M.Com. 2nd Semester Examination, 2023

COMMERCE

(*Advanced Statistics*)

PAPER – COM-202

Full Marks : 50

Time : 2 hours

The figures in the right hand margin indicate marks

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

PAPER – COM 202.1

[*Marks* : 20]

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

    (*a*) Explain the concept of probability distribution with an example. Briefly discuss the use of probability distribution in decision making process of business enterprises. 2 + 3

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

(c) In a multiple-choice examination, there are 20 questions. Each question has four alternative answers, and the students must select one correct answer. Four marks are given for the correct answer but one mark is deducted for every wrong answer. A student must secure at least 50% of the maximum possible marks to pass the examination. Suppose that a student has not studied at all so that he decides to select the answers to the questions on a random basis. What is the probability that he will pass the examination ?

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

   (a) (i) Assume the mean height of soldiers to be 68 inches with a variance of 9 inches. What is the probability that a soldier selected at random from the regiment will be more than 6 ft tall ? What is the probability that out of 5 soldiers

(*Continued*)

selected at random at least 2 of them will be more than 6 feet ?

(*ii*) The administrator of a large airport is interested in the number of aircraft departure delays that are attributable to inadequate control facilities. A random sample of 10 aircrafts take off is to be thoroughly investigated. If the true proportion of such delays in all departures is 0.04, what is the probability that 4 of the sample departures are delayed because of control inadequacies ? Also find the value of the skewness and kurtosis of the distribution and comment on the nature of the distribution. (Given $e^{-10} = 0.00005$, $e^{-4} = 0.0183$, $e^{-0.4} = 0.6703$, $e^{-0.04} = 0.9608$).

$$5 + 5$$

(*b*) (*i*) Discuss the relative advantages of sample survey over the census survey in social, business and economic enquiries.

(*ii*) What are the potential biases that can arise in sampling ? How does it arise in sampling ? $5 + (2 + 3)$

PAPER — COM 202.2

[*Marks* : 20]

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

   (a) Distinguish between—

   (i) Point estimation and interval estimation

   (ii) Type-I error and Type-II error   2 + 3

   (b) State the properties that a maximum likeli-hood estimator follows.   5

   (c) Distinguish between parametric test and non-parametric test. Write the names of any four popular non-parametric tests.   3 + 2

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

   (a) (i) What precaution would you take while applying chi-square test ?

   (ii) Contingency table below shows the return on investment (ROI) and percent of sales growth over the previous 5 years for 340 Indian firms. Test at $\alpha = .05$,

whether ROI is independent of sales growth.

	Low Growth	Medium Growth	High Growth	Total
Low ROI	36	48	28	112
Medium ROI	26	56	28	110
High ROI	18	48	52	118
Total	80	152	108	340

[Given that the table value of chi square at 5% level and for 4 degrees of freedom is 9.49; Decimal values in your calculations could be rounded off to the nearest whole number]   2 + 8

(b) (i) State the assumptions of ANOVA.

(ii) Sales of People Magazine over a 5-week period at three Outlets in Kharagpur Railway Station are given in the following table. Do the data show a significant difference in mean weekly sales in three outlets ? (Test at $\alpha = 0.05$)

	Sale		
Week	Outlet 1	Outlet 2	Outlet 3
1	102	97	89
2	106	77	91
3	105	82	75
4	115	80	106
5	112	101	94

[Given that the table value of F at 5% level of significance and for (2, 12) degrees of freedom is 3.88].   2 + 8

[*Internal Assessment — 10 Marks*]

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