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# University of Petroleum \& Energy Studies <br> College of Management \& Economics Studies <br> Kandoli Campus, Dehradun 

End Semester Examination - May, 2018

Programme Name: MBA (UISC)
Subject: Operations Management
Subject code: LSCM 7001

Semester - II
M.Marks: 100

Duration: 3 Hrs

Note: All sections are compulsory \& this question paper carries $\mathbf{4}$ sections.

## $\underline{\text { Section - A (20 Marks) }}$

Attempt all questions in this section. Each question carries 2 marks each
A hotel purchases 8,000 gallons of a cleaning product annually. Each gallon costs $\$ 10$ and the cost of holding one gallon for a year is estimated to be $\$ 3$. Ordering cost amounts to $\$ 30$ per order. Answer $1 \& 2$

1. If the hotel orders in lots of 500 gallons, how many orders does it place each year?
(a) 14
(b) 15
(c) 17
(d) none
2. What is the total annual cost?
(a) $\$ 1120$
(b) $\$ 1150$
(c) $\$ 1350$
(d) none
3. The bill of material for end item A is shown below:


Item On-Hand Inventory
A 50
B 50
C 90
D 70
E $\quad 15$
Calculate the dependent demand for D
(a) 50
(b) 60
(c) 70
(d) none
4. A $\qquad$ is a statement of how many finished items are to be produced and when they are to be produced.
(a) Aggregate Plan
(b) Master Production Schedule
(c) Material Requirements Plan
(d) Capacity Requirements Plan
5. Which lot sizing rule is best when inventory carrying costs are high and setup/order costs are low?
(a) Lot-for-Lot (LFL)
(b) Fixed order quantity (FOQ)
(c) Periodic order quantity (POQ)
(d) None
6. A company currently has no items in inventory. The demand for the next four months is $200,400,250$ and 350 units. Determine the level production rate if a level strategy is selected with the goal of ending Period 4 with 100 units in inventory.
(a) 300
(b) 310
(c) 350
(d) none
7. Johnson's sequencing rule is used to sequence
(a) several jobs through several work centers
(b) several jobs through one work center
(c) two jobs through several work centers
(d) several jobs through two work centers
8. Staff scheduling needs all of the following except the
(a) Flow-time estimates
(b) Accurate forecasting
(c) Staffing levels required by time period
(d) Determining available personnel
9. Which leader in quality management promoted the Quality Trilogy of quality planning, quality control, and quality improvement?
(a) W. Edwards Deming
(b) Joseph Juran
(c) Philip Crosby
(d) Jack Hillerich
10. Which of the following is not one of W. Edwards Deming's 14 points?
(a) Create a vision and demonstrate commitment
(b) Stop making decisions purely on the basis of cost
(c) Eliminate exhortation
(d) The only performance standard is Zero Defects

## Section - B (20 Marks)

## Attempt any 4 question, each question carries 5 marks only

2. (a) Determine the reliability of the system shown below where lamp 2(backup of lamp 1), lamp 4(backup of lamp 3), lamp 5(backup of lamp 4), lamp 7(back up of lamp 6)

(b)The Ramani corporation purchases 8000 transistors each year as components in minicomputers. The unit cost of each transistor is $\$ 10$, and the cost of carrying one transistor in inventory for a year is $\$ 3$, ordering cost is $\$ 30$ per order. What are (i)the optimal order quantity (ii) the expected number of orders placed each year and(iii) the expected time between orders? Assume that corporation operates a 200 day working year.
(c)Define service quality \& what are the various dimension of service quality?
(d) Define the following (i) value (ii) Efficiency (iii) Effectiveness (iv) BOM (v) MRP
(e) Children's art set are ordered once each year by Mr. Smith Inc. and the reorder point, without safety stock is 100 art sets. Inventory carrying cost is $\$ 10$ per set per order, and the cost of stockout is $\$ 50$ per set per year. Given the following demand probabilities during the reorder period, how much safety stock should be carried?

