

**Paper 9- Operation Management
& Information Systems**

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Full Marks : 100

Time allowed: 3 hours

Section – A

I. Answer the following question which is compulsory:

1. Answer any five of the following questions:

[5×2=10]

(a) Write the advantages of vertical Integration?

Solution:

Advantages of Vertical integration:

- (i) Can sometimes increase market share and allow the firm enter foreign markets more easily.
- (ii) Can achieve savings in production cost and produce higher quality goods.
- (iii) Can achieve more timely delivery.
- (iv) Better utilization of all types of resources.

(b) What is demonstrated capacity?

Solution:

Demonstrated Capacity:

- The actual level of output for a process over a period of time is known as the demonstrated capacity.
- Demonstrated capacity deals with the actual production over a time rather than the calculated designed capacity or planned capacity.
- Demonstrated capacity is determined by averaging the recorded figures of actual output over a period of time.

(c) Define efficiency.

Solution:

Efficiency refers to how well the resources are brought together for achieving results with minimum costs. It implies the attainment of a level or range of result that is acceptable but not necessarily desirable.

$$\text{Efficiency} = \frac{\text{Actual}}{\text{standard output}} \text{ (or) efficiency} = \frac{\text{Standard hours produced}}{\text{Actual Hours}}$$

(d) What is P-D-C-A cycle?

Solution:

Deming Wheel/Deming cycle/P-D-C-A cycle:

- P- Plan (process) the improvement;
- D- Do implement the plan;
- C- Check- check how closely result meets goals;

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A – Act- use the improved process as standard practice.

(e) Define qualified worker.

Solution:

A qualified worker is one who is accepted as having the necessary physical attributes, possessing the required intelligence and education and having acquired the necessary skill and knowledge to carry out the work in hand to satisfactory standards of safety, quantity and quality.

(f) What are the tangible benefits of ERP?

Solution:

Tangible benefits of ERP system:

- Integration of information resulting efficiency, transparency and effective MIS.
- Error reduction accuracy of inventory record.
- Improvement or service.
- Establishment standardized procedures.
- Improved accounting control and shorter sales to cash cycle.
- Legal and regulatory compliance.

(g) Define data Mart.

Solution:

Data Mart is a simple form of data warehousing. In other words, it is a scaled-down version of data warehousing. Data marts of a company are generally created with specific objectives. It may be function specific. The advantages of creation of data mart are low cost and less time requirement. Data marts are created with a specific focus.

(h) What is closed system?

Solution:

Closed System:

- I. A closed system is one which does not have any interaction with outside environment.
- II. Closed systems functions in the closed environment set and is insular with the change in the environment.
- III. A closed system is a self contained one and normally a rigid one.
- IV. There is no closed system. Some systems in Military or defense service may be closed system partially.

2. Matching the following:

[5x1=5]

List A

- A. Linear Programming**
- B. Computer Aided Designing**
- C. Work in process**
- D. Debugging**
- E. Digital signature**

List B

- (i) Product design**
- (ii) Production control**
- (iii) Authentication of electronic record**
- (iv) Product mix determination**
- (v) Syntax error**

Solution:

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- A. — (iv)
- B. — (i)
- C. — (ii)
- D. — (v)
- E. — (iii)

3. Statement whether the following statements are True/False: [5]

- (a) C++ is a programming language.
- (b) EIS helps top level management in solving unstructured problems.
- (c) E-commerce has started a new revolution that is changing the way business houses buy and sell products and services.
- (d) Increase in production is increase in profit.
- (e) Critical path is the shortest path from the beginning of the project to ending of the project.

Solution:

- (a) True;
- (b) True;
- (c) True;
- (d) False;
- (e) False.

4. Fill in the blanks: [1x5=5]

- (a) Ergonomics is another name for _____
- (b) Design capacity > _____ > demonstrated capacity.
- (c) _____ Japanese word, which means change for better.
- (d) Key pair means a private key and its mathematically related _____ key.
- (e) _____ is physical replica of the system based on different scale from original.

Solution:

- (a) Human engineering;
- (b) planned;
- (c) Kaizen;
- (d) public;
- (e) Iconic model.

