



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 :

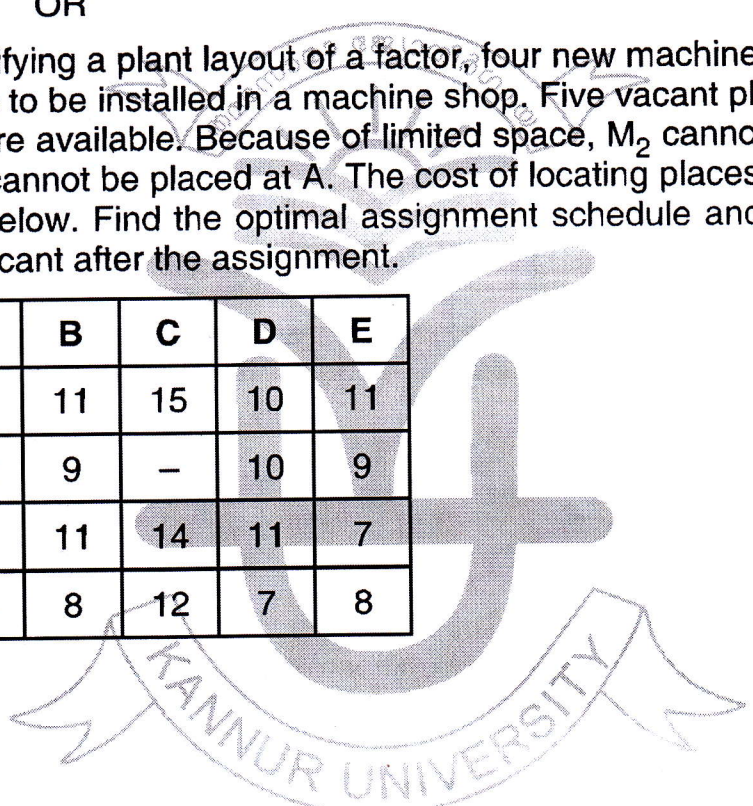
- i) EST, LST, EFT and LFT of the activities.
- ii) Critical path and its duration.

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

(2x12=24)





K21P 4167

Reg. No. :

Name :

**I Semester M.Com. Degree (CBSS – Reg./Supple./Imp.)
Examination, October 2021
(2018 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) What do you mean by degree of freedom ?
b) What do you mean by level of significance ?
c) Explain Type I error and Type II error.
2. a) What is multiplication or compound probability theorem ?
b) What is Bayes' theorem or inverse probability rule ?
c) Explain characteristics of Binomial distribution.
3. a) Explain Poisson distribution.
b) Explain the exponential distribution.
c) The following mistakes per page were observed in a book :

Number of mistakes per page	0	1	2	3
	211	90	19	5

Fit a Poisson distribution to find the theoretical frequencies.
4. a) What do you mean by multiple solutions in linear programming ?
b) Expand and explain LPP.
c) What do you mean by degeneracy in LPP ? Explain how it can be solved.

P.T.O.

K21P 4167



5. a) What is critical activity in network analysis ?
b) Expand and explain the acronym of CPM and PERT and contrast it.
c) Differentiate between Standard Error and Standard Deviation.
6. a) Explain one tailed or two tailed tests.
b) Differentiate between Standard Error and Standard Deviation.
c) Explain Null and alternative hypothesis.

SECTION – B

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

7. a) A random sample of 200 villages was taken from district A and average proportion per village was 485 with SD 50. Another village random sample of 250 villages from the same district gave an average population of 510 per village with SD of 40. Is this difference between the averages of these of the two samples statistically significant ?

OR

- b) Briefly explain the different models of operations research.
8. a) A company manufactures two products X and Y on two facilities A and B. The data collected by the analyst is presented in the form of inequalities. Find the optimal product mix for maximizing the profit.

