Paper 9 (Operations Management and Information Systems)

Test Paper—I/9/OMS/2012/T-1

Section A (Operations Management): [60 marks]

Answer Question 1 and any four from the rest

Question 1

a) What is application of technology or process to the raw material to add use value is known as?

b) What is activity of specifying when to start the job and when to end the job is known as?

c) What type of layout would you choose for job production?

d) What do you understand by aesthetic quality of product?

e) Name the phases in production, productivity and control.

f) What principle is used in work sampling?

g) Random numbers are used in which production planning process?

h) What is 'effectiveness'?

i) What do you understand by commercialization of a product?

j) State the equation of EBQ (Economic Batch Quantity).

k) Which method is used for forecasting new products?

l) Despatching is toughest in which type of production**?** **[12]**

Question 2

a) What do you understand by the term 'Operations Management? What are its basic objectives?
b)What are the characteristics of a good product design?
c) What is process planning? **[5+5+2]**

Question 3

a) Two alternative methods X and Y using different tooling set-ups may be employed to manufacture a component on a particular machine tool whose operating cost is Rs. 20(including wages of operator) per hour.

Particulars	Method X	Method Y
Component	4000pieces	3000pieces
Cost of tooling	Rs. 320	Rs.1500
Production rate per hour	10pieces	15pieces

Justify with suitable calculation which of the two methods would you choose as being more economical for regular production? Would your answer be different if only 1000 pieces of particular component are required?

b) ABC Ltd, manufacturer of radio sets makes x sets of radio sets per week and total cost is $\left(\frac{x^2}{25}+3x+100\right)$. The equation of the demand function is x = 75 - 3p (p = price). Show that if he wants to maximise profit, he will produce about 30 sets of radio per week. What price per set will he charge?

c) What do you understand by the term 'Design Capacity'?

d) A workshop operates on 2 shifts of 8 hours per day. It has 10 machines. It works for 6 days in a week. Machine utilization is 90% and the efficiency of the machines is 85%. Calculate the designed / rated capacity of the workshop in standard hours. [3+4+2+3]

Question 4

a) Distinguish between a flow shop and a job shop.

b) P, a fabricator with specialization in making steel wardrobes , made a survey to decide on the area to locate his new factory. He has found two alternative locations which suits his requirements. He has to plan to produce 1000 units in a year. Selling price of wardrobes is Rs. 10,000/per unit. Fixed and variable costs relating to both the locations are:

Location	Fixed Cost(Rs)	Variable Cost(Rs.)
I	12,50,000	500/units
II	20,00,000	350/units

Calculate:
i) Production level at break-even point for location I and location II.
ii) Which location should P choose to set up his unit?
iii) State the production level at which either of the locations can be selected.
iv) Which is the preferred location for production level of 1000 units?

c) What do you understand by the term 'Project Life Cycle'?

d) Project with the following data is to be implemented. Draw the network and find the critical path.

Activity	Predecessor	Duration (days)	Cost (Rs. Day)
A	-	2	50
B	-	4	50
C	A	1	40
D	B	2	100
E	A,B	3	100
F	E	2	60

i. What is the minimum duration of the project?
ii. Draw a Gantt chart for early start schedule.
iii. Determine the peak requirement money and day on which it occurs above schedule (3+3+3+3)

Question 5

a) XYZ Ltd has 3 factories and 3 customers. The following table gives the transportation cost per unit from the factories to the customers and also the quantities available and required. Determine the initial transportation cost per unit from the factories to the customers and also quantities available and required. Determine the initial transportation solution using Vogel's method.

