w) The ratio of A's present age to B's present age is 3:10. After 8 years, the corresponding ratio is 5:12. Find their present ages.
- x) A person saved ₹ 16,500 in ten years. In each year after the first, he saved ₹ 100 more than in the preceding year. How much did he save in the first year?
- y) A council consists of 10 members, 6 belonging to party A and 4 to the party B. In how many ways can a committee of 5 be selected so that the members of the party A are in majority?

z) If  $A = \begin{bmatrix} 2 & 3 \\ 3 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 5 & 6 \\ 6 & 5 \end{bmatrix}$ , show that  $(A + B)(A - B) = A^2 - B^2$

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