Maximize $Z = 6x - 2y$ S.T. Writing in the equation form :

Maximize $Z = 6x - 2y$ S.T.

$$2x - 1y \leq 2$$

$$2x - 1y = 2$$

$$1x + 0y \leq 3 \text{ and both } x \text{ and } y \text{ are } \geq 0$$

$$1x + 0y = 3 \text{ and both } x \text{ and } y \text{ are } \geq 0$$

OR

- b) What you mean by float ? Explain the different types of float.
-



K21P 0510

Reg. No. :

Name :

**First Semester M.Com. Degree (CBSS – Reg./Suppl. (Including Mercy
Chance)/Imp.) Examination, October 2020
(2014 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 Random Experiment.
b) What are the general characteristics of Poisson distribution ?
c) A card is drawn from a pack of cards. What is the probability that it is a spade king ?
2. a) State Addition theorem of probability.
b) State the salient features of Binomial distribution.
c) Three coins whose two faces are marked 1 and 2 are thrown. Find the expectation of the number obtained.
3. a) Define an 'event'.
b) State four limitations of Operations Research.
c) Distinguish between CPM and PERT.
4. a) What is standard error ?
b) When and for what purpose 't' test is used ?
c) What is LPP ? What are the major limitation ?
5. a) What are type I and type II errors ?
b) Distinguish between one tailed and two tailed tests.

P.T.O.



c) Draw the network diagram to the following activities.....

Activity (i, j) Time duration

1 - 2	2
1 - 3	4
1 - 4	3
2 - 5	1
3 - 5	6
4 - 6	5
5 - 6	7

6. a) What is dummy activity ?
 b) Distinguish between 'slack' and 'float'.
 c) What are the uses of t-test ? **(4×9=36)**

SECTION - B

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

7. a) In a test given to two groups of students the marks obtained were as follow :

Group I :	18	20	36	50	49	36	34	49	41
Group II :	29	26	28	35	35	44	46		

Assuming that the group standard deviations are the same and that the marks normally distributed, test the hypothesis that the group means are equal.

OR

b) Between the hours of 2 and 4 P.M. the average number of phone calls per minute coming into the switch board of a company is 2.5. Find the probability that during one particular minute there will be (i) no phone call at all (ii) at least 5 calls.

Given ($e^{-2} = 0.13534$ and $e^{-0.5} = 0.6065$)



8. a) Solve graphically the following linear programming problem.

Minimize : $Z = 3x_1 + 5x_2$
Subject to $-3x_1 + 4x_2 \leq 12$
 $2x_1 - x_2 \geq -2$
 $2x_1 + 3x_2 \geq 12$
 $x_1 \leq 4, x_2 \geq 2$
 $x_1, x_2 \geq 0.$

OR

b) The following table gives the activities in a construction project and other relevant information :

Activity :	1 - 2	1 - 3	2 - 3	2 - 4	3 - 4	4 - 5
Duration :	20	25	10	12	6	10

- i) Draw the network for the project.
- ii) Find free, total and independent floats for each activity.
- iii) Which are the critical activities ?

(2x12=24)



M 26599

Reg. No. :

Name :

I Semester M.A./M.Sc./M.Com. Degree (Reg./Supple./Imp.) Examination,
 November 2014
COMMERCE
 (2014 Admn. – under CBSS)

COM1C02 : Quantitative Techniques & Operation Research

Time : 3 Hours

Max. Marks : 60

- Instructions :** 1) Answer **any 4** bunches of questions from **6** bunches of questions in **Section A**.
 2) Answer **any one** question **each** from the **2** sets of questions in **Section B**.

SECTION – A

1. a) What do you mean by a Random experiment ? 1
- b) Construct a network diagram from the following data : 3
 Activities A, B and C can start simultaneously
 A precedes D, I
 B precedes G, F
 D precedes G, F
 C precedes E
 E precedes H, K
 F precedes H, K
 G, H precedes J
- c) A systematic sample of 200 pages was taken from a dictionary and the observed frequency distribution of foreign words per page was found to be as follows. Calculate the expected frequencies using Poisson Distribution. 5

No. of foreign words per page (x)	0	1	2	3	4
Frequency (f)	109	65	22	3	1

P.T.O.



