CMR INSTITUTE OF TECHNOLOGY

CMR INSTITUTE OF TECHNOLOGY

Improvement Test -I May 2017

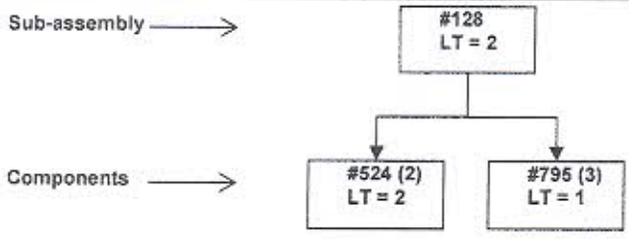
Sub:	Operations Management			Code:	10ME81
Date: 25/05/17	Duration: 90 mins	Max Marks: 50	Sem: 8TH	Branch:	ME

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

Q.No.	Question	OBE Marks	OBE CO	OBE RBT
1a	What is Inventory? Explain different types of inventories?	[07]	CO1	L1
1b	Differentiate between Independent and dependent demand?	[03]	CO3	L2
2a	Gamma 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
2b	What is meant by bullwhip effect, briefly explain?	[03]	CO1	L1
3	Explain with a block diagram MRP & MRP-II?	[10]	CO1	L1
4	Suzlon is German-based Company that manufactures wind turbines. In its turbines, an 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
5	Derive the Basic EOQ Model with uniform rate of demand and instantaneous replenishment with necessary assumptions?	[10]	CO2	L2

Suppliers data	Vendor-A	Vendor-B	Vendor-C
Quantity supplied	90	80	75
Quantity accepted	78	80	70
Price of each item Rs.	4	4.2	3.9
Delivery promised in weeks	6	6	6
Actual deliveries made in weeks	8	6.2	7

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



6	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
7	A laboratory require 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
8a.	Differentiate between purchasing and supply chain management?	[5]	CO3	L2
8b.	Differentiate between traditional and e-procurement?	[5]	CO3	L2

SCHEME & SOLUTION'S FOR IMPROVEMENT TEST MAY 2017

SUB :- OPERATION'S MANAGEMENT SEM :- 8th SEM A & B

SUBCODE :- 10ME81 ACADEMIC YEAR :- 2016-17

(01)

Q1a

Ans a :→ Inventory is nothing but the stocking up of goods, commodities, and other requirements for future use.

→ The different types of Inventory are :-

1- Raw material Inventory :- The unfinished goods stocked is known as raw materials inventory

2. Work in procen Inventory :- The goods that are in procen on the job shop floor queued up for the operation (semi finish)

3. Finished goods Inventory :- The materials that are completely finished and which are ready to be dispatched.

4. Purchased Parts Inventory :- The goods that are yet to be machined, like raw materials.

5. Maintaince, Operations managment & Repair Inventory :- Items like lubbricants and other operations required items stocked come under this category.

6. Tools Inventory :- The machinary like, Lathe, drilling machine, drill bits etc. come under this category.

7. Miscellaneous Inventory :- All other items like, office stationary, front office required items come under this section.

Q1(b)

Ans(b) → Demand is the requirement of items per unit of time

(1) Independent demand : The items whose demand does not depend on the demand of the finish of other items.
Ex :- Finished products

(2) Dependent demand :- The item whose demand depends on other item demand is known as dependend demand.
Ex :- All raw materials.

Q2(b)

Ans(b) The bull whip effect is one in which demand information creates distortion and carries away from end use customers.

→ In this effect, independent demand is continuous.
→ The cummulative lead time is more (or) less equal to annual lead time.
→ The plain horizon is long enough so that less cost of material
→ The production items are need to produce the product and improve the business plan.