Factory	P	Q	R	Availability
F1	10	11	20	10
F2	15	12	10	2
F3	17	9	16	8
Requirement	8	5	7	20

b) What is Delphi technique? What is its applicability in a manufacturing organization?

c) An agriculturist has a 125-acre farm. He produces radish, muttar arid potato. Whatever he raises is fully sold in the market. He gets Rs. 5 for radish per kg, Rs. 4 for muttar per kg and Rs. 5 for potato per kg. The average per acre yield is 1500 kg of radish, 1800 kg of muttar and 1200 kg of potato. To produce each 100 kg of radish and muttar and 80 kg of potato, a sum of Rs. 12.50 has to be used for manure. Labour required for each acre to raise the crop is 6 man-days for radish and potato each and 5 man-days for mutter. A total of 500 man-days of labour at a rate of Rs. 40 per man-day are available.
Formulate this as a Linear programming model to maximize the agriculturist's total profit. [5+2+5]

Question 6

a) Write short note on Six Sigma quality programme.

b) A company manufactures around 150 mopeds. The daily production varies from 146 to 154 depending upon the availability of raw materials and other working conditions.

Production per Day	Probability
146	0.04
147	0.09
148	0.12
149	0.14
150	0.11
151	0.10
152	0.20
153	0.12
154	0.08

The finished mopeds are transported in a specially arranged lorry accommodating only 150 mopeds. Using following random numbers 80, 81, 76, 75, 64, 43, 18, 26, 10, 12, 65, 68, 69, 61, 57, simulate the process to find out:
(i) What will be the average number of mopeds waiting in the factory?
(ii) What will be the average number of empty spaces on the lorry?

c) State the managerial uses of break even analysis.

d) What is quality control? [3+4+3+2]

Question 7

a) The following mortality rates have been observed for a certain type of light bulbs.

Week	Present failing by week end
1	10
2	25
3	50
4	80
5	100

There are 1000 bulbs in use and it cost Rs. 20 to replace an individual bulb which has burnt out. If all bulbs are replaced simultaneously, it would cost Rs. 4 per bulb. It is proposed to replace all the bulbs at fixed intervals , whether or not they are burnt out, and to continue replacing burnt out bulbs as they fail. At what levels the bulbs should be replaced to optimise .

b) A machine shop has a press which is to be replaced as it wears out. A new press is to be installed now and an optimum replacement plan is to be for next 7 years after which the press is no longer required. Following data is available:

Rs. in '000

Years	Cost of new machine	Salvage value	Operating cost
1	500	250	150
2	525	125	200
3	550	75	250
4	600	50	300
5	650	40	375
6	725	25	450
7	800	0	575

Find the optimum replacement policy.

c) What are the objectives of using Control Charts for Variables? [4+5+3]

Section B (Information Systems) [40 marks]

Answer question 8 and any three from the rest.

Question 8

a) What is the place called that a user can create to store files?

b)What type of package is SAPAG?

c) What is Total which is used for checking and validation and do not have any significance in accounting known as ?

d)What is touch screen?

e)Define protocol .

f)What is 'cache'?

g) What is 'peer to peer' network?

h) What do you understand by data independence? Answer in one sentence.

i) With what do you associate the terms 'public key' and 'private key'?

j*) Expand the abbreviations: (i)* HVAC system (ii) *WAIS* **[10]**

Question 9

a) What is Information? How does it differ from Information System.

b) Describe the characteristics of an Information System.

c) Explain why information system die? [4+4+2]

Question 10

a) What is a database? What are the functions of DBMS?

b) What is the role of Database Designer?

c) Who are the end users in a database environment? [3+4+3]

Question11

a) Give a definition of MIS. Why are information systems for managers difficult to design and build?

b) Executive Information System is different from Traditional Information System. Do you agree?

Justify your answer.

c) State various software tools used in Decision support system. [4+3+3]

Question 12

a) What is meant by E-Commerce? Mention some advantages offered by E-Commerce.

b) What is a Certifying Authority? Mention the functions of Certifying Authorities in India in context of digital signature.

c) What is meant by "Affixing digital signature"? [3+4+3]

Paper 9 (Operations Management and Information Systems)

Test Paper—I/9/OMS/2012/T-2

Section A (Operations Management): [60 marks]

Answer Question 1 and any four from the rest .

