CMR
INSTITUTE OF
TECHNOLOGY

CMR

Improvement Test -I May 2018

Sub:	Operations Management			Code:	10ME81
Date:	21/05/18	Duration: 90 mins	Max Marks: 50	Sem: 8TH	Branch: ME

Note: Answer any five questions, Missing data if any may be assumed suitably:

Q.No.	Question	OBE Marks	CO	RBT
1	Demand forecast for the product is given below along with the data on feasible production alternatives. Develop an optimal aggregate plan and determine the minimum cost.	[10]	CO3	L3

Period	Expected Demand	Capacity Limits		
		Regular	overtime	subcontract
1	3000	2900	500	300
2	2000	3000	400	300
3	2500	2900	500	300

Initial Inventory= 100 , Final Inventory = 50, Regular Production cost/unit = Rs 900 , Overtime cost/unit = Rs 1000, subcontract cost / unit = Rs 1300
Back order cost = Rs 100/unit/period
Inventory carrying cost/unit/period = R s 10

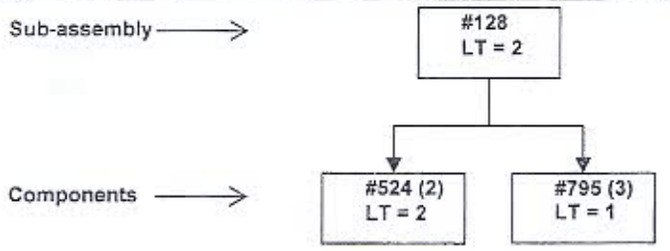
2a	What is Inventory? Explain different types of inventory costs?	[05]	CO1	L1
2b	What is a Plant Layout? Explain factors which influence plant location?	[05]	CO1	L1
3a	Alpha Engineering is in a fix to select the best vendor between the three select the best calculate the vendor rating for the following item under consideration is the same from all suppliers. Weight age for quality = 70%, price = 20% delivery = 10%.	[07]	CO3	L3

Suppliers data	Vendor-A	Vendor-B	Vendor-C
Quantity supplied	105	102	95
Quantity accepted	92	89	90
Price of each item Rs.	5	5.2	4.9
Delivery promised in weeks	6	6	6
Actual deliveries made in weeks	8	6.2	7

3b	Differentiate between traditional and e-procurement?	[03]	CO1	L1
4	Explain with a block diagram MRP & MRP-II?	[10]	CO1	L1

5	electrical sub-assembly #128 is used with MPS as shown in the table below. The assembly period (lead time) is 2 weeks for this sub-assembly, which requires two units of component #524 to be combined to three units of component #795 (see figure below). These components are sourced from outside suppliers in quantities of 3500 units and 5000 units (or multiples thereof) at a time with lead time of 2 weeks and 1 week respectively. The initial inventory for these two components (Week 0) is 400 and 900 units respectively. Create an MRP report for the sub-assembly and its components.	[10]	CO3	L3

	September				October			
	week 1	week 2	week 3	week 4	week 5	week 6	week 7	week 8
MPS				1500		1500		1500



6	Derive the Basic EOQ Model with uniform rate of demand and instantaneous replenishment with necessary assumptions?	[10]	CO2	L2
7	A television manufacturing company uses 25,000 PCB's per year each costing Rs1,000/- it costs Rs200/- for placing an order and the inventory carrying cost is Rs 100/- per unit per year. a) Determine the EOQ b) How many orders should be placed per year c) What is the duration between each order d) Total annual inventory costs e) Total cost including materials.	[10]	CO2	L3
8	A laboratory requires 1000 units of a particular drug additive per month the average demand occurs at the rate of 30 units per day. The production process is capable of producing 50 units per day each item produced in the lab costs Rs10/- The setup cost per order is Rs100/- the inventory carrying cost is 15% of cost of item determine a) EPQ b) Number of production runs per year c) Time between each production run. d) Total annual inventory costs e) Total cost including cost of drug.	[10]	CO2	L3

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IAT-3 SOLUTIONS

SUBCODE: 10MG81

NAME: OPERATIONS MGT STD.: DIV.:

