FINAL EXAMINATION

(REVISED SYLLABUS - 2008)

GROUP - IV

Paper-15 : MANAGEMENT ACCOUNTING–ENTERPRISE PERFORMANCE MANAGEMENT

Q. 1. (a) Expand the following abbreviations :

(i) MRP II

(ii) SDR

(iii) MPS

(iv) PLCM

(v) AQL

(vi) EFQM

(vii) DMAIC

(viii) JUSE

(ix) CRM

(x) SCP

(xi) QFD

(xii) ISO

(xiii) TQC

(xiv) CWTQM

(xv) CMS

(xvi) CRP

(xvii) TOC

(xviii) PDSA

(xix) HCM

(xx) OPT

Q. 1. (b) Define the following terms :

(i) V in VAT Analysis

(ii) Matrix Organizational Structure

(iii) Bench Marking

(iv) Contribution Approach

(v) Talent Drain

(vi) Cost Driver

(vii) Learning Curve effect

(viii) Data Mining

Q. 1. (c) State if each of the following statements is *True* or *False*.

  (i)   **The concept of Value Analysis was first conceived by Jerry Kaufman**

  (ii) **The term value has four different meanings-exchange value,cost value,use value, wealth value**

 (iii) **Internal Quality costs consists of Preventive Costs,Appraisal Costs and Failure Cost**

 (iv)   **The phrases – right first time or zero defects-were promoted by the Japanese quality expert Kaoru Ishikawa.**

  (v)   **The Balance Score Card (BSC) is a performance measurement tool for controlling individual productivity.**

 (vi)   **Theory Y style of management is a highly autocratic style.**

 (vii) **The matrix organization structure is suitable for large projects.**

(viii) **The key factors of Theory of Constraints are contribution and profit.**

 (ix)   **Life Costing is a technique to establish the total cost of ownership.**

  (x)   **One of the goals JIT seeks to achieve is batch sizes of one**

 (xi)   **Theory Y style of Mnagement is a highly autocratic style.**

 (xii) **EVA encourage short term performance.**

(xiii) **Black Flash Accounting COMPARES PROFIT WITH THE COST OF PRODUCING A PRODUCT**

(xiv)   **The key factors "Theory of Constraints" are Contribution & Profit.**

 (xv)   **Life Costing is a techniqueto establish the total cost of ownership.**

(xvi)   **The experience curve effect is broader in scope than the learning curve.**

(xvii) **The concept of quality Circle is primarily based upon recognition of the value of the worker.**

(xviii) **Akio Morita is credited with pioneering the cost approach of target costing.**

Answer 1. (a)

   (i)   Manufacturing Resource Planning
   (ii) Search Decision Rule
  (iii) Master Production Schedule
   (iv) Product Life Cycle Management
   (v)   Acceptable Quality Level
   (vi) European Foundation for Quality Control
  (vii) Define, Measure, Analyze, Improve, Control
 (viii) Japanese Union of Scientists and Engineers
   (ix) Customer Relationship Management
   (x)   Supply Chain Planning
   (xi) Quality Function Deployment
  (xii) International Organization for Standardization
 (xiii) Total Quality Control
  (xiv) Company Wide Total Quality Management
   (xv) Capacity Management Strategy
  (xvi) Capacity Requirement Planning
 (xvii) Theory of Constraints
(xviii) Plan- Do- Study- Act

(xix) Human Capital Management

(xx) Optimized Production Technology

Answer 1. (b)

(i) A logical structure starts with one or few raw materials and the product expands into a number of different products as it flows through its routings.

(ii) Matrix Organization Structure combines the coordination and control of the decentralized structure with the technical excellence of econimies of scaleof the functional structures to reap the benefits of both.

(iii) Benchmarking is a prosess of continuously comparing and measuring an organizations business process against business leader anywhere in the wotld to gain information that will help the organization take action to improve performance.

(iv) Contribution Approach is a method of preparing incomes statement that separates variable cost from Fixed Cost to emphasize cost behaviour patternfor the purpose of planning and control.

(v) Talent Drain is the second potential problem in succession planning. Because upper management must identify a small group of managers to receive training and development for promotion, those managers who are not assigned to development activities may feel overlooked leave the organizations. This turnover may reduce the number of talented managers of lower and middle levels of the organization.

(vi) Cost drive is the one that is selected and used as a basis with a view to assigning costs attached/ attributed to an activity cost centre to cost objects. This term is commonly used in ABC costing.

(vii) Learning Curve Effect states that the more times a task has been performed, the less time will be required on each subsequent iteration.

(vii) Data mining or the process of analysing emprical data, allows for the extra polation of the information.

Answer 1. (c)

(i) False

(ii) False

(iii) True

(iv) False

(v) False

(vi) False

(vii) False

(viii) False

(ix) True

(x) True

(xi) False

(xii) False

(xiii) False

(xiv) False

(xv) True

(xvi) True

(xvii) True

(xviii) True
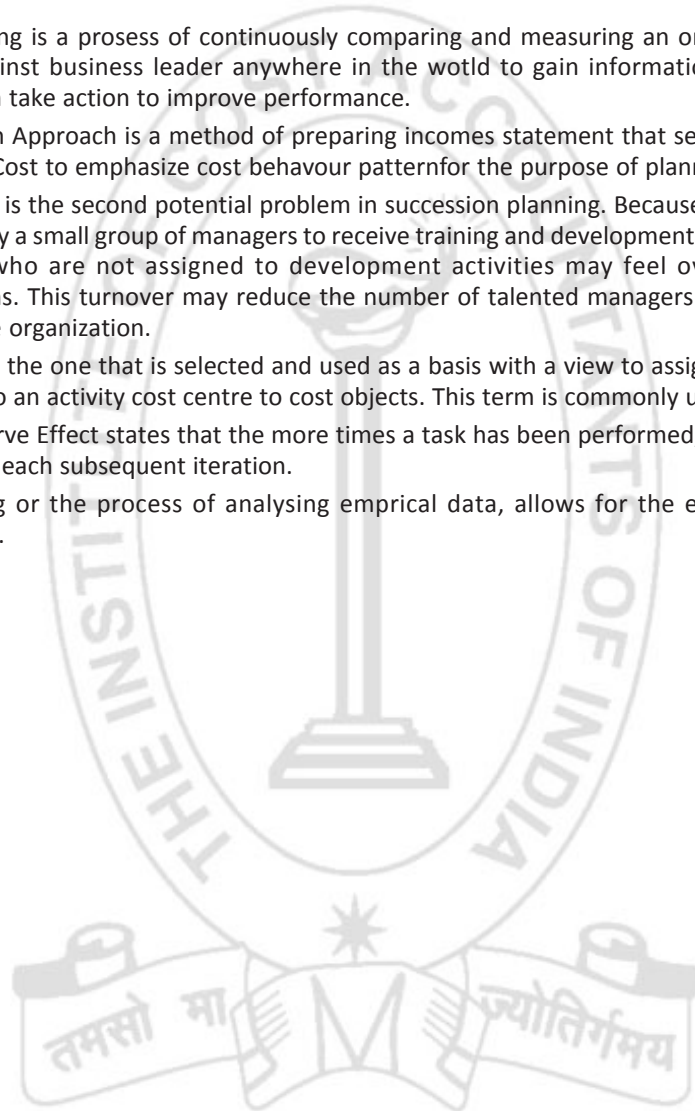
Q. 2. **T ltd produces a product which passes through two processes Cutting & Finishing. The following data is given :**

Particulars	Cutting	Finishing
Hours available per annum	50,000 hours	60,000 hours
Hours needed per unit of product	5	12
Fixed Operating Cost pa excluding Direct Material	₹ 10,00,000	₹ 10,00,000

The selling price of the product is ₹ 1000 pu and the only variable cost per unit is Direct Material, which cost ₹ 400 pu.

Evaluate each of the proposals independent of each other

1. An outside Agency is willing to do finishing operation of any number of units between 5000 and 7000 at ₹ 400 pu
2. An outside Agency is willing to do the cutting operation of 2000 units at ₹ 200 pu
3. Additional Equipment for cutting can be bought for ₹ 10,00,000 to increase the cutting facility by 50,000 hours, with Annual Fixed Costs increased by ₹ 2 lakhs.

Answer 2.

Basic Computation

Throughput Contribution pu = Selling Price ₹ 1000 - variable Cost ₹ 400 = ₹ 600

Particulars	Cutting	Finishing
Hours available per annum	50,000 hours	60,000 hours
Hours required per unit of product	5	12
Capacity in units	50,000/5 =10,000	60,000/12 =5000
Whether Bottleneck Resource	No	Yes

Observation :

Even though cutting process has a capacity of 10,000 units, The finishing process has capacity to complete only 5000 units. Hence overall effective Output of the company is only 5000 units.

Finishi nng Process will operate to full capacity (5000 units) and there will be spare capacity of (10,000-5000) = 5000 units in the cutting process.

Evaluation of Options :

Option 1 – There is Spare capacity in cutting process for additional 5000 units, in order to supply the required cut material to the Outside Agency. So finishing process can be outsourced for 5000 units, since Additional Contribution = (Throughput Contribution ₹ 600-Outsourcing Cost ₹ 400) × 5000 = ₹ 10,00,000.

Option 2 – Cutting process has spare capacity upto 5000 units. Outsourcing the Cutting Process will not lead to any saving in Fixed Operation Costs, but will increase outsourcing cost and pile up WIP inventory, without generating any saleable output. Hence, this proposal of outsourcing Cutting process for 2000 units at ₹ 200 pu is not worthwhile.

Option 3 – Cutting Process already has spare capacity upto 5000 units.

Purchasing additional equipment for ₹ 10,00,000 will lead to increase in Fixed Operating Cost and pile up WIP Inventory without generating any saleable output. Hence proposal of purchasing cutting equipment is not worthwhile.

Q. 3. **P Ltd. has tow divisions, S and T, S transfer all its output to T, which finishes to work. Cost and revenues at various levels of capacity are as follows :**

Output (Units)	S.costs	T Net revenues (i.e., revenue minus costs incurred in T) (₹)	Profit (₹)
600	600	2,950	2,350
700	700	3,250	2,550
800	840	3,530	2,690
900	1,000	3,780	2,780
1,000	1,200	4,000	2,800
1,100	1,450	4,200	2,750
1,200	1,800	4,350	2,550

Company profits are maximised at ₹ 2,800 with output of 1,000 units. If P Ltd. wish to select a transfer price in order to establish S and T as profit centres, what transfer price would motivate the managers of S and T together to produce 1,000 units, no more and no less?

P Ltd. wants that the transfer price should be set at ₹ 2.10 per unit. Comment on this proposal.

Answer 3.

The transfer price will be notional revenue to S and notional costs to T.

   (a) S will continue to produce more output until the costs of further production exceed the transfer price revenue.

   (b) T will continue to want to receive more output from S until its net revenue from further processing is not sufficient to cover the incremental transfer price costs.

