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 :

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 3

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 :
      i) Sample point
      ii) Sample space
      iii) Equally likely events
      iv) Mutually exclusive events
      v) Dependent events. 5

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

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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
Raw materials	P	16	20	160
	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**
