

Time Allowed : 3 Hours

The figures in the margin on the right side indicate full marks.

Attempt Question No. 1 (carrying 25 marks) which is compulsory and any five (each carrying 15 marks) from the rest.

1. (a) State the correct answer in each of the following statements by writing only the capital letter given under it: 1x5

(i) Synergy is often expressed (0)
A. $2 + 2$ is 5
B. $2 + 2$ is 4
C. $2 + 2$ is < 4
D. $2 + 2$ is > 4

(ii) Control in management parlance consists of five actions (0)
1. Planning;
2. Comparison of achievement of plan;
3. Assessment of deviations;
4. Corrective action for mismatch of performance with the plan
5. Execution.
The correct sequence of these activities is
A. 1 – 2 – 3 – 4 – 5
B. 1 – 5 – 3 – 4 – 2
C. 1 – 4 – 5 – 3 – 2
D. 1 – 5 – 2 – 3 – 4.

(iii) The basic problems in design of organisation structure are (0)
1. Ensuring functional excellence;
2. Ensuring coordination;
3. Ensuring sense of belonging;
4. Ensuring control.
As a matter of fact, the problems are
A. 1 + 2 + 3 + 4
B. 1 + 2
C. 1 + 2 + 4
D. 2 + 3 + 4

(iv) The formula suggested by E.H.Bowman for optimum production rate P_1 for a period is (0)
A. $aW_{t-1} + bI_{t-1} + cF_{t+1} + K$
B. $aW_{t-1} - bI_{t-1} + cF_{t+1} + K$
C. $aW_{t-1} + bI_{t-1} - cF_{t+1} + K$
D. $aW_{t-1} + bI_{t-1} + cF_{t+1} - K$
Where W_{t-1} = the workforce in the previous period
 I_{t-1} = the ending inventory for the previous period
 F_{t+1} = the forecast of demand for the next period
 a, b, c, K are constants the values whereof are obtained by using regression analysis.

- (v) The theory of constraints, as developed by Dr. Goldratt, evaluates performance by three measures, viz., Throughput (T), Inventory (I), and operating expenses (O), Of these measures, the most important one is (0)
- A. T as it focuses on sales
 B. I as it puts a zero value on unsold inventory
 C. O as it aims a reducing operating expense
 D. T, I, and O in a judicious combination, as they are seperate but interrelated processes and concepts to increase return on investment and cash flow.
- (b) State which of the two words given in brackets should better fill in the gap in each of the following statements: 1x5
- (i) In operations management TOC, in a word, is "balance of flow, not the _____? (0)
 [capacity/production].
- (ii) Data mining, or the process of analysing empirical data, allows for the _____ of (0)
 information. [interpolation/extrapolation].
- (iii) _____ can help users to locate and view information faster. [Internate/Intranets]. (0)
- (iv) The process of determining gross requirements of components is termed 'the _____ (0)
 process'. [explosion/inclusion]
- (v) The central focus of distribution is to increase the efficiency of time, place, and _____ (0)
 utility. [customer/delivery]
- (c) State if each of the following statements is T (true) or F (false): 1x5
- (i) Value Analysis (VA) process is a less important tool than Function Analysis System (0)
 Technique (FAST).
- (ii) The term 'value' has four different meanings, namely exchange value, cost value, use value, (0)
 wealth value.
- (iii) Internal quality costs consist of preventive costs, Appraisal costs, and Failure costs. (0)
- (iv) The phrases _____ right first time or zero defects — were promoted by the Japanese quality (0)
 expert Kaoru Ishikawa.
- (v) The BSC (Balanced Scorecard) puts more stress on financial parameters than on non– (0)
 financial parameters since its objective is the growth of the organization.
- (d) Match the items in Group X with the relevant items in Group Y, using failure mode and effects (0)
 analysis (FMEA):
- | Group X | Group Y |
|-----------------------------|--|
| (i) A Top–down analysis | (a) Looks at failure from the product user's stand point |
| (ii) Bottom–up analysis | (b) FMEAs are done on smallest pieces first |
| (iii) C. component analysis | (c) FMEAs are done on the physical parts of the system |
| (iv) D. functional analysis | (d) FMEAs are done on the larger items first |
- Note: Your answer should consist of two letters only like
 (i) As, Ab, Ac or Ad
 (ii) Ba, Bb, Bc or Bd etc.
- (e) State the correct answer (= 1 mark) showing your workings (= 2 marks) for each of the following (1+2)x2
 two problems.
- (i) Division R makes a single product. Information for the division for the year just ended is (0)
- | | |
|--------------|---------------|
| Sales | 30,000 units |
| Fixed costs | Rs. 48,70,000 |
| Depreciation | Rs. 24,75,000 |