Output (Units)	Division S Incremental costs (₹)	Division T Incremental costs (₹)
600	-	-
700	100	300
800	140	280
900	160	250
1,000	200	220
1,100	250	200
1,200	350	150

Since S will continue to produce more output if the transfer price exceeds the incremental costs of production, a price of at least ₹ 200 per units (₹ 2 per unit) is required to 'Persuade' the manager of S to produce as many as 1,000 units, but a price in excess of Rs.250 per 100 units would motivate the manager of S to produce 1,100 units (or more).

By a similar argument, T will continue to want more output from S if the incremental revenue exceed the transfer costs from S. If T wants 1,000 units the transfer price must be less than ₹ 220 per 100 units. However, if the transfer price is lower than ₹ 200 per 100 units, t will ask for 1,100 units from s in order to improve its division profit further.

In summary :

(a) The total company profit is maximized at 1,000 units of output.

(b) Division S will, want to produce 1,000 units, no more and no less, if the transfer price is between ₹ 2 and ₹ 250 (i.e. ₹ 200 to ₹ 250 per 100 units).

(c) Division T will want to receive and process 1,000 units, no more and no less, if the transfer price is between ₹ 2 and ₹ 2.20

(d) A transfer price must, therefore, be selected in the range ₹ 2.00 to ₹ 2.20 per unit (exclusive).

Thus, if a price of ₹ 2.10 per unit is selected, profits at 1,000 units of output would be :

Particulars	Division S	Division T	Total
Sales/Net revenue	2,100	4,000	4,000
Costs	1,200	2,100	1,200
Profit	900	1,900	2,800

At a transfer Price of ₹ 2.10, any increase in output above 1,000 units, or shortfall in output below this amount, would reduce the profits of the company as a whole, but also the divisional profits of S and T.

Q. 4. **B Ltd. manufactures two types of bags-L & T Both bags are produced on the same equipment and use similar processes. The following budgeted data has been obtained for the year ended 31ˢᵗ December 2009.**

Product	L	T
Production Quantity	25,000	2,500
Number of Purchase Orders	400	200
Number of Set ups	150	100
Resources required per unit		
Direct Material (₹)	25	62.5
Direct Labour (hours)	10	10
Machine Time (hours)	5	5

Budgeted Production overheads for the year have been analyzed as follows :

	₹
Volume Related Overheads	2,75,000
Purchase Related Overheads	3,00,000
Set up Related Overheads	5,25,000

The budgeted wage rate is ₹ 20/- per hour.

The cos present system is to absorb overheads by product units using rates per labour hour.

However, the company is considering implementing a system of activity based costing. An activity baseinvestigation revealed that the cost drivers for the overhead costs are as follows :

Volume Related Overhead	**Machine Hours**
Purchase Related Overhead	**No of Purchase Orders**
Set up related Overheads	**No of Set ups**

Calculate the unit cost for each type of bag using

(i) **The current absorption Costing method**

(ii) **The proposed activity based costing approach**

Compare your results and briefly comment on your findings.

Answer 4.

	L	T	Total (₹)
Production Quantity	25,000	2,500	
Direct Labour hours required	250,000	25,000	275000
Total Production Overhead			1,1,00,000
Overhead absorption rate per labour hour			4.00
Machine hours required	125,000	12,500	1,37,500
Total Puchase Order	400	200	600
Total Set ups	150	100	250
Cost per cost driver			
Volume Related Overheads			2,75,000
Machine hours required			1,37,500
Volume related overheads/machine hour			2.00
Purchase related overhead			3,00,000
Total Purchase orders			600
Purchase related overheads/order			500
Set ups related overheads			5,25,000
Total Set ups			250
Set up related overheads per set up			2100

(a) (i) Unit cost using existing overhead absorption rate

Product	L ₹	T ₹
D. Material	25.00	62.50
D. Labour Cost	200.00	200.00
Overheads (10 lab hrs × ₹ 4)	40.00	40.00
	265.00	302.50

(ii)

Product	L ₹	T ₹
D. Material	25.00	62.50
D. Labour Cost	200.00	200.00
Overheads		
Volume Related		
(₹ 2 per machine hour)	10.00	10.00

| Purchase Related
(₹ 500 × 400 orders/25000)
Set up related
(₹ 2100 × 150 set ups/25000) | 8.00

12.60
255.60 | 40.00 (₹ 500 × 200/2500)

84.00 (₹ 2100 × 100/2500)
396.50 |

(b)	Cost pu traditional method	₹ 265.00	₹ 302.50
	Cost pu ABC	₹ 255.60	₹ 396.50
	Difference	9.40	− 94.00
	% change	3.55%	31.07%

The ABC approach attributes the cost of resources to each product which those rsources on a more appropriate are basis than the traditional absorption costing method.the price of the t should be reviewed in the light of the new unit cost.

Q. 5. (a) The selling price per unit of a product is ₹ 14.For the forthcoming period,the demand will be only 5000 units. The fixed expenses at 50% capacity (5000 units) will be ₹ 30,000. The company is thinking of shutting down operations. In each case an additional amount of ₹ 2000 will have to be incurred for shutting down and only ₹ 20,000 of the above fixed costs can be avoided.What should be the variable cost per unit to recommend a shut down?

(b) L ltd produces and sells 95000 units of X in a year at its 80% production capacity. The selling price of peoduct is ₹ 8 pu. The Fixed cost is ₹ 3,50,000. The company is continuously incurring losses and management plans to shut down the plant. The Fixed cost is expected to be reduced to ₹ 130000. Additional costs of Plant shut down are expected at ₹ 15,000.

Should the plant be shut down? What is the capacity level of production of Shut down point?

Answer 5. (a)

Let Variable Cost per unit be X

Particulars	Continue Operations	Shur down
Revenue	5000 unit × ₹ 14 = ₹ 70,000	NIL
Less : Variable Cost	5000X	NIL
Contribution	70,000 − 5000X	NIL
Less : Fixed Cost	30,000	30,000 − 20,000 + 2000 = 12000
Profit	40,000 − 5000X	(12000)

For indifference between continue and close down options,the profits of the two options should be equal

$\quad$ 40,000-5000X = − 12000

$\quad$ X = 10.40

Conclusion : If variable cost pu is greater than ₹ 10.40, Shut down option is preferable.

Answer 5. (b)

1.	Contribution pu = SP less VC pu = ₹ 8 – 75% of ₹ 8	₹ 2 pu
2.	Avoidable Fixed Cost = Total Fixed Cost ₹ 3,50,000—Minimum Fixed Cost ₹ 1,30,000 – Shut down cost ₹ 15000	₹ 2,05,000
3.	Shut Down Point = Avoidable Fixed Cost/Contribution pu Since present output of 95000 units < Shut down point,it is preferable to close down the plant.	1,02,500 units
4.	Total Capacity = 95000/80%	1,18,750 units
5.	Capacity Level at shut down point = 102500/118750	= 86.32%

Q. 6. **A Ltd. is engaged in production of three types of ice-cream products: Coco, Strawberry and Vanilla. The Company presently sells 50,000 units of Coco at ₹ 25 per unit, Strawberry 20,000 at ₹ 20 per unit ad Vanilla 60,000 at ₹ 15 per unit. The demand is sensitive to selling price, and it has been observed that every reduction of ₹ 1 per unit in selling price increases the demand for each product by 10% to the previous level. The Company has the production capacity of 60,500 units of Coco, 24,200 units of Strawberry and 72,600 units of Vanilla. The Company marks up 25% on cost of the product.**

The Company management decides to apply ABC analysis. For this purpose, it identifies four activities and the rate as follows :

Activity	Cost Rate
Ordering	₹ **800 per purchase Order**
Delivery	₹ **700 per Delivery**
Shelf Stocking	₹ **199 per Hour**
Customer Support and Assistance	₹ **1.10 p.u. sold**

The other relevant information for the products are as follows:

Particulars	Coco	Strawberry	Vanilla
Direct Material p.u. (₹)	8	6	5
Direct Labour p.u. (₹)	5	4	3
No. of Purchase Orders	35	30	15
No. of Deliveries	112	66	48
Shelf Stocking Hours	130	150	160

Under the traditional costing system, Store Support Costs are changed at 30% of Prime Cost. In ABC these costs are coming under Customer Support and Assistance.

Required :

1. **Calculate Target Cost for each product after a reduction of selling price required to achieve the sales equal to the production capacity.**
2. **Calculate the Total Cost and Unit Cost of each product at the maximum level using Traditional Costing.**
3. **Calculate the Total Cost and Unit Cost of each product at the maximum level using Activity Based Costing.**
4. **Compare the Cost of each product calculated in (i) and (ii) with (iii) and comment on it.**

Answer 6.

1. Computation of New Selling Price to achieve 100% production Capacity.

Coco		Strawberry		Vanilla	
Price (₹)	Quantity (Units)	Price (₹)	Quantity (Units)	Price (₹)	Quantity (Units)
25	50,000	20	20,000	15	60,000
25-1 = 24	50,000 + 10% = 55,000	20-1 = 19	20,000 + 10% = 22,000	15-1 = 14	60,000 + 10% = 66,000
24-1 = 23	55,000 + 10% = **60,500**	19-1 = 18	22,000 + 10% = **24,200**	14-1 = 13	66,000 + 10% = **72,600**

2. Computation of Target Cost to achieve 100% Capacity

Particulars	Coco	Strawberry	Vanilla
(a) Total Production Capacity	60,500 Units	24,200 Units	72,600 Units
(b) Proposed Selling Price as per WN 1 above	₹ 23.00	₹ 18.00	₹ 13.00
(c) Profit Margin at 20% on Cost (1/4th on Cost = 1/5th on Sales)	₹ 4.60	₹ 3.60	Rs.2.60
(d) **Target Cost p.u.**	₹ **18.40**	₹ **14.40**	₹ **10.40**

3. Computation of Cost under Traditional Costing

Particulars	Coco	Strawberry	Vanilla
(a) Direct Material p.u	₹ 8.00	₹ 6.00	₹ 5.00
(b) Direct Labour p.u.	₹ 5.00	₹ 4.00	₹ 3.00
(c) Prime Cost (a+b)	₹ 13.00	₹ 10.00	₹ 8.00
(d) Store Support 30% pf Prime cost (c)	₹ 3.90	₹ 3.00	₹ 2.40
(e) Total Cost p.u	₹ **16.90**	₹ **13.00**	₹ **10.40**
(f) 100% level Output Quantity	60,500 Units	24,200 Units	72,600 Units
(g) Total costs (e × f)	₹ 10,22,450	₹ 3,14,600	₹ 7,55,040
(h) Target Cost p.u as per WN 2	₹ 18.40	₹ 14.40	₹ 10.40
(i) Comments (e) vs (h)	₹ 1.50 cost further saved when compared to Target Cost	₹ 1.40 further cost saved when compared to Target Cost	Target Cost just achieved

4. Computation of Total cost & Unit cost using ABC

Particulars		Coco (₹)		Strawberry (₹)		Vanilla (₹)
	p.u.	Total	p.u	Total	p.u.	Total
Output quantity		60,500 Units		24,200 Units		72,600 Units
Direct Material	8.00	4,84,000	6.00	1,45,200	5.00	3,63,000
Direct Labour	5.00	3,02,500	4.00	96,800	3.00	2,17,800
Cost of purchase order	0.46	(800 × 35) 28,000	0.99	(800 × 30) 24,000	0.17	12,000 (800×15)
Cost of Delivery	1.30	(700 × 112) 78,400	1.91	(700 × 66) 46,200	0.46	33,600 (700×48)
Shelf Stocking	0.43	(199 × 130) 25,870	1.23	(199 × 150) 29,850	0.44	31,840 (199×160)
Customer Support & Assistant	1.10	66,550	1.10	26,620	1.10	79,860

