

[This question paper contains 8 printed pages.] 1

Your Roll No.....

Sr. No. of Question Paper : 7508  
Unique Paper Code : 12481302  
Name of the Paper : Statistics for Business Economics  
Name of the Course : B.Sc. (Hons) Business Economics, 2023  
(LOCF)  
Semester : III  
Duration : 3 Hours  
Maximum Marks : 75



Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **all** questions.
3. Choice is available within each question. Use of simple calculator is permitted and statistical table is allowed.

1. Attempt any three parts.

(5 x 3 = 15)

(a) The noise level experienced by 500 employees in a production unit has the following distribution:

Noise level	8-11	11-16	16-19	19-25	25-40	40-65
No. of employees	90	160	100	70	60	20

7508

2

2



- (i) Construct a histogram corresponding to this frequency distribution and comment on the shape of the distribution?
- (ii) What proportion of employees experience a noise level less than 20?
- (b) Given the sample of test scores obtained by 20 students of the class below:

88	87	87	66	45	87	13	25	98	99
92	90	69	76	23	49	56	99	19	52

- (i) Find the median, mean and 10% trimmed mean of the test scores.
- (ii) How will the median and the mean change if the test score of 66 and 13 was wrongly recorded. The correct scores are 42 and 53 respectively.
- (c) The closing prices of two stocks for nine consecutive days are recorded below:

Stock	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Day9
ABC	78	78	76	75	74	78	76	76	77
DEF	54	67	57	57	65	87	56	74	54

- (i) Find the coefficient of variation for each stock.
- (ii) If you are a conservative investor, in which of the two stocks would you invest?
- (iii) If the prices of stocks of ABC increase by 50 rupees on each day and that of DEF double, what is the impact on the coefficient of variation.

(d) What adjustments are needed to convert a variable  $X$  into another variable  $Y$  such that the mean of  $Y$  is same as mean of  $X$ , but variance of  $Y$  is 4 times that of  $X$ .

2. Attempt any four parts.

(5 × 4 = 20)

(a) Hospital records show that 70% of patients suffering from a disease die due to that disease. What is the probability that out of the 15 randomly selected patients

(i) 10 recover

(ii) At least 8 recover

(iii) Atmost 5 die.



(b) A factory produces on an average 1.5 defects per 100 units of output and the number of defects follows a poisson distribution. What is the probability that the next 600 units show

(i) less than 5 defects;

(ii) More than 15 defects

(c) An urn contains 7 white and 3 red balls. Two balls are drawn together, at random, from this urn. Compute the probability that neither of them is white. Find also the probability of getting one white and one red ball. Compute the expected number of white balls drawn.

(d) The number of pages of a book in a library are normally distributed with mean 178 and standard deviation 42.

(i) Find the probability that the book has between 100 to 200 pages.

(ii) Find the probability that the book has atleast 180 pages

(c) If A and B are mutually exclusive events,  $P(A) = 0.26$  and  $P(B) = 0.45$ , find

(i)  $P(A')$

(ii)  $P(A \cup B)$

(iii)  $P(A \cap B')$

(iv)  $P(A' \cap B')$



3. Do any three parts.

(5×3=15)

(a) Let the pdf of X is given by:

$$f(x) = \begin{cases} x^2 \left( 2x + \frac{3}{2} \right), & 0 < x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

(i) Find  $P(\frac{1}{2} < X < \frac{3}{4})$  and  $P(X = 0.5)$

(ii) If  $Y = 2X + 3$ , find  $\text{Var}(Y)$ .

(b) Consider two continuous random variables X and Y with joint p.d.f. as

$$f(x, y) = \begin{cases} \frac{2}{81} x^2 y, & 0 < x < k, 0 < y < k \\ 0 & \text{otherwise} \end{cases}$$

- (i) Find the value of  $k$  so that  $f(x, y)$  is a valid joint p.d.f.
- (ii) Are  $X$  and  $Y$  independent?
- (iii) Find the conditional distribution of  $X$  given  $y = 2$ .
- (c) Consider the following joint probability distribution of  $X$  and  $Y$  shown in the table:

X	P(X,Y)	Y		
		5	10	15
1		1/9	1/9	0
2		1/6	2/9	1/6
3		0	0	2/9

- (i) Are  $X$  and  $Y$  independent?
- (ii) Find  $P(X+Y) > 12$ .
- (iii) Find conditional probability  $P(X=1/Y < 15)$



- (d) The number  $X$  of days in the summer months that a construction crew cannot work because of the extreme weather has the probability distribution as given below:

X	P(X)
6	0.03
7	0.08
8	0.15
9	0.20
10	0.19
11	0.16
12	0.10
13	0.07
14	0.02



(i) Construct the cdf of the probability mass function given above and from it calculate the the probability that no more than ten days will be lost next summer and also the probability that also from 8 to 12 days will be lost next summer.