2. a) What do you mean by a standard normal distribution ? 1

b) An Electric company produces 2 products-X and Y. Products produced are sold on weekly basis. The weekly production cannot exceed 70 for product X and 55 for product Y because of limited available facilities. The company employs total of 80 workers. Product X requires 3 man weeks of labour, while Y requires one man week of labour. Profit margin on X is 40 and on Y is 60. Formulate a LPP to maximise profit. 3

c) Explain the steps involved in testing hypothesis. 5

3. a) What do you mean by standard error ? 1

b) The odds against X solving a mathematical problem are 9 to 5 and odds in favour of student Y solving the same problem are 15 to 13. What is the probability that the problem is solved ? 3

c) The following table gives the activities in a construction project and other relevant information.

Activity	1-2	1-3	2-3	2-4	3-4
Duration	20	25	10	12	6

i) Draw a network diagram.

ii) Find total and free floats for each activity. 5

4. a) Define Operations Research. 1

b) Distinguish between one tailed and two tailed tests. 3

c) A small project is composed of seven activities whose time estimates are given below-

Activity	Event	Optimistic time	Most likely time	Pessimistic time
A	1-2	6	6	24
B	1-3	6	12	18
C	1-4	12	12	30
D	2-5	6	6	6
E	3-5	12	30	48
F	4-6	12	30	42
G	5-6	18	30	54

Draw a network diagram and calculate expected project duration and variance of project length. 5



- 5. a) What is a feasible solution in Linear Programming Problems ? 1
- b) Outline the main features of Operations Research. 3
- c) On inspection of random sample of 300 items produced by a machine, 20 are found to be defective. Does this justify the assumption that the machine is producing 2% defective items on an average. 5

- 6. a) What is free float ? 1
- b) The mean height of the students of a certain college is 64" with a standard deviation of 2". How many of the said college consisting of 5000 students would you expect to be over 5 feet height. 3
- c) Define : 5
 - i) Sample point
 - ii) Sample space
 - iii) Equally likely events
 - iv) Mutually exclusive events
 - v) Dependent events.

SECTION - B

- 7. a) Fit a normal curve to the following data and calculate the theoretical frequencies by the area method. 12

X :	60 - 65	65 - 70	70 - 75	75 - 80	80 - 85	85 - 90	90 - 95	95 - 100
F :	3	21	150	335	326	135	26	4

OR

- b) The following data relate to the yield of four varieties of wheat each sown on 5 plots. Find whether there is a significant difference between the mean yield of these varieties.

Plot	A	B	C	D
1	17	10	13	9
2	9	5	16	11
3	7	15	17	9
4	13	12	10	8
5	19	13	14	13

12



8. a) A company manufactures two products A and B. The contribution per kg of output is ₹ 240 and ₹ 140 respectively for product A and B. The total fixed costs amounts to ₹ 1,200 per week.

	Product A	Product B	Total quantity available per week
P	16	20	160
Raw materials Q	10	25	150
R	4	0	32

Using the graphical approach of Linear programming, calculate the maximum profit per week.

12

OR

- b) A random sample of 10 items gives a Mean of 3 with a sum of the squares of deviations from the Mean of 25. From this can it be said that at 95% and 99% probability level that the sample is from a population having a Mean of 4. Also determine the fiducial limits of the population mean at the above two confidence levels.

12

SECTION - B

7. a) Fit a normal curve to the following data and calculate the theoretical frequencies by the area method.

X	f
60-65	3
65-70	21
70-75	150
75-80	385
80-85	358
85-90	135
90-95	15
95-100	4

b) The following data relate to the yield of four varieties of wheat each sown on 5 plots. Find whether there is a significant difference between the mean yield of these varieties.

Plot	A	B	C	D
1	17	10	10	9
2	9	2	11	11
3	7	18	17	9
4	13	12	10	8
5	19	13	14	13

Draw a network diagram and calculate expected project duration and variance of project length.



K15P 0323

Reg. No. :

Name :

I Semester M.Com. Degree (Reg./Sup./Imp.)

Examination, November 2015

(2014 Admn. Onwards)

COMMERCE

COM 1C02 : Quantitative Techniques and Operation Research

Time : 3 Hours

Max. Marks : 60

Instructions : 1) Answer **any 4** bunches of questions from **6** bunches of questions in Section – A.

2) Answer **any one** question **each** from the **2** sets of questions in Section – B.