Particulars		Coco (₹)		Strawberry (₹)		Vanilla (₹)
(a) ABC Cost p.u.	16.29	9,85,320	15.23	3,68,670	10.17	7,38,100
(b) Target Cost p.u.	18.40		14.40		10.40	
(c) Comments (a vs b)	₹ 2.10 cost further saved when compared to Target Cost		0.83 further cost reduction required.		0.23 cost further saved when compared to Target Cost	

Q. 7. Hudco Ltd. Requires its various operating divisions to meet the company's target return of 15% on investment, as specified by the board. Besides the ROI of 15% the board also requires an annual positive cash flow. The Steady Division has achieved the 15% target for many years. Steady's assets are mainly plant and equipment (its property rented), plus net current assets. The average age of its assets has increased by 10 months per year over the last four years. A recent benchmarking exercise has shown that Steady's productivity is below that of its competitors, although its financial performance appears very good. The divisional operations director has recently presented a proposal for a major investment in new plant and machinery. He argued that without substantial investment Steady would not be able to compete on either quantity or delivery time. The divisional sales director agreed that these factors had become the two most important features in winning new orders. The budgeted financial figures for 2004 are shown here :

Steady Division- 2004

	(₹ Cr)
Sales	**168.60**
Operation profit before depreciation	**22.20**
Depreciation	**3.00**
Operating profit	**19.20**
Interest payable	**1.80**
Divisional net profit before tax	**17.40**
Plant and equipment	**60.00**
Net current assets	**36.00**
Total divisional assets	**96.00**

The proposal for new investment would lead to a net increase in plant and equipment of ₹ 36 crore and a reduction in net current assets of ₹ 12 crore. Steady expects that the new assets would lead to an increase in operating profit before depreciation of ₹ 8.4 crore and a net increase in depreciation of ₹ 4.8 crore. Hudco charges 12% on all funds used by divisions.

Answer 7.

(a)

Hudco Ltd.-Steady Division

Return on Investment (ROI)

	Without investment ₹ Cr.		with investment ₹ Cr.
PBIT	19.20	(+8.4 − 4.8)	22.80
Total Assets	96.00	(36.00 − 12.00)	120.00
ROI	20%		19%

Comments :

Stedy's return is more than the company's target. However, the information of poor productivity and aged assets makes a discerning accountant wonder if the apparent better result were the products of low asset values rather than production efficiency.

With new additional investment the ROI is reduced. This might discourage the steady manjagement to undertake the proposed investment, though this will mean steady remains a weakling in respect of productivity, quality of goods and service in its market.

This measure, ROI, obstructs a clear vision of the merit of a project at times.

(b)

Residual Income (RI)

	Without investment ₹ Cr.		with investment ₹ Cr.
PBIT	19.20		22.80
Imputed interest charge			
@ 12% (on 96.00)	(11.52)	(on 120.00)	(14.40)
RI	7.68		8.40

Comments :

As in ROI, RI also shows better results as the imputed interest on older assets gets smaller.

However, the RI measure here will encourage new investment. As against the current return, a target return is decided with a view to long term objective of the corporate management. Sometimes the target rate of return is used as the imputed interest charge; a positive RI in this case will indicate a project that earns in excess of the target ROI. Performance measures must be designed to reward decisions that are optimum for the company as a whole.

(c) Economic Value Added (EVA)

EVA, as a measure, follows the same principle as RI. Value addition by a project is measured by EVA. However, this measure looks at the impact on economic value of the business by the project. This requires

a procedure which may deviate from the conventional accounting principles. For example, fully written off goodwill, research and development may be reinstated at their economic values with corresponding adjustments to the reported profit. The use of all the assets to generate economic benefits is thus highlighted. The emphasis on measuring value creating in the EVA should encourage managers to make decisions that are compatible with the objectives of the business as a whole.

Indeed, assets are often measured on a current cost basis within the EVA, which will eliminate the misleading benefit that appears to be gained from holding assets for longer than their economic value warrants. Divisional bonus schemes may be based on EVA for motivation of managers, which will attain corporate goal congruence at the same time.

Q. 8. A Research Project to date has cost a company ₹ 2,50,000 and its under review. It is anticipated that, should the project be allowed to proceed, it will be completed in about one year and can be sold for ₹ 4,00,000. The following additional information is available.

   1. **Material have just been received for ₹ 60,000.These are extremely toxic,and if not used in the project have to be disposed of by special means at ₹ 15,000.**

   2. **Labour- ₹ 75000. The men are highly skilled. If they are released from the research project, they may be transferred to the Works department of the company and consequently the sales could increase ₹ 1,50,000. The Accountant estimates that the prime cost of those sales would be ₹ 1,00,000 and the overhead absorbrd(all fixed) would amount to ₹ 25000.**

   3. **Research Staff- ₹ 1,60,000. A decision has already been taken that this will be the major piece of research undertaken and consequently, when work on the project ceases, the staff involved will be made redundant. Redundancy and severance pay have been estimated at ₹ 25,000.**

   4. **Share of General Building expenses- ₹ 35,000. The managing director is not sure what is included in this amount, but the accounts staff charge similar amounts each year to each department.**

   You are required to advise whether the project should be allowed to proceed and explain the reasons for the treatment of each of the amounts above in your analysis.

Answer 8.

Particulars		Es
Cost Incurred till date	Historical and irrelevant	Nil
Materials	Already puechased. Hence irrelevant.	Nil
Disposal Cost	Not incurred, if project is continued. Hence opportunity Gain, relevant	(15,000)
Labour	Has alternative use. So variable cost + opportunity costs relevant. Variable cost ₹ 75000 Opportunity cost = ₹ 1,50,000 – ₹ 1,00,000 = ₹ 50,000	₹ 125,000
Research Staff	Variable Cost and hence relevant	₹ 1,60,000
Redundancy and Severance pay	Decision already taken and hence irrelevant	Nil
Share of General O/H	Apportionment. Hence irrelevant	
Additional Cost of continuing the project		270,000

Additional Net Benefit = Project Revenue ₹ 4,00,000 – Additional Cost ₹ 2,70,000

                = ₹ 1,30,0000

Hence the project may be continued.

Q. 9. Quick Progress Ltd. Have been able to achieve remarkable improvement in the profits over the previous year and the figures are as under :

Particulars	Previous year	This year
Sales	**5,00,000**	**8,40,000**
Direct material	**1,50,000**	**1,99,500**
Direct labour	**1,00,000**	**1,54,000**
Variable overheads	**50,000**	**70,000**
Fixed costs	**1,50,000**	**1,80,000**
Profit	**50,000**	**2,36,500**

The improvement has been effected by increasing the sales volume and at the same time putting up the selling price by 20%. Labour have been paid more and administration strengthened. On account of increased purchases of material discounts in price have been obtained.

You are required to find out in terms of percentage over the previous year, the increase in sales volume, labour and administration costs as well as savings in material costs. You are also required to qualify in monetary terms the effect of each of these factors on the improvement in the profit made.

Answer 9.

Percentage Increase in Sales, Sales Volume, Labour and Administration Cost, as well as Savings in Material Cost :

Increase in Sales volume	$= \dfrac{2,00,000}{5,00,000} \times 100$	=	40%
Increase in Labour Costs	$= \dfrac{14,000}{1,00,000 + 40,000} \times 100$	=	10%
Increase in Administration Cost	$= \dfrac{30,000}{1,50,000} \times 100$	=	20%
Savings in Material Costs	$= \dfrac{10,500}{1,50,000 + 60,000} \times 100$	=	5%

Working Notes :

(1) Sales Volume (this year) at previous year's selling price:

$= 8,40,000 \times 100/120 = ₹\ 7,00,000$

(2) Increase in Sales Volume = 7,00,000 – 5,00,000 = ₹ 2,00,000

(3) Percentage increase in sales volume 2,00,000/ 5,00,000 × 100 = 40%

(4) Variations in Sales and Costs due to change in Volume and Price etc.

(₹)

Particulars	Previous Year	This year over the Previous Year	Change due to volume at 40%	Change to price & other causes (5)	Change due
	(1)	(2)	(3)	(4)	(3)-(4)
Sales	5,00,000	8,40,000	3,40,000	2,00,000	1,40,000
Direct material	1,50,000	1,99,500	49,500	60,000	(-)10,500
Direct labour	1,00,000	1,54,000	54,000	40,000	14,000
Variable overheads	50,000	70,000	20,000	20,000	–
Fixed costs	1,50,000	1,80,000	30,000	–	30,000
Profits	50,000	2,36,000	1,86,500	80,000	1,06,500

Statement showing in Monetary Terms the effect of the various factors on the improvement in the profit

Particulars		(₹)
Improvement in Profits		1,86,500
Accounted by :		
Increase due to change in Sales Volume	(40% of ₹ 2,00,000)	80,000
Increase due to change in Sale Price	(20% of ₹ 7,00,000)	1,40,000
Increase due to decrease in Material Costs	(5% of ₹ 2,10,000)	10,500
Decrease due to increase in Labour Costs	(10% of ₹ 1,40,000)	(14,000)
Decrease due to increase in Fixed Costs		(30,000)
Total increase in Profits		1,86,500

Q. 10.

(a) Next years forecasted trading results for Caribee Ltd. A small company manufacturing three different types of product, are shown below.

	Product A	Product B	Product C	Total
Selling price, per unit	₹ 10	₹ 12	₹ 8	
Sales	100	96	32	₹ 228
Variable cost of sales			(₹ '000)	
Prime cost	40	38	13	91
Variable overhead	20	18	11	49
Share of general fixed overhead	30	27	10	67
Profit/ (loss)	10	13	2	21

Required :

(I) Explain how the company's forecasted profits would be affected if product C were discontinued. It should be assumed that sales of the remaining products would not be affected; any other assumptions made should be included with your explanation.

(ii) Additional advertising for product B would cost ₹ 8,000 next year; this amount is not included in the forecasts shown above. Calculate the minimum extra sales, in units, or product B required to cover this additional cost.

(iii) Calculate the increase in sales volume of product A necessary to compensate for a 10% reduction in the selling price of the product. Carefully explain why the increase in volume is proportionately greater that the reduction in selling price.

(b) The production director of Caribee Ltd has just been informed that next year's supplies of a material used in the manufacture of each of the three products will be restricted to 92,000 kg; no substitute materials is available and the estimated consumption of this restricted material, per product is:

Product A   8 kg per unit

Product B   4 kg per unit

Product C   1 kg per unit

The sales director estimates that the maximum demand for each product is that which is shown in the original forecast (a) above; also he decides that advertising or adjustment to selling price are not possible.

Assume that stocks of materials, work in progress or finished goods cannot be carried.

Required : Calculate the optimum quantities of product A, B and C which should be manufactured next year in order to maximize company profits.

