2014

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 :   5×2

   (a) Describe briefly the importance of probability distribution indecision making. Give an example.

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

   (c) Briefly discuss the procedure and applicability of multi-stage sampling with an example.

(d) 1000 light (bulbs) with a mean life of 120 days are installed in a new factory and their length of life is normally distributed with standard deviation of 20 days.

    (i) How many bulbs will expire in less than 90 days ?

    (ii) If it is decided to replace all the bulbs together, what interval should be allowed between replacements if not more than 10% should expire before replacement ?

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

(a) (i) The incidence of a certain disease is such that on an average 20 per cent of workers suffers from it. If 10 workers are selected at random, find the probability that :

    (i) exactly 2 workers suffer from the disease ;

    (ii) not more than 2 workers suffer from the disease.

  (ii) In 10 independent throws of a defective die, the probability that an even number will appear 5 times is twice the probability that an even number will appear 4 times. Find the probability that an even number will not appear at all in 10 independent throws of the die.   5+5

(b) (i) What do you mean by 'simple random sampling with replacement'? How does it differ from 'simple random sampling without replacement'?

  (ii) What is non-sampling error or bias ? How does it arise in sampling ?   (2+2)+(2+4)

Unit—II

[Marks : 20]

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

(a) Distinguish between Point estimation and Interval estimation. How would you estimate the population mean, μ by interval estimation.

(b) 'A good point estimator must be *consistent* and *efficient*'. In the light of the above statement briefly explain the criteria of consistency and efficiency for a point estimator.

(c) State the important properties of a maximum likelihood estimator.

(d) The following table gives the number of aircraft accidents that occurs during the various days of the weeks over last five years. Find whether the accident are uniformly distributed over the week.

Days	Sun	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	14	16	8	12	11	9	14

[Given : the values of chi-squire significant at 5, 6, 7 degree of freedom are respectively 11.07, 12.59, 14.07 at the 5% level of significance]

(Turn Over)

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

(a) (i) What is ANOVA ? State its assumptions.

(ii) The following table relates to production of wheat (in quintal per acre) of three varieties of seeds A, B and C on 18 plots :

A	14	16	18	12	16		
B	14	13	15	22	20	18	
C	18	16	19	19	20	22	14

Test whether three is any significant difference in the productivity of three varieties. $\qquad$ 4+6

(b) (i) What do you mean by critical region and level of significance in testing of 1 hypothesis ?

(ii) A company wants to know whether a particular treatment reduces the amount of bacteria in milk. To find out, counts of bacteria were made before and after the treatment was applied resulting in the outcomes shown below :

Sample	1	2	3	4	5	6	7	8	9	10	11	12
Before treat- ment (x)	6.9	7.0	8.3	5.3	6.2	6.7	7.0	5.5	5.9	6.6	7.0	7.6
After treat- ment (y)	6.9	6.9	7.1	5.1	6.2	6.8	6.5	5.3	5.9	6.5	6.8	6.9

Test at 5% level of significance whether the treatment is effective for reducing bacteria. $\qquad$ 4+6

[Internal Assessment : 10 Marks]

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