Q2(a)

Sol(a)

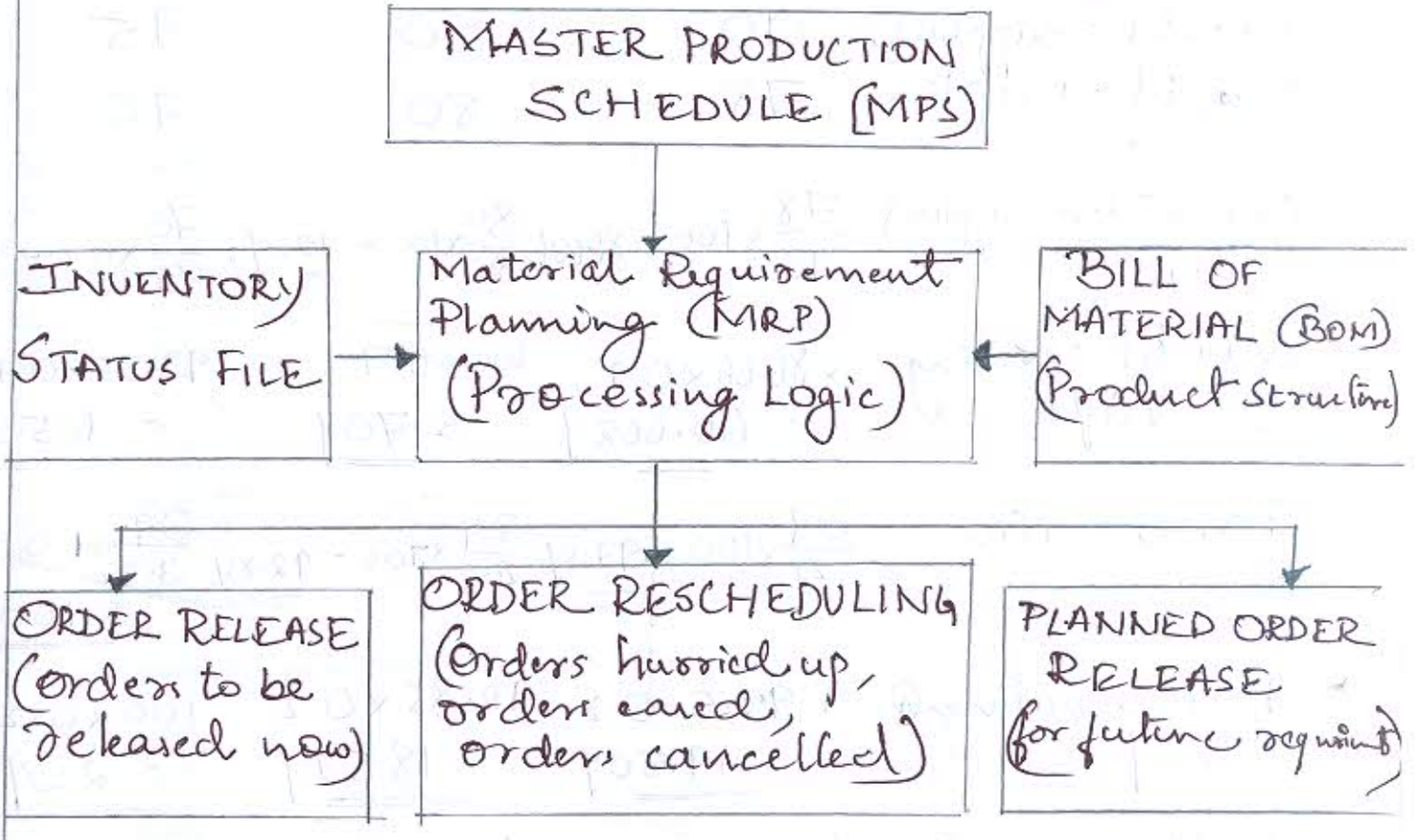
Data Analysis	Vendor - A	Vendor - B	Vendor - C
Quantity supplied Quantity accepted	90 78	80 80	75 70
Quantity supplied ratio	$\frac{78}{90} \times 100 = 86.66\%$	$\frac{80}{80} \times 100 = 100\%$	$\frac{70}{75} \times 100 = 93.33\%$
→ ① Quantity rating @ 70%	$\Rightarrow 86.66 \times 0.7 = 60.662\%$	$100 \times 0.7 \Rightarrow 70\%$	$93.33 \times 0.7 = 65.331\%$
Price ratio	$\frac{3.9}{4} \times 100 = 97.5\%$	$\frac{3.9}{4.2} \times 100 = 92.85\%$	$\frac{3.9}{3.9} \times 100 \Rightarrow 100\%$
→ ② Price rating @ 20%	$\Rightarrow 97.5 \times 0.2 = 19.50\%$	$92.85 \times 0.2 = 18.57\%$	$100 \times 0.2 = 20\%$
Delivery ratio	$\frac{6}{8} \times 100 = 75\%$	$\frac{6}{6.2} \times 100 = 96.77\%$	$\frac{6}{7} \times 100 = 85.71\%$
→ Delivery rating @ 10%	$75 \times 0.1 \Rightarrow 7.5\%$	$96.77 \times 0.1 \Rightarrow 9.677\%$	$85.71 \times 0.1 = 8.571\%$
Total rating of all	87.662%	98.247%	93.902%

