

[This question paper contains 32 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3683

J

Unique Paper Code : 2412082401

Name of the Paper : Business Statistics

Name of the Course : **B.Com. (H)**

Semester : IV – DSC

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **all** questions.
3. All parts of a question to be attempted together.
4. **All** questions carry equal marks.
5. Use of simple calculator is allowed.
6. Answers may be written either in English or Hindi; but the same medium should be used throughout the paper.

P.T.O.

छात्रों के लिए निर्देश

1. इस प्रश्न-पत्र के मिलते ही ऊपर दिए गए निर्धारित स्थान पर अपना अनुक्रमांक लिखिए ।
2. सभी प्रश्नों के उत्तर दीजिए ।
3. प्रश्न के सभी भागों को एक साथ कीजिए ।
4. सभी प्रश्नों के अंक समान हैं ।
5. साधारण कैलकुलेटर उपयोग की अनुमति है ।
6. इस प्रश्न-पत्र का उत्तर अंग्रेजी या हिंदी किसी एक भाषा में दीजिए, लेकिन सभी उत्तरों का माध्यम एक ही होना चाहिए ।

1. Attempt **any six** questions of the following :

(a) In a moderately skewed distribution, the mode and median are 20 and 24 respectively. Locate the value of Mean.

(b) State any three mathematical properties of Standard Deviation.

- (c) The following equation has been derived for the production of wheat:

$$Y_c = 4.80 + 125 X$$

(Origin: 2015; X unit: 1 year; Y unit: Tonnes per year)

Rewrite the equation by:

- (i) Shifting the origin to 2018.
 - (ii) Express X units in months and Y units in Tonnes per month.
- (d) What is kurtosis? Why it is used in statistics?
- (e) The regression coefficient of regression equation X on Y is -0.23 and the same for regression equation Y on X is -0.66. Find out coefficient of correlation.

- (f) Explain the time reversal and factor reversal tests under Index Number.
- (g) The mean marks of the 100 students were found to be 55. Later, it was discovered that two student's marks were misread as 65 and 56 instead of 75 and 57. Find the correct mean corresponding to the correct score.
- (h) Explain absolute and relative measures of dispersion. (6×3=18)

OR

- (a) Following are the data related to two data set :

	<i>Company A</i>	<i>Company B</i>
Number of employees	100	200
Average Salary	1600	1750
Standard Deviation	16	25

Compute the following :

- (i) The combined standard deviation of the companies.
 - (ii) Which company shows greater consistency?
 - (iii) Which company pays larger pay package?
(9)
- (b) A box of 100 toys contains 20 toys with type A defect, 10 toys with type B defect and 4 toys with both types of defects. Find the probability that :
- (i) A toy to be drawn has type B defect under the condition that it has a type A defect.

(ii) A toy to be drawn has type A defect under the condition that it has a type B defect.

(iii) A toy to be drawn has no type B defect under the condition that it has no type A defect. (9)

2. (a) An incomplete distribution is given below :

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	10	20	?	40	?	25	15	170

Find out the missing frequencies if the median of the data is 35. (9)

(b) The first four moments of a distribution about value 5 are 7, 70, 140 and 170 respectively. You are required to calculate :

- (i) First four moments about mean,
- (ii) Skewness
- (iii) Kurtosis (9)

OR

(a) In a factory producing spark plug, machine A, B and C manufacture 45%, 35% and 20% of the total output respectively. Out of their output, respectively, 4%, 3% and 2% are known to be defective. A spark plug is picked at random and is found to be defective. Find the probability that:

- (i) It is produced by machine A
- (ii) It is produced by machine B
- (iii) It is produced by machine A or B (9)

- (b) An automobile firm has got the delivery of 200 Music systems to be installed in their luxury cars. After inspection by the engineer the defects per set is recorded below :

No. of defects	0	1	2	3	4
No. of sets	158	36	4	2	0

Fit a poison distribution to the above data and calculate the frequencies of 0, 1, and 2 defects.

$$(e^{-0.25} = 0.7788) \quad (5)$$

- (c) State any four properties of normal distribution. (4)

3. (a) Explain additive and multiplicative theorem of probability. (4)

- (b) An investment consultant predicts that the odds against the price of a certain stock going up are 3:1 and the odds in favour of price remaining the same are 1:4. What is the probability that the price of the stocks will go down? (5)

