B.Com. DEGREE EXAMINATION,NOVEMBER 2018
I Year II Semester
Allied - Paper II
BUSINESS STATISTICS AND OPERATIONS RESEARCH-II

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. A Sub-committee of 6 members is to be formed out of a group consisting of 7 men and 4 women. Calculate the probability that the sub-committee will consist of exactly 2 women.
2. If a pair of dice is thrown, find the probability that the sum is neither 7 nor 11.
3. Define sample.
4. Define Chi-Square distribution.
5. Define Unbalanced assignment problem.
6. Define critical path.
7. State Addition theorem of probability.
8. Construct a network for the project whose activities and their precedence relationships are as given below:

Activities	A	B	C	D	E	F	G	H	I
Immediate Predecessor	-	A	A	-	D	B,C,E	F	D	G,H

9. X is a normal variate with mean 30 and S.D. 5. Find the probability that $|X - 30| > 5$.
10. Obtain an initial basic feasible solution to the following transportation problem using least cost method.

	D1	D2	D3	D4	Supply
O1	1	2	3	4	6
O2	4	3	2	0	8
O3	0	2	2	1	10
Demand	4	6	8	6	24

11. A random sample of 10 boys had the following I.Q.'s: 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean I.Q. of 100?
12. A project schedule has the following characteristics:

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time (days)	4	1	1	1	6	5	4	8	1	2	5	7

Compute the earliest event time and latest event time.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. There are 1000 students in a college; 400 of them are in Tamil medium (T) while others are in English medium (E). Also among these 1000 students, 700 have taken Science Course (S) and others art courses (A). There are 200 in Science course with Tamil medium. A student is selected at random and is found to be from Science course. What is the probability that he/she is in English medium?

14. What are the types of Sampling?

15. The following table gives the classification of 100 workers according to sex, and the nature of work. Test whether nature of work is independent of the sex of the worker.(Five percent value of Chi-square with 1 d.f. is 3.841).

	Skilled	Unskilled	Total
Male	40	20	60
Female	10	30	40

16. Below are given the gain in weights (in kgs.) of pigs fed on two diets A and B.

    Gain in weight

    Diet A: 25, 32, 30, 34, 24, 14, 32, 24, 30, 31, 35, 25

    Diet B: 44, 34, 22, 10, 47, 31, 40, 30, 32, 35, 18, 21, 35, 29, 22

    Test if the two diets differ significantly as regards their effect on increase in weight.

17. Solve the following transportation problem to maximise the profit.

	A	B	C	D	Supply
1	15	51	42	33	23
2	80	42	26	81	44
3	90	40	66	60	33
Demand	23	31	16	30	100

18. A company has 5 jobs to be done on five machines. Any job can be done on any machine. The cost of doing the job in different machines are given below. Assign the jobs for different machines so as to minimize the total cost.

Jobs	Machines				
	A	B	C	D	E
1	13	8	16	18	19
2	9	15	24	9	12
3	12	9	4	4	4
4	6	12	10	8	13
5	15	17	18	12	20

19. The following table shows the jobs of a network along with their time estimates.

Job	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
a (days)	1	2	2	2	7	5	5	3	8
m (“)	7	5	14	5	10	5	8	3	17
b (“)	13	14	26	8	19	17	29	9	32

Draw the project network and find the probability that the project is completed in 40 days.

Section C $(2 \times 15 = 30)$ Marks

Answer any **TWO** questions

20. A bag contains 4 white and 6 black balls. Two balls are drawn at random. What is the probability that

    a) both are white b) both are black c) one white and one black.

21. Let X be normally distributed with mean 8 and standard deviation 4. Find

    a) $P(5 \leq X \leq 10)$, b) $P(10 \leq X \leq 15)$, c) $P(X \geq 15)$ and d) $P(X \leq 5)$.

22. A travelling salesman has to visit 5 cities. He wishes to start from a particular city, visit each city once and then return to his starting point. Cost of going from one city to another is shown below. Find the least cost route.

$$\begin{array}{cc} & \text{To city} \\ & \begin{array}{ccccc} \text{A} & \text{B} & \text{C} & \text{D} & \text{E} \end{array} \\ \text{From city} & \begin{array}{c} A \\ B \\ C \\ D \\ E \end{array} \begin{bmatrix} \infty & 4 & 10 & 14 & 2 \\ 12 & \infty & 6 & 10 & 4 \\ 16 & 14 & \infty & 8 & 14 \\ 24 & 8 & 12 & \infty & 10 \\ 2 & 6 & 4 & 16 & \infty \end{bmatrix} \end{array}$$

23. For a project consisting of the following activities,

Job	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration (days)	15	15	3	5	8	12	1	14	3	14

    a) Draw an arrow diagram representing the project.

    b) Find the total float for each activity.

    c) Find the critical path and the total project duration.