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Shree Damodar College of Commerce and Economics, Margao-Goa
F.Y.B.COM. SEM I. Semester End Examination-October 2016
MATHEMATICAL TECHNIQUES(NEW COURSE)

Duration: 2 hours

Max. Marks:80

Instructions:

All questions are compulsory (choice is internal).

Start each question on fresh page.

Figures to the right indicate full marks.

Non programmable Calculators are allowed.

- Q1 Attempt the following:
- a) Prove that, the following pairs of statements are equivalent. 5
 $(p \rightarrow q) \vee r$ and $(p \vee r) \rightarrow (q \vee r)$
- b) Of the 200 candidates who were interviewed for a position at a call center, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone. 40 of them had both, a two-wheeler and a credit card, 30 had both, a credit card and a mobile phone and 60 had both, a two wheeler and mobile phone and 10 had all three. How many candidates had none of the three? 5
- c) In how many ways can 8 Indians and, 4 American and 4 Englishmen can be seated in a row so that all person of the same nationality sit together? 5
- d) A display of cans on a grocery shelf consists of 20 cans on the bottom, 18 cans in the next row, and so on in an arithmetic sequence, until the top row has 4 cans. How many cans, in total, are in the display? 5
- OR**
- Q1 Attempt the following
- w) Find whether following statement is Tautology or Contradiction 5

$$[(\sim p) \wedge q] \wedge (q \wedge r) \wedge (\sim q)$$
- x) If $U=\{1,2,3,4,\dots,15\}$, $A=\{1,3,5,8,9,10,12,15\}$ and $B=\{2,3,4,6,8,9,10,11,13\}$, $C=\{1,2,5,8,9,14\}$. Verify that 5
 i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ ii) $A \cap B^c = A - B$
- y) How many different words can be formed using all the letters of the word ALLAHABAD? 5
 (a) When vowels occupy the even positions.
 (b) Both L do not occur together
- z) What is 24th term of an arithmetic sequence if its 11th term is 29 and its 31st term is 169? 5

- Q2 Attempt the following
- a) Check the validity of the argument: 5
 If it rains, there is a traffic jam
 There was traffic jam.
 Therefore it rained.
- b) Write all the subsets of set $A = \{x / x^2 - 4x + 3 = 0\}$ 5
- c) A local delivery company has three packages to deliver to three different homes. if 5
 the packages are delivered at random to the three houses, how many ways are
 there for at least one house to get the wrong package?

- Q2 Attempt the following 5
- d) Find the number of multiples of 9 between 30 and 901.

OR

- w) Construct the truth table for 5
 $(\sim p \vee q) \wedge [q \rightarrow (\sim r \wedge \sim p)] \wedge (p \vee r)$
- x) If $A = \{x / x^2 - 4x - 5 = 0\}$ and $B = \{x / x^2 - 8x - 9 = 0\}$, find $A - B$ and $B - A$. 5
- y) How many numbers of 5 digits can be formed using the digits 1, 2, 3, 4, 5, 6 such that
 i) No digit is repeated. ii) Repetition of digits is allowed.
- z) Find the sum of following series 5
 $8 + 4/\sqrt{2} + 4 + \dots \text{upto } n \text{ terms}$

Q3 Attempt the following

- a) From a group of 7 men and 6 women, five persons are to be selected to form a 5
 committee so that at least 3 men are there in the committee. In how many ways
 can it be done?
- b) Find the sum of the following sequence : 2, 22, 222, to n terms. 5
- c) Find a matrix C such that $A + B + C = O$ where 5
 $A = \begin{bmatrix} 1 & 2 & 2 \\ -3 & -1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 3 \end{bmatrix}$
- d) If the ratio of chocolates to ice-cream cones in a box is 5:8 and the number of 5
 chocolates is 30, find the number of ice-cream cones.

OR

5

Q3

w) How many ways can a team of 5 persons be formed out of a total of 10 persons such that two particular persons should be included in each team?

x) The rate of monthly salary of a person is increased annually in AP. It is known that he was earning Rs.400 a month during the 11th year of his service and Rs.760 during the 29th year. Find the starting salary and the rate of annual increment. What should be his salary at time of retirement just on completion of 36 years of service?

y) Find x if $\begin{vmatrix} 5 & -3 & 7 \\ 2 & 1 & 2 \\ 9 & -1 & x \end{vmatrix} = 0$

z) A fort has provisions for 60 days. If after 15 days 500 men strengthen them and the food lasts for 40 days, how many men are there in the fort?

Q4 Attempt the following

a) Find the values of a and b from the matrix equation:

$$\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix} \begin{bmatrix} a & 1 \\ 5 & b \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ -3 & 5 \end{bmatrix}$$

b) A Juice manufacturing firm produces 2 types of canned juice (i) Apple Juice. (ii) Guava juice. The amount of labour and material required to produce each type of juices and the resources utilized, per hour, by the firm is given in the following table. Find the number of cans of Juices produced per hour, by the company.

	Apple Juice Cans	Guava Juice Cans	Utilization by the firm, per hour
Labour	2	1	32
Material	3	2	54

c) If a 60 ml of water contains 12% of chlorine, how much water must be added in order to create an 8% chlorine solution?

d) A publisher sells 80 books of Business Mathematics for 6144. If the list price of the book is 96. Calculate the rate of trade discount.

OR

Q4 Attempt the following

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

$$3x + 3y - z = 11 ; 2x - y + 2z = 9 ; 4x + 3y + 2z = 25$$

x) If $A = \begin{bmatrix} 2 & -1 \\ 3 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 5 & 7 \\ -3 & -2 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} -1 & 6 & 4 \\ 3 & 2 & 1 \end{bmatrix}$.

Verify $A(B + C) = AB + AC$

y) Salaries of Ravi and Sumit are in the ratio 2:3. If the salary of each is increased by

Rs. 4000, the new ratio becomes 40:57. What is Sumit's salary?

- z) If 8 men working 8 hours a day can complete a piece of work in 15 days. How many men can complete the work in 6 days by working 10 hours a day.