

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.

B.Com. - END SEMESTER EXAMINATIONS - APRIL 2025

SEMESTER - III

23UCOCT3007 - Business Statistics and Operations Research-II

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. A bag contains 8 white and 4 red balls. Five balls are drawn at random. What is the probability that 2 of them are red and 3 white?
2. Assuming a four-yearly cycle calculate the trend by the method of moving averages from the following data relating to the production of tea in India.

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Production	464	515	518	467	502	540	557	571	586	612

3. A company manufacturing three items A,B and C. these items are processed on three machines M1,M2 and M3. The time required for each product in each machine is given below. Also the total time of availability of each machine is given.

Machine	Time per unit (hours)			Availability of the machine hr/day
	A	B	C	
M1	1	1.5	2	18
M2	2	1	1	20
M3	1	2	2	16

The company gets a profit of Rs.30 and Rs.40 per unit of A,B and C respectively. Determine the number of units of each product to be manufactured per day in order that the total profit is maximum.

4. Draw a network for the following set of activities

Activity	A	B	C	D	E	F	G	H	I
Immediate predecessor	-	-	-	A	B,C	A	C	D,E,F	D

5. The sum of 20 observations is 300, its sum of squares is 5000 and median is 15. Find the coefficient of skewness and coefficient of variation.
6. Classify the components of time series.

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7. Solve graphically Minimize $Z = 5x_1 + 2x_2$ Subject to the constraints
- $$3x_1 + x_2 \geq 3$$
- $$3x_1 - 2x_2 \leq 6$$
- $$x_1 + x_2 \leq 4$$
- $$x_1, x_2 \geq 0.$$

8. Find the critical path of a project having the tasks as given below:

Job	Time	Job	Time
(1,2)	2	(5,8)	5
(2,3)	7	(6,7)	8
(2,4)	3	(6,10)	4
(3,4)	3	(7,9)	4
(3,5)	5	(8,9)	1
(4,6)	3	(9,10)	7

Section C

Answer any **THREE** questions ($3 \times 10 = 30$ Marks)

9. A and B play for a prize of Rs. 1000. A is to throw a dice first and is to win if he throws 6. If he fails B is to throw and is to win if he throws 6 or 5. If he fails, A is to throw again and to win if the throws 6,5 or 4 and so on. Find their respective expectations.
10. Find the standard deviation and coefficient of skewness for the given distribution.

Variables	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
frequency	2	5	7	13	21	16	8	3

11. Compute the average seasonal movement for the following series.

Year	Quarterly production			
	I	II	III	IV
2011	3.5	3.9	3.4	3.6
2012	3.5	4.1	3.7	4.0
2013	3.5	3.9	3.7	4.2
2014	4.0	4.6	3.8	4.5
2015	4.1	4.4	4.2	4.5

12. A Manufacturing of furniture makes chairs and tables. Processing of these product is done on two machines A and B. A chair requires 2 hours on machine A and 6 hours on B. A table requires 5 hours on A and 6 hours on B. There are 16 hours of time available on machine A and 30 hours on machine B. At the most 4 chairs are to be manufactured. The manufacturer gets a profit of Rs.50 on a chair and Rs.100 on a table. Determine the number of chairs and tables to be manufactured so as to maximise the profit.

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13. A project consists of the following activities and time estimates.

Activity	Estimated duration in weeks		
	Optimistic	Most likely	Pessimistic
(1,2)	1	1	7
(1,3)	1	4	7
(1,4)	2	2	8
(2,5)	1	1	1
(3,5)	2	5	14
(4,6)	2	5	8
(5,6)	3	6	15

- (i) Draw the network
- (ii) Find the expected time and variance for each activity.
- (iii) What is the probability that the project will be completed 4 weeks earlier than the expected time?
- (iv) What is the probability that the project will be completed in 19 weeks?