Page: 1

Date: 2018-19

Q1. Total capacity: (2900 x 2 + 3000) + (500 x 2 + 400) + 300 x 3 + 100

: 11200 units

Total demand: 3000 + 2000 + 2500 + 50 : 7550 units

Fictious demand: 11200 - 7550 : 3650 units

Production source	Demand period 1	2	3	Final inventory	Fictious demand	Prod. capacity
Initial inventory	0 |100	10	20	30	0	100
RP 1	900	910	920	930	0 |2900	~~2900~~
OT 1	1000	1010	1020	1030	0 |500	~~600~~
SC 1	1300 |50	~~1310~~ 1310	1320	1330	0 |250	~~300~~ ~~50~~
RP 2	1000 |1000	900 |2000	910	920	0	~~3000~~ ~~1000~~
OT 2	1100 |400	1000	1010	1020	0	400
SC 2	1400 |300	1300	1310	1320	0	~~300~~
RP 3	1100 |350	1000	900 |2500	910 |50	0	~~2900~~ ~~400~~ ~~350~~
OT 3	1200 |500	1100	1000	1010	0	~~500~~
SC 3	1500 |300	1400	1300	1310	0	~~300~~
Forecasted demand	~~3000~~ ~~2900~~ ~~1900~~ ~~1500~~ ~~1150~~ ~~850~~ ~~600~~ ~~200~~	~~2000~~	~~2600~~	~~50~~	~~3650~~ ~~750~~ ~~250~~	11200 11200

Total cost: 7455500 ₹

Q2. Inventory is the stock of goods, commodities or other resources that are stored for future use. Inventory is the idle resource of enterprise

Types of inventory:

Raw material inventory: They are those basic unprocessed materials which are yet to undergo any operation before becoming part of finished product. Ex: ingots, angles, pipes.

WIP inventory: They are semi finished or partially completed materials at various stages of manufacturing

Finished goods inventory: They refer to completed products ready for dispatch.

Purchased parts inventory: They are items purchased from O/s suppliers instead of manufacturing them in factory shop.

Maintenance, Operating and repair inventory: They are items which do not form a part of the final product but are consumed in the production process.

Tool inventory: They includes various tools for processing such as tools, milling cutters etc.

Miscellaneous inventory: They includes all office stationary such as envelops, letter heads, pens etc.

Plant layout: Its a schematic arrangement of physical facilities to achieve faster through put. Physical facilities include - materials, machines etc.

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Factors which influence plant location.

1. Type of product
2. Type of production process
3. Volume of production
4. Management policy
5. Service facility
6. Possibility of future expansion

3 a.

Vendor rating	Vendor A	Vendor B	Vendor C
Quality % quoted	92/105 : 87.619	89/102 : 87.254	90/95 : 94.736
Quality rating at 70%.	87.619 x 0.7 : 61.33 %.	61.078 %.	66.3157 %.
Price ratio	4.9/5 x100 : 98%.	4.9/5.2 : 94.2307 %.	100 %.
Price rating at 20%.	19.6 %.	18.84614 %.	20 %.
Delivery ratio	6/8 x100 : 75 %.	6/6.2 x100 : 96.77 %.	85.714 %.
Delivery rating at 10%.	7.5 %.	9.677 %.	8.5714 %.
Total rating	83.43	89.601	94.8871

∴ Vendor C is preferd.

3b.

Traditional	E- procurement.
* Deals with several suppliers for each item	Deals with one or two suppliers for each item
* Needs excessive follow up	Needs less follow up
* Sets up competition between suppliers	Avoids entering into conflict with suppliers.
* With hold business information and get better price	Exchange business information and get better gain

NAME :_____ STD.:_____ DIV.:_____

5.

