

PAPER 9 - OPERATIONS MANAGEMENT & INFORMATION SYSTEM

MTP_Intermediate_Syllabus2012_Jun2015_Set 1

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
		Identify	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	

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Paper 9 - Operations Management & Information System

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 indicated.

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

1. (a) Define Quality Control.
- (b) An analyst wants to obtain a cycle time estimate that is within $\pm 5\%$ of the true value. A preliminary run of 40 cycles took 80 minutes to complete and had a calculated standard deviation of 0.3 minutes. What is the co-efficient of variation to be used for computing the sample size for the forthcoming time study?
- (c) Explain Utilization.
- (d) State the principles of Total Quality Control.
- (e) State the limitations of Preventive Maintenance.
- (f) The main shaft of an equipment has a very high reliability of 0.990. The equipment comes from Japan and has a high downtime cost associated with the failure of this shaft. This is estimated at ₹8 crores as the costs of sales lost and other relevant costs. However, this spare is quoted at ₹15 lakhs at present. Should the shaft spare be procured along with the equipment and kept or not?
- (g) Explain the terms Deterministic System and Probabilistic System.
- (h) Explain ODMG object model.
- (i) List the types of information supplied by Marketing Information System.
- (j) Explain the term Computer Network. [2 × 10=20]

Operations Management

Answer any three questions

2. (a) (i) A Hospital has to pay nurses for 40 hours a week. One nurse is assigned to one patient. The cost per hour for each of the nurses is given below:

Patient →	W	X	Y	(i) Find the nurse patient combination to minimize cost to the hospital.
Nurse ↓				
K	10	10	30	
L	30	10	20	
M	20	30	20	

Suppose that a new patient Z is admitted and that a new nurse is appointed. The new patient is charged ₹40 per hour by each of the existing nurses. The new nurse charges ₹50 per hour irrespective of the patient.

- (iii) What would be your revised calculations?
- (iv) Comment on the new solution. [10]

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- (ii) A company has two grades of inspectors, 1 and 2 to undertake quality control inspection. At least 3,500 pieces must be inspected in an 8 hour day. Grade 1 inspector can check 50 pieces in an hour with an accuracy of 95%. Grade 2 inspector checks 25 pieces an hour with an accuracy of 90%.

The daily wages of grade 1 inspectors are ₹6 per hours while those of grade 2 inspectors are ₹5 per hour. Any error made by an inspector cost ₹4 to the company. If there are, in all, 20 grade 1 inspectors and 25 grade 2 inspectors in the company, find the optimal assignment of inspectors that minimizes the daily inspection cost. Formulate the LPP. [6]

- (b) (i) Workers come to tool store room to enquire about special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 40 seconds. Determine:
 (a) Average queue length
 (b) Average length of non-empty queues
 (c) Average number of workers in system including the worker being attended. [6]

- (ii) Draw the network for the following activities and find critical path and total duration of project:

Activity	Duration (days)	Activity	Duration (days)
1-2	34	2-5	37
1-3	27	2-6	18
1-4	41	3-5	10
2-3	38	3-6	16
2-4	85	4-5	19

[10]

- (c) (i) Following is the profit matrix based on four factories and three sales depots of a company:

	Sales depots			Availability
	S1	S2	S3	
Factory 1	6	6	1	10
Factory 2	-2	-2	-4	190
Factory 3	3	2	2	50
Factory 4	8	5	3	100
Demand	80	120	150	

Find the initial solution by Vogel's Approximation method to maximize the profit. Is the initial solution feasible? [12]

- (ii) State Juran's 10 Steps for Quality Improvement. [4]

- (d) (i) A car manufacturing company manufactures 80 cars per day. The sale of cars depends upon the demand which has the following distribution.

Sale of cars	77	78	79	80	81	82
Probability	0.10	0.15	0.20	0.35	0.15	0.05

The production cost and sale price of each car are ₹4 lakhs and ₹5 lakhs respectively. Any unsold car is to be disposed of at a loss of ₹2 lakhs. There is penalty of ₹1 lakh per car, if the demand is not met. Using the following random numbers, estimate the total profit/loss for the next 10 days:

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09	98	64	98	94	01	78	10	15	19
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If the company decides to produce 79 cars per day, what will be its impact on profitability? [12]

- (ii) Explain the terms Little JIT and Big JIT. [4]

Information System

Answer any two questions.

3. (a) (i) Explain the major areas of computer-based applications. [5]
(ii) Describe the main quality criteria of a business information system. [6]
(iii) "Debugging consists of four steps" – List the steps. [3]
(iv) State the function of query compiler. [2]
- (b) (i) From the following two relations find the Intersection operator and Difference operator.

Relation A

REGN_NO	NAME	OCCUPATION
AB 03	J	SERVICE
AB 04	K	STUDENT
AB 05	S	STUDENT
AB 09	D	SERVICE
AB 11	P	STUDENT

Relation B

REGN_NO	NAME	OCCUPATION
AB 04	K	STUDENT
AB 05	S	STUDENT
AB 11	P	STUDENT
AB 15	G	STUDENT
AB 16	R	STUDENT

- (ii) Describe the effects of using computer for MIS. [5]
(iii) State the key functionalities of Accounts Payable Module. [6]
(c) (i) Describe the duties of Certifying Authority. [5]
(ii) List the main goals of E-commerce. [4]
(iii) Describe the term "Secure System". [3]
(iv) Define Executive Information System and list the special features of an EIS. [4]