

statistics was found to be 0.5. It was later discovered that the difference in ranks in two subjects obtained by one of the students was wrongly taken as 3 instead of 7. Find the correct coefficient of rank correlation.

- (ii) The marks obtained by students in maths and stats paper were recorded. Find whether the marks in the two subjects are highly correlated with each other or not. The data is given as follows:-

Student	A	B	C	D	E	F	G
Maths Marks (X)	35	40	45	50	55	60	65
Stats Marks (Y)	30	38	50	48	60	58	68

- (c) (i) Use least squares regression line to estimate the increase in sales revenue expected from an increase of 7.5 per cent in advertising expenditure.

Firm	A	B	C	D	E	F	G	H
% Increase in Advertising Exp (X)	1	3	4	6	8	9	11	14
% Increase in Sales Revenue (Y)	1	2	2	4	6	8	8	9

- (ii) The two regression lines obtained in a correlation analysis of 60 observations are $5y=6x+24$ and $1000y=768x-3708$. What is the correlation coefficient?

(200)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4960

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Unique Paper Code : 2924001202/2924000022/
2924000022

Name of the Paper : Statistics for Business (GE)

Name of the Course : B.A. (H). Business Economics

Semester : II/IV/VI

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. Choice is available within each question
 3. Use of simple calculator is permitted
1. Attempt any three parts: - (6×3)
- (a) (i) A company claims that the average income of a group is ₹50,000 per month, but most of the employee's state that they earn less than

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₹30,000 per month. What does this indicate about the distribution of income? Critically analyse the claims using the statistical concepts.

- (ii) The following data summarizes the daily returns of two investment portfolios, A and B, over a certain period:

Portfolio	A.M. (Return %)	S.D. (%)
A	08	2.4
B	10.5	3.1

Find out which portfolio shows greater consistency in returns.

- (b) (i) Construct a histogram for the following frequency distribution table:-

Class Interval	0-30	30-50	50-70	70-80	80-100	100-130
Frequency	15	20	40	25	30	9

- (ii) Comment on the skewness and mark the value of mean and mode on the graph.
- (c) A dataset consists of 10 observations with a given mean of 40 and a variance of 36. It was later discovered that one of the recorded values, 30, was incorrect and should have been 40. Determine the corrected mean and corrected variance of the dataset after accounting for the error.

Commodity	1998	1999	2000	2001	2002
A	4	6	8	10	12
B	16	20	24	30	36
C	8	10	16	20	24

5. Attempt any two- (9 x 2)

- (a) (i) In the process of computing the correlation coefficient between two variables X and Y from 30 paired observations, a data analyst obtained the following summary statistics: $N=30$, $\Sigma X=210$, $\Sigma X^2=1600$, $\Sigma Y=190$, $\Sigma Y^2=1450$, $\Sigma XY=1350$

It was however, discovered at the time of checking that he had copied down two pairs as: (6,14) and (9,8), while the correct values were actually (9,8) and (15, 12). Determine the corrected value of the correlation coefficient.

- (ii) The value of Spearman's rank correlation coefficient of a certain number of observations was found to be $2/3$. The sum of the squares of difference between the corresponding ranks was 55. Find the number of pairs.
- (b) (i) The coefficient of rank correlation of the marks obtained by 10 students in physics and

Year	Old Series	New Series
2000	100	-
2001	120	-
2002	125	-
2003	150	-
2004	-	110
2005	-	120
2006	-	95
2007	-	105
2008	-	120

(ii) Distinguish between Laspeyres and Paasche's Index.

- (b) (i) The following figures relate to the prices and quantities of certain commodities. Calculate the Fischer Ideal Index number and show if it satisfies the time reversal

Commodities	1995		1996	
	Price	Quantity	Price	Quantity
Wheat	30	50	32	50
Gram	25	40	30	35
Barley	18	50	16	55

(ii) Why is the Fischer Index termed as an Ideal Index Number?

- (c) (i) What is the difference between Fixed Base and Chain Based Index number? (ii) Calculate the chain base index number and fixed base index number from the following data:-

- (d) (i) Why is mean preferred over median and mode despite it being heavily affected by outliers?
- (ii) Find the missing frequency in the following data if it is known that the median of the distribution is 32.5 marks -

Marks Interval	10-20	20-30	30-40	40-50	50-60
No. of Students	3	5	--	3	1

2. Attempt any three parts: - (6 × 3)

- (a) A basket contains 5 mangoes, 3 apples, and 2 oranges. A person picks 2 fruits at random without replacement. He earns Rs. 12 for each mango, Rs. 20 for each apple, and Rs. 25 for each orange that he picks. Calculate the expected total earning from the draw.
- (b) At a help desk, it is observed that an average of 3 customer calls are received every 15 minutes. What is the probability that no more than 2 calls are received in a randomly selected 15-minute interval? (Given $e^{-2}=0.135$)
- (c) A certain disease is known to affect 1% of the population. A diagnostic test is available, which correctly identifies the presence of the disease 95% of the time when it is actually present (true positive), but it also gives a false positive in 2% of healthy individuals. A person tests positive for
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the disease. What is the probability that the person actually has the disease?

- (d) The lifespans of a particular brand of LED bulbs are normally distributed with a mean life of 1,200 hours and a standard deviation of 150 hours.

(i) What proportion of bulbs are expected to last more than 1,500 hours?

(ii) What percentage of bulbs are expected to last between 1,050 and 1,350 hours?

3. Attempt any three parts: - (6 × 3)

- (a) Define hypothesis testing. What are the steps involved in conducting a hypothesis test?

- (b) A factory estimates the time required to complete a special machinery order is normally distributed with a mean of 120 days and a standard deviation of 15 days. The management commits to deliver the order within 130 days and agrees to pay a penalty of Rs. 5,000 for each day delayed beyond 130 days.

Find:

- (i) What is the probability that the factory pays a penalty of Rs. 25,000 or more?

- (ii) What is the probability that the factory completes the order within 135 days?

- (c) A random sample of 64 LED bulbs was taken from a production batch. The average life of the sample was found to be 1,180 hours, with a standard deviation of 150 hours. Could this sample have come from a population where the true mean life is 1,200 hours? Also, determine the 99% confidence interval for the population mean life of the LED bulbs.

- (d) In a test, the marks of students are normally distributed with a mean of 60 and a standard deviation of 10. The top 10% of students will get a Grade A. The bottom 20% of students will get a Grade F.

Find:

- (i) The lowest mark to get a Grade A.

- (ii) The highest mark to still get a Grade F

4. Attempt any two parts (9 × 2)

- (a) (i) Combine the following two series with a common base of 2003. By what per cent did the price of steel rise between 2000 and 2007 ?