Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS ENGINEERING

VII SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, DECEMBER 2021

SUBJECT: PRODUCTION AND OPERATIONS MANAGEMENT [MTE 4080]

(22.12.2021)

Time: 75 + 10 MINUTES **MAX. MARKS: 20**

Instructions to Candidates:

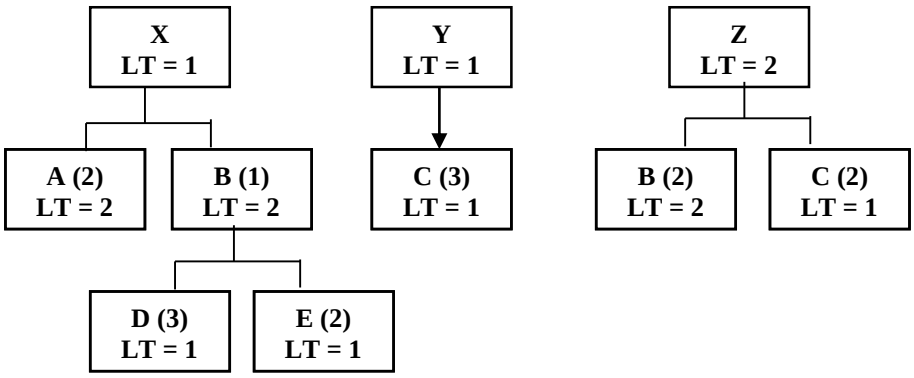
- Answer **ALL** the questions.
- Missing data if any can be suitably assumed

Q. No	QUESTIONS	M	CO	PO	LO	BL
1A.	A business man decide whether to build a small capacity plant or a large capacity plant at a new location. Demand at the location can be either low or high with probabilities estimated at 0.4 and 0.6 respectively. If a small capacity plant is built and demand proves to be high the businessman may choose ether to expand or not to expand with payoffs of Rs.5,40,000 and Rs. 4,46,000 respectively. In case a small capacity plant is built and the demand is low there is no reason to expand and the payoff is Rs. 4,00,000. If a large capacity plant is built and the demand is low the choice is to do nothing with payoff of Rs. 80,000 or to stimulate demand through intensive advertising. The response to advertising may be either modest or sizable with their probabilities estimated to be 0.3 and 0.7 respectively. If it is modest the payoff is estimated to be only Rs. 40,000 and the payoff grows to Rs. 4,40,000 if the response is sizable. Finally if a large capacity plant is built and demand turns out to be high the payoff is Rs.16,00,000. Draw the decision tree and determine whether the businessman should build a small capacity plant or a large capacity plant?	**4**	**2**	**1, 3, 4,11**	**1, 2, 3, 4, 5, 11, 13**	**4**
1B.	Construct the flowchart to show the information flow in the production consumption cycle considering automotive industry as an example.	**3**	**1**	**1, 3, 5**	**1, 2, 3, 4, 5, 11, 13**	**3**
1C.	The demand forecast for a company for the first six months of the next year and the working days available as shown in the table below. Months: 1 | 2 | 3 | 4 | 5 | 6 Demand: 1520 | 2304 | 1920 | 240 | 1024 | 1536 Work days: 25 | 20 | 24 | 25 | 20 | 24 The company has a constant workforce of 80 workers and each unit requires 10 worker hors to produce at a labor cost of $6 per hour as regular rate and $9 per hour as overtime. Working hours are 8 hours per day. If the company plans to resort to the strategy of giving overtime and allowing idle time to the workers to meet the demand in time, determine the total cost of the plan if the manufacturing cost excluding the labor cost is $120 per unit?	**3**	**2**	**1, 3, 4,11**	**1, 2, 3, 4, 5, 11, 13**	**4**

2A.	A medical group is planning to set up a new health care facility in a state to serve seven possible locations. Currently the facility is located D. The coordinates for each location and projected population measured in thousands is shown in the table below. Customers will travel from their respective locations to the new facility when they need health care. Calculate the possible nearest location using suitable method? Compare the load distance scores for the new possible location and the current location using rectilinear distance.	**4**	**5**	**1, 3, 4, 11, 12**	**1, 2, 3, 5, 13**	**6**
2B.	ABC Ltd. produces three products namely X, Y and Z, which have demand, safety stock and product structure as shown in the below table and the tree structure • On hand Inventory X = 140, Y= 100. A = 50, C = 110, E = 80. • The only scheduled receipts are 60 units of Z due in period 4. • Lot size for B is 75 and D is 50. Determine the order quantities and order release dates for all requirements using the MRP format.	**3**	**4**	**1, 2, 3, 4, 11**	**1, 2, 3, 5, 13**	**5**
2C.	Project the trend of industrial employment in the city from the below mentioned data using least square method and calculate the correlation coefficient of the obtained trend.	**3**	**1**	**1, 3, 5**	**1, 2, 3, 4, 5, 11, 13**	**3**

Location	Population (x 10^3)	X-Coordinate	Y-Coordinate
A	2	2.5	4.5
B	5	2.5	2.5
C	10	5.5	4.5
D	7	5	2
E	10	8	5
F	20	7	2
G	14	9	2.5

Product	Safety Stock	1	2	3	4	5	6
X	20		120			100	160
Y	30		80			80	
Z	0						60



Year	1	2	3	4	5	6	7	8	9	10
No. of workers (x10)	3.2	3.3	3.7	3.9	3.6	4.3	4.8	4.8	5.4	6.3