Vidya Vikas Mandal's
Shree Damodar College of Commerce & Economics, Margao-Goa
TY B.Voc (ST), Semester-V, Semester End Examination NOVEMBER 2023
ADVANCED QUANTITATIVE TECHNIQUES (STG 503)

__Duration: 2hours__   __Max Marks: 80__

__Instructions:__

1) **All Questions are Compulsory**
2) **Start each question on fresh page.**
3) **Figures to the right indicate maximum marks.**

Q1. **Answer ANY FOUR of the Following.**   **(4 X 4 = 16 Marks)**

Write the following sets in set builder form:

a)
   i) $\{5,7, 9 ,...,77,79\}$

   ii)   Rational numbers strictly between -1 and 1

   iii)   The even integers

   iv) $\{...,-18,-9,0,9,18,27,...\}$

b)   Let X =$\{a,b,c,d,e,f\}$ and R be a relation on X defined by R=$\{(a,a), (a,b),$
   $(a,e), (b,a), (b,b), (b,e), (c,c), (c,f), (d,d), (e,a), (e,b), (e,e), (f,c), (f,f)\}$.

   Show that R is an equivalence relation on X.

c)   Show that f: R→R defined by f(x)= 3x-4 is bijective.

   Find n if

d)
   i) $^nP_5 = {}^nP_6$

   ii) $4({}^nP_4) = {}^nP_5$

   Identify the following type of matrix

e)
   i) $\begin{bmatrix} 1 & 9 & -3 \end{bmatrix}$

   ii) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

   iii) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$

   iv) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

   Seven persons including 2 ladies, 3 gents and 2 children go for a movie.

f)   Find the different seating arrangements that can be done in a line so that

   i)   Anybody can sit anywhere

ii)   Ladies occupy end seats

Q2.   Answer ANY FOUR of the Following.   (4 X 4 = 16Marks)

a)   Find minors and cofactors of $A = \begin{bmatrix} 1 & -2 \\ 0 & -1 \end{bmatrix}$

b)   Find D_8 for the following

Class interval	0-5	5-10	10-15	15-20
frequency	12	3	1	4

c)   Using Spearman's rank correlation coefficient, find the rank correlation coefficient of (1,3) (2,1) (3,5) (4,2) (5,4) and interpret.

Prepare a cumulative frequency table of less than type for frequency distribution of 100 workers. Also state how many workers are of age less than or equal to 40 years.

d)

Age	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
f	3	9	15	25	23	12	10	3

e)   Calculate mean deviation from mean of the following set of numbers:

10,9,4,7,12,7,15,9,7

f)   Find the median of

C.I	10-20	20-30	30-40	40-50
f	2	5	6	3

Q3.   Answer the Following.   (2 x 6 = 12 Marks)

If X={ x/x∈N, 1≤x≤15}

A= {1,3,5,7,8,9,10}

B={1,2,4,6,8,9,10}

A)   Then: write X in roster form and find   **6 marks**

i)   AUB
ii)   A∩B
iii)   A-B
iv)   A'
v)   (A∩B)'

OR

B) If $f(x)= x^2-1$ and $g(x)=\frac{1}{x+2}$, find $f(3)$, $g(-1)$, $f[f(x)]$, $g[g(x)]$, $f[g(x)]$ and $g[f(x)]$

6 marks

A box contains 2 white, 3 red and 4 green balls of identical size. 3 balls are drawn at random from the box. Find the probability that

C)
i)   All are green

6 marks
ii)   At most one is green

iii)   All are of different colours

iv)   At least one is green

Q4.   Answer the Following.   (2 x 6 = 12 Marks)

A)
Solve the recurrence relation

6 marks
$a_{n+2} -2a_{n+1} +4a_n =0$

OR

Find number of words that can be formed when the following letters of words are permuted

B)   i)   COMMITTEE   6 marks

ii)   REPETITION

iii)   INDIFFERENCE

Solve the following system of equations using Cramer's rule:

$2x-y+4z=18$

C)   6 marks

$-3x+z=-2$

$-x+y=0$

Q5.   Answer the Following.   (2 x 6 = 12 Marks)

Find the inverse by adjoint method

A)   6 marks
$A=\begin{bmatrix} 1 & -3 & 2 \\ 2 & 5 & -1 \\ 3 & 1 & 4 \end{bmatrix}$

OR

Find eigen values and eigen vectors of

B)
$$B = \begin{bmatrix} 1 & 5 \\ 3 & 3 \end{bmatrix}.$$

6 marks

C)
Describe the purpose of sampling and explain any 5 sampling techniques.

6 marks

Q6. Answer the Following.

(2 x 6 = 12 Marks)

Find the quartile deviation of the following

A)

Class	20-30	30-40	40-50	50-60	60-70
frequency	5	4	3	3	5

6 marks

OR

Find the Karl Pearson's coefficient of correlation of the following data and comment

B)

X	2	3	0	2	3
y	1	6	3	4	6

6 marks

Due to heavy rains, most records from a survey from survey office are washed off. However, a partial record of the following data is available.

    i)   Variance of x=25

C)   ii)   Regression lines :

6 marks

        x-5y=-21 and 64x-45y=31

Identify the regression lines and find the mean and standard deviation of both x and y. also state the correlation coefficient between variables.

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