(ii) If the revenue loss due to non-working days is a function of the number of these days and is given by:  $R(x) = 2000x + 1750$ . Find the Expected value of the Revenue loss.

4. Do any five parts.

(5x5=25)

(a) The average heights of a random sample of 400 people from a city is 1.75 m. It is known that the heights of the population are random variables that follow a normal distribution with a variance of 0.16.

- (i) Determine the 95% confidence interval for the average height of the population.
- (ii) With a confidence level of 90%, what should be the minimum sample size need for the true mean of the heights to be within 2 cm of the sample mean?
- (b) Internet usage for course-related work among college students in the United States and in India is studied. The following details are obtained:

	Course related work
U.S Students(X)	$\bar{X} = 1.76$
N=149	$s_x = 1.52$
Indian Students (Y)	$\bar{Y} = 0.73$
N=306	$s_y = 0.79$



Determine whether U.S. students have significantly higher Internet use for course work than the Indian students. Test at the .05 alpha level.

- (c) A random sample of size two is drawn from a population which consists of numbers 4, 5, 6, 7 and 8. Construct a sampling distribution of mean of these samples and find its expected value.
- (d) A hot-tub manufacturer advertises that with its heating equipment, a temperature of 100°F can be achieved in at most 15 min. A random sample of 49 tubs is selected, and the time necessary to achieve a 100°F temperature is determined for each tub. The sample average time and sample standard deviation are 16.5 min and 2.2 min, respectively. Does this data cast doubt on the company's claim?

- (e) According to the norms established for a reading comprehension test, eighth graders should average 84.3 with a standard deviation of 8.6. If 16 randomly selected eighth graders from a certain school district averaged 87.8, test the null hypothesis  $\mu = 84.3$  against the alternative  $\mu > 84.3$  at the 0.01 level of significance
- (f) A testing agency test 1000 tyres of A make and another 1200 of B make. The agency finds that A make tyres give an average life of 31125 hours with a standard deviation of 800 hours. The B make tyres gives an average of 31000 hours with a standard deviation of 900 hours. Is there a significant difference between the two makes? Test the above hypothesis at 5% level of significance





Your Roll No.....

Sr. No. of Question Paper : 7505  
Unique Paper Code : 12481301  
Name of the Paper : Macroeconomics & Applications - I  
Name of the Course : B.Sc. (Hons) Business Economics, 2023 (LOCF)  
Semester : III  
Duration : 3 Hours  
Maximum Marks : 75



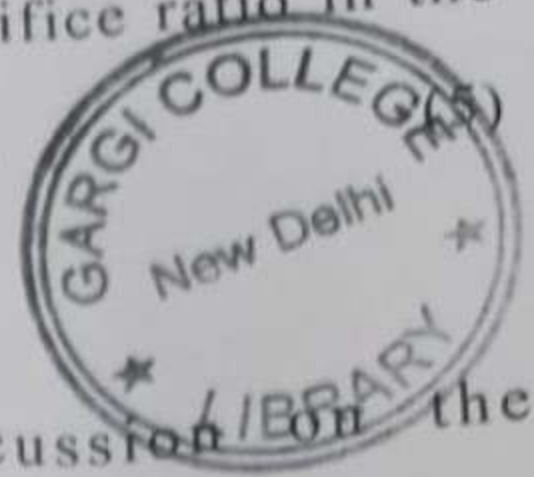
Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
  2. **All parts** of each question must be done together.
  3. Attempt **Five** questions in all.
- 
1. (a) Gross Domestic Product (GDP) solely encompasses the output of final goods within a specific timeframe. What are the various components of the final demand for goods? (10)



- (b) Elaborate the concept of GDP Deflator. (5)
2. (a) How the interest rate is determined as being determined by the condition that the supply of central bank money be equal to the demand for central bank money. (9)
- (b) How central bank controls the money supply through its open market operations? (6)
3. Explain that the IS - LM model characterizes the implications of equilibrium in both the goods and the financial markets. What is the impact of expansionary fiscal policy on the economy's output and interest rate? (15)
4. (a) Utilizing wage-setting and price-setting relationship, elucidate the equilibrium in the labor market. Demonstrate the connection between the natural rate of unemployment, the natural rate of employment, and the natural output level. (10)

(b) Describe the concept of the sacrifice ratio in the context of achieving disinflation.



5. Provide a comprehensive discussion on the interrelationships between inflation, unemployment, and output growth, often referred to as the three economic relations? (15)

6. Discuss that the new Keynesian economics provides a better explanation of stickiness of wages and prices in the short run. Also using quantity theory of money examines the links between inflation and economic growth.

(15)

7. Write short notes on any two of the following:

(i) Small menu costs and aggregate-demand externalities

7505

12 4

(ii) Wage indexation

(iii) Lucas critique



(7.5×2=15)