Master Production Schedule for #128

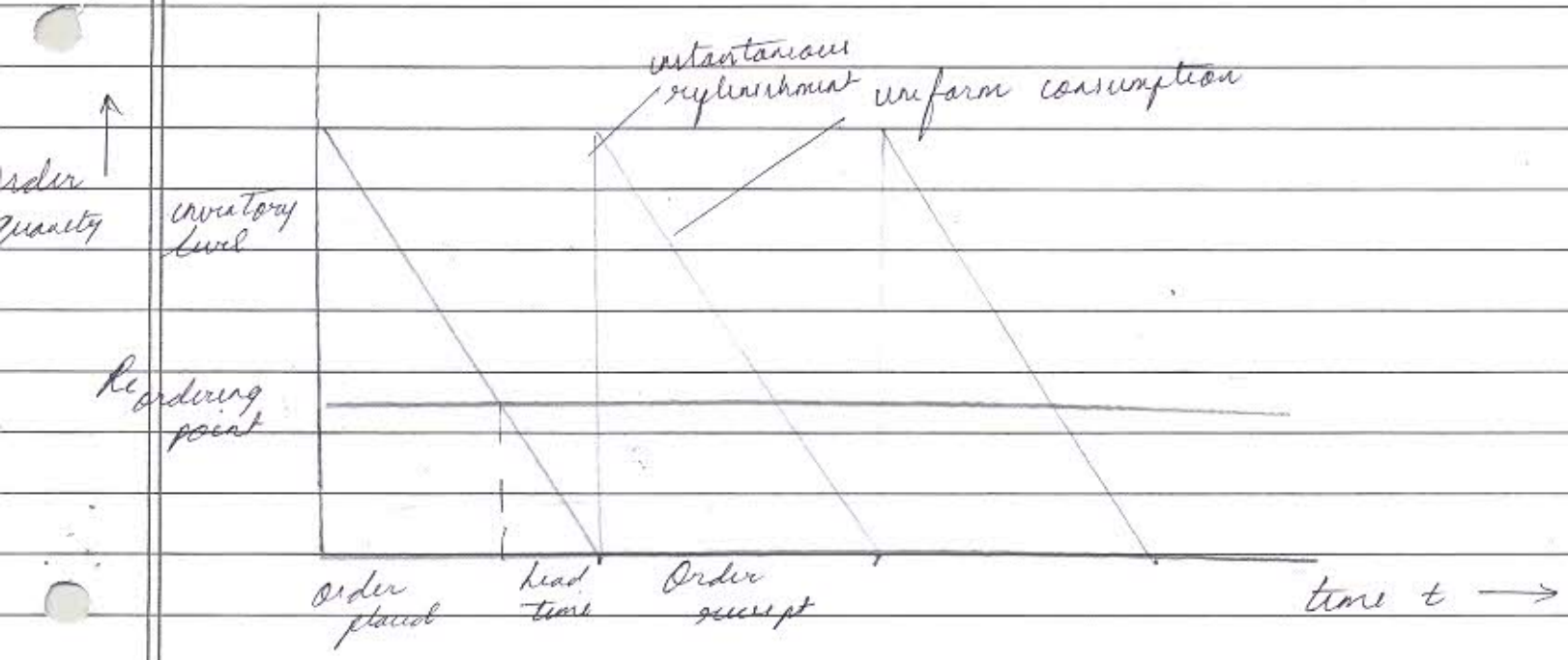
Weeks	0	1	2	3	4	5	6	7	8
Gross req.					1500		1500		15
MRP report for #128 LT: 2 weeks									
Gross req.					1500		1500		150
scheduled report									
Projected on hand									
Net requirement					1500		1500		1500
Planned order rcpt					1500		1500		1500
Planned order release			1500		1500		1500		
MRP report for #524(2) LT: 2 weeks									
Gross req.			3000		3000		3000		
scheduled report									
Projected on hand	400	400	400	900	900	1400	1400	1900	190
Net requirement			2600		2100		1600		
Planned order rcpt			2600		2100		1600		
Planned order release	3500		3500		3500				
MRP report for #795 LT: 1 week									
Gross req.			4500		4500		4500		
scheduled report									
Projected on hand	900	900	900	1400	1400	1900	1900	2400	240
Net requirement			3600		3100		2600		
Planned order rcpt			3600		3100		2600		
Planned order release		5000		5000		5000			

NAME :_____ STD.:_____ DIV.:_____

6. Assumptions of EOQ model

* Demand requirement remains constant always
* No shortages are allowed
* Order quantity is received all at once
* Order receipt must be constant

The inventory carrying cycle of uniform rate of demand and instantaneous replenishment is shown below -



Let -

Co - cost of ordering
D - Actual demand
Q - order quantity
Cc - inventory carrying cost

