PAPER 9 - OPERATIONS MANAGEMENT & INFORMATION SYSTEM

The following table lists the learning objectives and the verbs that appear in the syllabus learning aims and examination questions:

	Learning objectives	Verbs used	Definition
LEVEL B	KNOWLEDGE What you are expected to know	List	Make a list of
		State	Express, fully or clearly, the details/facts
		Define	Give the exact meaning of
	COMPREHENSION What you are expected to understand	Describe	Communicate the key features of
		Distinguish	Highlight the differences between
		Explain	Make clear or intelligible/ state the meaning or purpose of
		Identity	Recognize, establish or select after consideration
		Illustrate	Use an example to describe or explain something
	APPLICATION How you are expected to apply your knowledge	Apply	Put to practical use
		Calculate	Ascertain or reckon mathematically
		Demonstrate	Prove with certainty or exhibit by practical means
		Prepare	Make or get ready for use
		Reconcile	Make or prove consistent/ compatible
		Solve	Find an answer to
		Tabulate	Arrange in a table
	ANALYSIS How you are expected to analyse the detail of what you have learned	Analyse	Examine in detail the structure of
		Categorise	Place into a defined class or division
		Compare and contrast	Show the similarities and/or differences between
		Construct	Build up or compile
		Prioritise	Place in order of priority or sequence for action
		Produce	Create or bring into existence

Paper – 9 – Operations Management & Information Systems

Full Marks: 100   **Time allowed-3hrs**

This paper contains 3 questions. All questions are compulsory, subject to instruction provided against each question. All workings must form part of your answer. Assumptions, if any, must be clearly indicted.

Question No. 1: Answer all questions. [20 marks]

1.
   (i) State the meaning of Concurrent Engineering.
   (ii) Explain the term Route Sheet.
   (iii) A worker is employed for 12 hours. During this period he takes 8 hours to complete a job with the standard time of 7 hours. Calculate the productivity of the workers as a percentage.
   (iv) A steel plant has a designed capacity of 50,000 tons of steel per day, effective capacity of 40,000 tons of steel per day and an actual output of 36,000 tons of steel per day. Compute the efficiency of the plant and its utilisation.
   (v) List the three axioms of Deming's Triangle.
   (vi) State the three prominent kinds of failure probability distribution.
   (vii) Define the term Rescue maintenance .
   (viii) Define Non-planned or non-structure decisions.
   (ix) Describe Encumbrance Budgetary Control.
   (x) Define Computer network.

                                                                                                        [10×2=20]

Operations Management

Answer any three questions

2. **(a) (i)** List the basic types of production control.   **[6]**

   (ii) Methods P and Q are both capable of manufacturing a product. They compare as follows:

Data		Method P	Method Q
Fixture	- cost	₹24,000	₹16,000
	- life	6 months	4 months
Tooling	- cost	₹2,560	₹4,800
	- life	300 pieces	500 pieces
Processing time per piece		6 mts.	4 mts.

   The annual requirement is 1,500 nos. Operating cost per hour of the process is ₹128 for both processes. Material cost is same in each case.
   Which method would you choose for production during a period of one year?   **[6]**

   (iii) Write the distinction between method & work study.   **[4]**

2. (b) (i) A retailer is evaluating two alternative computerized cash register system. The firm expects that about 2,500 customers per hour will require service and estimates a cost of ₹2 per hour per customer in ill will caused by waiting to complete a transaction. Each of the two systems can be considered to be single queue, single server system:

System 1	System 2
= 2,800 per hour	= 3,500 per hour
Operating cost = ₹100/hour	Operating cost = ₹125/hour

Which system would you recommend?   [3]

(ii) At a service station a study was made over a period of 50 days to determine both the number of automobiles being brought in for service and the number of automobiles serviced. The results are given below:

No. of automobiles arriving for service or completing services/day	Frequency of arrivals	Frequency of daily serviced
0	4	6
1	8	4
2	20	24
3	10	6
4	6	8
5	2	2

Simulate the arrival service pattern for a ten day period and estimate the mean number of automobiles that remain in service for more than a day.

Use the following series of random numbers:

For Arrivals	09	54	42	01	80	06	06	26	57	79
For Service	49	16	36	76	68	91	97	85	56	84

[7]

(iii) Explain the need for Productivity Improvement.   [6]

2. (c) (i) A production supervisor is considering how he should assign five jobs that are to be performed to five operators. He has the following information about the wages paid to the operators for performing these jobs:

Operators ↓	Job 1	Job 2	Job 3	Job 4	Job 5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

Assign the jobs the operators so that the aggregate cost is least.   [8]

(ii)

Origin	Profit (₹)/Unit				Supply
	Destinations				
	1	2	3	4	
A	40	25	22	33	100
B	44	35	30	30	30
C	38	38	28	30	70

Demand	40	20	60	30	

Find the initial solution by Vogel's Approximation method to maximize the profit. Is the initial solution feasible? **[8]**

2. (d) (i) **Draw network. Determine the critical path and duration of the project. Make float analysis. (Duration in weeks)**

Activity	1- 2	1- 3	2- 4	3- 4	3- 5	4- 9	5- 6	5- 7	6 -8	7- 8	8 – 9	8 – 10	9 –10
Duration	4	1	1	1	6	5	4	8	1	2	1	8	7

[8]

(ii) **Transport Ltd. provides tourist vehicles of 3 types – 20-seater vans, 8-seater big cars and 5 – seater small cars. These seating capacities are excluding the drivers. The company has 4 vehicles of the 20 –seater van type, 10 vehicles of the 8 – seater big car types and 20 vehicles of the 5 –seater small car types. These vehicles have to be used to transport employees of their client company from their residences to their offices and back. All the residences are in the same housing colony. The offices are at two different places one is the Head Office and the other is the Branch. Each vehicle plies only one round trip per day, if residence to office in the morning and office to residence in the evening. Each day, 180 officials need to be transported in Route I (from residence to Head office and back) and 40 officials need to be transported in Route II (from residence to Branch office and back). The cost per round trip for each type of vehicle along each route is given below.**

You are required to formulate the information's as a liner programming problem, with the objective of minimizing the total cost of hiring vehicles for the client company, subject to the constraints mentioned above.

(Only formulation is required. Solution is not needed).

(₹/round trip)

	20- Seater Vans	8 – Seater big cars	5 – Seater small cars
Route – I Residence – Head Office and back	600	400	300
Route – II Residence – Branch Office and back	500	300	200

[4]

(iii) **In a simulated operation, a firm's maintenance crew received requests for service and provided service during an 8 hour period as shown below:**

Request arrival (clock) time	Service time (hours)
0.00	1.5
1.00	0.5
3.30	2.0
4.00	0.5
7.00	1.0

The maintenance labour cost is ₹ 140 per hour and the delay time cost is ₹ 450 per hour.

(a) Find the idle time cost for the maintenance crew.

(b) Find the delay time cost for the machinery. **[2+2]**

Information System

Answer any two questions.

3. (a) (i) Write a note on Entropy. [2]

(ii) Describe Information System Organization. [6]

(iii) Describe the different System Costs. [3]

(iv) State the Different Roles Involved in System Development Life Cycle. [5]

3. (b) (i) 'There are other implications of using the database approach that can benefit most organizations.'- Describe them. [5]

(ii) Describe the three –schema architecture. [6]

(iii) List the information type and report contents of the three levels of management. [6]

3. (c) (i) Describe the different phases of ERP life cycle. [10]

(ii) State the main reasons for the Spread of E-commerce. [6]