SECTION – A

1. a) Define a Poisson Distribution. 1
- b) Explain the management application of Linear Programming Problems. 3
- c) A talcum powder manufacturing company was distributing a particular brand of talcum powder through a large number of retail shops. Before a heavy advertisement campaign, the mean sales per week per shop were 100 dozens. After the campaign, a sample of 10 shops was taken and the mean sales were found to 120 dozen with standard deviation of 10. Can you consider the advertisement effective ? 5
2. a) Differentiate between a parameter and a statistic. 1
- b) A committee of 5 is to be formed from a group of 8 boys and 7 girls. Find the probability that the committee consists of :
 - i) 3 boys and 2 girls
 - ii) Atleast one girls. 3
- c) Write notes on :
 - i) Type I and Type II error
 - ii) Addition theorem
 - iii) Mutually exclusive and exhaustive events. 5

P.T.O.



3. a) What do you mean by Null Hypothesis ? 1
- b) A food manufacturing company must produce atleast 350 kg of a mixture consisting of ingredients A and B daily. A cost ₹ 6 per kg and B costs ₹ 15 per kg. Not more than 200 kg of A can be used and atleast 150 kg of B must be used. Formulate a LPP to minimise cost. 3
- c) A speaks truth in 65% cases and B in 90% cases. In what percentage of cases are likely to contradict each other in stating the same fact. 5
4. a) What is an iconic model ? 1
- b) The distribution of marks obtained by a group of students is normal with mean 70 marks and standard deviation 5 marks. Estimate the percentage of students with marks below 63. 3
- c) The following table shows the jobs of a network along with their time estimates. The time estimates are in days :
- | Job | 1-2 | 1-6 | 2-3 | 2-4 | 3-5 | 4-5 | 5-8 | 6-7 | 7-8 |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Optimistic | 3 | 2 | 6 | 2 | 5 | 3 | 1 | 3 | 4 |
| Most likely | 6 | 5 | 12 | 5 | 11 | 6 | 4 | 9 | 19 |
| Pessimistic | 15 | 14 | 30 | 8 | 17 | 15 | 7 | 27 | 28 |
- Draw a project network and find critical path and project duration. 5
5. a) What is slack ? 1
- b) Draw a network diagram to the following activities : 3
- | Activities | A | B | C | D | E | F | G | H | I | J |
|----------------------|---|---|---|---|---|---|------|------|---|------|
| Pre-requisite | - | - | A | B | A | B | C, D | G, F | E | H, I |
- c) From the production process which turns 10% defectives on an average, a sample of size 5 is drawn. Using Binomial Distribution model find the probability that the sample contains :
- No defective
 - At most one defective
 - Atleast one defective
 - Exactly 3 defectives.
- 5
6. a) List any 2 assumptions of LPP. 1
- b) What are the uses of 't' distribution. 3



c) Solve the following LPP graphically :

Maximise $Z = 5x_1 + 3x_2$
Subject to $2x_1 + x_2 \leq 1000$
 $x_1 \leq 400$
 $x_2 \leq 700$
 $x_1, x_2 \geq 0.$

5

SECTION – B

7. a) Set up an analysis of variance table for the following per acre production data for 3 varieties of wheat, each grown on 4 plots and state if the variety differences are significant :

12

Per acre production data

Plot of land	Variety of wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

OR

b) Using the area method, find the frequencies of the normal distribution which has the same mean, same standard deviation and the same total of frequencies as the distribution given below :

12

X :	60 – 65	65 – 70	70 – 75	75 – 80	80 – 85	85 – 90	90 – 95	95 – 100
f :	3	21	150	335	326	135	26	4

8. a) Explain the various tools and techniques used in Operations Research.

12

OR

b) Bharath Electric Company produces 2 products P_1 and P_2 . Products are produced and sold on weekly basis. The weekly production cannot exceed 25 for product P_1 and 35 for product P_2 because of limited available facilities. The company employs total 60 workers. Product P_1 requires 2 man weeks of labour, while P_2 requires one man weeks of labour. Profit margin on P_1 and P_2 is ₹ 60 and ₹ 40 respectively. Formulate LPP and solve graphically for maximising profit.

