PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCom DEGREE EXAMINATION MAY 2023
(First Semester)

Branch – **COMMERCE**

QUANTITATIVE TECHNIQUES

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. The mean and variance of Poisson distribution is
   (i) Different (ii) Same
   (iii) Positively skewed (iv) Skewed

2 Standard error of standard deviation
   (i) $\frac{\sigma}{2n}$ (ii) $\frac{2\sigma}{n}$
   (iii) $\frac{\sigma}{n}$ (iv) $\frac{\sigma}{2n^2}$

3 The χ^2 test of .....is an extension of the chi-square test of independence.
   (i) Goodness of fir (ii) Heterogeneous
   (iii) Homogeneity (iv) Dependence

4 The sign test based on .....distribution
   (i) Binomial (ii) Poisson
   (iii) Geometric (iv) Negative Binomial

5 Purpose of MODI method in Transportation problems is to get_____.
   (i) Degenerate solution (ii) Non -Degenerate solution
   (iii) Feasible (iv) Optimum

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Two ladies wre asked to rank 7 different types of lipsticks. The ranks given by them are as follows

Lip ticks	A	B	C	D	E	F	G
Meena	2	1	4	3	5	7	6
Lakshmi	1	3	2	4	5	6	7

Calculate the spearman's rank correlation coefficient.

OR

b List out the properties of Normal distribution.

7 a Before an increase an increase in excise duty on tea, 800 persons out of a sample of 1,000 persons were found to be tea drinkers. After an increase in duty, 800 people were tea drinkers in a sample of 1,200 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea after the increase in execise duty?

OR

Cont...

b Two types of drugs were used on 5 and 7 patients for reducing their weight. Drug A was imported and drug B indigenous. The decrease in the weight after using the drugs for six months was as follows.

Drug A : 10 12 13 11 14
Drug B : 8 9 12 14 15 10 9

Is there a significant difference in the efficacy of the two drug? If not which the drug should you buy?

8 a From the table given below, whether the colour of son's eyes is associated with that of father's eyes.

		Eye colour in sons	
		Not Light	Light
Eye colour in fathers	Not Light	230	148
	Light	151	471

OR

b In a test given to two groups of students drawn from two normal populations, the marks obtained were obtained as follows.

Group A : 18 20 36 50 49 36 34 49 41
Group B : 29 28 26 35 30 44 46

Examine at 5% level, whether the two population have the same variance.

9 a The nicotine contents of two brands of cigarettes, measured in milligrams was found to be as follows.

Brand A: 2.1 4.0 6.3 5.4 4.8 3.7 6.1 3.3
Brand B: 4.1 0.6 3.1 2.5 4.0 6.2 1.6 2.2 1.9 5.4

Test the hypothesis at the 0.05 level of significance that the average nicotine contents of the two brands are equal against the alternative that they are unequal.

OR

b Fit a straight line trend to the following data using method of least squares

Year	1989	1990	1991	1992	1993	1994	1995
Sales	672	824	968	1205	1464	1758	2058

10 a Obtain the initial (starting) solution for the following transportation problem by Vogel's Approximation method

	Destination				
		A	B	C	**Supply**
Source	1	2	7	4	**5**
	2	3	3	1	**8**
	3	5	4	7	**7**
	4	1	6	2	**14**
Demand		**7**	**9**	**18**	34

OR

b Solve the following Linear Programming problem by Graphical method.

minimize $z = 20x_1 + 40x_2$

Subject to the constraints

$$36x_1 + 6x_2 \geq 108,$$
$$3x_1 + 12x_2 \geq 36,$$
$$20x_1 + 10x_2 \geq 100$$
$$and\ x_1, x_2 \geq 0$$

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Find the correlation coefficient from the following data.

X	:65	66	67	67	68	69	70	72
Y	:67	68	65	68	72	72	69	71

OR

b Four coins are tossed simultaneously. What is the probability of getting (a) 2 heads and two tails (b) at least two heads (c) at least one head.

12 a Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 mean and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal, are same against that they are not, at 5% level.

OR

b The means of two single large samples of 1,000 and 2,000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches?

13 a A die was thrown 498 times. Denoting x to be the number of appearing on the top face it, the observed frequency of x is given below

x	1	2	3	4	5	6
f	69	78	85	82	86	98

What opinion you would form for the accuracy for the die?

OR

b Three different machines are used for production ,on the basis of the outputs ,setup One – Way ANOVA table and test whether the machines are equally effective.

MACHINES		
MACHINE I	MACHINE II	MACHINEIII
10	9	20
15	7	16
11	5	10
10	6	14

Given that the value of F at 5% level of significance for (2,9) d.f is 4.26.

14 a The following are the weight gains (in pounds) of two random samples of young Indians fed on two different diets but otherwise kept under identical conditions:

Diet I:	16.3	10.1	10.7	13.5	14.9	11.8	14.3	10.2	12.0	14.7	23.6
	15.1	14.5	18.4	13.2	14.0						
Diet II:	21.3	23.8	15.4	19.6	12.0	13.9	18.8	19.2	15.3	20.1	14.8
	18.9		20.7	21.1	15.8	16.2					

Use U test at 0.01 level of significance to test to the null hypothesis that the two population samples are identical against the alternative hypothesis that on the average the second diet produces a greater gain in weight.

OR

b A company's trainees are randomly assigned to groups which are taught a certain industrial inspection procedure by three different methods: At the end of the instructing period they are tested for inspection performance quality. The following are their scores.

Method A : 80, 83, 79, 85, 90, 68
Method B : 82, 84, 60, 72, 86, 67, 91
Method C : 93, 65, 77, 78, 88

Use the H test to determine at the 0.05 level of significance whether the three methods are equally effective.

15 a Use simplex method to solve the LPP

$$\text{Maximise } Z = 5x_1 + 8x_2$$

Subject to $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$ and $x_1, x_2 \geq 0$

OR

b The processing time in hours for the jobs when allocated to the different machines are indicated below. Assign the machines for the jobs so that the total processing time is minimum.

		Machines				
		M_1	M_2	M_3	M_4	M_5
Jobs	J_1	9	22	58	11	19
	J_2	43	78	72	50	63
	J_3	41	28	91	37	45
	J_4	74	42	27	49	39
	J_5	36	11	57	22	25

Z-Z-Z END