Question 1

a) How does a Finance Manager define a product?

b) Define in one sentence the term 'routing'.

c) On what does ABC analysis depends?

d) (Total station time/Cycle time*Number of work stations)*100 is known as:----------

e) Why do we build 'Buffer Stock'?

f) Define by an equation , Standard Time.

g) What is a Brown Field project?

h) Production management is a line function. Do you agree?

i)What is optimum capacity?

j) How would you define 'Kaizen'?

k) Define 'tempering'.

l) Name an important factor for forecasting production. **[12]**

Question 2

a) Discuss the role of operations manager in decision making process.
b) What do you understand by 'designing product for customer'?
c) Discuss the framework for process design. [5+4+3]

Question 3

a) KBC Ltd. has to process a large number of components/month. The process equipment time required is 36 minutes/component, whereas the requirement of an imported process chemical is 1.2 litres/component. The manual skilled manpower required is 12 minutes/component for polishing and cleaning. The following additional data is available:

	Availability/month	Efficiency of utilisation
Equipment hour	500	85%
Imported chemicals	1000	95%
Skilled manpower - hours	250	65%

(I)What is the maximum possible production under the current conditions?

(II) If skilled man-power availability is increased by overtime by 20%, what will be the impact on production increase?

b) The work - study engineer carries out the work sampling study. The following observations were made for a machine shop.

Total number of observations	7000
No. Working activities	1200
Ratio between manual to machine elements	2:1
Average rating factor	120%
Total number of jobs produced during study	800 units
Rest and personal allowances	17%

Compute the standard time for the job.

c) The demand for new double door refrigerators is increasing every year. This is thought to be related to increase in population of the urban areas. The relationship observed between the two is:

X= 7000+ 1100 Y, where X is the demand for new double door refrigerators, Y is the years with Y at 2008 being zero.

If the demand for new double door refrigerators is seasonal and indices for September, October and November are 1.30, 0.90 and 0.95, respectively, then

i)Forecast the demand for new double door refrigerators in September 2013

ii)Find the trend values (i.e, deseasonalised) for September 2014, and November 2014 and

iii)Find estimates of demand for new double door refrigerators for October 2014. **[3+4+5]**

Question 4

a) Explain the 'Operator Performance' scheme.

b) Three components are to be manufactured on three machines i.e. Center lathe, Milling machine and Cylindrical grinding machine.
(I) Calculate the number of machines required of each kind to produce the components if the plant works for 48 hours per week.
(II) Calculate the number of machines required assuming the machine efficiency of 75%.
(III) How do you reduce the number of machines. The following information is given:

Machine	Component A Setup operation		Component B Setup operation		Component C Setup operation	
Centre lathe	30 min	2 min	55 min	2.5 min	40 min	1.5 min
Milling machine	45 min	8 min	30 min	4 min	-	-
Cylindrical grinding	50 min	8 min	60 min	8 min	60 min	10 min
Other details						
Lot size	350		400		600	
Quantity demanded/ month	1750		4000		3000	

c) Discuss the principles involved in choice of layout. **[4+5+3]**

Question 5

a)What do you understand by Work Breakdown Structure(WBS)?

b) Consider a small maintenance project, as given below, plan it with the help of CPM.

Activity Relationship

Activity	***Duration***	***Predecessor***
A	11	Nil
B	3	Nil
C	5	Nil
D	0	A
E	2	A
F	1	B
G	12	B
H	6	C,F
I	7	D, H
J	3	E

Compute the following for each job:

Early start time (ES), late start time (LS), early finish time (EF), late finish time (LF), Total Float (TF), Free float (FF), minimum total duration of the project, if all the jobs have been scheduled to start as early as possible and the work has been in schedule up to the end of week 5. There is strike on week 6 causing a delay of 1 week. Draw a CPM diagram for the jobs remaining to be done when work resumes on week 7.

c) A machining centre in a job shop of a local fabrication company has five unprocessed jobs remaining at a particular point in time. The jobs are labeled 1,2,3,4 and 5 in the order they enter the shop. The respective processing time and due dates are given in the time table below:

Job number	Processing time (days)	Due date
1	11	61
2	29	45
3	31	31
4	1	33
5	2	32

The production manager and the marketing manager of the job shop have different opinion on customer service. The production manager feels that for certain jobs delays are inevitable in the basic structure of the job shop working the loss as Rs. 50 per job per day of delay with respect to delivery date .The marketing manager feels delay would cost the organization Rs.1000 per tardy job.