$\Rightarrow$ Total $\Rightarrow 1 \oplus 2 \oplus 3 \Rightarrow 87.662\%$.

Hence rating of vendor-B is higher, so vendor-B is preferred from all other vendors.

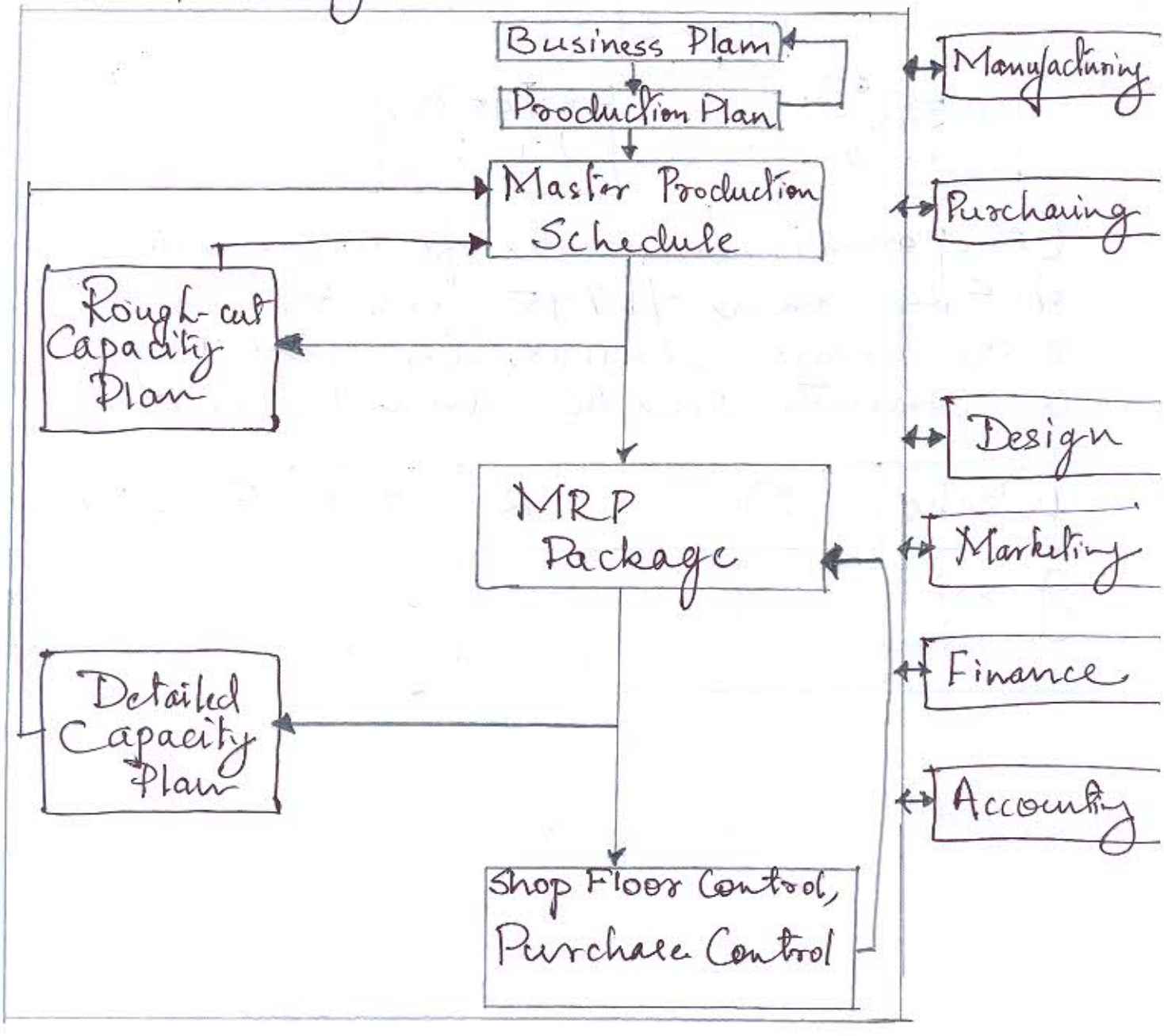
Q3

Ans:- Fig 1 :- Block diagram of [MRP] Material Requirement Planning



P.T.O

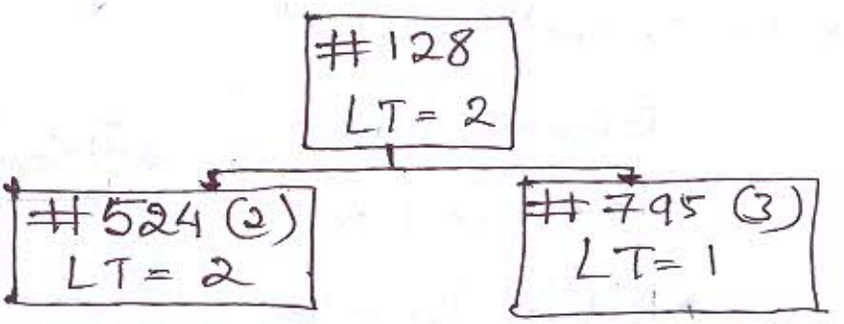
Fig 2 :- MRP-II An integrated system for planning and control.



(06)

Q4.

Ans:



Components sourced from suppliers for #524 and #795 are 3500 and 500 respectively. Intial Inventory for components are 400 and 900 units.

Weeks	0	1	2	3	4	5	6	7	8
gross required					1500		1500		1500

P.T.O

Q4 → MRP Report for assembly and Subassembly :-

Weeks	0	1	2	3	4	5	6	7	8
gross required.					1500		1500		1500

Sub assembly → MRP report for #128, LT = 2 weeks.

gross required					1500		1500		1500