Section – B

II. Answer any three questions from the following: [15x3=45]

1. (a) The demand for three months for 100 Watt bulbs is given below:

Period	January	February	March
Demand	500	600	800

If the weight assigned to the period of January, February and March are 0.25, 0.35 and 0.4 respectively, forecast the demand for the months of April by using Weighted Moving Average method. [7]

Solution:

Computation of new forecast by using weighted moving Avg. Method :

$$\text{Forecast} = \sum \text{weight} \times \text{demand}$$

Answer to MTP_ Intermediate _Syllabus 2012_Dec2016_Set 2

Period	Weight	Amount	Forecast
Jan	0.25	500	125
Feb	0.35	600	210
March	0.40	800	320
			655

New forecast for April = 655 bulbs

(b) A company is planning to undertake the production of medical testing equipments has to decide on the location of the plant. Three locations are being considered, namely, A, B and C. The variable costs are ₹3000, ₹2000 and ₹3500 per unit respectively. The average sales price of the equipment is ₹7000 per unit. Fixed costs are ₹300 lakhs, ₹500 lakhs and ₹25 lakhs respectively.

Find:

(i) Select the best location, if the sales volume is of 18,000 units.

(ii) Find B.E.P. at A, B and C.

[8]

Solution:

Total cost = Fixed cost + Variable cost

F. Cost at A = ₹300 lakhs, B = ₹500 lakhs, C = ₹25 lakhs

Particulars	A	B	C
Units to produce	18,000	18,000	18,000
Total Sales	₹1,260 lakhs	₹1,260 lakhs	₹1,260 lakhs
Less: Total Variable Cost	₹540 lakhs	₹360 lakhs	₹630 lakhs
	₹720 lakhs	₹900 lakhs	₹630 lakhs
Less: Fixed Cost	₹300 lakhs	₹500 lakhs	₹25 lakhs
Profit	₹420 lakhs	₹400 lakhs	₹605 lakhs

Particulars	A	B	C
Fixed cost	₹300 lakhs	₹500 lakhs	₹25 lakhs
Sale Price	₹7,000	₹7,000	₹7,000
Variable Cost	₹3,000	₹2,000	₹3,500
Contribution	₹4,000	₹5,000	₹3,500
Fixed Cost/Contribution=B.E.P.	₹7,500	₹10,000	₹714.3

2. (a) A project consists of six activities. Activities P, Q, R run simultaneously. The relationships among the various activities is as follows:

Activity	Immediate Successor
P	S
Q	T
R	U

Activity T is the last operation of the project and it is also immediate successor to R and S. Draw the network of the project.

[5]

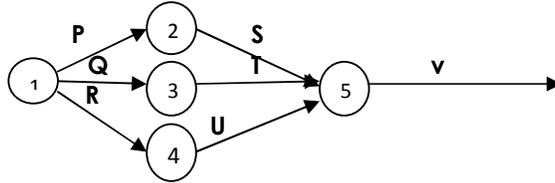
Solution:

Activity	immediate successor
P	S
Q	T
R	U
S	V

Answer to MTP_ Intermediate _Syllabus 2012_Dec2016_Set 2

T
U
V

V
v
-



(b) Six salesmen are to be allocated to six sales regions so that the cost of allocation of the job will be minimum. Each salesman is capable of doing the job at different cost in each region, The cost matrix is given below:

		Region					
		I	II	III	IV	V	VI
Salesmen	A	15	35	0	25	10	45
	B	40	5	45	20	15	20
	C	25	60	10	65	25	10
	D	25	20	35	10	25	60
	E	30	70	40	5	40	50
	F	10	25	30	40	50	15

- (i) Find the allocation to give minimum cost what is the cost?
 (ii) Now suppose the above table gives earning of each sales man at each region. How can you find an allocation so that the earning will be maximum? Determine the solution with optimum earning. [5+5=10]

Solution:

Step-I Row matrix; Select least value of the each row and then subtract the same form the remaining values in each row

	I	II	III	IV	V	VI
A	15	35	0	25	10	45
B	35	0	40	15	10	15
C	15	50	0	55	15	0
D	15	10	25	0	15	50
E	25	65	35	0	35	45
F	0	15	20	30	40	5

