Goa Vidyaprasarak Mandal's
GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND ECONOMICSPONDA GOA
B.COM. (SEMESTER I -Old Course) EXAMINATION
OCTOBER 2017

MATHEMATICAL TECHNIQUES

Duration: 2 hours **Marks: 80**

Instructions: 1. Attempt all questions.
2.Figures to the right indicate full marks.

Q.1 Attempt the following: **(5 X 4 = 20)**

a) Verify using truth table that $\sim (p \vee q) = (\sim p) \wedge (\sim q)$ **.**
b) If ${}^{n}P_5 : {}^{n}P_3 = 2:1$, find n.
c) Rajesh keeps aside ` 800 in the first month and increases his savings by` 80 in every subsequent month. What will be his total savings at the end of 3 years?
d) If $A = \begin{bmatrix} 9 & 1 \\ 4 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 5 \\ 7 & 12 \end{bmatrix}$, find the matrix X such that
$3A + 5B + 2X = 0$.
e) The ratio of the students in Science, Commerce and Arts are in the ratio of 7:5:2. If the numbers of students in Commerce is 280, find the number of students in Science and Arts.

OR

Q.I Attempt the following: **(5 X 4 = 20)**

p) Construct the truth table for $(p \wedge q) \wedge \sim (p \vee q)$.
q) A 3 digit number is to be formed using the digits from from 0 to 9. How many such numbers can be formed if the repetition of digits in the number is allowed.
r) If for an A.P. $t_{10} = 20$, find S_{19} .
s) If $M = \begin{bmatrix} 3 & -2 \\ 4 & 0 \end{bmatrix}$ and $N = \begin{bmatrix} 2 & 0 \\ 3 & 1 \end{bmatrix}$, find the matrix 3M - 2N + I, where I is the identity matrix of order 2.

t)Divide the amount of ` 29520 among Gita, Sita and Nita in the ratio 1:2:3.

Q.2 Attempt the following: **(5 X 4 = 20)**

a) The universal set X = {x/x is positive integer less than 11}
A={2 ,4,7,9} and B = {1,3,5,7} Verify $(A \cup B)^c = A^c \cap B^c$.

b) If $^{18}C_r = {}^{18}C_{r+2}$, find the value of r.

c) Using Cramers's Rule solve the following equations
$3x - 5y = 4$ and $x + 4y = 2$.

d) In a G.P. the fourth and seventh terms are 24 and 81 respectively. Find the first term and common ratio.

e) 75 men can finish a piece of work in 48 days. How many more men should be engage tocomplete the work in 30 days.

OR

Q.II Attempt the following: **(5 X 4 = 20)**

p) Use Venn diagram to show that for any sets A and B, $A \cup B = A \cup (B - A)$.

q) A committee of 4 members is to be formed out of 5 men and 3 women. In how many ways committee can be formed to have at least 2 men?

r) Using Cramer's rule, solve the following equations.
$2x + 3y = 10$, $4x - 5y = 12$.

s) The third term of a G.P. is 12 and the sixth term is 96, find its first term and the common ratio.

t) If the cost of 10DVD is `800. How many DVD can be bought for `2400.

Q 3. **Attempt the following:** **(5 X 4 = 20)**

a) Check wether the following statement is tautology or contradiction.
$$\mathbf{(p \wedge q) \rightarrow (p \vee q)}$$

b) If $^nC_r = 120$ and $^nP_r = 720$, find the value of n.

c) If $A = \begin{bmatrix} 3 & 0 \\ 2 & -1 \end{bmatrix}$. Find the matrix $A^2 + 2A + I$, where I is the identity matrix.

d) Find the sum $4 + 44 + 444 + \ldots$ upto n terms.

e) 35% marks are required to qualify an examination. Ramesh gets 432 marks and is failed by 23 marks. Find the maximum marks in the examination.

OR

Q III. **Attempt the following:** **(5 X 4 = 20)**

p) Prove that **(p ∧ q) ∧ ~ (p∨ q)** is a contradiction.

q) A club has 5 girls and 7 boys. If 4 persons out of these are to be selected, find the total number of choices if 1) there is no restriction on gender 2) 3 boys and 1 girl is to be selected.

r) Find x if $\begin{vmatrix} x & 1 & 2 \\ 3 & x & 3 \\ 1 & 3 & 2 \end{vmatrix} = 0$

s) A sum of ` 72800 is to be paid in 6 monthly instalments, such that each instalment is three times the previous instalment. Find the first and the last instalment.

t) A man donates 3% and spends 90% of his monthly income. If he saves` 1750. Find his monthly income.

Q 4. **Attempt the following:** **(5 X 4 = 20)**

a) How many words can be formed from letters of the word CENTRAL, so that it begins with a consonant and end with a vowel.

b) Find the value of x and y satisfying the matrix equation:

$$\begin{bmatrix} x & 3 & 0 \\ 2 & y & 4 \end{bmatrix} + \begin{bmatrix} 3 & 1 & 2 \\ 4 & 3 & -2 \end{bmatrix} = \begin{bmatrix} 4 & 2 & 2 \\ 6 & 5 & 2 \end{bmatrix}$$

c) Mr. Fernandes invests ` 10,000 in the first month and increases his investment by ` 1000 in every subsequent month. Calculate his total investment at the end of 2 years.

d) If A = {x / x^2 + x -12 = 0},
B = {x / x^2 - 3x + 2 = 0},
C = {x / x^2 - 4x + 3 = 0}.
Verify that A ∩ (B - C) = (A ∩B) – (A ∩ C).

e) A candidate get 65% votes in an election and wins by 2745 votes. Find the total number of votes cast.

OR

Q IV **Attempt the following:** **(5 X 4 = 20)**

p) From 5 professors and 7 students, a committee of 4 is to be formed. In how many ways this can be done, if the committee contains
   i) Exactly 3 professors
   ii) At least 3 professors.

q) Find x if $\begin{vmatrix} x & 1 & 1 \\ 2 & 3 & x \\ 1 & 1 & 1 \end{vmatrix} = 0$

r) Find the sumof all the numbers between 200 and 400, which are exactly divisible by 3.

s) A and B are two subsets such that n(AU B) = 75, n(A) = 45 and n(A∩ B) = 5, find n(B).

t) A publisher fixes the price of a book 50% above its cost price and allows 15% trade discount and 4% cash discount. Calculate the profit percentage.