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(Held in April–May, 2021)

COMMERCE

(Generic Elective)

Paper : GE-303

(Business Statistics)

Full Marks : 80

Pass Marks : 32

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Answer any *eight* questions : 2×8=16

(a) Calculate AM from the following data :

10, 20, 15, 18, 30

(b) Define mutually exclusive events.

(c) What are the probabilities of an impossible event and a certain event?

(d) Mention the two properties of correlation coefficient.

(e) If the correlation coefficient between two variables x and y is +1 and $b_{yx} = 0.5$, then find the value of b_{xy} .

(f) Define price index number and quantity index number.

(g) What do you mean by cost of living index number?

(h) Write the main objectives of time series analysis.

(i) What do you mean by seasonal variations in time series analysis?

(j) Define parameter.

(k) In what situations stratified sampling is used to draw a sample from a population?

2. (a) (i) Prove that for any two non-zero numbers $GM^2 = AM \cdot HM$. 3

(ii) Find standard deviation and coefficient of variation from the following series : 6

Class Interval : 5–15 15–25 25–35 35–45 45–55

Frequency : 8 12 15 9 6

(3)

Or

- (b) (i) Why is standard deviation considered to be the best measures of dispersion? 3
- (ii) Calculate median from the following distribution : 6

Marks	:	0-10	10-20	20-30	30-40	40-50	50-60
No. of Students	:	4	6	10	15	12	6

3. (a) (i) Two coins are tossed simultaneously. Find the probability of getting same face on both the coins. 3
- (ii) A problem is given to three students A, B and C. The probability of solving the problem by A, B and C are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that the problem will be solved. 5
- (iii) A random variable X has the following probability distribution :

X	x :	1	2	3	4	5	6	7
P(x)	:	2k	3k	k	2k	k ²	7k ²	2k ² k

Find the value of k and P(X = 6).
3+2=5

(4)

Or

- (b) (i) Find the probability that a leap year selected at random will contain 53 Sundays. 3
- (ii) A random variable X has the following probability distribution :

X	x :	1	4	7
P(x)	:	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

Find E(X). 3

- (iii) A binomial variable X has mean 6 and variance 4. Find the probability distribution of X. 3
- (iv) A normal variate X has a mean 50 and standard deviation 5. Find the probability that X lies between 40 and 60. 4
4. (a) (i) Prove that coefficient of correlation is the geometric mean of the two regression coefficients. 3
- (ii) If the two regression equations are $x = 2y + 5$ and $2x = y + 8$, what should be the means of x and y? 4
- (iii) Find the correlation coefficient from the data given below : 6

x	:	105	120	95	150	130
y	:	100	115	110	135	115

(5)

Or

(b) (i) What is meant by correlation? Distinguish between positive, negative and zero correlations. 3

(ii) Calculate the coefficient of rank correlation from the data given below : 5

x : 92 89 86 87 83 71 77 63 53 50
y : 86 83 77 91 68 52 85 82 57 57

(iii) Derive the regression line of X on Y from the following data : 5

x 50 y 30 xy 1000
x² 3000 y² 1800 N 10

5. (a) (i) What are NSE SENSEX and NSE NIFTY? 3

(ii) From the data given below, prove that Fisher index number satisfies time reversal test : 5

Items	p ₀	q ₀	p ₁	q ₁
A	4	20	6	10
B	3	15	5	23
C	2	25	3	15
D	5	10	4	40

(6)

(iii) The following table gives the index number of different groups of items with their respective weights for 2020 (base year 2010) :

Group	Group Index No.	Weight
Food	525	40
Clothing	325	16
Fuel	240	15
Rent	180	20
Others	200	9

Calculate the overall cost of living index number and interpret the result. 4+1=5

Or

(b) (i) Write the three uses of cost of living index number. 3

(ii) Prove that Fisher index number satisfies time reversal test and factor reversal test. 5

(iii) Find the price index number from the following data using Paasche

(7)

and Laspeyres index : 5

Items	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	6	50	6	72
B	7	84	10	80
C	10	80	12	96
D	4	20	5	30

6. (a) (i) Write the two models used for studying time series analysis. 3

(ii) From the data given below, find the straight line trend by using the method of least squares :

Year	:	1968	1969	1970	1971
Value	:	80	90	92	83

Year	:	1972	1973	1974	1975	1976
Value	:	94	99	92	110	100

Also estimate the value for the year 1980. 8

Or

(b) (i) What are the components of time series? Discuss any one of them. 2+3=5

(8)

(ii) Calculate the seasonal index for the following data by using the method of simple averages (assuming that the trend is absent) : 6

Year	Q ₁	Q ₂	Q ₃	Q ₄
1991	72	68	80	70
1992	76	70	82	74
1993	74	66	84	80
1994	76	74	84	78
1995	78	74	86	82

7. (a) What is simple random sampling? Explain lottery method used to draw a simple random sample from a population. 5

Or

(b) What do you mean by the standard error of a statistic? A random sample of size 100 has mean 15, the population variance is 25. Find the interval estimate of the population mean with confidence level of (i) 99% and (ii) 95%. 2+3=5
