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(A Constituent Institute of Manipal University)



VII SEMESTER B.TECH

(MECHANICAL / I&P ENGINEERING)

END SEMESTER (MAKE UP) EXAMINATIONS, DEC 2015/JAN 2016

SUBJECT: PRODUCTION/OPERATIONS MANAGEMENT [MME 401]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL the questions.
- Missing data may be suitably assumed.
- 1A. The following data refers to an aggregate planning problem. The Company wants to use only regular time production at a uniform rate throughout the year to meet the demand. The cost of production is Rs.100/unit. Shortage are not permitted. The inventory carrying cost is Rs.6/unit/quarter. Determine the starting inventory required for this plan. Calculate the total annual cost of the aggregate plan. The aggregate demand and working days are as shown below:

Period [Quarter.]	I			IV
Aggregate Demand [units]	960	600	900	1140
Working days	60	55	60	65

- **1B.** Explain the various costs that are associated with aggregate planning strategies.
- **1C.** Explain in detail the functions of production/operations management with a tabled list **05** of general functions and its formal terminology.
- **2A.** 5 aircrafts have to be processed through sheet metal centre (work centre 1) and painting center (work centre 2) in an aircraft repair facility. The time duration required for the 5 aircrafts at the two work centers are as shown.

Work Centers	А	В	С	D	E
1	4	17	14	9	11
2	5	7	12	2	6

Determine the optimum sequence, total elapsed time and idle time for both the work centers.

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2B. A company manufactures and sells three products with the below details:

Product	Fixed cost in Rs	Annual sales in Rs	Profit in Rs
A	3000	8000	1000
В	6000	12000	1500
С	9000	20000	2500

Determine:

- $(\frac{p}{2})_{\text{ratio}}$ & BEP for each product.
- Overall $(\frac{p}{2})_{ratio}$ & overall BEP.
- Represent the above data on Profit-Volume chart.
- **3A.** The annual requirement of an item is 25,000 units. Its price is Rs. 10/ unit for order quantities up to 1499 units, Rs. 9.95 / unit for order quantities between 1500 and 2999 units, and Rs. 9.9 / unit for order quantities of 3000 and above. The inventory carrying costs are Rs. 2 / unit / year. The ordering costs are Rs. 200 / order. Determine the optimum ordering policy?
- **3B.** Explain in detail the qualitative methods of forecasting.
- **4A.** Derive an expression for Economic Lot Size when the delivery rate is finite and the **05** shortages are not permitted.
- **4B.** From the following data compute,
 - Running Sum of Forecast Error, Mean Absolute Deviation, Mean Squared Error, Mean Absolute Percent Error and Tracking Signal.
 - Also plot the tracking signal and comment on the same.

Month	1	2	3	4	5	6
Demand Forecast	1000	1000	1000	1000	1000	1000
Actual Demand	950	1070	1100	960	1090	1050

5A. The annual requirement of an item is 12,000 units. It is manufactured at the rate of 2000 units /month. The set up cost per production run is Rs. 3,000/-. The inventory carrying costs are Rs. 20/unit / year. The shortage costs are estimated to be Rs. 3 / unit / month.

Calculate i) Economic lot Size ii) Maximum shortage in a cycle iii) Maximum level of inventory in a cycle iv) The production time / cycle v) Cycle time

5B. Johnson cogs wants to set up a line to produce 60 units per hour. The work elements and their precedence relationships are as given in the table.

Work Element	А	В	С	D	Е	F	G	Н	I	J
Time (Seconds)	40	30	50	40	6	25	15	20	18	30
Immediate		А	А	В	В	С	С	D.E	F.G	H,I
Predecessor								,	, –	,

- Draw precedence diagram
- What cycle time in seconds ensures the desired output rate?
- Use the longest work element rule for assigning various tasks to different

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assembly stations.
What is the line efficiency and balance delay?
Write a short note on

i) Inputs to MRP system
ii) Critical Ratio Rule

6B. How break-even chart is different from a Profit-volume chart? Explain with suitable graphs.
6C. A product requires processing through three work centres namely A, B & C in series, whose system efficiencies are 85%, 75% & 70% respectively. Determine the system capacities of the three work centres if the desired output is 4000Units.