Answer 10. (a)

(i) The forecasted results show that product C makes a loss of ₹ 2,000. However, if product C is discontinued, sales will decline by ₹ 32,000 and cost, will decline by ₹ 24,000 (prime cost ÷ variable overhead). It is assumed that fixed overheads will still continue to be incurred and that the fixed costs of ₹ 10,000 will be borne by other products. Therefore the company will lose a contribution of ₹ 8,000 towards fixed overheads and profit if product C is discontinued and company's profit would be reduced to ₹ 13,000 as shown below :

		₹ '000
Sales (product A & B)		196
Variable Cost of Sales :		
Prime Cost	78	
Variable O.H.	38	116
Total Contribution		80
Less: Fixed cost		67
		13

(ii) The minimum extra sales of B to cover the ₹ 8,000 advertising is calculated as follows:

$$\frac{\text{Cost of Advertising}}{\text{Contribution per unit of B}} = \frac{₹8,000}{₹5} \qquad = 1,600 \text{ units}$$

For calculating contribution per unit of B	₹
Total Sales of B	96,000
Less: Variable cost	56,000
Total contribution of B	40,000

Units sold = ₹ 96,000 ÷ ₹ 12 = 8,000 units

Contribution per unit = ₹ 40,000 ÷ 8000 units = ₹ 5 per unit of B

(iii) Existing contribution per unit of product A :   ₹

Total sales of A	1,00,000
Less: variable cost (total)	60,000
Total contribution of A	40,000

Units of A sold = ₹ 1,00,000 ÷ ₹ 10 = 10,000 units.

Contribution per unit of A = ₹ 40,000 ÷ 10,000 = ₹ 4 per unit.

Contribution per unit after a 10% reduction in selling price ₹ 9.00 − ₹ 6 = ₹ 3

Reduction in product contribution due to decrease in selling price will be ₹ 10,000 (i.e. ₹ 1×10,000)

Increased sales volume to obtain a contribution of ₹ 10,000 = ₹ 10,000 ÷ ₹ 3 = 3,333 units percentage increase in sales volume = 33-1/3%

Answer 10. (b)

	A	B	C
Total contribution	₹ 40,000	₹ 40,000	₹ 8,000
Unit contribution (₹)	4	5	2
Quantity used (kg)	8	4	1
Contribution per kg	0.50	1.25	2
Ranking	III	II	I

Optimal Production :

Product	unit	Qty.used (kg)	Qty unused (kg)
C	4,000	4,000	88,000
B	8,000	32,000	56,000
A	7,000 *	56,000	—

*56,000 ÷ 8 = 7000 units.

Q. 11. M Ltd. operates its plant on single shift basis. It can produce upto 8000 units of output per month without overtime. The fixed cost on single shift basis of operation amount to ₹ 30,000 per month. GThr average variable costs pu is ₹ 10.

The output can be increased upto 15000 units pm by working overtime. This entails no increase in Fixed Costs, but the variable cost during overtimr will be ₹ 12 in excess of 8000 units upto the capacity of 15000 units.

However, if a second shift is worked, the maximum capacity of the second shifts 8000 units per month. The variable cost of second shift operation is ₹ 10.50 pu and the incremental fixed cost unvolved in second shift operations is ₹ 6000 pm.

Required :

(i) If the Co's demand the product is 10,000 units, should the company work overtime or second shift?

(ii) At what level of output will the company consider working second shift instead of working overtime? State the range of output for overtime working and second shift operation?

Answer 11.

Computation of Indifference point

Particulars	Overtime work	Second Shift
Variable Cost	₹ 12 pu	₹ 10.50 pu
Fixed Cost	Nil	₹ 6000

Indifference point = Difference in fixed Cost/Difference in variable cost pu

  = ₹ 6000-nil/₹ 12 – ₹ 10.5 = 5000 units

Indiffrerence point interpretation

Product Demand	Decision	Reason
8000 + 4000 = upto 12000 units	Overtime work	Lower Fixed Cost
At 12000 units	Either Overtime or Second Shift	Indifference Point
Above 12000 units	Second Shift	Lower Variablr cost pu

Q. 12. (Overall profitability of the company – optmising problem). A company has two divisions A and B sells two products B1 and B2 made of 3 materials A1, A2, and A3 produced by division A. Division A has no outside market for these 3 materials. The following details are relevant :

	A1	A2	A3
Variable cost per unit Rs.	1.00	0.50	0.75
Quantity used (units) per unit of			
B1	2	0.5	1
B2	2	2	3
Processing capacity (Unit/week in Division A)	4,000	3,000	4,800

The price and variable processing cost for products B1 and B2 are :

	B1	B2
Price	₹ 8	₹ 14
Processing cost in division B	2	1.75

The overall profitability of the company has to be maximized and with this end in view, formulate the optimization as a linear programming model.

Answer 12.

Let Y_1 and Y_2 be the amounts of B1 and B2 respectively

Let X_1, X_2, X_3, be the amounts of A1, A2, A3 produced.

The capacity constraints :

  X_1 - 4,000 X_2 - 3,000 X_3 - 4,800

The demand for each of the 3 of the Division A Products in terms of the amounts of the 2 of the Division B Products to be produced is given by.

$$2Y_1 + 2Y_2 - X_1 \geq 0$$

$$0.5Y_1 + 2Y_2 - X_2 \geq 0$$

$$Y_1 + 3Y_2 - X_3 \geq 0$$

The model to be formulated

Maximize $(8-2) Y_1 + (14-1.75) Y_2 - 1X_1 - 0.5X_2 - 0.75X_3$

Subject to			
$2Y_1 + 2Y_2 - X_1$	$\geq$	0
$0.5Y_1 + 2Y_2 - X_2$	$\geq$	0
$Y_1 + 3Y_2 - X_3$	$\geq$	0
X_1	$\geq$	4,000
X_2	$\geq$	3,000
X_3	$\geq$	4,800
Where	Y_1, Y_2, X_1, X_2, X_3	$\geq$	0

Q. 13. A Mutual Fund has cash resources of Rs.200 million for investment in a diversified portfolio. Table below shows the opportunities available, their estimated annual yields, risk factor and term period details.

Formulate a Linear Program Model to find the optimal portfolio that will maximize return, considering the following policy guidelines :

- All the funds available may be invested.
- Weighted average period of at least five years as planning horizon.
- Weighted average risk factor not to exceed 0.20
- Investment in real estate and speculative stocks to be not more than 25% of the monies invested in total.

Investment type	Annual yield (percentage)	Risk factor	Term period (years)
Bank deposit	9.5	0.02	6
Treasury notes	8.5	0.01	4
Corporate deposit	12.0	0.08	3
Blue-chip stock	15.0	0.25	5
Speculative stocks	32.5	0.45	3
Real estate	35.0	0.40	10

Answer 13.

Mathematical formulation :

Let x_1, x_2, x_3, x_4, x_5 and x_6 represent the six different investment alternatives, i.e., x_1 is bank deposit, x_2 is treasury note. x_3 corporate deposit, x_4 blue chip stock, x_5 speculative stock and x_6 real estate. The objective is to maximize the annual yield of the investors (in number of units) given by the Linear expression.

Maximise $Z = 9.5x_1 + 8.5x_2 + 12.0x_3 + 15.0x_4 + 32.5x_5 + 35.0x_6$ subject to the constraints :

$x_1 + x_2 + x_3 + x_4 + x_5 + x_6 \leq 1$ (Investment decision)

$0.02x_1 + 0.01x_2 + 0.08x_3 + 0.25x_4 + 0.45x_5 + 0.40x_6 \leq 0.20$(weighted average risk of the portfolio)

$6x_1 + 4x_2 + 3x_3 + 5x_4 + 3x_5 + 10x_6 \geq 5$(weighted average length of investment)

$x_5 + x_6 \leq 0.25$ (limit on investment in real estate and speculative stock)

$x_1, x_2, x_3, x_4, x_5, x_6 \geq 0$ [non-negativity condition].

Q. 14. What are Cost Drivers? List three factors that are important is selecting cost drivers in Activity Based Costing System.

Answer 14.

Meaning : Cost Drivers are characteristic of an event or activity that results in the incurrence of costs. In ABC system, the activity cost drivers are used for assigning the cost of activities to cost objects.

Considerations : Selection of Cost Drivers is dependent upon –

1. **Degree of Correlation :**
   (a) ABC System seeks to assign the costs of each activity to product lines on the basis of how each product line consumes the cost driver. So, the accuracy of resulting cost assignment depends on degree of correlation between consumption of activity and the consumption of cost drivers.
   (b) **Example :** If Inspection cost is selected as an Activity cost pool, the Cost Driver may be – (i) the number of inspections, or (ii) hours of inspection time. If every inspection requires the same amount of time for all products, then the number of inspections on a product line will be highly correlated with consumption of inspection activity by the product line. However, if inspection time significantly varies, hours of inspection time would be highly correlated with actual consumption of the inspection activity. Depending on the circumstances of the case, the appropriate Cost Driver should be chosen.

2. **Cost of Measurement :** Designing any information system entails cost benefit trade – offs. The more activity cost pools are in an ABC system, the greater will be the accuracy of the cost assignment but higher will be the costs of implementing and maintaining the system.

3. **Behavioural Effects :** Information systems have the potential not only to facilitate decisions but also to influence the behavior of decision makers. In identifying cost drivers, ABC analyst should consider the possible behavioural effects.

Q. 15. Optimal product mix when P/V ratio, material percentage and turnover percentage are given). A company engaged in the manufacture of sophisticated product uses high grade raw materials which are in short supply. During the year 2011, the company earned profit of 12% before interest and depreciation on a turnover of ₹ 10 crores. Interest and depreciation which are fixed amounted to ₹ 75 lakhs and ₹ 50 lakhs respectively. The product-mix was as under:

Product Group	PV Ratio	Raw Materials as % to Sales Value	% of Turnover to total turnover
A	30%	40	30
B	40%	50	20
C	25%	36	50

During the year 2012, the price of the raw materials is expected to increase by 10%. The company has been able to make arrangements for the procurement of raw materials of a total value of ₹ 561 lakhs at 2012 prices. The sales potential of each product group can be increased in 2012 by 50% of 2011 sales.

Required :

  (i) **Set optimal product-mix for 2012.**

 (ii) **What increase in overall price is required to raise the sales valueof 20122 to maintain the Margin of Safety at 10%.**

Answer 15.