- (c) An enquiry into the budgets of the middle-class family in a certain city gave the following information :

<i>Items</i>	Food	Fuel	Clothing	Rent	Miscellaneous
<i>% expenditure</i>	30%	15%	20%	10%	25%
<i>Price in 2010 (₹)</i>	140	27	72	30	50
<i>Price in 2020 (₹)</i>	165	35	84	36	62

From the above information construct a cost-of-living index of 2020 compared to that of 2010. Suppose Mr. Devavrat is earning ₹25,000 salary

package in the year 2010. What should be his salary hike in the year 2020 to maintain the same standard of living as in the year 2010. (9)

OR

(a) The lifetime of certain kind of car battery has a mean life of 800 hours and standard deviation as 90 hours. Assuming the distribution of lifetime to be normal, find:

(i) The percentage of battery with a lifetime of at least 940 hours.

(ii) The proportion of battery with a lifetime between 770 to 830 hours. (9)

(b) Following table gives the details of price and consumption related to five commodities :

Commodity	2010		2020	
	Price	Quantity	Expenditure	Quantity
A	12	80	1260	90
B	14	100	1800	120
C	10	40	600	50
D	16	20	450	30
E	20	30	1125	45

Calculate price index number from above data using 2010 as base year from following methods :

- (i) Laspeyres's method
- (ii) Paasche's Method, and
- (iii) Fisher's method.

Also, prove Fisher's Index satisfies both time reversal and factor reversal test. (9)

4. (a) Following are the data related to marks scored by 10 students of a class in Statistics and Costing :

Marks in Statistics	32	40	28	27	28	23	30	33	38	35
Marks in Costing	30	27	22	31	20	29	18	21	27	24

You are required to calculate spearman's rank correlation coefficient. (9)

- (b) In a firm, the mean and standard deviation of the advertisement expenditure were found to be 30 and 3 respectively. Whereas, the mean and standard deviation of the sales were found to be 90 and 12 respectively. The correlation coefficient of advertisement expenditure and

sales was 0.8. You are required to calculate the following :

- (i) The two regression equations.
- (ii) Estimate the advertisement expenditure required to attain a sales target of Rs. 150 Lacs.
- (iii) What is the standard error of the estimate in the regression of Y on X. (9)

OR

- (a) In an end semester examination following marks were obtained by ten students of a particular class in mathematics and statistics:

Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

You are required to find out :

- (i) Two regression equations.
- (ii) The coefficient of correlation between the marks in economics and statistics.
- (iii) The most likely marks of student in economics if marks in statistics is 60.
- (iv) Calculate standard error of estimate (S.E) for regression line Y on X. (14)

(b) Differentiate between correlation and regression. (4)

5. (a) Following data relates to the production of a sugar factory :

Year	2015	2016	2017	2018	2019	2020	2021
Production (‘000 tonnes)	25	30	35	40	44	48	52

You are required to :

- (i) Fit a straight-line trend using method of least square.
- (ii) What is average annual change in production?
- (iii) Obtain the trend values for the years 2015-2021
- (iv) Estimate the production of sugar for 2023.

(14)

(b) Explain components of time series analysis. (4)

OR

(a) Following are the data related to annual sales of a company for the period 2014-2020 :

Year	2014	2015	2016	2017	2018	2019	2020
Sales (in lakhs ₹)	45	50	67	74	80	85	95

You are required to :

(i) Fit the second-degree parabolic trend

(ii) Forecast the sale for 2022 (10)

(b) Explain the components of time series analysis.

(4)

- (c) If standard deviation of X and Y are 4 and 3 respectively, and coefficient of correlation between X and Y is 0.8, find the two regression coefficients. (4)

1. निम्नलिखित में से किन्हीं छह प्रश्नों का उत्तर दीजिए :

- (क) एक मध्यम विषम वितरण में, माध्यिका और बहुलक क्रमशः 20 और 24 हैं। माध्यिका का मान ज्ञात कीजिए।
- (ख) मानक विचलन के तीन गणितीय गुणों को बताइए।
- (ग) गेहूँ के उत्पादन के लिए निम्नलिखित समीकरण निकाला गया है :

$$Y_C = 4.80 + 125 X$$

(उत्पत्ति: 2015; X यूनिट: 1 वर्ष; Y यूनिट: टन प्रति वर्ष)