Examine the three commonest sequencing rules and state sequencing rule that would satisfy the organization requirement best. **[3+4+5]**

Question 6

a) A company manufactures two items X1 and X2. They are sold at a profit of Rs. 30 per unit of X1 and Rs. 20 per unit of X2. X1 requires 2kgs of materials, 3 man-hours and 1 machine hour per unit. X2 requires 1 kg of material, 2 man hours and 3 machine hours per unit.
During each production run there are 280 kgs of material available, 500 labour hours and 420 hours of machines used. How much of the two items should the company produce to maximize profits?
Maximize 30X1 + 20X2 subject to
2x1+x2 < 280
3xl + 2x2 < 500
x1 + 3x2 < 420
x1, x2, x3 > 0

b) What is maintenance? What types of losses may arise due to poor maintenance?

c) Write short note on Sound incentive plan **.** **[5+4+3]**

Question 7

a) Distinguish between:

i)Quality of Design and Quality of Conformance.

ii) 100% Inspection and Sampling Inspection

b) A firm has to place orders for the supply of raw materials every three months. The raw materials are procured from a supplier at periodic intervals. The annual requirements of the raw materials amount to Rs. 12 lacs. The cost of ordering is estimated to be Rs.5000/- per order and the cost of carrying inventory is estimated to be 25% of the value of inventory. Average lead time for procurement of the raw materials from the supplier is observed to be two months. The demand for the raw materials can be approximated to a normal distribution with a standard deviation of Rs. 1 lac per period. Design an inventory system for the raw materials for a service level of 97.5% .

c) What do you understand by the term 'economics of quality'? **[5+4+3]**

Section B(Information Systems)[40 marks]
Answer question 8 and any three from the rest.

Question 8
a) What do you understand by 'domain name'?
b) What is the first calculating machine known as?
c) What is 'bootstrapping'?
d) State one word for ' eliminating errors of a program'.
e) What is 'throughput'?
f) One KB stands for how many bytes?
g) Define'download'.
h) What has made PDAs obsolete?
i) What do you understand by'string'?
j) For information recording the magnetic tape is divided into vertical columns called:---------- **[10]**

Question 9
a) Explain prototyping approaches to systems development.
b) Distinguish between Hardware and software.

c) Describe briefly four categories of the major tools that are used for system development. **[3+3+4]**

Question 10

a) Which areas of DBMS should be addressed while maintaining a database? Explain.

b) Distinguish between logical record and physical record in relation to DBMS.

c) Write a short note on System maintenance. **[4+3+3]**

Question 11

a) Explain the concept of MIS in terms of its three elements.

b) Discuss the prerequisites of effective MIS.

c) "Decision support systems are widely used as part of an Organisation's Accounting Information system". Comment. **[4+3+3]**

Question 12

a) Explain the process of evaluation of various ERP packages.

b)) Define the following terms with reference to Section 2 of Information Technology Act, 2000:

i)Key Pair

ii) Originator

iii)Secure System **[4+6]**

Paper 9(Operations Management and Information Systems)

Test Paper—I/9/OMS/2012/T-3

Section A (Operations Management): [60 marks]

Answer Question 1 and any four from the rest.