  (a) **Schedule Showing Raw Material Cost in 2011.**

Product	Sales Mix %	Sales (₹ In lakhs)	P/v ratio %	Contribution (₹ In lakhs)	Variable Cost (₹ In lakhs)	Raw Materials	
						% to sales	(₹ In lakhs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A	30	300	30	90	210	40	120
B	20	200	40	80	120	50	100
C	50	500	25	125	375	36	180
	-	1,000	–	295	705	-	400

(b) Schedule showing ranking of products based on contribution to raw material (after increase of 10% in raw materials price)

Products	10% increase in R.M.cost (₹ In lakhs)	Raw material cost after increase	Revised Variable cost	Revised contribution (₹ In lakhs)	Revised P/V Ratio %	% of Contribution to raw materials	Ranking based on col.7
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A	12	132	222	78	26	59.09%	II
B	10	110	130	70	35	63.64%	I
C	18	198	393	107	21.4	54.04%	III
	40	440	745	255			

Statement showing sales potential of each products in 2012

Products	Sales in 1991 ₹ in lakhs	Increase in 1992 (50% of 1991) ₹ in lakhs	Sales potential of each product in 1992 ₹ in lakhs
A	300	150	450
B	200	100	300
C	500	250	750
	1,000		

(i) Schedule showing the proposed sales mix based on the ranking at (b)

Products of material —	Ranking —	Sales ₹ in lakhs —	Revised P/V ratio —	Contribution (₹ in lakhs) —	% of contribution to raw materials —	Raw Material (₹ in lakhs) —	Balance raw (₹ in lakhs) 561
B (Maximum)	I	300	35%	105	63.64%	165	396
A (Maximum)	II	450	26%	117	59.09%	198	198
C	III	500*	21.4%	107	54.04%	198	—
Total		1,250		329			

* As product C is last in ranking, only as much units as are sufficient to consume, balance raw material of ₹ 198 lakhs will be produced i.e. 198 lakhs × 54.04% = 107 lakhs ÷ 21.4% = 500 lakhs.

Target is to maintain margin of safety at 10%. For this fixed cost or break-even sales is required. Fixed cost can be found out from the data of 2011 as follows :

		₹ in lakhs
Sales in 2011		1000
Profit 12% sales		120
Less : Interest	75	
Depreciation	50	125
Loss after interest and depreciation		5
Contribution (as per (a) above)		295
Fixed cost (contribution + Loss)		300
Profit in 2012		
Total contribution "as above in (i)"		329
Fixed expenses		300
Profit		29

BES × P/V ratio = Fixed cost

∴   BES = 300 ÷ (329 / 1250) = ₹ 1140 lakhs

Margin of safety = ₹ 1250 – 1140 = ₹ 110 lakhs

Margin of safety required   = 10%

∴   BE Sales   = 90%

If break-even sales is 90 required sales for 10% margin of safety = 100

Break –even sales is 1140 lakhs, required sales for 10% margin of safety = (100 ÷ 90) × 1140 = 1266.67 lakhs

Sales value increase required = 1266.67 – 1250 = 16.67 lakhs

Required percentage increase in sales price = (16.67 1250) × 100 = 1.33%.

*Break even sales = Fixed cost. This will remain the same even after increase in selling price

Verification: New Sales Value   = ₹ 1,267 lakhs

Less: Break-even point   =   1,140 lakhs

Margin of safety (which is 10%)   127 lakhs

Q. 16. Expected ROI

The frequency distribution of Contribution per Unit, Annual Demand and Investment requirement of a manufacturing Company were found as below –

Contribution per Unit (₹)	3	5	7	9	10
Relative frequency	0.1	0.2	0.4	0.2	0.1

Annual demand (in 1000 units)	20	25	30	35	40	45	50
Relative frequency	0.05	0.10	0.20	0.30	0.20	0.10	0.05

Required Investment (₹ 000s)	17,50	20,00	25,00
Relative frequency	0.25	0.50	0.25

Consider the random number 93, 03, 51, 59, 77, 61, 71, 62, 99, 15 for simulating 10 run, to estimate the Percentage of Return on Investment (ROI = Cash inflow ÷ Investment   100) for each run. Find the average ROI.

Answer 16.

1. Random Number Allocation :

Table 1: Random Number for Demand

Event	Prob.	Cum Prob	Random Nos.
20	0.05	0.05	00-04
25	0.10	0.15	05-14
30	0.20	0.35	15-34
35	0.30	0.65	35-64
40	0.20	0.85	65-84
45	0.10	0.95	85-94
50	0.05	1.00	95-99

Table 2: Random Number for contribution

Event	Prob.	Cum Prob	Random Numbers
3	0.10	0.10	00-09
5	0.20	0.30	10-29
7	0.40	0.70	30-69
9	0.20	0.90	70-89
10	0.10	1.00	90-99

Table 3: Random number for Investment

Event	Prob.	Cum Prob	Random Numbers
1750	0.25	0.25	00-24
2000	0.50	0.75	25-74
2500	0.25	1.00	75-99

2. Simulation Table :

Trial (a)	Random No (b)	Demand (₹) (c)	Contribution p.u. (₹) (d)	Investment (₹) (e)	Cash inflow (₹) (f) = (C) × (d)	ROI (g) = (f) ÷ (e) × 100
1	93	45	10	2,500	450	18.00%
2	03	20	3	1,750	60	3.43%
3	51	35	7	2,000	245	12.25%
4	59	35	7	2,000	245	12.25%
5	77	40	9	2,500	360	14.40%
6	61	35	7	2,000	245	12.25%
7	71	40	9	2,000	360	18.00%
8	62	35	7	2,000	245	12.25%
9	99	50	10	2,500	500	20.00%
10	15	35	5	1,750	150	8.57%
Total				**21,000**	**2,860**	**131.40**

Result : Simple Average ROI = Total ROI   10 = 131.40 ÷ 10 = 13.14%

Weighted Average ROI = Total Cash Inflow ÷ Total Investment = 2860 ÷ 21000 = 13.62%.

Q. 17. **X ltd.is considering the purchase of a new computer controlled packing machine to replace the two machines which are currently used to pack product y. The new machine would result in reduced labour costs because of more automated nature of the process and in addition, would permit production levels to be increased by creating greater capacity at the packing stage. With an anticipated rise in the demand for product y, it has been estimated that the new machine will lead to increased profits in each of the next three years. Due to uncertainty in demand, however, the annual cash flows (including savings) resulting from purchase of the new machine cannot be fixed with certainty and have therefore been estimated probabilistically as follows :**

Annual Cash Flows (₹ '000)

Year 1	Prob.	Year 2	Prob.	Year 3	Prob.
10	0.3	10	0.1	10	0.3
15	0.4	20	0.2	20	0.5
20	0.3	30	0.4	30	0.2
		40	0.3		

Because of the overall uncertainty in the sales of product y, it has been decided that only 3 years cash flows will be considered in deciding whether to purchase the new machine. After allowing for the scrap value of the existing machines, the net cost of the new machine will be ₹ 42,000. ignore tax.

Required :

(i) **Ignoring time value of money, identify which combinations of annual cash flows will lead to an overall negative net cash flow and determine the total probability of this occurring.**

(ii) **On the basis of the average cash flow for each year, calculate the net present value of the new machine, given company's cost of capital is 15% and the present value of Re. 1 at 15% discount rate are as follows :**

Year	1	2	3	4	5
P. V	0.8696	0.7561	0.6575	0.5718	0.4972

Answer 17.

If the total cash flow in years 1,2 and 3 is less than ₹ 42,000, the net cash flow will be negative.

(i) The combination of cash flow which total less than ₹ 42,000 are given below :

Year 1	Year 2	Year 3	Total	Jt. probability of combination	
10	10	10	30	0.3 × 0.1 × .3	= 0.009
10	10	20	40	0.3 × 0.1 × 0.5	= 0.015
10	20	10	40	0.3 × 0.2 × 0.3	= 0.018
15	10	10	35	0.4 × 0.1 × 0.3	= 0.012
20	10	10	40	0.3 × 0.1 × 0.3	= 0.009
				Total	0.063

The probability of a negative cash flow is 0.063.

(ii) Expected cash flow.

Year 1	Expected cash flow=	10 × 0.3 + 15 × 0.4 + 20 × 0.3 =	15(000)
Year 2	Expected cash flow=	10 × 0.1 + 20 × 0.2 + 30 × 0.4 + 40 × 0.3 =	29(000)
Year 3	Expected cash flow=	10 × 0.3 + 20 × 0.5 + 30 × 0.2 =	19(000)

Present cash flow = 15 × 0.8696 + 29 × 0.7561 + 19 × 0.6575 = 47.4634 (₹ 000)

The NPV of the new machine = ₹ (47463 − 42000) = ₹ 5463.

Q. 18. As a result of change in consumer preference the company of which you are the management accountant finds that certain materials in stock which were boutht for ₹ 7,000 a few year ago have not moved for a long time. The current replacement price of these material is ₹ 8,000. If these materials were disposed of by sale, they would fetch a net realizable value of ₹ 4,000 only.

The company has the opportunity of carrying out a one time job (Job 101) which can utilize material and yield a revenue of ₹ 16,000. The additional costs, other than the cost of these materials, chargeable to this will amount to ₹ 14,200. This charge includes the apportionment of general administration overhead amounting to ₹ 3,800, but the incurrence of all other expenses is dependent upon the execution of job 101.

Alternatively, the materials in question could be used as a substitute for other materials in another regular job (Job208). The materials so replaced will otherwise cost ₹ 6,000. These costs have been included in the viability of job 208 which is expected to yield an additional net benefit of ₹ 11,000.

The company has thus three alternatives namely:

   (i) use of the material in Jobs 208

   (ii) use the material in Job 101 and carry out Job 208 by buying in the material required; and

   (iii) sell the materials and carry out Job 208 by buying in the materials required.

You are required to :

(a) State with reasons the costs which are irrelevant to the decision of alternative choices.

(b) Evaluate the three alternatives given above by using the concept of;

   (1) Incremental cost and benefit analysis;

(2) **Opportunity cost and benefit analysis.**

(c) **State which of the alternative should be accepted by the company.**

Answer 18.

(i) The following costs are irrelevant to the decisions of alternative choices:

(a) The materials worth ₹ 7,000 was bought a few years ago cannot be used for the original job. Therefore, materials amounting to ₹ 7,000 is the past cost which is irrelevant for cost and benefit analysis.

(b) Apportionment of general administration overheads amounting to ₹ 3,800 to one-time Job 101 is irrelevant as this amount represents fixed cost which cannot be considered relevant to the present analysis.

(c) Decision to use the material as substitute in a regular job (Job 208). This is expected to yield and additional net benefit of ₹ 11,000. The undertaking of Jobs 208 (a regulate jobs) is already committed and therefore, this cost is irrelevant of the analysis.

(b) (1) Incremental cost and benefit analysis

Any incremental cost and benefit analysis required certain base to be used. For the present analysis, Job 208 is a regular job and the same has been used as a base for incremental cost and benefit analysis.

Details	Execute Job 208	Use the materials job 101	Selling the existing matrials
Costs			
Cost of Job 101 (Additional cost Less fixed overheads)	–	₹ 10,400	–
Purchase for material for Job 208	–	6,000	₹ 6,000
Total costs	–	16,400	6,000
Benefits			
Sales of existing material	–	–	4,000
Revenue from Job 101		16,000	–
Total benefit		16,000	4,000
Net cost/benefit		(400)	(2,000)

(In both above alternatives the costs are more than the benefits).

(2) Opportunity cost analysis

Opportunity costs		10,400	
Benefits (By using materials)	6,000	16,000	4,000
Net benefit	6,000	5,600	4,000

As the benefit is maximum if the material is used in Jobs 208, it is advisable to use the materials in job 208.