12



Reg. No. :

Name :

First Semester M.Com. Degree (Reg./Suppl./Imp.)
Examination, October 2017
(2014 Admission Onwards)
COM1C02 : QUANTITATIVE TECHNIQUES AND OPERATION
RESEARCH

Time : 3 Hours

Max. Marks : 60

- Instructions :** 1) Answer **any 4** bunches of questions from **6** bunches of questions in Section – A.
- 2) Answer **any one** question **each** from the **2** sets of questions in Section B.

SECTION – A

1. a) What is Random variable ? 1
- b) Explain the characteristics of Operation Research. 3
- c) Test whether Son's eye colour and Father's eye colour are associated. 5

	Father's eye colour	Son's eye colour	Total
Not light	230	148	378
Light	151	471	622
Total	381	619	1000

2. a) What is level of significance ? 1
- b) A speaks truth in 70% cases and B in 85% cases. In what percentage of cases are they likely to contradict each other in stating the same fact ? 3
- c) Briefly explain the features of normal distribution. 5
3. a) What is sample point ? 1
- b) What are the difference between surplus variables and slack variables ? 3
- c) It is claimed that a random sample of 100 tyres with a mean life of 15269 km is drawn from a population of tyres which has a mean life of 15200 km and S.D. of 1248 km. Test the validity of the claim. 5



4. a) What is Critical Activity ? 1
- b) Briefly explain PERT and CPM. 3
- c) Mean and S.D. of a project duration are 300 and 100 days respectively. Find the probability for (a) Completing the project within 417 days (b) Not completing within 417 days. 5
5. a) What is Linear Programming ? 1
- b) What are the basic assumptions of Linear Programming Problems. 3
- c) Draw the network diagram to the following activities. 5

Activity	Time Duration
1 - 2	2
1 - 3	4
1 - 4	3
2 - 5	1
3 - 5	6
4 - 6	5
5 - 6	7

6. a) What is sampling distribution ? 1
- b) Difference between two tailed tests and one tailed tests. 3
- c) A problem in statistics is given to three students, namely A, B and C, whether the chances of solving it are $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{5}$, what is the probability that the problem is solved ? 5

(4×9=36)



SECTION – B

7. a) Results of a common test given to a number of students belonging to four schools, are given below. Make a analysis of variance of the data.

Schools			
A	B	C	D
16	24	36	26
20	22	24	18
24	18	32	24
16	28	12	32
14	8	16	30

OR

b) It is known from the past experience that in a certain plant there are on the average of 4 industrial accidents per month. Find the probability that in a given year there will be less than 4 accidents. Assume Poisson distribution. 12

8. a) Solve the L.P.P.

$$\text{Max. } Z = 2x_1 + 3x_2$$

Subject to

$$x_1 + x_2 \leq 30$$

$$x_2 \geq 3$$

$$0 \leq x_2 \leq 12$$

$$x_1 - x_2 \leq 0$$

$$0 \leq x_1 \leq 20.$$

OR

b) What is Operation Research ? What are the applications of Operation Research. 12

(2x12=24)

Reg. No. :

Name :

First Semester M.Com. Degree (Reg./Supple./Imp.)
Examination, October 2018
(2014 Admn. Onwards)
COM 1C02 : QUANTITATIVE TECHNIQUES AND OPERATIONS
RESEARCH

Time : 3 Hours

Max. Marks : 60

SECTION – A

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

1. a) What is expectation of a random variable ?
b) State the density function of a discrete random variable.
c) In the game of rolling two dice simultaneously, a person is to get as many rupees as the sum of the numbers on the faces of the two dice. What is the mathematical expectation of his earnings ?
2. a) What are static models ?
b) Discuss in brief the role of OR models in decision making.
c) Discuss the various phases in solving an OR problem.
3. a) What is sample space ?
b) State Baye's theorem.
c) An illiterate servant is given 5 cards addressed to 5 different persons residing in the same city. What is the probability that the servant hands over the card to a wrong person ?
4. a) What is level of significance ?
b) When and for what purpose 'z' test is used ?
c) Explain the procedure for testing statistical hypothesis.



5. a) Define a Poisson distribution.
 - b) State the properties of Poisson distribution.
 - c) Five coins are tossed 3200 times. Find the expected frequencies of heads. Also calculate mean and standard deviation.
6. a) What is dummy activity ?
 - b) Distinguish between CPM and PERT.
 - c) State the practical applications of network techniques. (4×9=36)

SECTION – B

Answer the **two** questions. **Each** question carries **12** marks.