Question 1

a)When is process layout useful?

b) For movement of materials in a fixed path, the equipment should be:----------

c) What is the focus of good material handling system?

d) Which study considers Relaxation Allowance?

e) State one word for 'addition of value to raw materials through application of technology '.

f)What is Control chart for proportion of defectives known as?

g) Therbligs normally form part of which chart?

h) What is expediting?

i) In a waiting line problem, the customer arrival is expected to follow which distribution?

j) Name a group incentive plan.

k) What is the function Gantt Chart?

l) Should method study precede or succeed work measurement**?** **[12]**

Question 2

a) Discuss the contribution of Operations Management in business policy decisions.
b) Discuss the concept of 'product life cycle management'.
c) What do you understand by the term 'process strategy'? **[5+4+3]**

Question 3

a) The order position (i.e requirements of dispatch) for the next twelve months in respect of a particular product is as under:

Month	Required units
1	13000
2	12000
3	10000
4	9000
5	11000
6	13000
7	11000
8	7000
9	15000
10	13000
11	12000
12	10000

The production capacity of the shop is 10000 units per month on regular basis and 3000 units per month on overtime basis. Sub-contracting can be relied upon up to a capacity of 3000 units per month after giving a lead time of 3 months.
Cost data reveal as under:

Rs.5/- per piece on regular basis.

Rs.9/- per piece on overtime basis.

Rs. 7/- per piece on sub-contract basis.

Assuming an initial inventory of 1000 units and that no back logging of orders is permissible, suggest an optimal production schedule . Also work out the total cost on the basis of the suggested schedule.

b) The targeted weekly output of a manufacturing unit employing 20 workers is 400 pieces. The group is entitled to earn an incentive @ 10% on aggregate of wages based on basic piece rate plus dearness allowance (which is Rs. 120 per week) upon achievement of a minimum of 80% of the output target. This incentive rate is increased by 2.5 % flat for every 10% increase in achievement of targets upto a maximum of 10% at the level of 120% of the output target in the following manner:

Output Target	Incentive Rate
80%-90%	10%
90%-100%	12.5%
100%-110%	15%
110%-120%	17.5%
120% and above	20%

During the four weeks in February, the actual output achieved by the workers are 383 pieces,442 pieces,350 pieces and 318 pieces respectively. The average basic rate is Rs 5 Compute the amount of incentive earned by the group during each of the four weeks.

c) Define Motion Study. What are the steps involved in carrying out Motion Study. **[4+5+3]**

Question 4

a) Estimate the number of scooters to be sold in a town with population of 12 lacs with help of following data.

Population(in lacs)	(X)	4	6	7	10	13
No. of scooters	(Y)	5500	6600	5700	9000	10500

b) The production function of the firm, is $Q = 12 - \frac{1}{K} - \frac{1}{L}$

and $P_L = 1$, $P_K = 4$ and $P_Q = 9$. Which input combination will the firm use in order to maximise profit ?

c) The time study of a machinery operation recorded cycle times of 8.0, 7.0, 8.0 and 9.0 minutes. The analyst rated the observed worker as 90%. The firm uses a 0.15 allowance fraction. Compute the standard time. **[4+5+3]**

Question 5

a) 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.

b) Five jobs are required to be processed through two machines 1and 2 sequentially. The table below gives the processing times in hours:

Job	A	B	C	D	E
Machine 1	2	7	5	6	5
Machine 2	4	8	8	7	3

What is the minimum total time for completion of all jobs? For what period, if any, Machine 2 remains idle?

When does Job B gets completed?

c) State the difference between PERT and CPM. **[4+5+3]**

Question 6

a) The XYZ Scientific Laboratories is engaged in producing different types of high class equipment for use in science laboratories. The company has two different assembly lines to produce its most popular product 'Pressurex'.

The processing time for each of the assembly lines is regarded as a random variable and is described by the following distributions.

Process Time (minutes)	Assembly A_1	Assembly A_2
10	0.10	0.20
11	0.15	0.40
12	0.40	0.20
13	0.25	0.15
14	0.10	0.05

Using the following random numbers, generate data on the process times for 15 units of the item and compute the expected process time for the product. For the purpose, read the numbers vertically taking the first two digits for the processing time on assembly A_1 and the last two digits for processing time on assembly A_2.