Step- II: Column operation select least value in each and submit the same form values in each column

	I	II	III	IV	V	VI
A	15	35	0	25	0	45
B	35	0	40	15	0	15
C	15	50	0	55	15	0
D	15	10	25	0	5	50
E	25	65	35	0	25	45
F	0	15	20	30	40	5

Answer to MTP_ Intermediate _Syllabus 2012_Dec2016_Set 2

Step-III: Improvel matrix : first least value in uncovered lines and subtract the same from uncovered lines value. Add to the value at intersect point and unchanged the voverd lines values

	I	II	III	IV	V	VI
A	20	35	0	30	0	45
B	40	0	40	20	0	15
C	20	50	0	60	5	0
D	15	5	20	0	0	45
E	25	60	30	0	20	40
F	0	10	5	30	25	10

Number of lines is equal to six of the matrix an optimum assignment has been attained.

Calculation of minimum cost

Assignment:-

A	III	0
B	II	5
C	VI	10
D	V	25
E	IV	5
F	I	10
		55

Minimum cost =55

(ii) cost matrix: select the highest value in the matrix and subtract the reaming values from the selected highest value (i.e. 70)

	I	II	III	IV	V	VI
A	55	35	70	45	60	25
B	30	65	25	50	55	50
C	45	10	60	5	45	60
D	45	50	35	60	45	10
E	40	0	30	65	30	20
F	60	45	40	30	20	55

Row operation:

	I	II	III	IV	V	VI
A	30	10	45	25	35	0
B	5	40	0	25	30	25
C	40	5	55	0	40	55
D	35	40	25	50	35	0
E	40	0	30	65	30	20
F	40	25	20	10	0	35

Column operation:

	I	II	III	IV	V	VI
A	25	10	45	20	35	0
B	0	40	0	25	30	25
C	35	5	55	0	40	55
D	30	40	25	50	35	0
E	35	0	30	65	30	20
F	35	25	20	10	0	35

Answer to MTP_ Intermediate _Syllabus 2012_Dec2016_Set 2

Improveal matrix:

Select last number from uncovered lines i.e. 20 and deduct the same from numbers those universal by lines and add to the number at intersect points and the remaining unchanged.

	I	II	III	IV	V	VI
A	5	10	25	20	35	0
B	0	40	0	25	50	45
C	15	5	35	0	40	55
D	10	40	5	50	35	0
E	15	0	10	65	30	20
F	15	25	0	10	0	35

A	-	VI-	45
B	-	I	40
C	-	IV	65
D	-	VI	35
E	-	II	70
F	-	VI	50
			<u>305</u>

Number of lines = size of the matrix.

3. (a) A plant Manager is considering replacement policy to a new machine. He estimates the following costs

Year	1	2	3	4	5	6
Replacement cost at the beginning of the year	100	110	125	140	160	190
Salvage value at the end of the year	60	50	40	25	10	0
Operating costs	25	30	40	50	65	80

Find the year when replacement is to be made.

[8]

Solution:

Chart showing optimal replacement

Year	Net capital cost (₹)	Operating Cost (₹)	Cumulative operating cost	Total cost	Average cost
1	40	25	25	65	65
2	60	30	55	115	57.5
3	85	40	95	180	60
4	115	50	145	260	65
5	150	65	210	360	72
6	190	80	290	480	80

Optimal replacement is the end of 2nd year.

- (b) Discuss the advantages and disadvantages of process layout.

[7]

Solution:

Process layout is also called the functional layout, layout for job lot manufacture on batch production layout, the process layout involves grouping together of like machines in one department. For example, machine performing drilling operations are fixed in the drilling department.

Advantages:

1. Reduced investment of machines as they are general purpose machines.
2. Greater flexibility in the production.
3. Better and more efficient supervision is possible through specialization.
4. There is greater scope for expansion as the capacities of different lines can be easily increased.
5. This type of layout results in better utilization of men and machines
6. It is easier to handle breakdown of equipment by transferring work to another machine.
7. There is full utilization of equipment.
8. The investment of equipment would be comparatively lower.
9. There is greater incentive to individual worker to increase his performance.

