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MBA Degree (FT&PT) III Semesters End Semester Examination- December-2022 21-371-0301/21-372-0302: MANAGEMENT SCIENCE

(Regular)

Max Marks: 50

Time: 3 Hours

Course Outcomes: On completion of the course, the student will be able to:

CO1	To recall the quantitative models used in business decisions. How to translate business sit- uation into quantitative models for optimal decision making
CO2	To develop an understanding of basic management science techniques and their role in managerial decision-making, create a scientific approach to formulation and problem solving under competitive environment
CO3	To develop mathematical models for a real life situation and problems in Business and Management; Conducting what if analysis and Scenario analysis to find the activities to optimize cost and time
CO4	To apply various Management Science techniques for Resource, time and cost Optimization in Business and Management
C05	Evaluate the principles of construction of mathematical models of conflicting situations and mathematical analysis methods of Management Science
CO6	Have skills to develop Management Science objectives, mathematical methods, computer systems and analyzing different situations in the industrial/ business scenario Involving limited resources and finding the optimal solution within the constraints.
CO6	Involving limited resources and finding the optimal solution within the constraint

BL – Bloom's Taxonomy:(L1- Remember, L2 - Understand, L3 – Apply, L4-Analyse, L5-Evaluate, L6-Create)

PART A (Answer ALL questions. Each question carries 2 marks)

Q. Nos.	Questions	Marks	BL	CO	
1	List any four applications of Operation Research in Business and Industry.	2	1	CO1	
2	Explain the terms: (a) Unbounded Solution (b) Saddle point	2	2	CO2	
3	At a service Centre customers arrive at the rate of 10 per hour and are served at the rate of 15 per hour. Their arrival follows Poisson and service in exponential distribution. Find the aver- age length and average waiting time in the system.	2	3	CO3	
4	Distinguish between Transportation and Assignment problems	2	4	CO4	
5	Define sequencing Problem.	2	5	CO5	
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Q. Nos.	Questions							Marks	BL	CO
6	Solve the following transportation problem (basic feasible solution) for maximum profit:									
	Market									
	Warehouses	Α	B	С	ľ)				
	X	12	18	6	2	5		4	2	CO
	Y	8	7	10	1	8		4	3	CO
	Z	14	3	11	2	0				
	Availability at warehouses: X – 200 units, Y-500 units Z-300 units									
	Demand in the 400 units.	e mark	et: A-1	80 uni	ts, B∙	320 units,	C-100 units, D-			
7	Obtain the op value of the g		strategie	es for t	ooth j	players and	l determine the			
				Playe	er B					
			B 1		B2	B3		4	6	C06
	Player A	A1	15		2	3				
		A2	6		5	7				
		A3	- 7	7	4	0				
8	and Rs.7000 three states of and yields a p with a profit completion o high demand average demand demand givir	Projec for th f nature profit R Rs.800 f Proje (prob and (p ng a pr	t B. For e Proje e; either s.12000 00 or a ect B h ability robabil ofit Rs.	the P: ct 'B'. there 0 or an low do as thre = 0.6) ity $= 0$ 5000.	rojec The is a h aver eman æ sta and 0.3) v	t 'A' he ha completic igh demand age demand d giving a tes of natu yields a prof	in either as to invest Rs.8000 on of Project A has d (probability = 0.5) d (probability = 0.3) profit Rs.5000.The are; either there is a ofit Rs.10000 or an it Rs.9000 or a low ing maximum re-	4	6	CO
9	Distinguish b	etwee	n CPM	and Pl	ERT	(any 8 com	nparisons)	4	4	СО
10	perience indi Daily deman Probability: Simulate the	cates t d: (0. demai	he daily) 10 01 0.2 nd for 1	/ dema 20 0 0.15 next 10	ind a: 3(5 0.:) day	s given bel) 40 50 0.12 (rs, using th	50	4	3	со

PART B (Answer ANY FIVE Questions. Each question carries 4 marks)

(5X4=20 marks)

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	situation, if the owner of the bakery decides to make 30 cakes every day. Also calculate the daily average demand on the basis of simulated data			
11	Write down KENDALL'S NOTATION for representing Queuing models and explain the symbols used	4	2	CO5
12	Explain (a) Sensitivity Analysis in LPP (b) Integer Programming	4	2	CO2

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PART C (Answer ANY TWO questions. Each question carries 10 marks)

