Reg. No. : .....

Code No. : 8539 **Sub. Code : PKCM 22/ ZKCM 22**

M.Com. (CBCS) DEGREE EXAMINATION, APRIL 2022

Second Semester

Commerce — Core

QUANTITATIVE TECHNIQUES FOR DECISION MAKING

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Operations research has the characteristics that it is done by a team of

(a) scientists (b) mathematicians

(c) academicians (d) all of the above

2. If the feasible region of a LPP is empty the solution is

(a) In feasible (b) Un bounded

(c) Alternative (d) None of the above

3. Transportation algorithm can be used for ministry the transportation cost of – from 0 origin and destinatury

(a) Goods (b) Products

(c) Items (d) None of the above

4. What do we apply inorder to determine the optimum solution

(a) LPP (b) VAM

(c) MODI method (d) None of the above

5. Assignment problem helps to find a maximum weight identical in nature in a weighted ————

(a) Tripartite graph (b) Bipartite graph

(c) Partite graph (d) None of the above

6. Probabilistic models are also known as

(a) Deterministic models

(b) Stochastic models

(c) Dynamic models

(d) Static models

7. Replacement model is a

(a) Static models (b) Dynamic models

(c) Both (a) and (b) (d) None of the above

8. The operations research technique specially used to determine the optimum strategy is

(a) Decision theory (b) Simulation

(c) Game theory (d) None of the above

9. The operations research technique which helps in minimizing total waiting and service costs is

(a) Queuing theory

(b) Decision theory

(c) Both (a) and (b)

(d) None of the above

10. Key concept under which technique are network of events and activities resource allocation time and cost considerations network paths and critical paths?

(a) Game theory

(b) Network analysis

(c) Decision theory

(d) None of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What are the assumptions in linear programming?

Or

(b) Give the merits of linear programming.

12. (a) Explain about the steps to followed in north west corner.

Or

(b) Find the starting solution (IBFS) of the following transportation problem using north west corner.

1	2	6	7
0	4	2	12
3	1	5	11
10	10	10	

13. (a) What is an unbalanced assignment problem?

Or

(b) Find the optimal solution for the assignment problem with the following matrix.

	Area			
Salesman	W	X	Y	Z
A	11	17	8	16
B	9	7	12	6
C	13	16	15	12
D	14	10	12	11

14. (a) Give the working methodology of critical path analysis.

Or

(b) Draw the network for the following activities and find the critical path and total duration of project.

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

15. (a) What are the steps in the simulation process?

Or

(b) Explain about the conventions followed in drawing Network.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Solve the following problem using simplex method.

Maximize $z = 21x_1 + 15x_2$

Subject to constraints

$$-x_1 - 2x_2 \geq -6$$
$$4x_1 + 3x_2 \leq 12$$
$$x_1, x_2 \geq 0.$$

Or

(b) Minimise $z = 4x_1 + x_2$

Subject to

$$3x_1 + 4x_2 \geq 20$$
$$-x_1 - 5x_2 \leq -15$$
$$x_1, x_2 \geq 0$$

Find out optimal solution under graphical method in linear programming.

17. (a) A company has four factories from which it ships its product units to four warehouses w_1, w_2, w_3, w_4 which are the distribution centers. Transportation costs per unit bet ween various combination of factories (f_1, f_2, f_3 and f_4) and warehouses are

	w_1	w_2	w_3	w_4	Availability
f_1	48	60	56	58	140
f_2	45	55	53	60	260
f_3	50	65	60	62	360
f_4	52	64	55	61	220
Reqqurement	200	320	250	210	

Calculate transportation cost.

Or

(b) Determine an optimum distribution for the company In order to minimize the total transportation cost.

		To					
		D	E	F	G	H	
	A	5	8	6	6	3	800
From	B	4	7	7	6	6	500
	C	8	4	6	6	3	900
		400	400	500	400	800	

18. (a) Five machines can do any of the five required jobs with different profits resulting from each assignment as shown below.

Jobs	A	B	C	D	E
1	30	37	40	28	40
2	40	24	27	21	36
3	40	32	33	30	35
4	25	38	40	36	36
5	29	62	41	34	39

Find out maximum profit possible through optimal assignment.

Or

(b) Solve the following assignment problem. The data given in the table refer to production in certain units.

	Machines			
Operators	A	B	C	D
1	10	5	7	8
2	11	4	9	10
3	8	4	9	7
4	7	5	6	4
5	8	9	7	5

19. (a) A project has the following activities and characteristics estimated duration in days.

Activity	Optimistic	Most likely	Pessimistic
1-2	2	5	8
1-3	4	10	16
1-4	1	7	13
2-5	5	8	11
3-5	2	8	14
4-6	6	9	12
5-6	4	7	10

Required :

(i) Find expected duration of each activity.

(ii) Draw the project network and expected duration of the prefect.

(iii) Find variances of activities on critical path and its standard deviation.

Or

(b) Customers arrive at a window drive in PCT service station according to Poisson distribution with a mean rate of 4 per minute. Service time per customer is exponential with a mean of 3 minutes. The space infront of the window including that for the serviced car can accommodate a maximum of three cars other cars can wait outside they space.

(i) What is an probability that an arriving customer car drives directly to the space infront of the window?

(ii) The probability customer has to wait out side the indicated space.

20. (a) Consider an inventory situation in manufacturing concern where the number of sales per day is Poisson with mean 5 then generate 30 days of sales by Monte carlo method.

Or

(b) The date of collected in running a machine. The cost of which is Rs. 60,000 are given below.

Year	1	2	3	4	5
Resale value	42000	30000	20400	14400	9650
Cost of spares	4000	4270	4880	5700	6800
Cost of labour	14000	16000	18000	4000	2500

Determine the optimum period for the replacement of the machine.

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