# 2017

## M.Com. 2nd Semester Examination

## ADVANCED BUSINESS STATISTICS

**PAPER—COM-202**

*Full Marks* : 50

*Time* : 2 Hours

*The figures in the 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* questions : 2×5

(a) State the conditions under which the Binomial Distribution is applied.

(b) Proof that the variance of Binomial distribution is npq.

(c) A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which no car is used and the proportion of days on which some demand is refused. (Given $e^{-1} = 0.3679$, $e^{-1.5} = 0.2231$ and $e^{-3} = 0.0498$)

(d) "Sampling is a necessity under certain conditions." Illustrate this by suitable examples.

**2.** Answer any *one* question : 1×10

(a) (i) An oil exploration firm finds that 5% of the test wells it drills yields a deposit natural gas. If it drills 6 wells, find the probability that at least one well will yield gas.

(ii) The average daily food expenditure of families in a certain area has a normal distribution with mean Rs. 125 and standard deviation Rs. 25. What is the probability that a family selected at random from this area will have an average daily expenditure on food in excess of Rs. 175 ? What is the probability

that out of eight such families selected at least one family will have their daily food expenditure in excess of Rs. 175 ? 4+6

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

(ii) A population consists of the four members 2, 6, 8, 12, 14, 18. Consider all possible samples of size two which can be drawn without replacement from the population. Find

- the mean of the sampling distribution of means,
- the standard deviation of the sampling distribution of means. 5+(2+3)

## Unit – II

(Marks : 20)

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

(a) From a random sample of size n, drawn from a Poisson population, estimate the population parameter $\lambda$ using maximum likelihood estimation method. 5

(b) (i) What is interval estimation ?

(ii) In a random sample of 500 men 100 are found to be smokers. Make an interval estimation of the percentage of men smokers at 95% level. 2+3

(c) Write brief notes on :

(i) level of significance,

(ii) critical region,

(iii) type-II error. $1\frac{1}{2}+1\frac{1}{2}+2$

(d) The following table shows the recorded temperature (in C°) of Midnapore Town in eight consecutive Sundays in the months of March-April in two years.

| Sundays | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Year 2016 | 37 | 40 | 33 | 32 | 40 | 41 | 44 | 37 |
| Year 2010 | 36 | 34 | 42 | 35 | 33 | 37 | 31 | 40 |

Is there any significant difference in the fluctuation of temperature in two time periods ? Test at $\alpha$ = 2%.

5

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

(a) (i) What is a $\chi^2$ test ?

(ii) What do you understand by the term 'degree of freedom' ?

(iii) The following table shows the data of 300 students of Vidyasagar University in different semesters about their visit of the university medical unit.

| | Semester I | Semester II | Semester III | Semester IV | Total |
|---|---|---|---|---|---|
| Visited | 10 | 30 | 40 | 20 | 100 |
| Not visited | 50 | 51 | 50 | 49 | 200 |
| Total | 60 | 81 | 90 | 69 | 300 |

Do you find that visit of university medical unit by the students is independent of their class level ?
Test at a = 5%. 2+2+6

(b) (i) For 20 randomly selected girl students from the Pritilata Chhatri Nibas of Vidyasagar University, the average systolic blood pressure is found to be 126 with a standard deviation of 9.96. Do the data support the hypothesis that the girl students

residing in the university hostel are, on an average, suffering from high blood pressure ? (Consider the normal systolic blood pressure as 120).

(ii) 130 male and 70 female were asked about what they would do if they found a money purse missed by someone at Midnaport Railway Station. Would they return it to its owner ? Of the 130 males sampled, 91 said 'yes' and 70 females sampled, 56 said 'yes'.

Do the data indicate that the proportions that said 'yes' and different for male and female ?
Test at $\alpha$ = 5%. 4+6

*[ Internal Assessment — 10 ]*