

Goa Vidyaprasarak Mandal's
GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND
ECONOMICS, PONDA-GOA
B.COM. (SEMESTER-I) SUPPLEMENTARY EXAMINATION
MAY/ JUNE 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) 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 $4 + 7 + 10 + 13 + \dots$ 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) Ram, Rafique and John 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 $X \equiv \{x \mid x \in \mathbb{N}, x \leq 10\}$ 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 ${}^n C_3 = {}^n C_{12}$, find ${}^n C_4$.

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 be made by 12 carpenters in that time?

OR

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

p) If the universal set is $X \equiv \{x \mid x \in \mathbb{N}, x \text{ is odd and } 10 < x < 25\}$,

$A \equiv \{13, 19, 21, 23\}$, $B \equiv \{11, 15, 17, 19\}$, 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.

$$3x + 11y + 12 = 0, \quad x + 11y + 36 = 0.$$

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 engaged 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 ${}^n P_4 = 12 {}^n P_2$.

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

$$7 + 77 + 777 + \dots$$

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

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

- a) In how many ways can 4 mathematics, 3 statistics and 2 economics books be arranged on a shelf, if the books on the same subject are to be together.
- b) Let $X \equiv \{x \mid x \in \mathbb{N}, x \leq 10\}$ 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 vegetarians. Find by using Venn diagram, the number of female non-vegetarians 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 $25 + 22 + 19 + 16 + \dots$ is 116. Find the number of terms and the last term.

t) Rakesh purchases a washing machine priced ₹ 9850 for ₹ 9062. Calculate the rate of discount.

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