4134	8343	3602	7505	7428
7476	1183	9445	0089	3424
4943	1915	5415	0880	9309

b) ABC Ltd. has four sales representatives who are to be assigned to four different sales territories. The monthly sales increase estimated for each sales representative for different sales territories (in lakhs of rupees), are shown in the following table:

Sales Representatives	Sales Territories			
	I	II	III	IV
A	200	150	170	220
B	160	120	150	140
C	190	195	190	200
D	180	175	160	190

Suggest optimal assignment and the total maximum sales increase per month.

If for certain reasons, sales representative 8 cannot be assigned to sales territory III, will the optimal assignment schedule be different? If so, find that schedule and the effect on total sales.

c) Explain the term 'cost of quality'**.** **[4+5+3]**

Question 7

a) A manufacturing firm needs 5 component parts. Due to inadequate resources, the firm is unable to manufacture all its requirements. Thus, the management is interested in determining as to how many, if any, units of each component should be purchased from outside and how many should be produced internally. The relevant data are given here.

Component	M	A	T	TR	PP	PC
C_1	4	1	1.5	20	48	30
C_2	3	3	2	50	80	52
C_3	1	1	0	45	24	18
C_4	3	1	0.5	70	42	31
C_5	2	0	0.5	40	28	16

M: Per unit milling time in hours
A: Per unit assembly time in hours
T: Per unit testing time in hours
TR: Total requirement in units
PP: Price per unit quoted in the market
PC: Per unit direct costs (including materials, labour etc.)

Resources available are as follows:
Milling hours : 300
Assembly hours : 160
Testing hours : 150
Formulate this as an LPP, taking the objective function as maximisation of saving by producing the components internally.

b) Discuss the points to be considered while designing a Maintenance programme for an organization ?

c) Product A has a Mean Time Between Failures(MTBF) of 30 hours and has a Mean Time To Repairs (MTTR) of 5 hours. Product B has an MTBF of 40 hours and has an MTTR of 2 hours.

i) Which product has higher reliability?

ii) Which product has greater maintainability?

iii) Which product has greater availability**?** **[5+4+3]**

Section B (Information Systems) [40 marks]

Answer Question 8 and any three from the rest.

Question 8

a) What does a 'key field' imply?

b) What is 'cursor'?

c) What type of device is OCR?

d) Define 'surfing'.

e) Transistor Technology was used in which generation of Computers?

f) Define 'function' in relation to computer technology.

g) What do you understand by the term 'gateway' in relation to computer technology?

h) Name a software package for DBMS.

i) What is mapping?

j) Name two broad types of system maintenance. **[10]**

Question 9

a) Explain the concept of system decomposition.

b) Explain the role played by Financial Information System in making financial decisions.

c) Discuss briefly the reasons as to why the organizations fail to achieve their Systems Development Objectives? **[2+4+4]**

Question 10

a) What do you understand by the term 'Data Dictionary'?

b) What are the important decisions, which influence the physical design of a database? Discuss.

c) What are the functions of Database System Utilities? **[3+4+3]**

Question 11

a) Discuss the effect of applying computer technology to Management Information System.

b) What are the limitations of the Management Information system?

c) What are the four basic components of decision support system? **[4+2+4]**

Question 12

a)Write short notes on the following:

(i) Benefits of Enterprise Resource Planning

(ii) Business Process Reengineering (BPR).

b) Explain the terms Attribution, Acknowledgement and Dispatch of Electronic Records with reference to The Information Technology Act, 2000. **[6+4)**

Operations Management and Information Systems

Test Paper—I/9/OMS/2012/T-4

Section A (Operations Management): [60 marks]

Answer Question 1 and any four from the rest.

