PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2023
(Third Semester)

Common to Branches – **COMPUTER SCIENCE & COMPUTER TECHNOLOGY**

STATISTICS AND OPERATIONS RESEARCH

Time: Three Hours   Maximum: 50 Marks

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

1   Which can be located by histogram
    (i) Mean   (ii) Median   (iii) Mode   (iv) SD

2   What is hypothesis in statistics
    (i) An assumption to be tested   (ii) A prediction of future outcome
    (iii) A proven statement   (iv) An observed fact

3   What type of data is suitable for a chi-square test
    (i) Interval   (ii) Categorical (iii) Ordinal (iv) Continuous

4   Which of the following is a type of linear programming problem
    (i) Manufacturing problem   (ii) Diet problem
    (iii) Transportation problems   (iv) All of the options

5   An activity is critical if its _____ float is zero
    (i) Total float   (ii) Independent float
    (iii) Free float   (iv) Variance of each float

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

6   a) Production of keyboards per day from different companies are given below representing the data with a simple bar chart

Companies	Dell	HP	Lenovo	Acer	Intel
No. of Keyboards (in thousands)	168	200	172	100	85

OR

    b) The runs scored in a 9 cricket match are given below Calculate the median score 8, 17, 52, 43, 21, 48, 28, 85, 5

7   a) Explain the concept of coefficient of determination, if the correlation is 0.753 what is the coefficient of determination

OR

    b) How do you conduct a single proportion test?

8   a) The price of a popular tennis racket at a sports store is Rs179. a person bought five of the same racket at an online store for the following prices: 155,179,175,175,161 Assuming that the online prices of the rackets are normally distributed, determine whether there is sufficient evidence in the sample, at the 5% level of significance, to conclude that the average price of the racket is less than Rs.179 if purchased at an online store.

OR

b) Explain the assumptions of analysis of variance.

9 a) Two products 'A' and 'B' are to be manufactured. A single unit of 'A' requires 2.4 minutes of punch press time and 5 minutes of assembly time, while a single unit of 'B' requires 3 minutes of punch press time and 2.5 minutes of welding time. The capacity of the punch press department, assembly department, and welding department is 1200 min/week, 800 min/week, and 600 min/week respectively. The profit from 'A' is ₹60 and from 'B' is ₹70 per unit. Formulate LPP such that, profit is maximized.

OR

b) Explain the concept of duality in LPP.

10 a) Calculate IBFS using the North-West Corner Method.

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

OR

b) Show the network diagram for the following project.

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M
Preceding Activity	-	A	-	C	B	D,E	F	G	H	H	J	K	L

SECTION -C (30 Marks)
Answer ALL questions
ALL questions carry **EQUAL** Marks   (5 x 6 = 30)

11 **a)** Construct a pie chart for the percentage of fruits eaten by the students in a class:

Mango	Orange	Plum	Pineapple	Melon
1050	985	656	845	786

OR

b) Calculate the mean and standard deviation for the following distribution

Class	50-55	45-50	40-45	35-40	30-35	25-30	20-25
f	25	30	40	45	80	110	170

12 **a)** From the following data derive two regression equation also estimate x when y = 4 and estimate y when x = 1

X	3	2	1	6	4	2	5	7
Y	5	13	12	2	20	2	3	4

OR

b) A student at a four-year college claims that average enrollment at four–year colleges is higher than at two–year colleges in the United States. Two surveys were conducted. Of the 35 two–year colleges surveyed, the mean enrollment was 5,068 with a standard deviation of 4,777. Of the 35 four-year colleges surveyed, the mean enrollment was 5,466 with a standard deviation of 8,191.

13 **a)** A test was given to five students taken at random from the fifth class of three schools in a town. The individual scores are

School	I	9	7	6	5	8
School	II	7	4	5	4	5
School	III	6	5	6	7	6

Carry out analysis of variance.

OR

b) 1000 students at the college level were graded according to their I.Q. and the economic conditions of their homes. Use the chi-square test to find out whether there is any association between economic conditions at home and I.Q.

Economic	IQ		Total
Conditions	High	Low	
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

14 **a)** Use a graphical method to solve the following LPP

$$\text{Max } Z = 5X_1 + 3X_2$$

subject to constraints

$$X_1 + 2X_2 \le 14$$
$$3X_1 - X_2 \ge 0$$
$$X_1 - X_2 \le 2$$

Where $X_1, X_2 \ge 0$

OR

b) Find a solution using the Simplex method

$$\text{MAX } Z = 3x_1 + 5x_2 + 4x_3$$

subject to

$$2x_1 + 3x_2 <= 8$$
$$2x_2 + 5x_3 <= 10$$
$$3x_1 + 2x_2 + 4x_3 <= 15 \quad \text{and } x_1, x_2, x_3 >= 0$$

15 **a)** Use the penalty method to find an initial basic feasible solution

Factories	Destination Centers				Supply
	D1	D2	D3	D4	
F1	3	2	7	6	50
F2	7	5	2	3	60
F3	2	5	4	5	25
Demand	60	40	20	15	

OR

b) Draw the network diagram for the following project and find the critical path and maximum time for completion of the project also find float values.

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Preceded by	-	A	A	B	B	C	C	F	D	G, H	E	I
Duration (weeks)	10	9	7	6	12	6	8	8	4	11	5	7

Z-Z-Z   END