Scheduled receipts									
Projected on hand									
Net requ					1500		1500		1500
Pre order receipt					1500		1500		1500
Pre order release			1500		1500		1500		

Components → MRP Report for #524 (2), LT = 2

Gross req			3000		3000		3000		
Scheduled receipts									
Projected on hand	400	400	400	900	900	1400	1400	1900	1900
Net required			2600		2100		1600		
Pre order receipts			2600		2100		1600		
Pre order release	3500		3500		2500				

P.T.O

Q4 SOL- Contd.

→ Components → MRP Report for #795 (3), LT = 1

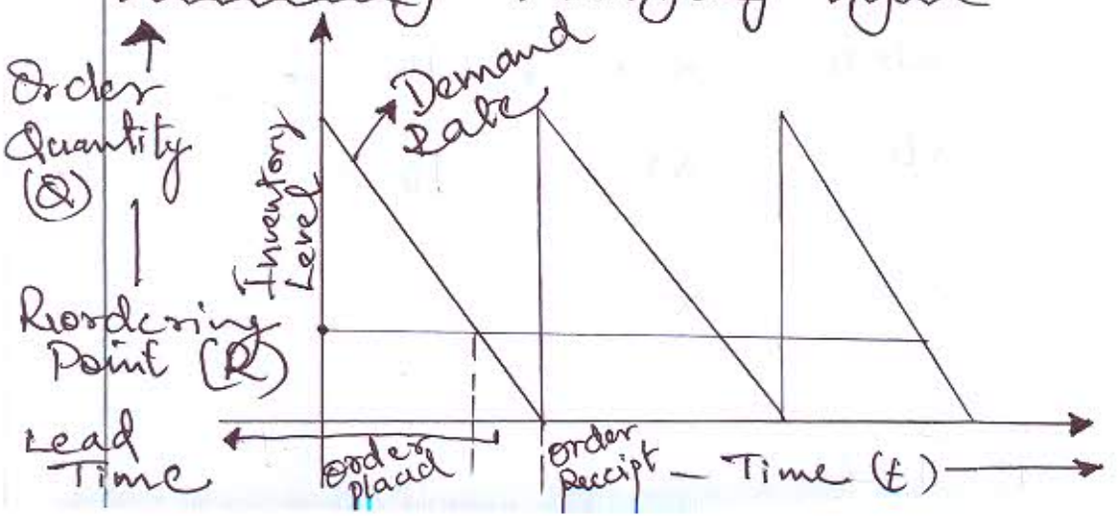
Week	0	1	2	3	4	5	6	7	8
Gross required			4500		4500		4500		
Scheduled receipts									
Project on hand	900	900	900	1400	1400	1900	1900	2400	2400
Net requird			3600		3100		2600		
Pre order Receipts			3600		3100		2600		
Pre-order release.		5000		5000		5000			

Q5.

