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.(A&F) END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - II
20UAFAT2002 - **Operations Research**

Total Duration : 2 Hrs. 30 Mins.   Total Marks : 60

Section B

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

1. Discuss the usefulness of OR in decision making process.

2. A company has three operational departments (weaving, processing and packing) with capacity to produce three different types of clothes namely suitings, shirtings and woollens yielding a profit of Rs.2, Rs.4 and Rs.3 per metre respectively. One metre of suiting requires 3 minutes in weaving, 2 minutes in processing and 1 minute in packing. Similarly one metre of shirting requires 4 minutes in weaving, 1 minute in processing and 3 minutes in packing. One metre of woollen requires 3 minutes in each department. In a week, total run time of each department is 60, 40 and 80 hours for weaving, processing and packing respectively. Formulate the linear programming problem to find the product mix to maximize the profit.

3. Use Vogel's Approximation method to obtain an initial basic feasible solution of the transportation problem:

	D	E	F	G	**Available**
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

4. A department head has four subordinates, and four tasks to be performed. The subordinates differ in efficiency, and the tasks differ in their intrinsic difficulty. His estimate, of the time each men would take to perform each task, is given in the matrix below

Task	Men			
	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allocated, one to a man, so as to minimize the total man – hours?   **Contd...**

5. Draw a network diagram for the following data

Activity	A	B	C	D	E	F	G	H	I	J
Preceding Activities	None	A	A	B	A	B,E	C	D,F	G	H,I

6. Explain the single channel and multi – channel queueing models.

7. A TV repairman finds that the time spent on his jobs has an Exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 – hour day, what is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in?

8. A supermarket has two girls serving at the counters. The customers arrive in a poisson fashion at the rate of 12 per hour. The service time for each customer is exponential with mean 6 minutes. Find the probability that an arriving customer has to wait for service.

Section C

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

9. Give a brief account on Queuing model. State the characteristics and applications of Queuing model.

10. Solve the following L.P.P by simplex method:
Maximise $Z = 3x_1 + 2x_2 + x_3$
subject to the constraints:
$2x_1 + 5x_2 + x_3 = 12$
$3x_1 + 4x_2 = 11$
$x_2, x_3 > 0$ and x_1 unrestricted.

11. Consider the following transportation problem:

Source	Destination				Availability
	1	2	3	4	
1	20	22	17	4	120
2	24	37	9	7	70
3	32	37	20	15	50
Requirement	60	40	30	110	240

Determine an initial feasible solution using the (a) row minima method, and (b) Vogel's approximation method.

12. Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do each job is known and given in the following table:

Men		Jobs				
		I	II	III	IV	V
	A	2	9	2	7	1
	B	6	8	7	6	1
	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

Find the assignment of men to jobs that will minimize the total time taken.

13. A project has the following time schedule:

Activity	Time in weeks	Activity	Time in weeks
1 – 2	2	4 – 6	3
1 – 3	2	5 – 8	1
1 – 4	1	6 – 9	5
2 – 5	4	7 – 8	4
3 – 6	8	8 – 9	3
3 – 7	5		

Construct PERT network and compute:

(i) Total float for each activity and (ii) Critical path and its duration.

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