Reg. No.

A Constituent Institute of Manipal University, Manipal

V SEMESTER B.TECH (MECHANICAL ENGG.) END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: PLANT LAYOUT AND MATERIAL HANDLING [MME-4030]

REVISED CREDIT SYSTEM

Time: 3 Hours

Date: 05/12/2016

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

- 1A. Sketch and explain the type of layout used in ship building. Also mention its merits and 04 demerits.
- **1B.** Mention the six services relating to men and explain any two of them.
- 1C. A product layout consists of three processes A, B & C in a sequential manner performed on 03 machines X, Y & Z respectively. Compute the number of machines required by considering the following:

Sales forecast=40,800 Units/year Operation hours=2400hours/year Expected production recovery=90% Operations required: A, B & C Operation time of Process(A) =6mins/unit Operation time of Process(B) =3mins/unit Operation time of Process(C) 18mins/unit

- 2A. What are four considerations that affect the material factor: Explain them in brief. 04
- 2B. List the six principles of plant layout and explain any three of them.
- 2C. A copy center of an office building prepares bound reports for 2 clients. The center make 03 different multiple copies of each report. The processing time to bind each copy depends on lot of factors. The center operates 250days/year with 8 hours per shift and one shift. The management wants a capacity cushion of 15%. Determine the required capacity to meet the demand using the information given below:

Particulars	Client-X	Client-Y	
Annual Demand (units)	2000	6000	
Processing Time (Hour/Copy)	0.5	0.7	
Lot Size (units)	20	30	
Set up time (Hour)	0.25	0.4	

- **3A.** Explain the flow process chart with example.
- **3B.** What are the seven features of waiting factor? And explain them briefly.
- **3C.** A car is to be assembled on a conveyor belt and 500 cars are required per day. Production

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time per day is 420 minutes, and the assembly steps and times for the wagon are given below. Find the balance that minimizes the number of workstations, subject to cycle time and precedence constraints.

Task	Task time (in seconds)	Description	Immediate predecessor
A	45	Position rear axle support and hand fasten	None
В	11	Four screws to nuts	А
С	9	Insert rear axle	В
D	50	Tighten rear axle support screws to nuts	None
E	15	Position front axle assembly and hand	D
F	12	Fasten with four screws to nuts	С
G	12	Tighten front axle assembly screws	С
Н	12	Position rear wheel 1 and fasten hubcap	E
I	12	Position rear wheel 2 and fasten hubcap	E
J	8	Position front wheel 1 and fasten hubcap	F, G, H, I
K	9	Position front wheel 2 and fasten hubcap	J

- **4A.** Explain the factors to be considered in the selection of material handling equipment.
- **4B.** With a neat sketch and examples, explain the string diagram in planning the layout.
- 4C. A new facility is going to be established in a city. Table below shows the co-ordinates for the 03 center of each location, along with the projected populations, measured in thousands. Customers will travel from the seven locations to the new facility when they need service. Location B and Location E are considered as possible locations for the new facility. Using rectilinear distance approach, which location is better in terms of its total Load-distance score?

Centres	А	В	С	D	E	F	G
Co-ordinates (X,Y)	(3, 4.5)	(2.2, 5)	(10,4.5)	(5.2)	(6,6)	(9.3)	(9.4)
Population	6	5	2	14	8	18	15

- **5A.** Explain with neat sketches Roller conveyor and Jib crane.
- **5B.** List and briefly explain any five principles of material handling.
- **5C.** What are the types of space can be utilized for movement of materials under the movement **03** factor.

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