

[This question paper contains 18 printed pages.]

Sr. No. of Question Paper : 6081

Your Roll No.....

Unique Paper Code : 12481302

Name of the Paper : Statistics for Business Economics

Name of the Course : B.A. (Hons) Business Economics, 2016 (CBCS)

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 calculators is permitted. Required statistical tables are attached with this paper.

1. Attempt any **three** parts. (5×3)

- (a) A sample of the daily earnings of a food vendor on a street outside a college was collected for 30 working days. The distribution of earnings is as follows :

Earning Range (Rs.): 100-200 200-250 250-300 300-400 400-600

No. of days: 4 6 5 7 8

- (i) Draw a histogram to depict the data and describe its shape.
 - (ii) If the municipal authorities were to charge Rs. 50 per day from the food vendor, what would be the impact on the mean and standard deviation of the vendor's daily earnings ? (3,2)
- (b) The wheat yield (in quintals per acre) for 8 farms sampled in Punjab was 53, 56, 47, 27, 52, 43, 46 and 55.

- (i) Compute the sample median, the 10% trimmed mean and the sample standard deviation for the wheat yield.
- (ii) Is the sample median the better measure of location for the given data? Why or why not? (4,1)
- (c) (i) Calculate the coefficient of variation for the first n natural numbers?
- (ii) In what circumstances is the coefficient of variation a preferred measure compared to the standard deviation? (4,1)
- (d) The first four moments about the value 5 for a distribution are -1 , 10 , -10 and 153 . Calculate the relevant measures to comment on the centre, dispersion, skewness and kurtosis of the distribution.

2. Attempt any **five** parts.

(5×5)

- (a) (i) Define 'independent event' and provide one example of such events.
- (ii) If events A and B are independent with $P(A) = 1/3$ and $P(\text{not } B) = 1/4$, find $P(A \cup B)$.
- (b) (i) It is known that in a certain school 40% of the cricket players also play football. Twenty cricket players are selected.
- (ii) What is the probability that more than 8 of them play football?
- (iii) If it is known that more than 8 play football, what is the probability that less than 11 play football. (3,2)
- (c) The sandwiches sold in a certain college canteen are required to have a weight of at least 80 grams. However the actual weight follows a Normal distribution with mean of 75 grams and standard deviation of 8 grams.
- (i) What proportion of the sandwiches possess the required weight of at least 80 grams?
- (ii) If the standard deviation cannot be altered, what average weight should be maintained by the manufacturer so that 90% of the sandwiches possess the required weight? (3,2)
- (d) The probability density function (pdf) of a continuous random variable X is $f(x) = a(1-x^2)$, $0 \leq x \leq 1$.

$$P(1) - P(0)$$

- (i) Find the value of a for $f(x)$ to be a valid pdf.
- (ii) Calculate the cumulative distribution function (cdf) for the random variable X .

- (e) The number of cell phones sold at a certain store follow the distribution provided:


$X :$	0	1	2	3	4	5	6
$p(x) :$	0.20	0.05	0.10	0.25	0.20	0.15	0.05

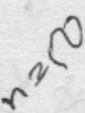
Find the expected value and variance of Y where $Y = 3X - 5$.


- (f) The six retail outlets of a fast food chain each has an average daily revenue of Rs. 80,000 with a standard deviation of Rs. 6,000. These outlets also have an average daily expenditure of Rs. 30,000 with a standard deviation of Rs. 4,000. If the expenditure and revenues have a correlation coefficient of 0.3, calculate the mean and standard deviation of profits (net revenue) of all the six outlets taken together.

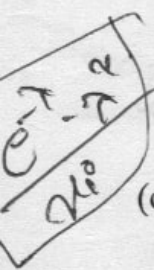
3. Attempt any **five** parts.

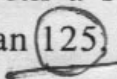
(5×5)

- (a) (i) State the Central Limit Theorem. 

- (ii) The weekly consumption of cereals by a household in Delhi is a random variable with mean value 4.0 kg and standard deviation 1.5 kg. If 50 households are independently selected, what is the probability that the sample average amount of consumption is more than 3.5 kg. 

- (b) The number of spelling mistakes in a sample of six newspaper advertisements was 2, 1, 5, 2, 3, and 4. If the distribution of the mistakes has a Poisson distribution $p(x; \lambda)$, calculate the estimator for λ using the method of moments and also the value of the estimate. 

- (c) The wages paid to construction labour in Delhi was estimated through a random sample of 12 workers. The resulting data was 400, 430, 500, 380, 360, 400, 420, 450, 370, 400, 440, 450. Estimate the 90% confidence interval for the variance in wages. 

- (d) A Normally distributed population has a mean of 120 with a standard deviation of 10. If a sample of size 25 has a mean greater than 125, the null 

hypothesis that the true mean is 120 is rejected in favour of the alternate hypothesis that the true mean is greater than 120. What is the level of Type I error ?

(e) Consider the hypotheses $H_0 : \mu = 72$ versus $H_1 : \mu > 72$ concerning a normal population with a standard deviation of 6. A random sample of 16 observations taken from this population produces a sample mean of 75.2.

(i) Calculate the p value.

(ii) Considering the p-value obtained in part (i), would you reject H_0 if the level of significance is 0.01. (3,2)

(f) A sample of 100 and 200 shoes used by the armed forces personnel in desert conditions and in mountain conditions respectively show an average life of 400 days and 370 days with standard deviations of 40 days and 30 days respectively. Can it be concluded at the 2% level of significance that mountain conditions as compared to desert conditions reduce the average life of the shoes.

4. Attempt any two parts.

(5×2)

(a) Explain or derive to show why the Laspeyres' Price index overestimates a price rise.

(b) The price index for 2010 with base in 2012 was 80. Prices increased by 8 percent from 2010 to 2011. The price increase from 2012 to 2013 was 10 percent. On the basis of the above, construct a price index series from 2010 to 2013 with 2010 as base.

(c) Combine the two Series of Index numbers given below to obtain a new Series with (a) 1963 as base (b) 1960 as base.

Year	Old Series (1958=100)	New Series(1963=100)
1960	101	136.00
1961	105	132.68
1962	112	142
1963	126	100
1964	134	106
1965	142	99
1966	133.56	102

Indicate the tests of adequacy of index numbers that must be satisfied to enable the above calculations.

Handwritten notes on the left margin:
 80
 80
 86.4
 80

Handwritten calculations on the right margin:
 120
 124
 133
 $\frac{134}{100} \times 106$
~~134~~
 134