Demand During Reorder Period


0 . 1
50 . 2

150
. 2
200

## Section-C(30 Marks)

## Attempt any 3 question, each question carries 10 marks only (10*3=30 marks)

3(a) The ABC Masala company has to process four items A, B, C \& D on five machines:- I, II, III, IV \& V. Processing times are given in the following table. Find the sequence that minimizes the total elapsed time \& also the idle time for each machine

|  | I | II | III | IV | V |
| :--- | :--- | :--- | :--- | :--- | :--- |
| A | 7 | 5 | 2 | 3 | 9 |
| B | 6 | 6 | 4 | 5 | 10 |
| C | 5 | 4 | 5 | 6 | 8 |
| D | 8 | 3 | 3 | 2 | 6 |

3(b) Mishra \& Co. produces electric wires for state electricity department. Quality is not quite good as it could be at this point, but the selling price is low and Anik can study the market response while spending more time on R\&D. At this stage, however Anik \& co. needs to develop aggregate production plan for the next six months January through June. You have been commissioned to create the plan. The following information should help:

|  | January | February | March | April | May | June | Total |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |


| Demand <br> forecast | 1800 | 1500 | 1100 | 900 | 1100 | 1600 | 8000 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Number <br> of <br> working <br> days | 22 | 19 | 21 | 21 | 22 | 20 | 125 |

## Costs

| Materials | $\$ 100 /$ unit |
| :--- | :--- |
| Inventory holding cost | $\$ 1.5 /$ unit/month |
| Marginal cost of stockout | $\$ 5 /$ unit/month |
| Marginal cost of subcontracting | $\$ 20 /$ unit |
| Hiring \& training cost | $\$ 200 /$ worker |
| Layoff cost | $\$ 250 /$ worker |
| Labour hours required | $5 /$ unit |
| Straight time cost(first eight hours each day) |  |
| Overtime cost | 6/hour |
|  |  |

## Inventory

Beginning inventory 200 units
Safety stock required $\quad 25 \%$ of month demand

What is the cost of each of the following production strategies?
(i)Level strategy
(ii) subcontracting
(c) Information for café coffee day is given below. Fixed costs are $\$ 3500$ per month

| Item | Price(\$) | Cost | Annual forecasted <br> sales unit |
| :--- | :--- | :--- | :--- |
| Sandwich | 2.95 | 1.25 | 7000 |
| Soft drink | .80 | .30 | 7000 |
| Baked potato | 1.55 | .47 | 5000 |
| Tea | .75 | .25 | 5000 |
| Salad bar | 2.85 | 1.00 | 3000 |

Calculate the breakeven point in dollars
(d) Five jobs are waiting to be assigned. Jobs area given below

| Job | Job work(processing time) | Job due date(days) |
| :--- | :--- | :--- |
| A | 6 | 8 |
| B | 2 | 6 |
| C | 8 | 18 |
| D | 3 | 15 |
| E | 9 | 23 |

Using SPT, FCFS, EDD \& LPT rule, Calculate
(i) Average completion time
(ii) utilization
(iii) Average number of jobs in the system
(iv) average job lateness

## Section - D (30 Marks)

## Attempt the situation \& provide the solution for this situation



In the above figure, the bills of material and inventory records for product A is given \& their components. The MPS for product A calls for completion of 100 units in period 2, 125 units in period $4 \& 150$ units in period 6 . The manufacturing lead time for product A is 1 week. The numbers in parentheses are the number of parts needed to make the parent item. Compute a full MRP explosion \& apply the appropriate lot sizing rules to determine a schedule of planned order releases

|  | Part C | Part D | Part E | Part F |
| :--- | :--- | :--- | :--- | :--- |
| Lot size rule | FOQ=250 | LFL | FOQ=1000 | POQ=2 weeks |
| Lead time(weeks) | 2 | 1 | 1 | 2 |
| Schedule receipts | 300 (week 1) | None | None | 1000 (week 2) |
| Beginning <br> inventory | 0 | 125 | 750 | 2500 |
| Spare parts orders | None | 100 each in <br> week 3 \& 6 | None | none |
| Source of item | Manufactured <br> in house | Manufactured <br> in house | Manufactured <br> in house | Purchase <br> items from <br> supplier |