Disadvantages:

1. There is difficulty in the movement of materials. Mechanical devices for handling materials cannot be conveniently used.
2. This type of layout requires more floor space.
3. There is difficulty in production control.
4. Production time is more as work-in-progress has to travel from place to place in search of machines.
5. There is accumulation of work-in-progress at different places.

4. (a) Discuss the advantages of preventive maintenance.

[8]

Solution:

Advantages of preventive Maintenance

- (i) Increase in life of machines and equipments by reduction of wear and tear.
- (ii) Reduction in frequency of breakdowns.
- (iii) Improvement in productivity due to lesser machine down-time and consequent loss of production.
- (iv) High reliability of production system due to lesser breakdown and repair.
- (v) Higher worker safety while using the plant and equipment.
- (vi) Planned shutdowns and start-ups of plant and equipment possible.
- (vii) Less requirement of stand-by machines due to lesser breakdowns.
- (viii) Minimum work-in-progress inventory due to reduced production hold ups due to equipment breakdowns.
- (ix) Lesser rejections and better quality control.
- (x) Less serious consequences of breakdowns and lesser breakdown maintenance costs.

(b) Briefly explain types of process.

[7]

Solution:

Basically, process can be categorized as:

Conversion processes:

I.e., converting the raw materials into finished products (for examples, converting iron ore into iron and then to steel). The conversion processes could be metallurgical or chemical manufacturing or construction processes.

Manufacturing process:

Manufacturing process can be categorized into (a) forming processes, (b) machining processes and (c) Assembly processes

Testing processes:

Which involve inspection and testing of product (sometimes considered as part of the manufacturing processes).

Forming processes:

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Forming processes include foundry processes (to produce castings) and other processes such as forging, stamping, embossing and spinning. These processes change the shape of the raw material (a metal) into the shape of the work piece without removing or adding material.

Machining processes:

Machining processes comprise metal removal operations such as turning, milling, drilling, Grinding, shaping, planing, Boring etc.,

Assembly process:

Assembly process involve joining of parts or components to produce assemblies having specific functions. Examples of assembly processes are welding, brazing, soldering, riveting, fastening with bolts and nuts and joining using adhesives.

Section – C

III. Answer any two questions from the following:

1. (a) Explain various SET operators used in DBMS.

[8]

Solution:

Union Operator (U):

The union operator is denoted by the word UNION or the symbol U. It is used to combine the result-set of two or more SQL statements.

Relation X	
Batch – No	Course
1	BA
2	BSC
3	BCA
4	BCOM

Relation Y	
Batch – No	Course
1	BA
2	BSC
3	BCA
4	BCOM
5	MA
6	MSC

(X U Y)	
Batch – No	Course
1	BA
2	BSC
3	BCA
4	BCOM
5	MA
6	MSC

Intersect Operators:

The intersection operator is denoted by the word INTERESECT or the symbol ∩

The INTERSECT operator takes the results of two statements/ quires and returns only rows that appear in both result sets. The intersect operator removes duplicate rows from the final result set.

Relation X

REGN – No	NAME	Occupation
ABC 123	AMAL	SERVICE
ABC 124	KAMAL	STUDENT
ABC 125	BMAL	STUDENT
ABC 129	RITA	SERVICE
ABC 130	SITA	BUSINESS
ABC 131	GITA	STUDENT

Relation Y

Answer to MTP_ Intermediate _Syllabus 2012_Dec2016_Set 2

REGN – No	NAME	Occupation
ABC 124	KAMAL	STUDENT
ABC 125	BIAMAL	STUDENT
ABC 131	GITA	STUDENT
ABC 234	MITA	STUDENT
ABC 235	SUMITRA	STUDENT
ABC 236	SUCHITRA	STUDENT

ABC 124	KAMAL	STUDENT
ABC 125	BIMAL	STUDENT
ABC 131	GITA	STUDENT

Extended Cartesian product:

The extended Cartesian product of two relations is denoted by operator \bowtie and it produces a third relation containing all possible tuples that may be formed by concatenating the attributes of the relations. At last it gives $M*N$ records in the result Let:

Relation A	Relation B
Names	Hobbies
Amal	Block collection
Kamal	Stamp collection
Bimal	Coin collection

The $A \bowtie B$ yields the following relation

Relation $A \bowtie B$	
Amal	Block collection
Amal	Stamp collection
Amal	Coin collection
Kamal	Block collection
Kamal	Stamp collection
Kamal	Coin collection
Bimal	Block collection
Bimal	Stamp collection
Bimal	Coin collection

(b) Define programmed and non-programmed decision.