Q. 19. **A Production department of a large manufacturing organisation has furnished the following data for May 2010:**

	Budget ₹	Actual ₹
Direct Materials	4,00,000	5,10,000
Direct Wages	2,50,000	3,25,000
Repairs and Maintenance (₹ 1,00,000 Fixed)	2,00,000	2,20,000
Supervision (Fixed)	1,00,000	1,10,000
Consumable Stores (Fixed)	75,000	95,000
Factory Rent (Fixed)	50,000	50,000
Depreciation (Fixed)	1,00,000	1,00,000
Tools (Variable)	25,000	30,000
Power & Fuel (Variable)	1,50,000	1,80,000
Administration (Fixed)	2,50,000	2,65,000

The department has 50 identical machines. During May 2010, the budgeted and actual productions of the departments are 10,000 and 12,500 units respectively. However, if the department was closed and the machine production services were hired from outside, the cost of hiring the services of similar machines would be ₹ 150 per unit.

(i) You are required to present reports showing the evaluation of the performance of the department based on the concept of (a) Cost Centre (b) Profit Centre and (c) Responsibility Center.

(ii) It is felt that since the total budgeted cost of production per unit is greater than the cost of hired services, the possibility of closing down the department and use of hired services should be explored if the budgeted production cannot be increased in June 2010. Assuming that the budgeted expenses and level of output planned for May 2010 will hold good for June 2010 also, calculate the volume of output required to justify the continuance of the department.

Answer 19.

(i) Reports showing the evaluation of the performance of the department on different responsibility concepets.

(a) Cost Centre basis

	Budget	Allowed cost	Actual
Output (Units)	10,000	12,500	12,500
Variable	₹	₹	₹
Direct Material	4,00,000	5,00,000	5,10,000
Direct Wages	2,50,000	3,12,500	3,25,000
Repair and Maintenance	1,00,000	1,25,000	1,20,000
Consumable Stores	75,000	93,750	95,000
Tools	25,000	31,250	30,000
Power and Fuel	1,50,000	1,87,000	1,80,000
Total Variable Cost	10,00,000	12,50,000	12,60,000

Fixed			
Repair and Maintenance	1,00,000	1,00,000	1,00,000
Supervision	1,00,000	1,00,000	1,10,000
Factory Rent	50,000	50,000	50,000
Depreciation	1,00,000	1,00,000	1,00,000
Administration	2,50,000	2,50,000	2,65,000
Total Fixed Cost	6,00,000	6,00,000	6,25,000
Total Cost	16,00,000	18,50,000	18,85,000

Expenses Variance = ₹ 18,50,000 - ₹ 18,85,000 = ₹ 35,000 (A)

Volume Variance = [(6,00,000 ÷ 10,000) × 12,500] 6,00,000 = ₹ 1,50,000 (F)

Total Overhead Variance = ₹ 35,000 (A) + ₹ 1,50,000 (F)   = ₹ 1,15,000 (F)

Check

Actual Overhead   ₹ 18,85,000

Standard or Budgeted Overhead (16,00,000 / 10,000) × 12,500   20,00,000

Total Overhead Variance   1,15,000 (F)

(b) Profit Centre Basis

Cost of production on hired machine services (12,500 × 150)   ₹ 18,75,000

Actual   18,85,000

Profit Variance   10,000 (F)

(c) Responsibility Centre Basis

Controllable

	Budget	Actual	Variance	
Direct Material	₹ 5,00,000	₹ 5,10,000	₹ 10,000	(A)
Direct Wages	3,12,500	3,25,000	12,500	(A)
Repairs and Maintenance	2,25,000	2,20,000	5,000	(F)
Consumable Stores	93,750	95,000	1,250	(A)
Tools	31,250	30,000	1,250	(F)
Power and Fuel	1,87,500	1,80,000	7,500	(F)
Supervision	1,00,000	1,10,000	10,000	(A)
	14,50,000	14,70,000	20,000	(A)

Non-controllable

Factory Rent	50,000	50,000		
Depreciation	1,00,000	1,00,000		
Administration	2,50,000	2,65,000	15,000	(A)
	4,00,000	4,15,000	15,000	(A)

(iii) Volume of output required to justify the continuance of Department

Variable cost of making on own machine as per budget	= ₹ 10,00,000 / 10,000 = ₹ 100
Variable Cost of making on hired services	= ₹ 150
Savings if manufactured on own machine	= ₹ 150 ₹ 100 = ₹ 50
Fixed cost	= ₹ 6,00,000
Minimum number of units to justify continuance of the Department.	= ₹ 6,00,000 ÷ ₹ 50 = 12,000 units.

Note: In cost centre approach, reasons or difference between actual cost and budgeted cost allowed for production should be explained. In profit center approach, profit variance should be highlighted. In the case of responsibility center approach, variance should be reported as controllable or non-controllable.

Q. 20. **(Evaluation of R&D Programme – use of joint probability concept). O.B.C Ltd. is evaluating its Research and Development programme for the year 1996. The five projects under consideration all appear to offer favourable profitability if they can be carried out successfully to completion. But ₹ 10 lakhs only has been provided against R&D in the Budget for 2012.**

The following information is relevant :

	Expenditure (₹ Lakhs)		Probability of success	
Project	**To date**	**To complete**	**Commercially**	**Technically**
1	**15**	**1**	**0.7**	**0.4**
2	12	3	0.8	0.5
3	11	3	0.5	0.9
4	6	7	0.4	0.5
5	4	10	0.3	0.9

Which Projects should be completed in 2012 and why?

Answer 20.

It is given that only ₹ 10 lakhs are available for carrying out R&D programme by five project. Only those projects should be completed which offer high probability of success. It is noticed that M/s O.B.C Ltd. Has already incurred expenditure to date. This being sunk cost is irrelevant for decision making purpose. However, expenditure required to complete the project and joint probability (commercial probability of success x technical probability of success) are relevant for this decision.

Project	joint probability of success (₹/lakhs)	Expenditure to complete for success	Weighted expenditure (2) × (3)
(1)	(2)	(3)	(4)
1	0.28	1	0.28
2	0.40	3	1.20
3	0.45	3	1.35
4	0.20	7	1.40
5	0.27	10	2.70

Projects 5 required ₹ 10 lakhs to complete but the weightage for success is 2.70 only. If projects 3 and 4 are completed, the weightage of success is 2.75 i.e. 1.35 + 1.40. Therefore, projects 3 and 4 should be completed in the year 2012.

Q. 21. (a) What are the major components of Balanced Score Card?

(b) What are the stages involved in the creation of a Balanced Score Card?

Answer 21. (a)

1. A well designed Balanced Score Card combines financial measures of past performance with measures of the Firm's drivers of future performance.

2. The specific objectives and measures of a Firm's BSC are derived from the Firm's vision and strategy.

3. Generally, the BSC has the following perspectives from which a Company's activity can be evaluated.

    (a) Customer perspective i.e., How customers see us? In order to translate effective internal processes into organizational success, customers/clients must be happy with the service they receive. The Customer perspective considers the business through the eyes of the customers, measuring and reflecting upon customer satisfaction.

    (b) Internal business perspective i.e., in what processes must the Firm excel? The Internal perspective focuses attention on the performance of the key internal processes, which drive the business. The nature of the processes is dependent on the nature of the organization.

    (c) Innovation and learning perspective i.e. Can we continue to improve and create value? The learning and Growth perspective is a measure of potential future performance – it directs attention to the basis of all future success – the organization's people and infrastructure. Adequate investment in these areas is critical to all long term success.

    (d) Financial perspective i.e., How we look to our shareholders? The Financial perspective measures the results that the organization delivers to its stakeholders.

Answer 21. (b)

The stages involved in the creation of a balanced score card are enumerated below :

1. To Identify a vision i.e., where on organization is going

2. To Identify Organisation's strategies: i.e., how an Organization is planning to go there

3. Define Critical success factors and perspectives: i.e., what we have to do well in each Perspective Customer perspective, Internal perspective, Innovation and Learning perspective and Financial perspective.

4. Identify measures which will ensure that everything is going in the expected way.

5. Evaluation of Balanced score card i.e., ensuring what we are measuring is right.

6. Create action plans and plan reporting of the Balanced score Card.

7. Follow up and manage i.e., which person should have reports and what reports should look like.

The diagram given below depicts various stages involved to create a balanced score card:
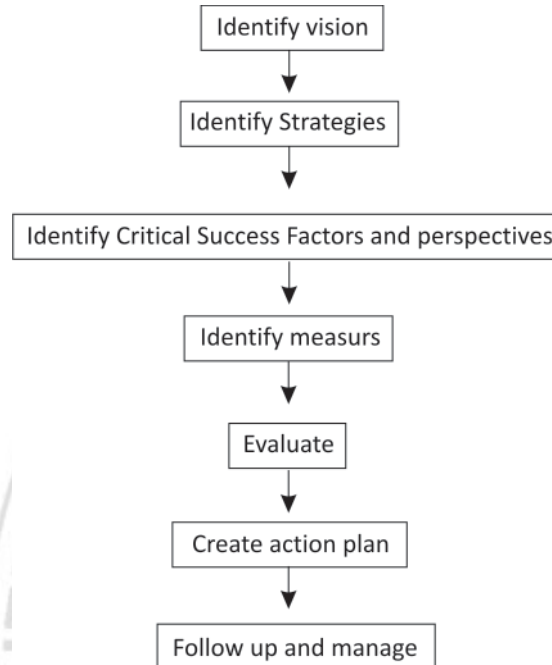
Although the process to create Balanced Score cards is the same for all organization. However, each organization must decide what its critical success factors are and what its performance measures are.

Q. 22. What is Zero Base Budgeting (ZBB)? What are the features?

Answer 22.

Meaning :

ZBB is an Expenditure Control Device where each Divisional Head has to justify the requirement of funds for each head of expenditure and prepare the budget accordingly, without reference to the past budget or achievements.

It is and operating planning and budgeting process, which requires each Manager to justify his entire budget requests in detail from "Scratch" (hence zero-base)

It is a decision-oriented approach to budgeting, whereby all activities are re-evaluated, each time a Budget is set.

Features :

1. **Wholistic :** The technique deals practically with all the elements of budget proposals.
2. **Analytical :** A critical evaluation of all the on-going activities is also done afresh, together with new proposals. Each Manager has to justify why he should spend any money at all.
3. **Priority Based :** This approach requires that all activities be identified as decision on packages which would be evaluated by systematic analysis and ranked in order of importance. It provides the Manager

a combination of choices for arranging proposals in order of preference, according to its importance to the Firm.

4. **Review Based :** The Firm should not only make decisions about the proposed new programmes but it should also, from time to time, review the "utility" and "appropriateness" of the existing programmes.

5. **Rational :** It allows for budget reductions and expansions in a rational manner and allows re-allocation of resources from low to high priority programmes.

6. **Efficiency :** Activities are indentified in Decision Packages, evaluated by systematic analysis, and ranked in order of priority. Available resources are directed towards the alternatives, in order of priority, to ensure optimum results.

Q. 23. What do you mean by Backflushing in JIT System? Explain briefly the problems with Backflushing, which must be corrected / addressed for the effective functioning of the system.

Answer 23.