Ans → Assumptions of EOQ Model :-

1. Demand requirements remain constant always.
2. No shortages are allowed.
3. Order quantity is received at once.
4. Order receipts should be constant

→ Inventory carrying cycle :-



Let C_o - Cost of ordering
C_c - Inventory carrying cost
D - Annual demand
Q - Order quantity (Annual)

Thus, the annual ordering cost is given by $\Rightarrow \frac{C_o \times D}{Q}$ ——— (1)

Similarly the annual carrying cost is given by $\Rightarrow \frac{C_c \times Q}{2}$ ——— (2)

$\therefore$ **Total cost $= \frac{C_o \times D}{Q} + \frac{C_c \times Q}{2}$**

∴ Deriving $Q_{optimal}$ (optimal ordering cost)

$\Rightarrow$ Optimal ordering cost can be derived when total annual ordering cost is equal to annual carrying cost.

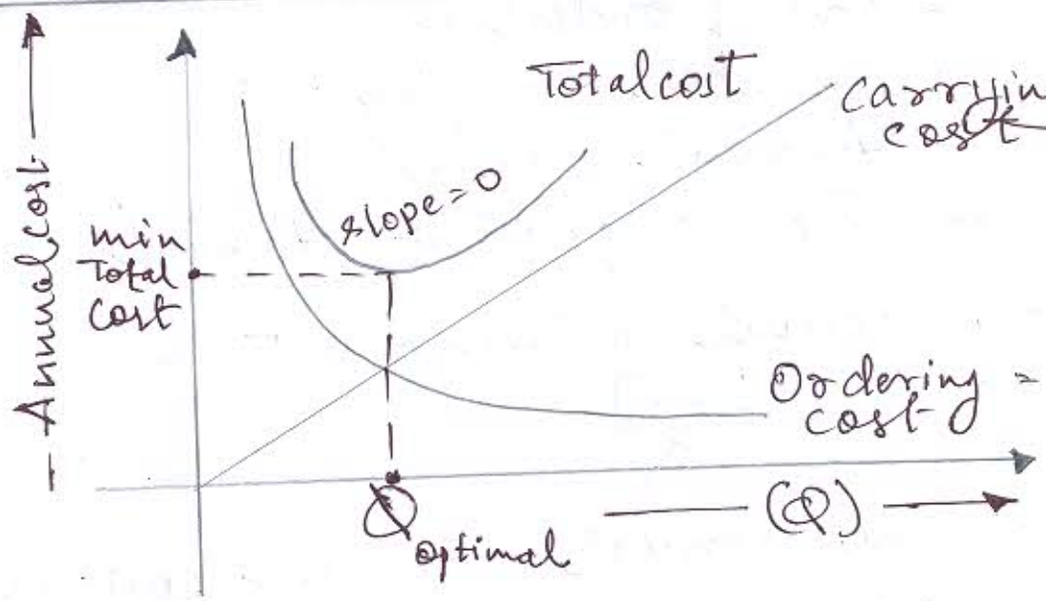
$$\Rightarrow \frac{C_o \times D}{Q} = \frac{C_c \times Q}{2}$$

$$\Rightarrow Q^2 = \frac{C_o \times D \times 2}{C_c}$$

$$\Rightarrow \boxed{Q_{optimal} = \sqrt{\frac{2 \times C_o \times D}{C_c}}}$$

Represented graphically,

P.T.O



Q6.