								Marks	BL	CO
Questions A firm makes products X and Y and has a total production of a Capacity of 9 tonnes per day. X and Y require the same production capacity. The firm has a permanent contract to supply at least 2 tonnes of X and at least 3 tonnes of Y per day to another company. Each tonne of X requires 20 machine hours production time and each tonne of Y requires 50 machine hours production time, the daily maximum possible number of machine hours is 360. All the firms output can be sold, and the profit made is Rs. 80 per tonne of X and Rs. 120 per tonne of Y. Formulate a mathematical Model of the above LPP and find its								10	5	COS
-									3	CO3
Man►	M 1	M 2	1		M 4	M 5				
Job A	1	3	2	_	3	6				
Job B	2	4	3		1	5				
Job C	5	6	3		4	6				
Job D	3	1	4		2	2				
Job E	1	5	6		5	4				
$\begin{array}{rrrr} \text{ject duratio} \\ \text{Activity: } 1 \\ t_0 & : & 2 \\ t_m & : \\ t_p & : & 1 \end{array}$	n and critic -2 1-3 2 2 6 3 0 4	cal path 2-3 2-4 7 6 11 14 15 16	4 3-4 6 7 14	3-5 6 7 14	4-5 2 6 10			10	5	CO5
	of 9 tonnes firm has a p 3 tonnes of machine ho hours produ hours is 360 80 per tonn Formulate a Optimal so Solve the fo Man Job A Job B Job C Job D Job E Construct a ject duratio Activity: 1 t_0 : 2 t_m : t_p : 1 What durati	of 9 tonnes per day. X firm has a permanent of 3 tonnes of Y per day machine hours production time hours is 360. All the f 80 per tonne of X and Formulate a mathema Optimal solution. Als Solve the following A Man M 1 Job A 1 Job B 2 Job C 5 Job D 3 Job E 1 Construct a Network of ject duration and critic Activity: 1-2 1-3 t_0 : 2 2 t_m : 6 3 t_p : 10 4	of 9 tonnes per day. X and Y req firm has a permanent contract to 3 3 tonnes of Y per day to another machine hours production time, the daily hours production time, the daily hours is 360. All the firms output 80 per tonne of X and Rs. 120 per Formulate a mathematical Mode Optimal solution. Also obtain the Solve the following Assignment Man M 1 M 2 Job A 1 3 Job B 2 4 Job C 5 6 Job D 3 1 Job E 1 5 Construct a Network diagram for ject duration and critical path Activity: 1-2 1-3 2-3 2-4 to : 2 2 7 6 tm : 6 3 11 14 tp : 10 4 15 16 What duration shall have 99% c	of 9 tonnes per day. X and Y require the firm has a permanent contract to supply at 3 tonnes of Y per day to another company machine hours production time, the daily maximum hours is 360. All the firms output can be a 80 per tonne of X and Rs. 120 per tonne of X and Rs. 120 per tonne of Continuate a mathematical Model of the a Optimal solution. Also obtain the dual of Solve the following Assignment problem Man M 1 M 2 M 3 Job A 1 3 2 Job B 2 4 3 Low E 1 5 6 Man I M 2 M 3 Low E 1 5 6 Job C 5 6 3 Low E 1 5 6 Construct a Network diagram for the give ject duration and critical path 4 Activity: 1-2 1-3 2-3 2-4 Lo : 2 7 6 6 Lm : 6 3 11 14 7 Ly :	of 9 tonnes per day. X and Y require the same p firm has a permanent contract to supply at least 2 3 tonnes of Y per day to another company. Each machine hours production time and each tonne of hours production time, the daily maximum poss hours is 360. All the firms output can be sold, at 80 per tonne of X and Rs. 120 per tonne of Y. Formulate a mathematical Model of the above I Optimal solution. Also obtain the dual of LPP. Solve the following Assignment problem. Man M 1 M 2 M 3 Job A 1 3 2 Job B 2 4 3 Job C 5 6 3 Job D 3 1 4 Job E 1 5 6 Construct a Network diagram for the given activity ject duration and critical path Activity: 1-2 1-3 2-3 2-4 3-4 3-5 to : 2 2 7 6 6 6 tm : 6 3 11 14 7 7 tp : 10 4 15 16 14 14 What duration shall have 99% confidence for p	of 9 tonnes per day. X and Y require the same product firm has a permanent contract to supply at least 2 tonnes 3 tonnes of Y per day to another company. 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