DC 2013

[This question paper contains 6 printed pages.]

Sr. No. of Question Paper : 1647 **Roll No.....**

Unique Paper Code : 101433

Name of the Paper : Production and Operations Management

Name of the Course : Bachelor of Business Studies

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **All** questions carry equal marks.
3. Attempt **five** questions in all. Question No. **1** is compulsory.
4. Use of non-programmable scientific calculator is allowed.
5. Answer parts of a question together. Show your workings clearly.

1. (a) Explain in detail ten functions of a production and operations manager. (5)

(b) The super snow paint shop has recorded the demand for a particular color during the past six weeks as shown below :

Week	Demand in litre
1st week May	19
2nd week May	17
3rd week May	22
4th week May	27
1st week June	29
2nd week June	33

(i) Calculate a 3-week moving average for the data to forecast demand for the next week. (2)

P.T.O.

(ii) Calculate a weighted average for the data (all weeks and the coming week), using a weight of 0.6 for the most recent data and weights of 0.3 and 0.1 for successive older data. (3)

(c) Arrivals at a telephone booth are considered to be exponential with an average time 10 minutes between one arrival and the next. The length of phone call is assumed to be distributed exponentially, with mean 3 minutes.

(i) What is the probability that a person arriving at the booth will have to wait ? (1)

(ii) The telephone department would install a second booth when convinced that the arrival has to expect waiting for at least 3 minutes for a phone call. By how much should the flow of arrivals be increased in order to justify a second booth ? (2)

(iii) What is the average length of the queue that forms from time to time ? (1)

(iv) What is the probability that it will take him more than 10 minutes altogether to wait for the phone and complete his call ? (1)

2. (a) A process is controlled by a device known as catalyst supply controller. The device was tested by the company for 600 hours and it was found that the device failed 45 times. The company also observed that it took around 120 hours to restore the device back to working conditions. Based on this information calculate the following :

(i) Failure Rate of the device

(ii) Mean Time to Failure (MTTF)

(iii) Mean Time to Repair (MTTR)

(iv) Availability

(v) Reliability for 50 hours (5)

(b) Explain in detail the equipment life cycle of the product. Also explain how it helps the operations manager. (5)

(c) Explain the service design matrix. Locate the position of the following services on the matrix : Hair Cut, Dry cleaning, Radio broadcast, and Online shopping. (5)

3. (a) A firm uses single exponential smoothing with alpha = 0.3 to forecast demand. The forecast for the first week of January was 500 units, whereas actual demand turned out to be 450 units.

(i) Forecast the demand for the second week of January. (1)

(ii) Assume that the actual demand during the second week of January turned out to be 550 units. Forecast the demand up to February third week, assuming subsequent demands as 475, 450, 470, 525 and 470 units. (2)

(iii) Using the above determine Bias and MAD. (2)

(b) Find the sequence that minimizes the Total elapsed time required to complete the following tasks on two machines.

Tasks	Machine 1	Machine 2
A	2	6
B	5	8
C	4	7
D	9	4
E	6	3
F	8	9
G	7	3
H	5	8
I	4	11

Also draw a Gantt chart and find out the idle time for both the machines ? (5)

(c) Explain Delphi method of Qualitative forecasting. Mention any two shortcomings of this method. (5)

4. (a) A business man has two independent investment portfolios A and B available to him but he lacks the capital to undertake both of them simultaneously. He can either chose A first and then stop, or if A is not successful then take, B or vice versa. The probability of success of A is 0.6 while for B is 0.4. Both investment schemes require an outlay of Rs. 10,000 and both return nothing if the venture is proven to be unsuccessful. Successful completion of A will return Rs. 20,000 (over cost) and successful completion of B will return Rs. 24,000 (over cost). Draw a decision tree in order to determine best strategy. (8)

(b) A manufacturer is developing plans for facility to make alumni storm windows. Desired output is 320. The workers work for 8 hrs a day. The precedence relation of tasks and the performance time is given below :

Task	Precedence	Task Time (Seconds)
A	–	70
B	A	80
C	A	40
D	A	20
E	A	40
F	B,C	30
G	C	50
H	D,E,F,G	50

(i) Draw a precedence diagram. (1)

(ii) Calculate the Cycle time. (1)

(iii) Find minimum possible no. of workstations. (1)

(iv) Balance the line using LOT rule. (3)

(v) What is the efficiency of your time balance ? (1)

5. (a) Mahesh Mehta & Co. wants to prepare an aggregate production plan for their company. They have the following data relating to demand available with them :

Month	Demand (Units)	No. of working Days
April	250	23
May	220	22
June	300	21
July	290	24
August	260	22
September	180	22

The following relevant details are also available :

(i) The company works on a single shift basis of 8 hours and employs 125 workers.

(ii) One unit requires 100 hours of production time.

(iii) Overtime costs are INR 40 per hour and under time costs are INR 20 per hour.

(iv) Hiring and training expenses are INR 7500 per worker and laying-off cost are INR 5000 per worker.

Evaluate the following options for chase strategy and give your suggestion to the company

(i) Utilize overtime and under time.

(ii) Using hiring and laying -off alternatives for capacity adjustment. (10)

(b) Alpha electronic Company manufactures cathode ray tubes on mass production basis. At some intermediate point of production line, 15 samples of size 50 each have been taken. Tubes within the sample were classified good or bad. The related data are given in the following table. Construct a P-chart (proportion defective) with 3 sigma limits and comment on the process.

Sample Number	Number of Defective Tubes
1	10
2	10
3	9
4	10
5	4
6	6
7	2
8	3
9	9
10	4
11	8
12	11
13	8
14	10
15	9

(5)

6. (a) Consider a one-machine six jobs scheduling problem. All the jobs are available for scheduling at the beginning of the planning horizon itself. The processing time and due dates are given as follows :

Jobs	Processing Time (Minutes)	Due (Minutes from starting of Planning Horizon)
1	12	25
2	10	45
3	15	55
4	13	30
5	12	90
6	9	70

Use SPT, EDD to arrive at a schedule and compute Mean Flow time, Make span, Mean Tardiness and Number of Tardy Jobs. (5)

(b) Explain in detail Product and Process Layout.

(c) Write short note on **two** of the following : (5)

(i) Two Card Kan Ban

(ii) Flexible Manufacturing System

(iii) Job-shop production (5)