Backflush Costing : An alternative approach to Sequential Tracking is Backflush Costing. Traditional normal and standard costing systems use the Sequential Tracking method for accounting costs. This involves recording journal entries in the same order as transactions occur, i.e. purchase, issue of materials, production, OH absorption, etc. It is a costing system that omits recording some or all of the journal entries relating to the cycle from purchase of Direct Materials to the sale of Finished Goods. The Journal Entries for the subsequent stages use normal or standard costs to work backward to flush out the costs in the cycle for which the Journal Entries were omitted earlier.

Suitability in JIT : Given the large transaction volumes associated in JIT, Backflush Costing is ideal when compared to sequential Tracking method. However, the following issues must be corrected before effective implementation of Backflush Costing –

(a) **Accurate Production Reports:** The total production figure entered into the system must be absolutely correct, or else the wrong component types and quantities will be subtracted from stock. Errors in Production Reporting can be reduced by proper staff training and reducing staff turnover.

(b) **Proper Scrap Reports:** All abnormal scrap must be diligently tracked and recorded. Otherwise, these materials will fall outside the Backflushing System and will not be charged to inventory. Since Scrap can occur anywhere in a production process, lack of attention by any of the Production Staff can result in an inaccurate inventory.

(c) **Lot Tracing:** Lot Tracing is impossible under Backflushing System. It is required when a Manufacturer needs to keep records of which production lots were used to create a product in case all the items in a lot must be recalled. Only a Picking System can adequately record this information. Some computer systems allow picking and Backflushing System to co-exist.

(d) **Inventory Accuracy:** The inventory balance may be too high at all times because the Backflushing Transaction that relieves inventory usually does so only once a day, during which time other inventory is sent to the production process. This makes it difficult to maintain an accurate set of inventory records in the warehouse.

The Success of a Backflushing System is directly related to the Company's willingness to invest in a well-paid, well experienced, well-educated production staff that undergoes little turnover.

Q. 24. Write short notes on Activity Based Budgeting (ABB).

Answer 24.

1. Activity Based Budget is a quantitative expression of the expected activities of the Firm, reflecting Management's forecast of workload and financial and non-financial requirements, to meet agreed strategic goals and planned changes to improve performance.

2. Activity Based Budgeting (ABB) is a process of planning and controlling the expected activities of the Firm, to derive a cost-effective budget, that meets forecast workland and agreed strategic goals.

3. Concept of ABB: ABB focuses on activity / business process, Resources required are determined on the basis of expected activities and workload. Expenses necessary to perform these activities are estimated, with a focus on overall efficiency.

4. Key Elements of ABB are –

    (a) Type of work / activity to be performed,

    (b) Quantity of work / activity to be performed, and

    (c) Cost of work / activity to be performed.

Q. 25. List of few Cost Factors and Non – Cost Factors in an asset Replacement Decision.

Answer 25.

Cost Factors	Non-Cost Factors
1. Comparison of Operating costs of the Existing Plant with that of Alternative Plant	1. Market standing of the product i.e. if the product is likely to become obsolete or go out of fashion in the near future, it will not be worthwhile to go in for plant replacement.
2. Figures of comparative profitability Return on capital Employed and Interest on Capital	2. Nature of the market – capability of absorbing the product manufactured by the new plant is its entirety at the anticipated price.
3. Assessment of Opportunity Costs to determine whether the funds proposed to be invested in purchase of the new asset in replacement could be more gainfully deployed elsewhere.	3. Constraints on the resources required for the new plant.
4. Effect of disposal of the existing plant.	4. Possibility of any bottleneck or imbalances in subsequent operations or process, in the new plant, and if so, whether these can be removed.
5. Additional Capital Expenditure of an obligatory nature to be incurred, if any, on related or allied projects such as those for welfare	5. Possibility of any substitute product coming up which may make the replaced plant redundant.
6. Effect on tax liability due to profit or loss on the sale of Plant/Machinery to be replaced.	6. Likely effects of any change in Government policy with regard to import of Raw Materials, export of products, levy of duties, etc.

"It is Prudent to hold large inventories in an inflationary economy". Comment.

In an inflationary situation, prices rise rapidly and the Firm may decided to buy large quantities immediately and hold inventories, anticipating further increase in prices. However, it is not prudent to hold large inventories even in inflationary situations due to the following reasons –

1. Increase in Stockholding costs like interest on capital blocked, deterioration and wastage, obsolescence etc.
2. Possible availability of cheaper substitutes at a later date in future.
3. Possible new sources of supply at a competitive rate.
4. Possibility of fall in prices.

Therefore, even in inflationary conditions, it is sufficient if a firm holds the normal levels of inventory in order to operate its business without incurring stock-out costs. Hence, the given statement is not fully true. Inflation is not the only factor determining the need for holding large inventory levels.

Q. 26. (a) What is lean manufacturing? Briefly describe the lean/JIT system.

(b) Explain how adoption of JIT affects profitability of an organization.

Answer 26. (a)

Just in time (JIT) philosophy was first developed in Japan. Toyota introduced it in 50's and later, other companies in Japan have adopted it.

The overriding feature of JIT is that materials or parts are generated in the exact quantity required and just at the time they are needed. A classic JIT system consists of a series of manufacturing units each delivering to one another in successive stages of production. The amount delivered by each unit to the next unit is exactly what the needs for the next production period (usually one day). There are no safety margins in the form of buffer stock, live storage or work-in-progress. JIT is a sophisticated approach in eliminating wastage in the process of manufacturing in different stages, say, from the production design stage to the stage of delivery of finished product. JIT is sometimes regarded as an inventory control technique or a purchasing method. It aims at eliminating all activities which do not add 'value' to the product.

JIT seeks to achieve the following goals :

• Elimination of non value added activities
• Zero inventory
• Zero defects
• Batch size of one
• Zero Breakdown
• A 100% on time delivery service

Schonberger defines JIT as being 'to produce and deliver finished goods just in time to be sold, sub assemblies just in time to be assembled into finished goods, fabricated parts just in time to go into sub assemblies and purchased materials just in time to be transformed into fabricated parts'.

Answer 26. (b)

The introduction of a JIT system can be expected to affect profit as follows :

• There will be a reduction in inventory holding costs since inventories of raw materials and finished goods will be eliminated.
• There will probably be an increase in the price paid for raw materials to compensate the supplier for the additional flexibility that they are required to offer.
• There may be cost increase as a result of peaks and troughs of demand which cause fluctuating production levels and results in high labour costs through overtime.

- More management time may be spent on planning the resource utilization rather than on making strategic decisions to improve the profitability.

Q. 27. (a) Write a note on Total Quality Management.

   (b) Differentiate between Quality Planning, Quality Control & Quality Improvement.

Answer 27. (a)

Quality is considered a by-product of the manufacturing system, i.e. each individual process has some variation that will lead to the production of some defective units. If the resulting defective rate is too high, compared to the established quality standards, quality inspectors will identify and send them back for rework. The approach is expensive and does not guarantee the desired quality, because quality maintenance and ensuring it self can not be inspected into a product. This approach assigns the responsibility for quality to quality control managers.

A more unlighted approach to quality emphasizes building quality into the product by studying and improving activities that affect quality, from marketing through design to manufacturing. This new approach is referred to as Total Quality Management (TQM).

It is an active approach encompassing a company-wide operating philosophy and system for continuous improvement of quality. It demands co-operation from everyone in the company, from the top management down to workers.

The principles of TQM are as follows :

  (i) Customer focus,
 (ii) Managerial Leadership,
 (iii) Belief in continious improvement.
 (iv) The current thinking on TQM is moving from Quality of product and service to Quality of people to embrace also Quality of environment. ISO 14000 standard supports this.

Answer 27. (b)

Difference between Quality Planning, Quality Control & Quality Improvement :

Quality Planning	Quality Control	Quality Improvement
• Determine who are the Customers	• Choose control subjects what to control?	• Establish the infrastructure needed to secure annual quality improvement
• Determine the needs of the Customers	• Choose units of measurements-Evaluate Measurements	• Identify the specific needs for improvement - the improvement projects
• Develop product features that respond to the customer's needs.	• Establish standards of performance	• For each project establish a project team with clear responsibility for bringing the project to a successful conclusion
• Develop processes that areable to product feature	• Measure actual performance	• Provide the resources, motivation and training needed by the teams to :
• Transfer the resulting plans to the operating forces.	• Interpret the difference (actual versus standard) • Take action on difference	• Diagnose the causes • Stimulate establishment of a remedy • Establish controls to hold the gains

Q. 28. Write Short Notes on :

   (a) Value Analysis

   (b) Supply Chain Management

   (c) Target Costing

   (d) Economic Value Added (EVA)

   (e) Value Chain Management

Answer 28. (a)

Value Analysis defines a basic function as anything that makes the products work or sell. A function that is defined as basic control change. Secondary functions, also called supporting functions, described the manner in which basic functions were implemented. Secondary function could be modified or eliminated to reduce product cost. The term value has four different meanings: Cost Value, use value, esteem value and exchange value. The first step in the value analysis process is to define the problem and its scope. Once this is done , the functions of the product and its items are derived. These functions are basic and secondary functions. A cost function matrix or value analysis matrix is prepared.. Improvement Opportunities are then brainstormed, analysed and selected.

Answer 28. (b)

Supply Chain Management- Supply Chain Management encompasses the planning and management of all activities involved in sourcing , procurement,conversion and logistics management activities. Supply Chain Management integrates supply and demand management within and across companies.

Five basic components of supply Chain Management are :

• Plan-Develop a strategy for managing all resources that go towards meeting customer demand.

• Source-Choose the supplier

• Make-Schedule activities for Production.

• Deliver- Coordinate receipt of order to delivery

• Return-Receive Defectives and excess

Answer 28. (c)

Target Costing :

This technique has been developed in Japan. It aims at profit planning. It is a device to continuously control costs and manage profit over a product's life cycle. In short, it is a part of a comprehensive strategic profit management system. For a decision to enter a market prices of the competitors' products are given due consideration. Target Costing initiates cost management at the earliest stages of product development and applied it throughout the product life cycle by actively involving the entire value chain. In the product concept stage selling price and required profit are set after consideration of the medium term profit plans, which links the operational strategy to the long term strategic plans.

Target Cost = Planned Selling Price – Required Profit.

From this, the necessary target cost can be arrived at. Target cost, then, becomes the residual or allowable sum. If it is thought that the product cannot generate the required profit, it will not be produced as such and aspects of the product would be redesigned until the target is met. Value engineering and value analysis may be used to indentify innovative and cost effective product features in the planning and concept stages.

Throughout the product's life target costing continues to be used to control costs. After the initial start up stage target costs will be set through short-period budget. Thus all costs including both variable and fixed overheads are expected to reduce on a regular (monthly) basis. Target profit is a commitment agreed by all the people in a firm, who have any part to play in achieving it.

Answer 28. (d)

Economic Value Added (EVA) :

In corporate finance, Economic Value Added or EVA is an estimate of a firm's economic profit – being the value created in excess of the required return of the company's shareholders – where EVA is the profit earned by the firm less the cost of financing the firm's capital. The idea is that shareholders gain when the return from the capital employed is greater than the cost of the capital; see corporate finance: working capital management. This amount can be determined, among other ways, by making adjustments to general accounting, including deducting the opportunity cost of equity capital.

