

(A constituent unit of MAHE, Manipal)

VII SEMESTER B. TECH (MECHANICAL ENGG.) END SEMESTER EXAMINATIONS, NOVEMBER 2019.

SUBJECT: PRODUCTION PLANNING & CONTROL [MME 4103]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

Missing data if any may be suitably assumed.

1A. The demand forecast for a certain product and production days available during the first four months of the next year as shown in the table below.

Month	January	February	March	April
Demand (Units)	10240	12800	11520	13820
Production Days	20	21	22	24

The company policy is to maintain a safety stock of 1200 units at the end of every month of the next year. The inventory carrying cost is \$ 10/unit/month. There are currently 280 workers employed in the subject department and the company plans to end the current year with 560 units of inventory. It takes an employee 4 hours to make a product at a labour cost of \$ 16 per hour as regular rate. The manufacturing cost excluding the labour cost is \$ 200 per unit. Net working hours are 8 hours/day and overtime rate is double the regular time rate. Prepare the aggregate plan by trial and error method and determine the total cost of the plan if the company plans to maintain the present workforce and use over time and idle time strategy to meet the monthly requirement.

- **1B.** Quoting suitable examples explain the characteristics of a continuous or mass **02** production activity.
- **1C.** Zeta Enterprises engaged in chrome plating business has the following jobs waiting to be processed as at the end of today (November 15).

Job	Due Date	Estimate of time needed
A	November 23	9
В	November 25	6
С	December 9	24
D	November 21	5
E	December 23	30

Since Zeta Enterprises is an private organization it operates on Sundays as well. Schedule the jobs according to critical ratio rule and calculate the average job lateness.

2A.	A manufacturer has to process 6 jobs through shearing and bending machines in that order. Each job has two identical individual units. The processing time in minutes for each unit of each job on the 2 machines are given below. Each machine can process only one individual job unit at a time. Determine the optimum sequence, total elapsed time and idle times for the two machines.08Job123456Shearing324024283656										15		
		Bending	20	36	4	0	32		48	32			
2B.	A comp months	A company has experienced the following demand for a fertilizer during the past 6 03 months.											
		Month	<u>)</u>	May J	uneJ	uly /	August	Sept	.Oct.	Nov.			
		(tons)		584 6	610 6	55 7	747	862	913	963			
	i) Comthe moii) Comfor thedeman	pute five-m nth of Dece pute three month of d twice as h	onth sim mber. month v Deceml neavily a	veightec ber if the s other	ving a I mov ne foi 2 prev	avera ing av recas vious	ge to f verage ter wai periods	oreca to fo nts to S.	st the recast weig	demar the de h the	nd in kgs mand in l most rec	for kgs ent	
2C.	Explair	the Delphi	method	of fored	asting	g.						02	12
3A.	A company manufacturing refrigerators establishes a fact that there is a relationship between sale of refrigerators and population of the city. The market research carried out reveals the following information. 05 Year 2013 2014 2015 2016 2017 2018 Population (lakhs) 5 7 15 22 27 36 No. of refrigerators 28 40 65 80 96 130 Fit a linear regression equation and estimate the demand for refrigerators for 2019 2010 is 4.5 million										15		
3B.	The de	mand for a	n item is	100000) unite	sper	year. 7	The o	rdering	g cost is	s Rs.400	per 0	13
	order. The inventory carrying cost is Rs.8 per unit per year. The purchase price depends on the order quantity and is shown in the table belowRange of order quantity (units)Up to 29993000-59996000 & abovePrice (Rs./unit)2019.919.8										TICE		
3C.	Write a short note on A class and C class items.02)2			
4A.	The annual requirement for an item is 12,000 kgs. It is manufactured at the rate of 2000 kgs/month. The set up cost per production run is Rs. 3,000/ The inventory carrying costs is Rs.20/kg/year. The shortage costs is estimated to be Rs.3/kg/month. Calculate the total inventory carrying cost per year and the total shortage cost per year if the unit cost of the item is Rs. 1000/kg.									e of 0 ory be otal)5		
4B.	Product 601 is made from three 740 sub-assemblies, two 810 sub-assemblies and one 900 sub-assembly. A 740 sub- assembly consists of one unit of component									13			

309 and two units of component 207. The 900 sub-assembly is made from two units of component 400 and one unit of component 782. An 810 sub-assembly consists of one unit of component 309, one unit of component 721 and two 682 sub- assemblies. A 682 sub- assembly is made from one unit of component 400 and one unit of component 207. Draw the product structure tree and determine the gross requirements for components 207 and 400 that are required to produce 150 units of product 601.

- **4C**. Calculate total cost per cycle for a purchasing model having the following data: 02 Annual Demand = 300 units, Unit price = Rs. 50/unit, Ordering cost = Rs. 40/order, Storage rate = 1% per year, Interest rate = 12% per year and Obsolescence rate = 7% per year.
- An assembly shop has a daily demand of 300 units and the shop is open from 9am 5A. 05 to 6pm with an one-hour lunch & tea break. Balance the assembly line using maximum follower method and calculate the line efficiency. The assembly task related details are shown in the table below:

Task	А	В	С	D	Е	F	G	Н	Ι	J	K
Task Time (seconds)	45	09	35	32	58	25	35	33	52	24	11
Immediate Predecessor			A,B,D	В	С	E,D	E,F,H	C,I		F,G,H	J,I

5B. A company is considering 3 alternative locations for a new plant with the relevant **03** cost data as shown in the table below.

Location	А	В	С
Fixed cost per year (Rs)	3,50,000	1,50,000	1,10,000
Variable Cost (Rs/Unit)	12	19	28

Using the break-even analysis determine the volume ranges over which each location is suitable? 02

Explain the load distance method of plant location. 5C.