Question 1

a) The deviations of work centre time and cycle time for five work centres on an assembly line are 0,10,10, 10 and 40 minutes. What is the smoothness index?

b) What are utilities?

c) Define 'free float'.

d) What do you mean by 'acceptance number' ?

e) With whom do we associate Time Study?

f) Expand '5 S'.

g) What do slack variable represent?

h) Which department prepares job card and why?

i) What is Human Resource Planning? Answer in one sentence.

j) State the function of 'Centrifugal pump'.

k) Why do we carry out VED analysis?

l) With whom do we associate Assembly Line? **[12]**

Question 2

a) Discuss the scope of operations management.

b) List the stages involved in design process of goods and services.

c) Write short note on 'process decisions' **[4+5+3]**

Question 3

a) What factors will have to be considered in choosing the location for the following industries?

(i) Aluminium industry.
(ii)Thermal power plant.
(iii) Large furniture(domestic and office)manufacturing unit.

b) Empire Glass Company can produce a certain insulator on any three machines which have the following charges shown below . The firm has an opportunity to accept an order for either (1) 50 units at ₹ 20/unit or (2) 150 units at ₹ 12/unit.

Machine	Fixed Cost (₹)	Variable Cost(₹)
A	50	4/unit
B	200	2/unit
C	400	1/unit

(i)Which machine should be used if 50 units order is accepted and how much profit will result?

(ii)Which machine should be used if the 150 unit order is accepted and what will be the resultant profit?

(iii)What is the break-even volume for machine B when the price is ₹ 12/unit?

(iv) Suppose the fixed cost for machine A is a stepped function with ₹ 50 up to 40 units and ₹ 100 thereafter. Will the answers to (i) and (ii) above vary? If so, what will be the revised answer?

c) P Timber Works uses forklift trucks to transport lumber from factory to a storage area 0.3 km away. The lift trucks can move three loaded pallets per trip and travel at an average speed of 8 km. per hour (allowing for loading, unloading, delays and travel). If 640 pallet loads must be moved during 8 hours shift, how many lift trucks are required? Assume single shift working and 300 working days in a year. **[4+5+3]**

Question 4

a) The demand curve faced by a firm is p = 20 - 4x and the cost function is C = 4x (where p = price, x = output, and C = total cost).
(i) Determine the optimum level of output, price and maximum profit if the objective of the firm is to maximise profit.
(ii) What will be the new price if a unit tax of ₹ .0.50 is imposed?
(iii) Determine the rate of unit tax so that tax revenue is maximum.

b) Pilot study showed percentage of occurrence of an activity as 50%. Determine the number of observation required for a work sampling study for 95% confidence level and a relative error of ±2%.

c) Following is the data obtained from the Bureau of Industrial Costs and Prices. Have the prices kept pace with the rising costs?

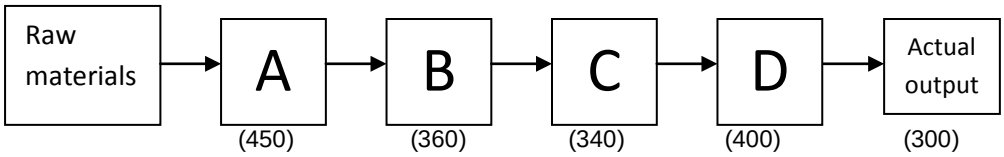
Note 1994 = 100

	2004	5	6	7	8	9	10	11	12
Costs per unit of output	203	216	223	239	248	253	279	301	311
Price of final output	225	242	250	271	275	277	295	318	329

[5+3+4]

Question 5

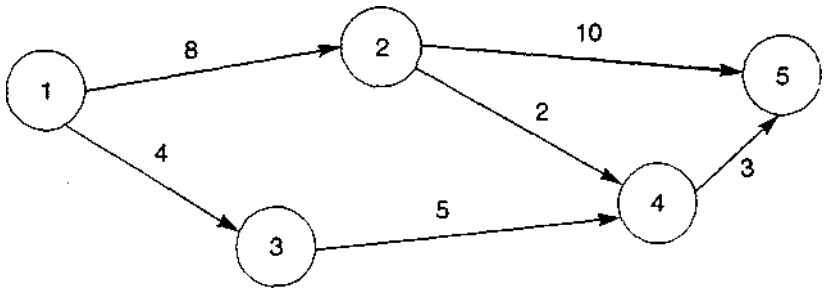
a) A firm has four work centres, A, B, C & D, in series with individual capacities in units per day shown in the figure below.