7. a) Solve the following LPP graphically.

$$\text{Maximise } z = 8000x_1 + 7000x_2$$

$$\text{Subject to } 3x_1 + x_2 \leq 66 ;$$

$$x_1 + x_2 \leq 45 ;$$

$$x_1 \leq 20 ; x_2 \leq 40 ;$$

$$x_1, x_2 \geq 0$$

OR

- b) The following table lists the jobs of a network with their estimates.

Job	Duration (days)		
	Optimistic	Most likely	Pessimistic
(1-2)	3	6	15
(1-6)	2	5	14
(2-3)	6	12	30
(2-4)	2	5	8
(3-5)	5	11	17
(4-5)	3	6	15
(6-7)	3	9	27
(5-8)	1	4	7
(7-8)	4	19	28

- a) Draw the project network.
- b) Calculate the length and variance of the critical path and
- c) What is the approximate probability that the jobs on the critical path will be completed in 41 days.



8. a) The following table gives the number of units manufactured per day by two employees A and B for a number of days.

Worker A	41	38	39	40	34	39	33	32
Worker B	38	41	35	40	30	38		

Should these results be accepted as evidence that the two employees are equally stable ? (Use F test).

OR

- b) In test given to two groups of workers, the scores obtained were as follows.

Group I	44	46	35	30	29	26	28			
Group II	49	50	36	41	49	36	29	26	34	28

Assuming that the group standard deviations are the same and that the scores are normally distributed, test the hypothesis that the group means are equal. Use 0.05 level of significance. (2×12=24)



0028983

K19P 1469

Reg. No. :

Name :

I Semester M.Com. Degree (CBSS-Reg./Suppl./Imp.)

Examination, October - 2019

(2014 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) **(4×9=36)**

1.
 - a) State Baye's theorem.
 - b) What is LPP?
 - c) A bag contains 7 white and 9 black balls. 3 balls are drawn together. What is the probability that
 - i) all are black
 - ii) all are white
 - iii) 1 white and 2 black
 - iv) 2 white and 1 black
2.
 - a) Define expectation of a random variable.
 - b) How does Poisson distribution differs from Binomial distribution?
 - c) If 3% of electric bulbs manufactured by a company are defective, find the probability that in a sample of 100 bulbs, exactly five bulbs are defective.
3.
 - a) What is level of significance?
 - b) What is Critical Path Method?
 - c) What are the assumptions in formulating LPP?

P.T.O.



4. a) What is Operations Research?
b) Find the expected value of the number of heads when two coins are tossed.
c) What are the different types of floats?
5. a) Define a Poisson distribution.
b) What are the uses of Z-test?
c) Explain the terms standard error, level of significance and rejection region in the context of testing of hypothesis.
6. a) What is PERT?
b) Briefly explain different phases in the application of network technique.
c) Construct a network diagram.

Activity	:	A	B	C	D	E	F
Predecessor	:	-	A	A	B	C	D&E

SECTION-B

Answer the **Two** questions in this section. Each question carries **12** marks.
(2×12=24)

7. a) Eight coins were tossed together 256 times. Find the expected frequencies of Heads. Find mean and SD.
- (OR)
- b) Solve graphically:

$$\begin{aligned} \text{Maximise } & Z = 9x + 10y \\ \text{Subject to } & 11x + 9y \leq 9900 \\ & 7x + 12y \leq 8400 \\ & 6x + 16y \leq 9600 \\ & \text{Where } x \geq 0, y \geq 0. \end{aligned}$$



(3)

K19P 1469

8. a) A project has the following time schedule.

Activity :	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Duration :	2	2	1	4	8	5	3	1	5	4	3

Construct Network and compute (1) EST, LST, EFT and LFT of the activities
(2) Total float for each activity (3) Critical path and its duration.

(OR)

b) In a certain district A, 450 persons were considered regular consumers of tea out of a sample of 1000 persons. In another district B, 400 were regular consumers of tea out of a sample of 800 persons. Do these facts reveal a significant difference between the two districts as far as tea drinking habit is concerned?