Soln:-

Given:-

$D = 25,000$ per year

$C_u = Rs.\ 1000/-$

$C_o = Rs.\ 200/-$ per year

$C_c = Rs.\ 100/-$ per year

(a) EOQ

$$Q_{optimal} = \sqrt{\frac{2 \times C_o \times D}{C_c}}$$

$$= \sqrt{\frac{2 \times 200 \times 25,000}{100}}$$

$$= 316.2277$$

$$\approx 317 \text{ units}$$

(b) No. of orders $= \frac{D}{Q_{optimal}}$

$$= \frac{25,000}{317}$$

$$\Rightarrow 78.86 \approx 79 \text{ units/year}$$

(c) Duration b/w each order $\Rightarrow \frac{N}{\text{No. of orders}}$

Assuming 'N' as 365

$\Rightarrow \frac{365}{79}$

$\Rightarrow 4.620$ days $\approx$ 5 days

(d) Total annual Inventory cost :-

$\Rightarrow (T_{ic})_{min} = \frac{C_o \times D}{Q} + \frac{C_c \times Q}{2}$

$= \frac{200 \times 25000}{317} + \frac{100 \times 317}{2}$

$\Rightarrow (T_{ic})_{min} =$ Rs. 31, 622.87 /-

(e) Total cost including materials :- $(C_u \times D) + (T_{ic})$

$\Rightarrow (1000 \times 25,000) + 31,622.87$

$\Rightarrow$ Rs. 2, 50, 31, 622.87 /-

Q7

Sol^{n} :-

Given :-

$D/month = 1000$ units

$\Rightarrow D = 1000 \times 12$

$= 12,000$ units

(demand rate) $d = 30$ units/day

(Production rate) $p = 50$ units/day

$C_u = Re.\ 10/-$

$C_o = Re.\ 100/-$

$C_c = C_u \times i$

$= 10 \times 15\%$

$\Rightarrow C_c = C_u \times i = Re.\ 1.5/-$

(a) EPQ

$$\Rightarrow Q_{optimal} = \sqrt{\frac{2 \times C_o \times D}{C_c \times \left(1 - \frac{d}{p}\right)}}$$

$$= \sqrt{\frac{2 \times 100 \times 12000}{1.5 \times \left(1 - \frac{30}{50}\right)}}$$

$\Rightarrow Q_{optimal} = 2000$ units

(b) Number of production runs per year

$$\Rightarrow \frac{D}{Q_{optimal}} = \frac{12000}{2000}$$

$\Rightarrow N = 6$ runs per year

(c) Time b/w each production run (assume 300 days in a year)

$$\Rightarrow \frac{300}{6} = \underline{50 \text{ days}}$$

(d) Total annual inventory costs

$$\Rightarrow (Tic)_{min} = \sqrt{2 \times Co \times D \times Cu \times i \times \left(1 - \frac{d}{p}\right)}$$

$$= \sqrt{2 \times 100 \times 12000 \times 1.5 \times \left(1 - \frac{30}{50}\right)}$$

$$= \underline{\text{Re. } 1200/-}$$

(e) Total cost including cost of drugs :-

$$\Rightarrow Cu \times D + Tic$$

$$\Rightarrow (10 \times 12000) + 1200$$

$$\Rightarrow \underline{\text{Re. } 1,21,200/-}$$

Q8(a)

PURCHASING	SUPPLY CHAIN MANAGEMENT
→ Purchasing is the process of getting goods (or) services that the company needs to full fill its business models.	→ Supply chain management consists of every individual task/person involved in getting the product into the hands of a customer.

PURCHASING	SUPPLY CHAIN MANAGEMENT
→ Some of the tasks involved in purchase are development of standards of quality, financial purchase, negotiating prices etc.	→ Some of the tasks involved in supply chain management are quality control, marketing, procurement & sourcing.
→ To make profit, the cost of purchases of goods must be less than the amount you sell it.	→ It is a network consisting of manufacturer, suppliers and logistics providers needed to get a specified product.

Q8(b)

Ans (b)

TRADITIONAL	E-PROCUREMENT
(1) Deals with several supplier for each item	Deals with only one (or) two supplier for every item.
(2) Needs excess follow up for the products	Needs less follow up for the products
(3) Sets a competitive situation for the suppliers	Avoids entering into conflicts with any supplier
(4) Engages in price negotiation every time an item is purchased.	Engages in cost reduction exercise jointly with the vendor.
(5) withhold business information & obtain better price	Exchange relevant business information & get better business gain.