(i) Identify the bottle neck centre.
(ii) What is the system capacity?

(iii) What is the system efficiency?

b) For given network find Total Float (TF), Free Float (FF) and Independent Float (IF)



Network

c) Write short notes on Supply Chain Management **[4+5+3]**

Question 6

a) Customers arrive at the rate of twenty per hour and the present serving arrangements can cope with thirty per hour for an eight-hour day.
Using the queuing formulae provided, you are required to calculate and state:
(i) the average time in the queue;
(ii) the implied value of customers' time if the owner of the service has considered but rejected a faster service arrangement which would cost an extra ₹ 20 for an eight-hour day and would raise the service rate to forty per hour.

b) PQR Airlines operating 7 days a week has given the following time-table. Crews must have a minimum lay-over of 5 hours between flights. Obtain the pairing flights that minimises lay-over time away from home. For any given pairing the crew will be based at the city that results the smallest lay-over:

Hyderabad-Delhi			Delhi-Hyderabad		
Flight No.	Departure	Arrival	Flight No.	Departure	Arrival
A1	6 AM	8 AM	B1	8 AM	10 AM
A2	8 AM	10 AM	B2	9 AM	11 AM
A3	2 PM	4 PM	B3	2 PM	4 PM
A3	8 PM	10 PM	B4	7 PM	9 PM

c) KBC Ltd. has two factories that ship to three regional warehouses. The costs of transportation per unit are:

Transportation Costs (₹)

Warehouse	Factory	
	F_1	F_2
W_1	2	4
W_2	2	2
W_3	5	3

Factory F_2 is old and has a variable manufacturing cost of ₹20 per unit. Factory F_1 is modern and produces for Rs. 10 per unit. Factory F_2 has a monthly capacity of 250 units, and Factory F_1 has a monthly capacity of 400 units. The

requirements at the warehouses are:

Warehouse	Requirement
W_1	200
W_2	100
W_3	250

How should each factory ship to each warehouse in order to minimize the total cost? Formulate this problem as a linear programming model. Do not solve it. **[4+5+3]**

Question 7

a) Explain the need for acceptance sampling.

b) What are the pros and cons of placing the quality department under operations manager?

c) The following cost have been recorded:

Particulars	₹
Incoming materials inspection	10000
Training of personnel	30000
Warranty	45000
Process planning	15000
Scrap	9000
Quality laboratory	30000
Rework	25000
Allowances	10000
Complaints	14000

What are the costs of prevention, appraisal, external failure and internal failure? **[4+4+4]**

Section B (Information Systems) [40 marks]

Answer Question 8 and any three from the rest.

Question 8

a) How do you define nanosecond?

b) With which device concept of 'cylinder' is used?

c) What is 'handshaking'?

d) What is 'firmware'?

e) What do we mean by data?

f) What are the two types of data independence?

g) What do you understand by 'domain'?

h) What does 'packet switching' on internet refer to?

i) Define 'cyber crime'.

j) What do you mean by reliability in respect of MIS**?** **[10]**

Question 9

a) State the attributes of useful information.

b) What do you understand by "Requirement analysis"? What is the significance of analysing the present system and how is it carried out?

c) What is program documentation? **[4+4+2]**

Question 10

a) Discuss the several integrity controls that DBMS has to support.

b) What do you understand by 'Data Independence'?

c) Write short note on the role of Database Administrator. **[5+3+2]**

Question 11

a) Explain the important characteristics of a good Management Information System.
b) What is an Executive Information system? Discuss its various purposes.

c) Write short notes on Expert systems. **[4+4+2]**

Question 12

a) Write short note on Cyber Appellate Tribunal.

b) State the objectives and scope of IT Act, 2000.

b) Write down the general guidelines which are to be followed before starting the implementation of an ERP package. **[3+4+3]**