PAPER – 9 – OPERATIONS MANAGEMENT & INFORMATION SYSTEMS

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: 3 hours**

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 objectives of Product Design.
   (ii)   List the advantages of Vertical Integration.
   (iii)   State the meaning of Routing.
   (iv)   A firm operates 6 days a week on single shift of 8 hours per day basis. There are 20 machines of the same capacity in the firm. If the machines are utilized for 75 per cent of the time at a system efficiency of 80 per cent, what is the rated output in terms of standard hours per week?
   (v)   Firm uses ₹50,00,000 in capital and 50,000 labour hours per year to produce ₹ 5,00,00,000 in product. What is the Partial Productivity of labour and partial productivity of capital?
   (vi)   Write the meaning of Total in 'Total Production Maintenance.'
   (vii)   List the two types of user acceptance testing.
   (viii) 'Coding has negative effects.' – List them.
   (ix)   Write a note on Legacy Data.
   (x)   List the two distinct steps of Digital Signature.   [10×2=20]

Operations Management

Answer any three questions

2. (a) (i) State the causes of low productivity.   6
   (ii) A process involves the production of a particular component which is then installed into an end product. Past observation has indicated that the average production time for the component is 4 minutes but fluctuations about the average do occur and the following probability distribution has been derived from past observations:

Minutes	Probability
2	0.10
3	0.25
4	0.40
5	0.10
6	0.10
7	0.05

The average time taken to install a component is 3 minutes but this also fluctuates and the following probability distribution has been derived:

Minutes	Probability
2	0.30
3	0.45
4	0.15
5	0.10

The current system uses one operative for installation but the company is considering employing another operative on the installation process.

We will simulate 10 arrivals on the current system, using the following 2 digit random numbers 20, 74, 94, 22, 93, 45, 44, 16, 04, 32, 03, 62, 61, 89, 01, 27, 49, 50, 90, 98. **10**

2. (b) (i) Fleet cars have increased their costs as they continue in service due to increased direct operating cost (gas and oil) and increased maintenance (repairs, tyres batteries etc.) The initial cost is ₹ 35,000, and the trade in value drops as time passes until it reaches as constant value of ₹ 5,000.

Given the cost of operating, maintaining and the trade-in-value determine the proper length of service before cars should be replaced.

Years of service	1	2	3	4	5
Years and trade-in value	19,000	10,500	6,000	5,000	5,000
Annual operating cost	15,000	18,000	21,000	24,000	27,000
Annual maintaining cost	3,000	4,000	6,000	8,000	10,000

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(ii) AB corporation has decided to carry out repairs on 4 main roads in the city. The government has agreed to make a special grant of ₹ 50 Lakhs towards the cost with the condition that the repairs should be carried out at the lowest cost. Five contractors have sent the bids. Only one road will be awarded to one contractor. The bids are given below:

	Road			

		Cost of repairs (₹ Lakhs)			
	Road	R_1	R_2	R_3	R_4
	C_1	9	14	19	15
Contractors	C_2	7	17	20	19
	C_3	9	18	21	18
	C_4	10	12	18	19
	C_5	10	15	21	16

You are informed that C_2 should get R_1 and C_4 should get R_2 to minimize the costs.
(i) What is the minimum cost allocation?
(ii) How much is the minimum discount that the eliminated contractor should offer for meriting a contract?
(iii) Independent of (ii) above, if the corporation can negotiate to get a uniform discount rate from each contractor, what is the minimum rate of discount so that the cost is within the grant amount? **9**

2. (c) (i) Compute the production cost per piece from the following data,
➢ Direct material per piece – ₹ 2
➢ Wage rate ₹ 2,000 per month consisting of 25 working days and 8 hours per day.
➢ Overheads expressed as a percentage of direct labour cost – 200%.
➢ The time for manufacture of 4 pieces of the time was observed during time study. The manufacture of the item consists of 4 elements a, b, c and d. The data collected during the time study are as under. Time observed (in minutes) during the various cycles are as below:

Element	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Element rating on B. S. Scale (0 – 100)
a	1.2	1.3	1.3	1.4	85
b	0.7	0.6	0.65	0.75	120
c	1.4	1.3	1.3	1.2	90
d	0.5	0.5	0.6	0.4	70

The personal, fatigue and delay allowance may be taken as 25%.   **8**

(ii) A company had planned its operations as follows: (Duration in days)

Activity	1-2	2-4	1-3	3-4	1-4	2-5	4-7	3-6	5-7	6-8	7-8
Duration	7	8	8	6	6	16	19	24	9	7	8

(I) Draw the network and find the critical paths

(II) After 15 days of working, the following progress in noted:
(a) Activities 1-2, 1-3, and 1-4 completed as per original schedule
(b) Activity 2-4 is in progress and will be completed in 4 more days.
(c) Activity 3-6 is in progress and will be completed in 17 more days.
(d) The staff members for activity 3-6 are specialized. They are directed to complete 3-6 and undertake an activity 6-7 which will require 7 days. This re-arrangement arose due to a modification in specialization.
(e) Activity 6-8 will be completed in 4 days instead of originally planned 7 days.
(f) There is no change in other activities.

Update the net work diagram after 15 days of start of work based on the facts given above. Indicate the revised critical path along with duration.   **8**

2. (d) (i) Write a note on Insurance Spares.   **3**
(ii) State the eight most common benchmarking errors.   **8**
(iii) The XYZ Company's Quality Control Deptt. is managed by a single clerk, who takes on an average 5 minutes in checking parts of each of the machine coming for inspection. The machines arrive once in every 8 minutes on the average. One hour of the machine is valued at ₹ 15 and a clerk's time is valued at ₹ 4 per hour. What are the average hourly queuing system costs associated with the quality control department?   **5**

Information System

Answer any two questions.

3. (a) (i) Describe the linking of corporate strategy with information system strategy.   **5**
(ii) List the steps of Prototyping Model and state its advantages.   **8**
(iii) Write a note on Operational Feasibility.   **3**

3. (b) (i) 'Most DBMSs have database utilities that help the DBA in managing the database system.' – Discuss.   **6**
(ii) Explain the importance of Marketing Information System.   **7**
(iii) List a typical set of issues for the Business Intelligence governance team to address.   **3**

3. (c) (i) Explain the important functionalities of Asset Management in an ERP system.   **8**
(ii) List the notable features of the Information Technology Amendment Act, 2008.   **6**
(iii) State the uses of EDI.   **2**