Residual income	Rs. 4,72,000
Net assets	Rs. 1,25,00,000

Head Office assesses divisional performance by the residual income achieved. It uses a cost of capital of 12% a year.

Division R's average contribution per unit was

A—Rs. 148.20; B—Rs. 228.10; C—Rs. 280.60; D—Rs. 310.56.

- (ii) Brilliant Ltd. has developed a new product. The nature of Brilliant's work is repetitive and it is usual for there to be an 80% learning effect when a new product is developed. The time taken for the first unit was 22 minutes. Assuming that an 80% learning effect applies, the time to be taken for the fourth unit is nearest to

A—9.91 mins; B—9.97 mins; C—14.08 mins; D—15.45 mins.

[The exponent b in the formula $Y_x = zX^b$ is given as — 0.322 for an 80% learning curve.]

2. (a) The research and development department of Innovative Ltd. has produced specifications for two new products. Modalf and Modbet for consideration by company's production director. The director has received detailed costings which can be summarized as follows:

	Modalf Rs.	Modbet Rs.
Direct costs		
Material	64	38
Labour (Rs. 3 per hour)	18	6
	<u>82</u>	<u>44</u>
Factory overheads (Rs. 3 per machine hour)	18	6
Total estimated unit cost	<u>100</u>	<u>50</u>

The sales department has provided estimates of the probabilities of various levels of demand for two possible prices for each product. The details are as follows:

	Modalf Rs.	Modbet Rs.
Low price alternative selling price	120	60
Demand estimates:		
Pessimistic—probability 0.2	1,000	3,000
Most likely—probability 0.5	2,000	4,000
Optimistic—probability 0.3	3,000	5,000
High price alternative:		
Selling price	130	70
Demand estimates:		
Pessimistic—Probability 0.2	500	1,500
Most likely—probability 0.5	1,000	2,500
Optimistic—probability 0.3	1,500	3,500

It would be possible to adopt the low price alternative for either product together with the high price alternative for the other product (demand estimates are independent for the two products).

The factory has 60,000 machine hours available during the year. For some year past it has been working at 90% of practical capacity making a standardized product. This product is very

profitable and it is only the availability of 6,000 hours of spare machine capacity that has made it necessary to search for additional product lines to use the machines fully. The actual level of demand will be known at the time of production. The monthly fixed cost is estimated at Rs. 10,000 and the variable cost at Re. 1 per machine hour.

The management seeks your advice for the best plan for the utilization of the 6,000 machine hours, to comment on the rational selling price alternatives that exist for this plan and to calculate the expected increase in annual profit which would arise for each alternative.

- (b) (i) Briefly describe the operation of an MRP system. 3 (0)
- (ii) How MRP II differs from MRP I? 2 (0)

3. Sun Ltd. is considering renting additional factory space to make two products, P – 1 and P – 2. You are the company's management accountant and have prepared the following monthly budget: 4+6+5 (0)

	P – 1	P – 2	Total
	Rs.	Rs.	Rs.
Sales (units)	4,000	2,000	6,000
Sales revenue	80,000	1,00,000	1,80,000
Variable material and labour costs	(60,000)	(62,000)	(1,22,000)
Fixed production overhead (allocated on direct labour hours)	(9,000)	(18,000)	(27,900)
Fixed administration overheads (allocated on sales value)	(1,600)	(2,000)	(3,600)
Profit	<u>8,500</u>	<u>18,000</u>	<u>26,500</u>

The fixed overheads in the budget can only be avoided if neither product is manufactured. Facilities are fully interchangeable between products.

As an alternative to the manual production process assumed in the budget, Sun Ltd. has the option of adopting a computer aided process. This process would cut variable costs of production by 15% and increase fixed costs by Rs. 12,000 per month. The management is not sure about demand for the new products.

