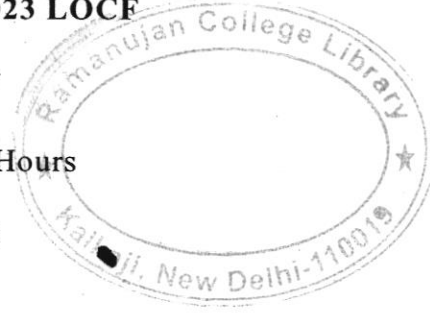


[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6830  
Unique Paper Code : 61015913  
Name of the Paper : Production & Operations Management  
(Generic Elective)  
Name of the Course : Bachelor of Management Studies (BMS),  
2023 LOCF  
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. Attempt any five questions in all.
3. All questions carry equal marks.
4. Show your working clearly in your answer sheet it self.
5. Use of simple calculator is allowed.

Q1. a) What activities are involved in operations? Describe how operations has evolved from the Industrial Revolution to Globalization. (7)

b) The manager of the Mega Service Station wants to forecast the demand for unleaded gasoline next month so that the proper number of litres can be ordered from the distributor. The owner has accumulated the following data on demand for unleaded gasoline from sales during the past 08 months:

P.T.O.

Month	Gasoline Demand (litre)
January	800
February	725
March	630
April	500
May	645
June	690
July	730
August	810

- i) Compute an exponentially smoothed forecast using a value of alpha as 0.30 for the month of September.
- ii) Compute a weighted three-monthly moving average forecast using weights of 0.5, 0.3, and 0.2 for the most recent, next recent, and most distant data, respectively, and compute the forecast error for each month.
- iii) Compare the two forecasts using MAD and indicate which seems to be more accurate.

(8)

Q2. a) List and explain the steps of strategy formulation. Follow the steps to outline a strategy for a company or an organization with which you are familiar.

(7)

b) Sequence the following jobs by SPT and Due Date criteria and determine mean flow time in each case:

Job	Processing Time (in days)	Due Date
A	3	10
B	10	12
C	2	25
D	4	8
E	5	15
F	8	18
G	7	20

If for each late day, a fine of Rs. 300 is imposed, then which sequencing rule would you recommend? (8)

Q3. a) How is the mass production system different from the batch production system? What are the key implications for operations managers?

b) Quick Start Technologies (QST) helps companies design facility layouts. One of its clients is building five new assembly plants across the country. QST will design the assembly-line layout and ship the layout instructions, along with the appropriate machinery to each new locale. Use the precedence and time requirements given below to design an assembly line that will produce a new product every 12 minutes.

Task	Precedence	Time (mins)
A	None	6
B	A	2
C	B	2
D	A	1
E	A	7
F	A	5
G	C	6
H	D, E, F	5
I	H	3
J	G	5
K	I, J	4

i) Construct the precedence diagram

ii) Determine the cycle time and theoretical minimum number of workstations considering an eight-hour day of production

iii) Balance the line and assign tasks to workstations following LOT rule

iv) What is the efficiency of the line? (8)

Q4. a) A nationwide mail order house desires to verify the accuracy of its clerical work in completing invoices. A defective is defined as an invoice containing at least one of a number of possible errors. Ten samples of different sizes were taken and the number of defectives in each sample are noted below:

Sample Number	1	2	3	4	5	6	7	8	9	10
Sample Size	100	300	200	150	200	250	300	150	100	250
No. of defectives	7	12	6	5	18	10	18	6	3	20

Draw a relevant control chart ( $z = 3$ ) to check the quality of clerical work done by staff at the mail order house. Is the work under statistical control? (7)

b) Western National Bank is considering opening a drive-through window for customer service. Management estimates that customers will arrive at the rate of 15 per hour. The teller who will staff the window can service customers at the rate of one every three minutes. Assuming Poisson arrivals and exponential service, find the following:

i) Utilization of the teller

ii) Average number of customers in the waiting line

iii) The probability of a non-empty queue

iv) Average waiting time in line (8)

Q5. a) A businessman has two independent investment options A and B available to him. But he lacks the capital to undertake both of them simultaneously. He can choose to take A first and then stop, or if A is successful then take B, or vice versa. The probability of success on A is 0.7 while for B it is 0.4. Both the investments require an initial outlay of Rs. 20,000 and both return nothing if the venture is unsuccessful. Successful completion of A will return Rs. 30,000 over cost and in case of B will return Rs. 50,000 over cost.

Draw a decision tree and determine the best strategy. (7)

b) The Relish Candy Store makes a variety of candies in its factories. Its line of chocolate candies exhibits a highly seasonal demand pattern, with peaks during the winter months (for the holiday season and Valentine's Day) and valleys during the summer months (when chocolate tends to melt, and customers are watching their weight). Given the following costs and quarterly sales forecasts, determine whether (a) level production, or (b) chase demand would more economically meet the demand for chocolate candies:

Quarter	Sales Forecast (kgs)
Spring	80000
Summer	50000
Fall	120000
Winter	150000

Hiring cost: Rs 100 per worker

Firing cost: Rs 500 per worker

Inventory carrying cost: 50 paise per kg per quarter

Regular production cost per kg: Rs 2

Production per employee: 1000 kgs per quarter

Beginning workforce: 100 workers

(8)

Q6. a) What are the advantages and disadvantages of a qualitative (as opposed to a quantitative) approach to location decision making?  
(5)

b) Amy Russell must choose a service provider for her company's e-commerce site. Other factors being equal, she will base her decision on server availability. Given the following server performance data, which provider should she choose?

Provider	MTBF (Hour)	MTTR (Hour)
A	60	4.0
B	36	2.0
C	24	1.0

(5)

c) The following set of five jobs is to be processed through two work centres at a printing company. The sequence is first printing, then binding. Processing time at each of the work centres is shown in the following table:

P.T.O.

Job	Printing (Hours)	Binding (Hours)
A	4	10
B	7	6
C	10	9
D	4	5
E	7	8

Determine the optimal sequence of jobs that will minimize the total completion time. Also determine idle time of Binding and Printing.  
(5)