Goa Vidyaprasarak Mandal's
GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND ECONOMICS,
PONDA GOA
B.COM. SEMESTER-I (NEW COURSE) SUPPLEMENTARY EXAMINATION, MAY 2019
MATHEMATICAL TECHNIQUES

Duration: 2 hours                                                                     Marks: 80

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

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

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

b) If for an A.P. $T_8 = 36$, find $S_{11}$.

c) Find the value of n, if $4 + 7 + 10 + 13 + \ldots$ upto n terms is equal to 175.

d) $A = \begin{bmatrix} 3 & -5 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$. Find AB and BA, if they exist.

e) A,B,C invests ₹120000, ₹88000 and ₹72000 respectively in a business. They earn profit of ₹, 70000. Find their share in profit.

**OR**

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

p) Using truth tables verify that $\sim (p \vee q) \equiv (\sim p) \wedge (\sim q)$.

q) A person pays ₹ 1950 in monthly installments, each installment is less than former by ₹ 10. The amount of the first installment is ₹ 200. In what time the entire amount be paid?

r) Find the three terms in A.P. such that their sum is 27 and the product is 504.

s) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, find $A^2 - 5A + 7I$.

t) A car uses fuel worth ₹ 1320 for 864 kms of run. How far would it have run if it had used fuel worth ₹ 990.

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

a) Given that $X \equiv \{x \mid x \in N, x \leq 10\}$ is the universal set.
$A \equiv \{2,4,7,9\}$, $B \equiv \{1, 5, 7\}$. Verify $(A \cup B)' \equiv A' \cap B'$.

b) If $^nC_3 = {}^nC_{12}$, find $^nC_4$.

c) Solve the equation $\begin{vmatrix} x+2 & 1 & -3 \\ 1 & x-3 & -2 \\ -3 & -2 & 1 \end{vmatrix} = 0$.

d) Find the sum all natural numbers from 100 to 300 which are divisible by 3.

f) If 16 carpenters can make 24 chairs in a certain period then how many chairs can made by 12 carpenters in that time?

**OR**

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

p) If the universal set is $X \equiv \{x \mid x \in N, \ x \text{ is odd and } 10 < x < 25\}$,
$A \equiv \{13, 19, 21, 23\}$, $B \equiv \{11, 15, 17, 19\}$, then verify
$(A - B)' \equiv A' \cup B$.

q) In how many ways can the letters of the word 'COMPUTER' be arranged? How many of these arrangements will begin with C?

r) Using Cramer's rule, solve the following equations.
$3x + 11y + 12 = 0$, $x + 11y + 36 = 0$.

s) Find three numbers in G.P. such that their sum is 216 and the sum of first and third is 20.

t) 75 men can finish a piece of work in 48 days. How many more men should be engage to complete the work in 30 days?

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

a) Using truth table prove that $(p \wedge q) \wedge \sim (p \vee q)$ is a contradiction.

b) Find n if $^nP_4 = 12\ ^nP_2$.

c) Find the matrix X such that $3X + \begin{bmatrix} 4 & 5 \\ 1 & -3 \end{bmatrix} = \begin{bmatrix} 7 & 11 \\ 8 & 9 \end{bmatrix}$.

d) For the G.P. 3, 6, 12, 24, .... find $S_n$, $S_{10}$.

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

**OR**

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

p) Verify the law $(p \rightarrow q) \equiv ((\sim q) \rightarrow (\sim p))$.

q) From 5 Accountant, 4 lawyers and 6 salesmen a committee of 7 persons is to be formed. How many different committees can be formed if 3 accountants, 2 lawyers and 2 salesmen must be included?

r) $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 2 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$, Show that AB = AC.

s) Find the sum upto n terms of

   $7 + 77 + 777 + \ldots\ldots$

t) Vinod spends 12.5% of his earnings on recreation. If he earns ₹ 15360 per month. Calculate expenditure on recreation per year.

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

a) In how many ways can 4 mathematics, 3 statistics and 2 economics book be arrange on a shelf, in the books on the same subject are to be together.

b) Let $X = \{x \mid x \in N,\ x \leq 10\}$ is the universal set.

$P \equiv \{x \mid x^2 -11x + 18 = 0\}$

$Q \equiv \{x \mid (x - 1)(x - 2)(x - 7) = 0\}$

$R \equiv \{x \mid x^2 - 9x + 14 = 0\}$

Find i) $P \cup Q \cup R$    ii) $P \cap Q \cap R$

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

d) The sum of first 31 terms of an A.P. is 186, find its $T_{16}$.

e) The market price of an article is ₹ 8960. If a discount of 8.75 is allowed. Find the amount payable by the customer.

OR

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

p) In a group of 15 boys there are 6 scouts. In how many ways can 10 boys be selected so as to include (i) exactly 5 scouts  (ii) at least 5 scouts?

q) In a group of 20 adults, there are 8 males and 9 vegetarian.  Find by using Venn diagram, the number of female  non-vegetarian if the group contains 5 male vegetarians.

r) Find the value of a and b satisfying the matrix equation:

$$\begin{bmatrix} 1 & 0 \\ 3 & a \\ 2 & 1 \end{bmatrix} + \begin{bmatrix} 4 & 3 \\ 4 & -2 \\ b & -1 \end{bmatrix} = \begin{bmatrix} 5 & 3 \\ 7 & 6 \\ 5 & 0 \end{bmatrix}.$$

s) The sum of the first n terms of the series 25 + 22 + 19 + 16 + …. is  116. Find the  number of terms and the last term..

t) Seema purchases a TV priced ₹ 9850 for ₹ 9062. Calculate the rate   of discount.