The annual ordering cost : $\frac{Co\ D}{Q}$

NAME :_____ STD.:_____ DIV.:_____

The annual carrying cost : $\frac{C_c \times Q}{2}$

Total cost : $\frac{C_o D}{Q} + \frac{C_c Q}{2}$

To derive $Q_{optimal}$ - Economic order quantity

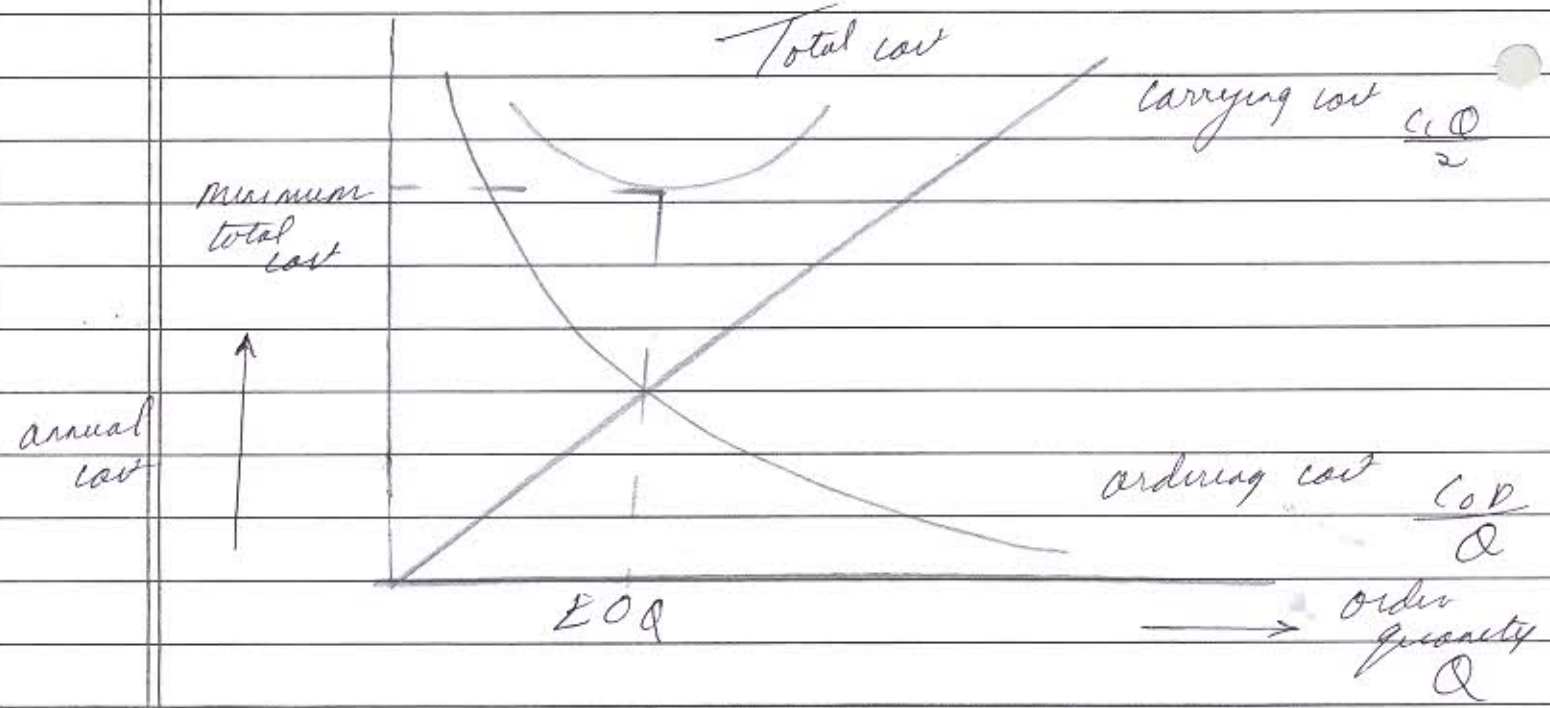
Optimal ordering ~~cost~~ quantity can be derived by equating total annual carrying cost and total annual ordering cost.

$$\frac{C_o D}{Q} : \frac{C_c Q}{2}$$

$$Q^2 : \frac{2 C_o D}{C_c}$$

$$EOQ : \sqrt{\frac{2 C_o D}{C_c}}$$

At EOQ, economic order quantity, the total cost is minimum as shown in the curve below -



NAME : STD.: DIV.:

Q7 Data given: D: 25000 units/year
Cu: 1000
Co: 200 / unit / year
Cc: 100 / unit / year

* EOQ: $\sqrt{\frac{2CoD}{Cc}}$: $\sqrt{\frac{2 \times 200 \times 25000}{100}}$: 316.227 ≈ 317 units

* No of orders: $\frac{D}{EOQ}$: $\frac{25000}{317}$: 78.86 ≈ 79 units

* Duration between each order: $\frac{N}{\text{No of orders}}$: $\frac{365}{79}$: 4.62 ≈ 5 days

* Total annual cavatory cost: Tic : $\frac{iQ}{2} + \frac{CoD}{Q}$

: $\frac{100 \times 317}{2} + \frac{200 \times 25000}{317}$: 31622.87 ₹

* Total cost including materials : Cu D + Tic
: 25000 x 1000 + 31622.87 ₹
: 25031622.87 ₹

NAME : STD.: DIV.:

8 Data:

Demand / month: 1000 unit

Demand / year: 12 000 units

d (demand rate): 30 units / day

p (production rate): 50 units / day.

C_u: ₹ 10 / unit

C_o: ₹ 100

i: 15%

* C_c: $i \times C_u$
: 0.15×10: 1.5 ₹

* EOQ: $\sqrt{\frac{2 C_o D}{C_c (1 - d/p)}}$

: $\sqrt{\frac{2 \times 100 \times 12000}{1.5 \times (1 - 30/50)}}$: 2000 units

* No of orders: $\frac{D}{EOQ}$: $\frac{12000}{2000}$: 6

* Duration between each order: $\frac{N}{\text{No of orders}}$

: $\frac{365}{6}$: 60.833 ≈ 61 days

* Total annual cost (Tic)

: $\sqrt{2 C_o D C_c (1 - d/p)}$

: $\sqrt{2 \times 100 \times 12000 \times 1.5 \times (1 - 30/50)}$

: 1200 ₹

* Total cost including drugs: Tic + $C_u D$.

: $12000 \times 10 + 1200$

: 121 200 ₹