

**DCT's S. S. DEMPO COLLEGE OF COMMERCE AND
ECONOMICS
ALTINHO, PANAJI - GOA
F.Y.B.Com. Semester I Examination, October - 2014
MATHEMATICAL TECHNIQUES
(OLD 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. Attempt the following:

(4 x 5=20)

a) Construct the truth table for $(p \rightarrow r) \wedge \sim (p \vee q)$.

b) If $A = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 6 \\ 3 & 1 \end{bmatrix}$,
find AB and BA .

c) Solve the following equations by using Cramer's rule.

$$\begin{aligned}x + 2y + z &= 4 \\2x - y + z &= -1 \\x + y - z &= 4\end{aligned}$$

d) The universal set X is $\{x / x \text{ is an even integer less than } 20\}$ and
 $A = \{2, 4, 10, 16\}$, $B = \{4, 6, 14, 18\}$. Verify that $(A \cap B)' = A' \cup B'$.

OR

Q.I. Attempt the following:

(4 x 5=20)

w) Show that $(p \vee q) \wedge (\sim p) \rightarrow q$ is a tautology.

x) Find the inverse of the matrix,

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

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

- z) Let A = Set of letters of the word "actual"
B = Set of letters of the word "function"
C = Set of letters of the word "formal"
Verify that $A \cap (B - C) = (A \cap B) - (A \cap C)$.

Q.2. Attempt the following:

(4 x 5=20)

- a) Find the value of n if ${}^n P_4 = 2 ({}^5 P_3)$.
- b) Find the middle term in the expansion of $\left(\frac{3}{x} - \frac{x}{6}\right)^{10}$.
- c) Find S_{10} for a G.P. (Geometric Progression) whose 4th term is 24 and 9th term is 768.
- d) Find x and y if
- $$\frac{1}{x-1} + \frac{3}{y+2} + 5 = 0$$
- $$\frac{6}{x-1} + \frac{5}{y+2} - 9 = 0$$

OR

Q.II. Attempt the following:

(4 x 5=20)

- w) How many different words can be formed with letters of the word STRANGE? How many of them begin with A and end with E?
- x) Write down the binomial expansion of $(3x - y)^4$.
- y) Find three numbers in a G.P (Geometric Progression) such that their sum is 21 and their product is 216.

z) Without actual expansion prove that

$$(i) \begin{vmatrix} a & b & c \\ 3 & 5 & 6 \\ a+6 & b+10 & c+12 \end{vmatrix} = 0 \quad (ii) \begin{vmatrix} x-y & x+y & x \\ z-x & z+x & z \\ y-z & y+z & y \end{vmatrix} = 0$$

Q.3. Attempt the following:

(4 x 5=20)

- a) From 2000 literate individuals of a town, 60% read newspaper A, 55% read newspaper B and 20% read neither A nor B. How many individuals read both the newspapers? (Draw Venn Diagram).
- b) Test the validity of the following argument.
“ If the sun is shining then he will play tennis. Sun was not shining.
Therefore he did not play tennis.”
- c) In how many ways a committee of 3 ladies and 6 gentlemen can be formed out of 9 ladies and 10 gentlemen?
- d) If the sum of the first 25 terms of an A.P. (Arithmetic Progression) is 1700 and first term is 8, find the common difference.

OR

Q.III. Attempt the following:

(4 x 5=20)

- w) In a class of 75 students the following observations are made, 40 students play cricket, 35 play hockey, 30 play football, 15 students play both cricket and hockey, 10 play hockey and football, 12 play both cricket and football and 4 play all the 3 games. Draw a Venn diagram showing these sets and find the number of students who do not play in any of these 3 games.
- x) Suppose that the statements p, q, r, s are assigned truth values T, T, F, F respectively, find the truth values of each of the following.
i) $(q \leftrightarrow s) \wedge r$ ii) $(p \rightarrow r) \wedge (q \leftrightarrow \sim s)$ iii) $(s \leftrightarrow q) \vee (\sim p \wedge r)$

y) In an examination paper 10 questions are set. In how many ways can you choose 5 questions to answer? If question number 1 is made compulsory, in how many ways can you select to answer 5 questions in all?

z) If ${}^nC_r = 56$ and ${}^nP_r = 336$. Find r and n.

Q.4. Attempt the following:

(4 x 5=20)

a) Find the sum of all natural numbers lying between 100 and 300 exactly divisible by 5.

b) Show that the following equations are consistent.

$$x + y = 2, 2x + 3y = 5, 5x + 6y = 11.$$

c) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ find the matrix X such that $A - 4X = \begin{bmatrix} 4 & 2 \\ -3 & -2 \end{bmatrix}$

d) Prove that $(\sqrt{3} + 1)^4 - (\sqrt{3} - 1)^4 = 32\sqrt{3}$.

OR

Q.IV. Attempt the following:

(4 x 5=20)

w) Sum of three numbers in Arithmetic Progression is 15 and sum of squares of its first and third term is 58. Find the numbers.

x) Solve the following equations by matrix method.

$$2x + 3y = 8, x + 2y = 5$$

y) Find x, y, z, a, b, c if $\begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} x & y & 3 \\ 3 & -1 & z \end{bmatrix} = \begin{bmatrix} 7 & 0 & 7 \\ a & b & c \end{bmatrix}$.

z) Find the term independent of x in $\left(x + \frac{1}{x}\right)^8$
