Goa Vidyaprasarak Mandal's
GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND ECONOMICS, PONDA - GOA
B.COM. (SEMESTER - I) SUPPLEMENTARY EXAMINATION
(old course), MAY/JUNE 2018
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) Show that $(p \wedge q) \wedge \sim p$ is a contradiction.

     b) If $^{n}P_4 = 12 \ ^{n}P_2$, find n.

     c) Snehal keeps aside `600 in the first month and increases her savings by `60 in every subsequent month. What will be her total savings at the end of 3 years?

     d) If $A = \begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ and I is the unit matrix of order 2 find A -2B +I.

     e) The ratio of the students in B.Com., M.Com. and B.C.A. are in the ratio of 7:5:2. If the numbers of students in M.Com is 280, find the number of students in B.Com and B.C.A.

<div align="center">**OR**</div>

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

     p) Construct the truth table for $\sim [\sim p \vee \sim q]$.

     q) A 3 digit number is to be formed using the digits from 0 to 9. How many such numbers can be formed if the repetition of digits in the number is allowed.

     r) For the Arithmetic progression find
        $1 + 5 + 9 + \ldots + 37$.

     s) If $M = \begin{bmatrix} 3 & 2 \\ 4 & 0 \end{bmatrix}$ and $N = \begin{bmatrix} 2 & 0 \\ 0 & -1 \end{bmatrix}$, find X such that $M - 2N + X = 0$.

     t) Divide the amount 29520 between A,B,C in the ratio 3:4:5.

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

     a) If A={1,2,3,4} and B = {3,4,5,6}, C= {4,5,6,7}. Find $A - (B \cap C)$.

     b) If $^{18}C_r = \ ^{18}C_{r+2}$, find $^{r}C_5$.

     c) Find x if $\begin{vmatrix} x-1 & x+3 \\ 3 & 2 \end{vmatrix} + 12 = 0$

d) The nth term of a G.P. with a = 1 and r = 2 is 128. Find n and the corresponding S_n.

e) 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.

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 5 members is to be formed out of 6 men and 4 women. In how many ways committee can be formed to have at least 4 men?

r) Using Cramer's rule, solve the following equations.
$x + 3y = 13$, $4x - 5y = 1$.

s) Find the 3 numbers in G.P. whose sum is 7/2 and product is 1.

t) If the cost of 8 Pen drives is `1800. How many Pen drives can be bought for   `3825.

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

a) Prove that **(p ∧ q) → (p∨ q)** is a tautology.

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

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

d) Find the sum $9 + 99 + 999 + ...$ 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) How many committees can be formed of 5 union members 4 non-union members selected from 10 union members and 8 non-union members?

r) Find x if

$$[3 \quad x \quad 1] \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = [9]$$

s) If for a G.P. S_2 is 8 and $S_4 = 80$, find the first term and the common ratio.

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 COURTESY? How many of them will begin with C and end with Y?

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

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

c) If for an A.P., the sum of first 31 terms is 186, find its T_{16}.

d) If $A = \{x / x^2 - 5x + 6 = 0\}$,

   $B = \{x / x^2 - 3x + 2 = 0\}$,

   $C = \{x / x^2 - 4x + 3 = 0\}$.

   Find $(A \cap B \cap C)$, $(A \cup B \cup C)$, $A \cap (B \cup C)$

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) There are 7 men and 3 ladies. Find the number of ways in which a committee of 6 can be formed from these, if the committee is to include at least 2 ladies.

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

r) If the sum of first n terms of an Arithmetic progression with $a = 1$ and $d = 5$ is 286, find n.

s) Of the total number of 200 students appearing in an examination, 140 passed in mathematics and 100 passed in Statistics. If 40 of them failed in both, find the percentage of students who have passed in both.

t) 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.

xxxxxxxxxxxxxx