The management believes the company will have to depart from its usual cash sales policy in order to sell P – 2. An average of three months credit would be given and bad debts and administration costs would probably amount to 4% of sales revenue for this product. Both products will be sold at the prices assumed in the budget. Sun Ltd. has a cost of capital of 2% per month. No stocks will be held. [29- () () 33158]

- (a) Calculate the sales revenues at which operations will break-even for each process (manual and computer added) and calculate the sales revenue at which Sun Ltd. will be indifferent between the two processes:
 (i) If P – 1 alone is sold;
 (ii) If P – 1 and P – 2 units are sold in the ratio 4 : 1, with P – 2 being sold on credit.
- (b) Explain the implications of your results with regard to the financial viability of P – 1 and P – 2.
4. (a) What is lean manufacturing? Briefly describe the lean/JIT system. 10 (0)
- (b) In the matter of operations management state any five options that can be used to adjust capacity to match current demand. 5 (0)
5. (a) A company is considering whether to develop and market a new product. Development costs are estimated to be Rs. 1,80,000, and there is a 0.75 probability that the development effort will be 5+5 (0)

successful and a 0.25 probability that the development effort will be unsuccessful. If the development is successful, the product will be marketed, and it is estimated that

- (i) If the product is very successful profits will be Rs. 5,40,000;
- (ii) If the products is moderately successful profits will be Rs. 1,00,000;
- (iii) If the product is a failure there will be a loss of Rs. 4,00,000.

Each of the above profit and loss calculation is after taking into account the development costs of Rs. 1,80,000.

The estimated probabilities of each of the above events are as follows:

(1) Very successful	0.4
(2) Moderately successful	0.3
(3) Failure	0.3

Required:

- (i) Prepare decision tree;
 - (ii) Offer your comments
- (b) Identify the assumptions on which cost–volume profit analysis is based. 5 (0)
6. (a) Explain the concept of learning curve and state how relevant is the same is managing cost. 5 (0)
- (b) A company has developed a special purpose Electronic Security Device and once introduced in the market, the same expected to have a life cycle of 3 years from the time of its introduction in the market before the Device becomes obsolete due to technological and advancement of other competitive products. 5+5 (0)
- You have been asked by the company to prepare a product life cycle budget.
- The following information are available:
- | | Year 1 | Year 2 | Year 3 |
|--|-----------|-----------|-----------|
| No. of units to be manufactured and sold | 50,000 | 2,00,000 | 1,50,000 |
| Price per device (Rs.) | 500 | 400 | 350 |
| R & D and Design cost (Rs.) | 9,00,000 | 1,00,000 | Nil |
| Production cost: | | | |
| Variable cost per Device (Rs.) | 200 | 150 | 150 |
| Fixed cost (Rs.) | 70,00,000 | 70,00,000 | 70,00,000 |
| Marketing cost: | | | |
| Variable cost per Device (Rs.) | 100 | 70 | 60 |
| Fixed cost (Rs.) | 30,00,000 | 25,00,000 | 25,00,000 |
| Distribution cost: | | | |
| Variable cost per Device (Rs.) | 50 | 50 | 50 |
| Fixed cost (Rs.) | 10,00,000 | 10,00,000 | 10,00,000 |
- Prepare the budgeted life cycle operating profit.
- It has been further indicated that if a discount of 10% is given to customers, the units to be sold per year will increase by 5%. Would you recommend introduction of such discount?
7. (a) Write a note on Cause–effect diagram. When it should be used? 5+5+3+2 (0)
- (b) After inspection of 10 rods, each of length 5 metres, the following number of defects is found on each rod:
45, 42, 52, 46, 51, 46, 50, 43, 51, 49. (0)
- Which type of control chart would be suitable to control the defects? Justify.

- | | |
|---|-----|
| (c) Distinguish between proportion defective (p) chart and number defective (np) chart. | (0) |
| (d) Draw a diagram to show trend in the control chart. How do you interpret the trend in the control chart? | (0) |

8. Write short notes on *(any three)*:

5x3

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|---------------------------------|-----|
| (a) Value Analysis; | (0) |
| (b) Supply Chain Management; | (0) |
| (c) Enterprise Risk Management; | |