MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL (A constituent unit of MAHE, Manipal)

## II SEMESTER M.TECH. CONSTRUCTION ENGINEERING AND MANAGEMENT END SEMESTER EXAMINATION, MAY - 2024

SUBJECT: SUPPLY CHAIN MANAGEMENT [CIE 5406]

## Time:

## MAX. MARKS: 50

Q.No	Question	Marks	CO	BL
1A.	Explain how the rise of organised retailing can shift the power structure in the	5	1	3
	construction supply chain from supplier to contractor.			
1B.	A company is considering using either trucks or rail to transport goods from	5	2	3
	the plant to the depot in eastern India. The relevant information is as follows:			
	Transport Transport Freight/unit Shipment mode Lead time Rs. size (units) (days)			
	Rail 12 20 5,000			
	Road 4 60 500			
	The company has plans to ship 50,000 units annually with 500 working days			
	In the year. Each unit costs Rs 1,500. Assuming the inventory-carrying cost			
	to be 20%, suggest to the company the preferred mode of transport they			
	should choose. If the actual demand follows a normal distribution with a			
	standard deviation of 65 days and a service level factor of 2, examine the			
	preferred mode of transport.			
2A.	A construction company purchases cement at a cost of Rs.60 per bag. The	F	3	3
	inventory carrying cost includes expenses such as storage fees, material	5		
	degradation, and insurance, estimated at 20% per annum. The ordering cost			
	for the cement, including administrative charges and transportation, is Rs.386			
	per order. Given the demand and lead-time data for cement procurement,			
	calculate the cycle and safety stock inventories while maintaining a 98%			
	service level (k=2). (For calculating the cycle stock, use the mean demand			
	and the average lead time that have been deemed stable; the number of			
	working days = 300/year).			
1			1	1

	De	mand lata		d₁	d <sub>2</sub>	(	d <sub>3</sub>	$d_4$	$d_5$	$d_6$	d7	d <sub>8</sub>	d <sub>9</sub>	<b>d</b> <sub>10</sub>			
	Demand 1		75	155	2	10	185	88	150	153	175	153	156				
	Lead-time data		L1	L2	I	_3	L4	L <sub>5</sub>	L <sub>6</sub>	L7	L <sub>8</sub>	L9	$L_{10}$				
	Lea	ıd time		18	21	1	10	27	24	17	18	24	25	26			
2B.	Design the optimum milk-run vehicle route for a consumer goods compare									ompany		2	6				
	with three vehicles and 10 dealers using a vehicle routing algorithm. T										nm. The	5					
	capacity of each vehicle is 25 units, and other relevant data from vehic										vehicle						
	heuristics are as follows: Distance- and load-related data for a consumer goods company																
	Deal	er		1		2	3	4	5	6	7	8	9	10			
	Dista	nce fro	m	16	1	8	10	17	26	18	7	12	15	21			
	Avera	age						6		0	0	6	0	4			
	demand (tons) 8 4 6 6 4 8 8 6 8						4										
	Distan	ce mat	rix in	KIIOM	etres												
	1	1	2	3	4	5	6	7	8	9	10						
	2	34	0														
	3	7	27	0													
	4	33	12	27	0												
	5	41	8	35	19	0											
	6	31	13	24	23	14	0										
	7	19	20	14	15	28	24	0									
	8	24	20	19	12	28	27	6	0								
	9	12	32	12	26	40	33	12	15	0							
	10	32	23	28	12	31	33	15	9	22	0						
3A.	Interp	oret th	ie cha	allen	ges i	n ao	doptir	ng soo	cial m	edia fo	r ente	rprise	applic	ations in	F	4	3
	pply	chaiı	n m	anage	gement.												
3B.	Reco	mmei	nd th	e be	st su	ppl	y cha	in stra	ategy	based	on co	st-effe	ectiven	ess and	5	3	5
	service level attainment for the following data given. Include num									umerical							
	calculations and insights to support your recommendation. The data are: Demand distribution at each region (16 regions) - Mean da demand per region is 120 units, standard deviation of daily demand per region is 25 units, lead time from central plant to stock points is 12 days, transport cost per unit for decentralization case is Rs. 1.5, there is a 11% increase																
											an daily						
											er region						
											ransport						
											rease in						

	transport cost per unit for centralization, ordering cost is Rs.300 per order, inventory-carrying cost per unit is Rs.7, working days are 300, and the required service level is 98% (k=2).			
4A.	A construction company needs a plan for the next three quarters to meet the demand for building materials. They produce a specific type of concrete block, with a production cost of Rs.5 per block. The estimated demand for blocks for the next three quarters is 500, 700, and 600 blocks respectively, and the plant has a capacity to manufacture 400 blocks in each of the first two quarters and 600 blocks in the third quarter. They can also employ overtime during the second quarter with an additional capacity of 200 blocks at a production cost of Rs.8 per block. The company incurs inventory carrying costs of Re.1 per block per quarter, and if the demand exceeds production capacity, backorders can be made at a cost of Rs.15 per block per quarter. The goal is to create an aggregate plan that minimizes the cost of the plan, using the transportation algorithm.	5	2	6
4B.	Draw inferences on an overview of a company's carbon footprint measurement initiative and the metrics used to achieve green and sustainable supply chain management.	5	5	4
5A.	Explain the potential applications of drones in managing the supply chain in construction.	5	4	3
5B.	Explain the difficulties in managing returned products and identify any new hurdles that may arise during the process.	5	5	4

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