

**DCT's S. S. DEMPO COLLEGE OF COMMERCE AND ECONOMICS**  
**ALTINHO, PANAJI - GOA**  
**F.Y.B.COM. Semester I Examination, October - 2014**  
**MATHEMATICAL TECHNIQUES**  
**(REVISED SYLLABUS)**

Duration: 2 Hours

Marks: 80

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

**Q.1. Answer the following. (5X4=20)**

- a) Construct the truth table for  $(p \leftrightarrow \sim q) \rightarrow \sim (q \wedge r)$ .
- b) The sum of three numbers in an A.P. (Arithmetic Progression) is 9 and the sum of their squares is 35. Find the numbers.
- c) The monthly incomes of A and B are in the ratio 4:3 and their monthly expenses are in the ratio 3:2. If each of them saves ₹ 600 per month, find their monthly incomes.
- d) Find AB and BA if they exist,

$$\text{where } A = \begin{bmatrix} 3 & -1 & 2 \\ 0 & 5 & 4 \end{bmatrix} \quad B = \begin{bmatrix} -2 & 0 \\ 4 & 2 \end{bmatrix}$$

**OR**

**Q. I. Answer the following. (5X4=20)**

- w) Test the validity of the following argument.  
“If Mary goes to college then she carries her books.  
Mary did not carry her books.  
Therefore Mary did not go to college.”
- x) If for an A.P. (Arithmetic Progression)  $T_7 = 30$  and  $T_{10} = 21$ , find  $T_4$ .

y) 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.

z) If  $A = \begin{bmatrix} 2 & -3 \\ 1 & -5 \end{bmatrix}$ , show that  $2A^2 - 3A + 2I$  is a scalar matrix,  
where  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ .

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

**(5X4=20)**

a) If  $A =$  set of letters in the word "LOGICAL"  
 $B =$  set of letters in the word "DOGMATIC"  
 $C =$  set of letters in the word "MAGNETIC"  
Verify that  $A \cap (B - C) = (A \cap B) - (A \cap C)$ .

b) In how many different ways can 6 examination papers be arranged in a row so that the best and the worst papers may never come together?

c) If  $A = \begin{bmatrix} 3 & 2 \\ 6 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 4 \\ 3 & 1 \end{bmatrix}$ ,  
find the matrix  $X$  such that  $3A - 4B + 3X = 0$ .

d) Solve the following equations by using Cramer's Rule.  
 $x + z = 0$ ,  $2x + 3y + 3z = 5$ ,  $x + y + z = 2$

**OR**

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

**(5X4=20)**

w) In a certain school, 35% play tennis, 30% play basket-ball, 30% play hand-ball, 10% play basket-ball and hand-ball, 10% play basket-ball and tennis, 8% play hand-ball and tennis and 3% play all the three. Find how many i) play basket-ball only ii) do not play any games. (Draw Venn Diagram)

x) Find  $n$  if  ${}^n P_6 = 56 \times {}^{n-2} P_4$ .

y) Find the sum of all natural numbers lying between 200 and 300 which are exactly divisible by 6.

z) Find x if  $\begin{vmatrix} 3 & -1 & -2 \\ 5 & x & 2 \\ 11 & 5 & -2 \end{vmatrix} = 0$

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

**(5X4=20)**

- a) If the seventh and fourth terms of a G.P. (Geometric Progression) are 192 and 24 respectively, find the first term and common ratio.
- b) If  $ax + by : bx + ay = 8:11$  and  $a:b = 3:2$ , find the ratio  $x:y$ .
- c) Find the adjoint of the following matrix.

$$A = \begin{bmatrix} 2 & -1 & 4 \\ 4 & -2 & 3 \\ 0 & 1 & 5 \end{bmatrix}$$

- d) In a group of 18 students, 10 have offered Accountancy and 8 offered Costing. In how many ways can a committee of 6 students be formed so that it will have a majority of students offering Accountancy?

**OR**

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

**(5X4=20)**

- w) Find three numbers in G.P. (Geometric Progression) whose sum is 14 and product is 64.
- x) What number must be added to each of the numbers 3, 4, 13 and 16 so that the results may be in proportion?
- y) Solve the following system of equations by matrix method.  
 $3x + 7y = 10$   
 $5x - 3y = 2$
- z) Find the value of  ${}^8C_5 + {}^7C_4 + {}^6C_3 + {}^6C_2$

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

**(5X4=20)**

- a) Out of 6 boys and 4 girls, a committee consisting of 3 boys and 2 girls is to be formed. In how many ways can this be done if  
i) one particular boy is always included.  
ii) one particular girl is always excluded.
- b) A trader sold an article at the net selling price of ₹ 20,000 after giving a 20% discount on its list price. Find the list price.
- c) Find the sum of n terms of  $9 + 99 + 999 + \dots$
- d) Suppose that the statements p, q, r, s are assigned the truth values T, F, T, F respectively, find the truth values of each of the following.  
i)  $\sim(p \leftrightarrow s) \wedge q$  (ii)  $(p \rightarrow r) \leftrightarrow (q \vee \sim s)$  (iii)  $(s \leftrightarrow q) \vee (\sim p \wedge \sim r)$

**OR**

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

**(5X4=20)**

- w) How many numbers of six digits can be formed from the digits 1, 2, 3, 4, 5, 6 (no digit repeated)? How many of these are not divisible by 5?
- x) An article is marked at ₹ 7000. Trade discount of 25% is allowed and further discount of 8% for cash payment is allowed. Find the net selling price of the article.
- y) 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?
- z) Let  $P = \{x / x^2 - 3x + 2 = 0\}$   
 $Q = \{x / x^2 - 5x + 6 = 0\}$   
 $R = \{x / x^2 - 4x + 3 = 0\}$   
Find (i) P, Q, R (ii)  $P \cap Q \cap R$  (iii)  $P \cup Q \cup R$