[7]

Solution:

Programmed Decisions:

Decisions which are of repetitive and routine nature are known as programmed decisions, for example, preparation of payroll and disbursement of pay through bank account are programmed decision. Generally, guidelines and rules are already established for taking programmed decision.

Non- programmed decisions:

Decisions which are unstructured, complex are known as non-programmed decision. In other words, decisions which are not automated are Non- programmed decision. For example, new product line, capital budgeting etc. Non-programmed decision making has no pre established decision procedure.

2. (a) What is flow chart? Write any 5 symbols in flow chart.

[3+5=8]

Answer to MTP_ Intermediate _Syllabus 2012_Dec2016_Set 2

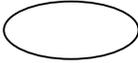
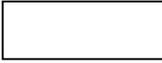
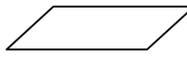
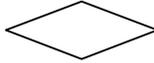
Solution:

Flowcharts: Flowcharting is a graphic technique that can be used by analysts to represent the inputs outputs and processes of a business in a pictorial form.

Flow charts are divided into four major categories:

- Document flow chart – showing a document-flow major categories.
- Data flow chart – showing data flows in a system.
- System flowchart – showing the controls at a physical or resources level.
- Program flowchart – showing the controls in a program in a system

Following are the five symbols used in Flowcharts:

				
Start/Stop	Assignment /Calculation	Input/Output	Decision Making	Flow Lines

(b) Write roles and responsibilities of DBA.

[7]

Solution:

Data Base Administrations:

In any organization where many persons use the same resources, there is a need for a chief administrator to oversee and manage these resources. In a database environment, the primary resource is the database itself and the secondary resource is the Database Management System and related software. Administering these resources is the responsibility of the database Administrator (DBA)

The Database Administrator is responsible for

- Authorizing access to the database,
- Coordinating and monitoring its use, and
- Acquiring software and hardware sources as needed.

The database administration is accountable for problems such as

- Breach – of security or
- Poor system response time

In large organizations, the DBA is assisted by a staff that helps carry out these functions.

3. (a) Write classifications of quality costs.

[6]

Solution:

Classifications of quality costs:

- Prevention costs
- Appraisal costs
- Internal failure costs
- External failure costs
- Appraisal costs relate to inspecting products to make sure they meet both internal and external customers expectations.
- Internal failure costs are incurred when the company detects defective products before they are delivered to customers.
- External failure costs occur when customer discover a defect.

Prevention costs are incurred to ensure that companies produce products according to quality standards.

(b) What are major features of ERP?

[9]

Solution:

Major features of ERP:

- (i) ERP provides multi-platform, multi-mode, manufacturing, multi-currency, multi-lingual facilities.
- (ii) It supports strategic and business planning activities, operational planning and executions activities, creation of materials and resources. All these functions are effectively integrated for flow and update of information immediately upon entry of any information.
- (iii) Has end to end supply chain management to optimize the overall demand and supply data.
- (iv) ERP facilitates company-wide integrated information system covering all functional areas like manufacturing, selling and distribution, payables, receivables, inventory accounts, human resources, purchases etc.
- (v) ERP performs core activities and increases customers service, thereby augmenting the corporate image.
- (vi) ERP bridges the information gap across organizations.
- (vii) ERP provides complete integration of systems not only across departments but also across companies under the same management.
- (viii) ERP is the solution for better project management. ERP allows automatic introduction of the latest technologies like electronic fund transfer, electronic data interchange, Internet, Intranet, Video conferencing, E-commerce etc.
- (ix) ERP eliminates most business problems like materials shortages, productivity enhancements, customer service cash management, inventory problems, quality problems, prompt delivery etc.
- (x) ERP provides intelligent business tools like decision support systems, executive information system, data mining and easy working systems to enable better decisions.