

**PAPER 9 - OPERATIONS MANAGEMENT & INFORMATION SYSTEM**

## MTP\_Intermediate\_Syllabus2012\_Dec2015\_Set 1

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

	<b>Learning objectives</b>	<b>Verbs used</b>	<b>Definition</b>
<b>LEVEL B</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
	APPLICATION  How you are expected to apply your knowledge	Illustrate	Use an example to describe or explain something
		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
	ANALYSIS  How you are expected to analyse the detail of what you have learned	Tabulate	Arrange in a table
		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.

1. Answer all questions: [10×2 = 20]

- (a) Define Quality Control.
- (b) State the meaning of Facility Loading.
- (c) 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 utilization.
- (d) State the three fundamental concepts of JIT.
- (e) 'Six Sigma provides flexibility in the new millennium of 3C's' – List them.
- (f) The main shaft of an equipment has a very high reliability of 0.990. The equipment comes from Russia and has a high downtime cost associated with the failure of this shaft. This is estimated at ₹2 crore as the costs of sales lost and other relevant costs. However, this spare is quoted at ₹10 lakh at present. Should the shaft spare be procured along with the equipment and kept or not?
- (g) Discuss Operational level Information System.
- (h) Name the different Entity Relationship Models.
- (i) State the characteristics of good quality information.
- (j) Define the term 'Data'.

## Operations Management

Answer any three questions:

2. (a) (i) Discuss the needs for operation research. [6]

- (ii) A manufacturing enterprise has introduced a bonus system of wage payment on a slab-rate based on cost of production towards labour and overheads.

The slab-rate being

Between 1% - 10%	Saving in production cost	5% of saving
Between 11%-20%	Saving in production cost	15%
Between 21%-40%	Saving in production cost	30%
Between 41%-70%	Saving in production cost	40%
Above 70%	Saving in production cost	50%

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The rate per hour for three workers A, B, C are ₹5, ₹5.50 and ₹5.25 respectively. The overhead recovery rate is 500% of production wages and the material cost is ₹40 per unit. The standard cost of production per unit is determined at ₹160 per unit.

If the time taken by A, B, C to finish 10 units is 26 hours, 30 hours and 16 hours respectively, what is the amount of bonus earned by the individual workers and actual cost of production per unit? [6]

(iii) Write a note on Quality Circle membership. [4]

2. (b) (i) Write the elements of preventive maintenance. [5]

(ii) Frontier Bakery keeps stock of a particular brand of cake. Daily demand based on past experience is as given below:

Experience indicates:

Daily demand	0	15	25	35	45	50
Probability	0.01	0.15	0.20	0.50	0.12	0.02

Consider the sequence of random number:

48	78	09	51	56	77	15	14	68	09
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Using the sequence, simulate the demand for the next 10 days. [6]

(iii) State the guiding principles of Total Productive Maintenance(TPM) Programs. [5]

2. (c) (i) The captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

Batsman	BATTING POSITIONS				
	I	II	III	IV	V
P	40	40	35	25	50
Q	42	30	16	25	27
R	50	48	40	60	50
S	20	19	20	18	25
T	58	60	59	55	53

(I) Find the assignment of batsmen to positions, which would give the maximum number of runs.

(II) If another batsman 'U' with the following average runs in batting positions as below is added to the team, should he be included to play in the team? If so, who will be replaced by him?

Batting Position	I	II	III	IV	V
Average runs	45	52	38	50	49

[10]

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- (ii) XYZ manufacturing company is using a machine whose purchase price is ₹ 65,000. The installation charges amount to ₹ 18,000 and the machine has a scrap value of only ₹ 8,000 because, the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

Year	1	2	3	4	5	6	7	8	9
Cost (₹)	1250	3750	5000	7500	10,500	14,500	20,000	24,000	30,000

Determine after how many years should the machine be replaced on economic considerations, assuming that the machine replacement can be done only at the year ends [6]

2. (d) (i) ORTIS INVESTMENT MANAGEMENT LTD. (a Mutual Fund company) has ₹40 lakh available for investment in Government Bonds, Blue Chip Stocks, Speculative Stocks and Short Term Deposits. The annual expected return and risk factor are given below:

Type of investment	Annual Expected	Risk Factor
Return (%)	(0 to 100)	
Government bonds	12	12
Blue chip Stocks	20	24
Speculative Stocks	25	50
Short terms Deposits	8	5

The Company (OIML) is required to keep at least ₹ 5 lakh in short term deposits and not to exceed average risk factor of 40. Speculative stocks must be at most 25% of the total amount invested.

**Required:**

How should ORTIS INVESTMENT MANAGEMENT LTD. invest the funds so as to maximize its total expected Annual Return?

Formulate this as a Linear Programming Problem. You are not required to solve the L.P.P. [8]

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

Activity	Duration (months)	Activity	Duration (months)
1-2	2	4-7	3
1-3	2	5-8	1
1-4	1	6-8	4
2-5	4	7-9	5
3-6	5	8-9	3
3-7	8		

[8]

### Information System

Answer any two questions:

3. (a) (i) Discuss the areas which would help in analyzing/investing the present system. [7]  
(ii) Differentiate between open and closed systems. [4]  
(iii) List the advantages of the successful implementation of an ERP system. [5]
3. (b) (i) Discuss the needs of integration of information. [6]  
(ii) State the pre-requisites of an MIS. [4]  
(iii) Explain the workers behind the scene. [6]
3. (c) (i) Describe the powers of Central Government to make rules by notifying in the Official Gazette and Electronic Gazette under Information Technology Act,2000. [8]  
(ii) List the tangible and intangible benefits of ERP. [8]