PG/IIS/COM/202.1 & 202.2/23 (Old)

M.Com. 2nd Semester Examination, 2023

COMMERCE

(*Advanced Business Statistics*)

PAPER – COM-202 (Old)

Full Marks : 50

Time : 4 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 : 2×2

(*a*) For a Binomial distribution the mean and variance are 4 and 3 respectively. Calculate the probability of getting a non-zero value of this distribution.

(*b*) Which of the following statements is true or false :

(*i*) The mean of binomial distribution is np and its standard deviation is npq.

(*ii*) The mean of binomial distribution is 20 and its variance is 9

(*c*) Distinguish between Statistic and Parameter. Give examples.

(*d*) What do you mean by Stratified Random Sampling ?

2. Answer any *two* questions : 4×2

(*a*) Describe briefly the importance of probability distribution in decision making. Give an example.

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

(*c*) Briefly discuss the procedure and applica bility 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*) How many bulbs would still burning after 130 days ?

3. Answer any *one* question : 8×1

(*a*) (*i*) The incidence of a certain disease is such that on an average 20 percent of workers suffer 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. $4 + 4$

(*b*) (*i*) What do you mean by 'simple random sampling with replacement' ? How does it differ from 'simple random sampling without replacement' ? 1 + 2

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

PAPER – COM 202.2

[*Marks* : 20]

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

(*a*) What do you understand by level of significance ?

(*b*) What is statistical inference ?

(*c*) Write the names of any four methods of point estimation.

(*d*) What is a null hypothesis ?

5. Answer any *two* of the following questions : 4×2

(*a*) What do you understand by minimum variance-unbiased estimator ?

(*b*) In what respects do the non-parametric tests differ from the parametric tests ?

(*c*) In a consignment of apple, there are 200 boxes and each box contains 500 apples. One box from the lot is taken at random and the number of rotten apples in the box is found to be 20. Make an interval estimation of percentage of rotten apples in the consignement at 95% confidence level.

(*d*) State any four properties of a maximum likelihood estimator.

6. Answer any *one* of the following questions : 8×1

(*a*) (*i*) What do you understand by degree of freedom ?

(*ii*) A pack of gems chocolates produced by Nestle Ltd. contains 300 chocolates of six different colors: red, orange, yellow, green, blue and brown. A researcher is curious about whether the six colors in a pack are in equal proportion. He selected one pack of chocolate at random and counted the chocolates of different colors which was observed as follows :

Colors	Red	Orange	Yellow	Green	Blue	Brown
No. of Chocolates	62	48	65	55	40	30

Would you like to conclude that the chocolates of different colors in the pack are in equal proportion ? Test at $\alpha = 0.05$.

[Given that the table value of chi square for 5% level of significance and for 5 degrees of freedom is 11.07] 2 + 6

(*b*) (*i*) State the application of paired- *t* test.

(*ii*) A drug was administered on 10 patients and the increments of their blood pressure were recorded to be 6, 3, -2, 4, -3, 4, 0, 6, 0, 2. Is it reasonable to believe that the drug has no effect on change in blood pressure ? Use $\alpha = 0.05$

[Given that the table value *t* at 9 degree of freedom is 1.833] 2 + 6

[*Internal Assessment* — 10 Marks]