Answer 28. (e)

Value Chain Management :

Value chain management (VCM) is a solution for smoothening the interaction between all partners of an enterprise, suppliers, dealers, bankers etc. VCM goes beyond supply chain management to bring synergy between business partner by way of providing business and knowledge information in the effective manner to help achieve business targets. There are three kinds of partners among whom a company try to build synergy.

- One is the normal supply chain management partners – suppliers, suppliers to suppliers, dealers, customers etc.

- The second important partner category is the transporter who transports raw material and finished goods. The transporters play an important role in value chain.

The third important category of partners are service providers and banks.

Q. 29. Write Short Notes on :
    (i) Product Life Cycle Costing
    (ii) Aggregate Planning
    (iii) ERP
    (iv) Quality Function Deployment
    (v) Zero Defects and Right First Time-Philip Crosby

Answer 29. (i)

Product Life Cycle Costing – Product Life cycle costing (PLCC) is an approach used to provide a long term picture of product line, profitability, feedback on the effectiveness of the life cycle planning and cost data to clarify the economic impact on the alternative, chosen in the design, engineering phase etc.,

Characteristics: PLCC –

   (a) Involves tracing of costs and revenues of each product over several calendar periods throughout their entire life cycle.
   (b) Traces research, design and development costs and total magnitude of these costs for each individual product and compared with product revenue.
   (c) Assists report generation for costs and revenues.

Answer 29. (ii)

Aggregate planning is an operational activity that does an aggregate plan for the production process, in advance of 2 to 18 months, to give an idea to management as to what quantity of materials and other resources are to be procured and when, so that the total cost of operations of the organization is kept to the minimum over that period.

The quantity of outsourcing, subcontracting of items, overtime of labour, numbers to be hired and fired in each period and the amount of inventory to be held in stock and to be backlogged for each period are decided. All of these activities are done within the framework of the company ethics, policies, and long term commitment to the society, community and the country of operation.

Aggregate planning has certain prerequired inputs which are inevitable. They include :

- Information about the resources and the facilities available.

- Demand forecast for the period for which the planning has to be done.

- Cost of various alternatives and resources. This includes cost of holding inventory, ordering cost, cost of production through various production alternatives like subcontracting, backordering and overtime.

- Organizational policies regarding the usage of above alternatives.

"Aggregate Planning is concerned with matching supply and demand of output over the medium time range, up to approximately 12 months into the future. Term aggregate implies that the planning is done for a single overall measure of output or, at the most, a few aggregated product categories. The aim of aggregate planning is to set overall output levels in the near to medium future in the face of fluctuating or uncertain demands.

The following procedure is generally adopted in the process of aggregate planning-

- Determine Demand for each period

- Determine Capacity for each period

- Identify company,departmental and union policy

- Determine Unit cost of production

- Develop alternative Plans

- If satisfactory plans emerge, select the one that best satisfies the objective.

Answer 29. (iii)

ERP- Enterprise resource planning (ERP) refers to a computer information system that integrates all the business activities and processes throughout an entire organization. ERP systems incorporate many of the features available in other types of manufacturing programs, such as project management, supplier management, product data management, and scheduling. The objective of ERP is to provide seamless, real-time information to all employees throughout the enterprise. Companies commonly use ERP systems to communicate the progress of orders and projects throughout the supply chain, and to track the costs and availability of value-added services.

ERP systems offer companies the potential to streamline operations, eliminate overlap and bottle-necks, and save money and resources. But ERP systems are very expensive and time-consuming to implement, and surveys have shown that not all companies achieve the desired benefits. According to the online

business resource Darwin Executive Guides, it is "a tall order, building a single software program that serves the needs of people in fi nance as well as it does the people in human resources and the warehouse... To do ERP right, the ways you do business will need to change and the ways people do their jobs will need to change too. And that kind of change doesn't come without pain."

Answer 29. (iv)

Quality Function Deployment- Quality Function Deployment (QFD) is a structured approach to defining customer needs or requirements and translating them into specific plans to produce products to meet those needs. The "voice of the customer" is the term to describe these stated and unstated customer needs or requirements. The voice of the customer is captured in a variety of ways : direct discussion or interviews, surveys, focus groups, customer specifications, observation, warranty data, field reports, etc. This understanding of the customer needs is then summarized in a product planning matrix or "house of quality". These matrices are used to translate higher level "what's" or needs into lower level "how's" — product requirements or technical characteristics to satisfy these needs.

While the Quality Function Deployment matrices are a good communication tool at each step in the process, the matrices are the means and not the end. The real value is in the process of communicating and decision-making with QFD. QFD is oriented toward involving a team of people representing the various functional departments that have involvement in product development: Marketing, Design Engineering, Quality Assurance, Manufacturing/ Manufacturing Engineering, Test Engineering, Finance, Product Support, etc.

The active involvement of these departments can lead to balanced consideration of the requirements or "what's" at each stage of this translation process and provide a mechanism to communicate hidden knowledge - knowledge that is known by one individual or department but may not otherwise be communicated through the organization. The structure of this methodology helps development personnel understand essential requirements, internal capabilities, and constraints and design the product so that everything is in place to achieve the desired outcome - a satisfied customer. Quality Function Deployment helps development personnel maintain a correct focus on true requirements and minimizes misinterpreting customer needs. As a result, QFD is an effective communications and a quality planning tool.

Answer 29. (v)

'Zero Defects' & "Right First Time" - Philip Crosby :

Philip Crosby prompted the phrases, "Zero Defects" does not mean mistakes never happen, rather than there is no allowable number of errors built into a product or process and that it is to be got right first time. He believes that management should take prime responsibility for quality and worker only follow their managers' example.

His four absolute quality management criteria are :

  (i) Quality is conformance to requirements,

 (ii) Quality prevention is preferable to quality inspection,

(iii) Zero defects is the quality performance standard,

(iv) Quality is measured in monetary terms—the price of non-conformance.

Steps to quality improvement :

Committed to quality,

Creation of quality improvement teams representing all the departments,

Measure processes to determine current and potential quality issues,

Calculate cost of (poor) quality,

Raise quality awareness of all employees, Take action to correct quality issues, Monitor progress of quality improvement, Train supervisors in quality improvement, Hold "Zero Defects" days,

Encourage employees to create their own quality improvement goals,

Encourage employee communication with management about obstacles to quality, Recognize participants' effort,

Create quality councils,

Do it all over again — quality improvement does not end.

Q. 30. Write Short Notes on :

    (a) Quality Circle

    (b) KAIZEN Costing

    (c) Five S Concept

    (d) Six Sigma

    (e) Shewhart Cycle

Answer 30. (a)

Quality Circle :

Quality circle is a small group of 6 to 12 employees doing similar work who voluntarily meet together on a regular basis to indentify improvements in their respective work areas using proven techniques for analyzing and solving work related problems coming in the way of achieving and sustaining excellence leading to mutual upliftment of employees as well as the organization. It is "a way of capturing the creative and innovative power that lies within the work force".

Attributes of Quality circle Concept :

The concept of Quality circle is primarily based upon recognition of the value of the worker as a human being, as someone who willingly activates on his job, his wisdom, intelligence, experience, attitude and feelings. It is based upon the human resource management considered as one of the key factors in the improvement of product quality & productivity. Quality circle concept has three major attributes:

    (a) Quality Circle is a form of participation management.

    (b) Quality circle is a human resource development technique.

Quality Circle is a problem solving technique.

Answer 30. (b)

Kaizen Costing :

Kaizen costing is a modification of standard costing which is essential to realize the planned cost reductions in continuous time. Kaizen costing is a Japanese contribution to cost accounting. Kaizen costing is continuous improvement applied to cost reduction in the manufacturing stage of a product's life. Like that of standard costing programme, the aim of Kaizen costing is to remove inefficiencies from production processes.

Kaizen costing tracks the cost reduction plans on a monthly basis. The Kaizen costing targets are expressed in the physical resources terms. If the head of a group fails to achieve the Kaizen costing target by 1 percent, review by senior will start. Resource consumption is so tightly controlled in many Japanese

firms. Thus the planned cost reductions are planned and monitored through Kaizen cost targets in terms of physical resources.

While implementing the concept of Kaizen, following few rules are to be remembered :

- List down your own problems.

- Grade your problems as to minor, difficult and major.

- Select the smallest minor problem and start with it. After tackling this, move on to next graded problem and so on.

- Know and always remember, improvement is a part of daily routine.

- Never accept status quo.

- Never reject any idea before trying it.

- Share the experiments with colleagues.

- Eliminate already tried but failed experiments, while sharing the problems with your colleagues.

- Never hide problems, always highlight them.

Answer 30. (c)

Five S Concept- Five 'S' are derived from the first letters of the words

SEIRI — means Organization or sorting

SEITON — means straighten or prepare correctly

SEISO — means Cleanup or Cleanliness

SEIKETSU — means Standardization

SHITSUKE — means Discipline

Advantages of 5S By thoroughly enforcing 5S in each work area.

1. Operations can be performed without error, proceeding in a well-regulated fashion, resulting in fewer defective items thereby increasing the overall quality of product.
2. Operations can be performed safely and comfortably, reducing the chances of accidents.
3. Machinery and equipment can be carefully maintained, reducing the number of breakdowns.
4. Operations can be performed efficiently, eliminating waste thereby incrasing the efficiency and productivity.

Answer 30. (d)

Six Sigma- Six Sigma is a rigorous and a systematic methodology that utilizes information (management by facts) and statistical analysis to measure and improve a company's operational performance, practices and systems by identifying and preventing 'defects' in manufacturing and service-related processes in order to anticipate and exceed expectations of all stakeholders to accomplish effectiveness.

Six Sigma is a business management strategy originally developed by Motorola, USA in 1981. As of 2010[update], it enjoys widespread application in many sectors of industry, although its application is not without controversy.

Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes.It uses a set of

<u>quality management</u> methods, including <u>statistical methods</u>, and creates a special infrastructure of people within the organization ("Black Belts", "Green Belts", etc.) who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified targets. These targets can be financial (cost reduction or profit increase) or whatever is critical to the customer of that process (cycle time, safety, delivery, etc.).

The term *six sigma* originated from terminology associated with manufacturing, specifically terms associated with statistical modelling of manufacturing <u>processes</u>. The maturity of a manufacturing process can be described by a *sigma* rating indicating its yield, or the percentage of defect-free products it creates. A six-sigma process is one in which 99.99966% of the products manufactured are free of defects, compared to a one-sigma process in which only 31% are free of defects. Motorola set a goal of "six sigmas" for all of its manufacturing operations and this goal became a byword for the management and engineering practices used to achieve it.

Answer 30. (e)

Shewhart Cycle or PDCA or Deming Cycle or Deming Wheel or PDSA is explained as follows:

Plan — Establish the objectives and processes necessary to deliver result in accordance, with the specifications.

Do — Implement the processes.

Check — Monitor and evaluate the processes and result as agent objectives and specifications and report the outcome.

Act — Apply actions to the outcome for necessary improvement. That means reviewing all steps (Plan, Do, Check, Act) and modifying the process to improve it before its next implementation.