2021

ECONOMICS — HONOURS

Second Paper

(Group - A)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

SECTION -A

1. Answer *any five* questions :

    (a) What should be the suitable diagram to represent the data in each case?   4

       (i) Colours of car in a parking lot

      (ii) Monthly family budget of a household with fixed monthly income

     (iii) GDP growth rate of India and China during 2000-01 to 2019-20

     (iv) Number of employees in different income groups in a particular firm

    (b) State with reasons, whether the following statements are 'True' or 'False'.   4

       (i) Histogram can be drawn with class intervals of unequal width.

      (ii) Simple and weighted arithmetic means can never be equal for a given set of observations.

     (iii) Mode is a unique value.

     (iv) Mean Deviation is minimum when deviations are taken about median.

    (c) (i) Weekly average wage of workers in a factory increases from ₹ 2,000 to ₹ 2,500 and s.d. increases from ₹ 150 to ₹ 180. Have the wages become less uniform now?

      (ii) What will be the suitable measure of dispersion for a grouped frequency distribution where one or both of the terminal classes are open?   3+1

    (d) The first two moments of a distribution about the value 2 are 1 and 16 respectively. Find the first two raw moments.   4

    (e) If $r_{xy} = 0$, does it necessarily imply that x and y do not have any mathematical relationship? Prove your answer.   4

    (f) Three friends A, B and C have appeared in a job interview. The probability to get the job offer is 0·6 for A, 0·8 for B and 0·5 for C. What is the probability that at least two of the three friends will get the job offer?   4

    (g) For a binomial distribution, the mean is 3 and the variance is 2. Find the value of n. Also, comment on the skewness of this distribution.   2+2

Please Turn Over

(h) What is a life table? Discuss the two uses of it. 2+2

SECTION - B

Answer *any five* questions.

2. (a) The median and mode of the following distribution are respectively 27 and 26. Find the missing frequencies *a* and *b*.

Class Interval	0-10	10-20	20-30	30-40	40-50
Frequency	3	*a*	20	12	*b*

(b) Mention one advantage of Arithmetic Mean as a measure of central tendency. 5+1

3. (a) What is Wholesale Price Index?

(b) Calculate the price index number for 2007 with 2000 as base year on the basis of the given data by using a suitable formula. Mention the formula.

COMMODITY	Price per unit (in ₹)		Expenditure (in ₹)
	Year 2000	**Year 2007**	**Year 2000**
A	4	8	40
B	6	9	42
C	5	11	60
D	3	6	24
E	2	4	32

2+(3+1)

4. (a) The correlation coefficient between two variables X and Y is found to be 0·4. What is the correlation coefficient between $2X$ and $(-Y)$?

(b) In a partially destroyed factory, from the records of an analysis of correlation data, the following data only was available :

Variance of $X = 9$

Regression equations : $8X - 10Y + 66 = 0$

$$40X - 18Y = 214$$

Find (i) The mean value of X and Y

(ii) The standard deviation of Y. 2+(2+2)

5. Ten participants in an essay writing competition were assessed by two judges and scores awarded were as follows :

1st Judge	39	65	62	90	82	75	25	98	36	78
2nd Judge	47	53	58	86	62	68	60	91	51	84

Calculate the rank correlation coefficient. Is there an agreement between the decision of the two judges? Justify your answer. 5+1

6. (a) If $P(A \cup B) = \dfrac{5}{6}, P(A \cap B) = \dfrac{1}{3}, P(A^C) = \dfrac{1}{2}$, find $P(A)$ and $P(B)$. Hence show that $P(A)$ and $P(B)$ are independent.

   (b) Participants in a survey were asked to sample unknown colas and choose their favourite. The results are shown in the table below :

Unknown Colas	Gender		
	Male	Female	Total
Pepsi	50	52	102
Coke	45	70	115
Thums Up	35	21	56
Limca	30	47	77
Total	160	190	350

   (i) If the participant is chosen at random, what is the probability that the person is female, given that the chosen cola was Coke?

   (ii) If the participants is picked at random, what is the probability that the person is a male and the chosen cola is Limca?

   (iii) If a participant is picked at random, what is the probability that the person is a female and did not choose Pepsi? (2+1)+(1+1+1)

7. (a) What is Bayes' Rule?

   (b) Three machines X, Y and Z are of equal capacities and they produce a machine part. The probabilities that the machines produce defectives are 0.1, 0.2 and 0.3 respectively. An item which is produced by one of the machines is taken at random and found to be defective. What is the probability that it has come from machine Z. 3+3

8. (a) Show that the binomial distribution with parameters 3 and 0.5 is symmetric.

   (b) Suppose 5% of the inhabitants of a city are consumers of coffee.

   Find the probability that in a sample of 100 inhabitants, there will be at least 2 consumers of coffee.

   [given $e^{-5} = 0.007$] 3+3

9. (a) Two uncorrelated random variables x and y have standard deviations 3 and 4 respectively. Find the standard deviation of $(x + y)$.

   (b) What kind of distribution is represented by the following probability density function of a random variable x :

   $$f(x) = \frac{5}{\sqrt{\pi}} e^{-25x^2}, \ -\infty < x < \infty$$

   Find its mean and variance. 2+4