K22P 1559

Reg. No. : .....

Name : .....

I Semester M.Com. Degree (CBSS – Reg./Sup./Imp.)
Examination, October 2022
(2019 Admission Onwards)
COM1C02 – QUANTITATIVE TECHNIQUES AND OPERATION RESEARCH

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **any four** questions in this Section. **Each** question carries **1** mark for Part (**a**), **3** marks for Part (**b**) and **5** marks for Part (**c**).

1. a) Define conditional probability.
   b) State addition and multiplication theorems on probability. Illustrate them using an example.
   c) A husband and wife appear in an interview for two vacancies in the same post. The probability of the husband's selection is 1/7 and that of the wife is 1/5. What is the probability that
      i) both of them will be selected
      ii) only one of them will be selected
      iii) none of them will be selected.

2. a) Explain Poisson Distribution.
   b) State the salient features of Binomial Distribution.
   c) Five coins are tossed 3200 times; find the frequencies of the distribution of heads and tails and tabulate the results. Calculate the mean number of successes and standard deviations.

3. a) What do you mean by an error in the hypothesis ?
   b) What do you mean by a hypothesis ? Define it and outline its essential characteristics.
   c) A sample of 30 girls married early gives an average life of 55 years with a standard deviation of 10 years. From this, can we conclude at a 5% significance level that the early married women live upto 65 years on average ?

P.T.O.

4. a) What is a linear programming problem ?

   b) Explain any five applications of LLP in management.

   c) Explain the steps in solving LLP using the graphic method.

5. a) What is network analysis ? When is it used ?

   b) Explain the steps involved in the Critical Path Method.

   c) Distinguish between PERT and CPM.

6. a) Write a necessary and sufficient condition for the existence of a feasible solution to the general transportation problem.

   b) What is an assignment problem ? How does it differ from a transportation problem ?

   c) Explain the terms standard error, level of significance and rejection region in the context of testing of hypothesis. **(4×9=36)**

SECTION – B

Answer **any two** questions in this Section. **Each** question carries **12** marks.

7. a) In a random sample of 100 men are taken from a village A, 60 were found to be consuming alcohol. In other sample of 200 men are taken from village B, 100 were found to be consuming alcohol. Do the two villages differ significantly in respect of the proportion of men who consume alcohol ?

   OR

   b) i) A company finds that the time taken by one of its engineers to complete a repair job has a normal distribution with a mean of 40 minutes and a standard deviation of 5 minutes. State what proportion of jobs take :

      1) less than 35 minutes

      2) more than 48 minutes.

   ii) The company charges Rs. 20 if the job takes less than 35 minutes, Rs. 40 if it takes between 35 and 48 minutes and Rs. 70 if it takes more than 48 minutes. Find the average charge for a repair job.

8. a) A project has the following schedule

Activity	1 – 2	1 – 6	2 – 3	2 – 4	3 – 5	4 – 5	6 – 7	5 – 8	7 – 8
Duration (in days)	7	6	14	5	11	7	11	4	8

Construct network and compute :

i) EST, LST, EFT and LFT of the activities.

ii) Critical path and its duration.

OR

b) When modifying a plant layout of a factor, four new machines, M_1, M_2, M_3 and M_4 are to be installed in a machine shop. Five vacant places, A, B, C, D and E, are available. Because of limited space, M_2 cannot be placed at C and M_3 cannot be placed at A. The cost of locating places for machines is shown below. Find the optimal assignment schedule and which space remains vacant after the assignment.

	A	**B**	**C**	**D**	**E**
M_1	9	11	15	10	11
M_2	12	9	–	10	9
M_3	–	11	14	11	7
M_4	14	8	12	7	8

(2×12=24)