2016

M. Com.

2nd Semester Examination

ADVANCED BUSINESS STATISTICS

PAPER — COM-203

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Unit—I

[Marks : 20]

1. Answer any *two* of the following questions : 2×5

(a) State the conditions under which Poisson distribution is used. Also mention the important properties of Poisson distribution.

(b) Proof that Poisson distribution is a limiting case of Binomial distribution under certain conditions.

(c) A bus, Sampa Travels, runs daily from Midnapore bus stand to Old Digha bus stand. It starts its journey from Midnapore bus stand at 6·30 am and arrived at Old Digha bus stand at 10·00 am daily. In its journey the bus takes 15 stoppages and on an average 75 passengers during the peak period. The bus can take a maximum of 8 passengers at any stoppage. Use the Poisson distribution to obtain the probability that the bus will be overloaded at any given stoppage.

(d) What do you mean by 'Standard Error'? How do you distinguish between 'Standard Error' and 'Standard Deviation'?

2. Answer any *one* question from the following : 1×10

(a) (i) A local politician claims that the assessed value of houses, for house tax purposes by the Municipal Corporation of Delhi, is not correct in 90% of the cases. Assuming this claim to be true, what is the probability that out of a sample of 4 houses selected a random (i) at least one will be found to be correctly assessed? (ii) at least one will be found to be wrongly assessed?

(ii) The following rules are followed in a certain examination. "A candidate is awarded a first division if his aggregate marks are 60% or above; a second division if his aggregate marks are 45%

or above but less than 60% and a third division if the aggregate marks are 30% or above but less than 45%. A candidate is declared failed if his aggregate marks are below 30%. A candidate is awarded distinction if his aggregate marks are 80% or above."

At such an examination it is found that 10% of the candidates have failed, 5% of them obtained distinction. Calculate the percentage of students who are placed in the second division. (assume Normal distribution of marks). 5+5

(b) (i) Explain the method of drawing a stratified sample. State the situation where stratified random sampling is preferred to simple random sampling.

(ii) A population consists of the four members 3, 7, 11, 15. Consider all possible samples of size two which can be drawn with replacement from the population. Find :

— the population mean,

— the population standard deviation,

— the mean of the sampling distribution of means,

— the standard deviation of the sampling distribution of means. (2+3)+5

Unit—II

[Marks : 20]

3. Answer any *two* of the following questions : 2×5

(a) What is Statistical estimation ? Distinguish between point estimation and interval estimation. Write the formula for the standard error of the difference between two sample means in the case of large samples. 1+3+1

(b) Write down the method of maximum likelihood estimation for estimating of an unknown parameter. State any four properties of such estimator 3+2

(c) The mean IQ of a sample of 25 children from a large population is 106·24 and the standard deviation is 14·54. Make an interval estimation of the average IQ of the children in the population with 95% confidence. 5

(d) Point out basic steps to be followed in testing of a statistical hypothesis. 5

4. Answer any *one* of the following : 1×10

(a) (i) In one year, West Bengal had 756 traffic fatalities. The number of fatalities by day of week is given in the following table. Do the data suggest that fatalities are uniformly distributed over the days of the weeks? Test at $\alpha = 0 \cdot 01$.

Day	Sun	Mon	Tue	Wed	Thurs	Fri	Sat
No. of fatalities	121	96	91	92	96	122	138

(ii) Heights of elder daughters of 10 randomly chosen families along with the heights of their corresponding mothers are given in the following table. At $\alpha = \cdot 05$ does the sample show that daughters are taller than their mothers?

Family	1	2	3	4	5	6	7
Daughter's height (cm)	167	166	176	171	165	181	173
Mother's height (cm)	172	162	157	159	157	177	174

5+5

(b) (i) What is meant by analysis of variance? What are the assumptions in analysis of variance?

(ii) Sales of *People* magazine are compared over a 5-week period at four outlets in Kharagpur Railway Station. Does the data show a significant

difference in mean weekly sales in four outlets ? (Perform one-way ANOVA at 5% level).

Weekly Sales:	*Store 1*	*Store 2*	*Store 3*	*Store 4*
1	102	97	89	100
2	106	77	91	116
3	105	82	75	87
4	115	80	106	102
5	112	101	94	100

(1+2)+7

[Internal Assessment : 10 Marks]