FINAL EXAMINATION

(REVISED SYLLABUS - 2008)

GROUP - IV

Paper-15 : MANAGEMENT ACCOUNTING–ENTERPRISE PERFORMANCE MANAGEMENT

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

(i) PLCM
(ii) HRP
(iii) COSU
(iv) EFQM
(v) PDCA
(vi) OSHAS
(vii) MRP II
(viii) AQL
(ix) CWTQM
(x) OPT
(xi) SDR
(xii) USCF
(xiii) RSCFA
(xiv) DMIAD
(xv) FAST
(xvi) FMEA
(xvii) OMP
(xviii) SCRS
(xix) CWTQM
(xx) LDR

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
(ix) Mckinsey's 7-S Framework
(x) Quality Function Deployment
(xi) Succession Planning

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.

Q. 1. (d) For each of the questions given below, one out of four answers is correct. Indicate the correct answer.

(i) Value Engineering lead to
(a) Increase in sales
(b) Cost Reduction
(c) Profit maximization
(d) Lesser Investment

(ii) The Introduction of NANO by Tata Motors could be viewed as a good example of
(a) Price leadership
(b) Cost leadership
(c) Product leadership
(d) Technology leadership

(iii) The selling price of product A is set at ₹ 1000/- for each unit and sales for the coming year are expected to be 500 Units. If the company requires a return of 10% in the coming year on its

investment of ₹ 10,00,000/- in product A, the target cost for each unit for the coming year is

(a) 1200

(b) 1050

(c) 1100

(d) 1000

(iv) Balance score card approach is developedby

(a) Phillip Crossby

(b) Dr. W.A. Shewart & Dr. W.E. Edward

(c) Robert Kaplan & David Norton

(d) Cahin Kirby

(v) Synergy is often expressed as

(a) 2 + 2 = 5

(b) 2 + 2 = 4

(c) 2 + 2<4

(d) 2 + 2>4

Answer 1. (a)

(i) Product Life cycle Management

(ii) Human Resource Planning

(iii) Committee of Sponsoring Organization

(iv) European Foundation for Quality Management

(v) Plan-do-check-act

(vi) Occupational safety and hazard system

(vii) Manufacturing resource planning

(viii) Acceptable quality level

(ix) Company wide total quality management

(x) Optimised production technology

(xi) Search decision rule

(xii) Upside supply chain flexibility

(xiii) Return on supply chain fixed asset

(xiv) Define, measure, analyse, design, verity

(xv) Function analysis system technique

(xvi) Failure modes and effects analysis

(xvii) Order management & pricing

(xviii) Setup cost reduction system.

(xix) Company wide total quality management

(xx) Linear decision rule

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 behavour 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 driver 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.

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

(ix) Mckinsey's 7-S Framework include Strategy, Structure, System, Style, Staff, Skills and Super Ordinate Goals.

(x) 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.

(xi) Succession Planning is the systematic process of defining future management requirements and identifying candidates who best meet those requirements. It involves using the supply of labour within the organization for future staffing needs.

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

Answer 1. (d)

(i) **(b)** – Cost Reduction
(ii) **(c)** – Cost leadership
(iii) **(a)** – 1200

S.R. 500 × 1000 = 5,00,000
Less : Return on Investment (10,00,000 × 10/100) = 1,00,000
6,00,000

Target Cost P.U.

Target Cost P.U. $\left(\frac{₹\ 6,00,000}{500}\right)$ = ₹ 1200

(iv) **(c)** – Robert Kaplan & David Norton
(v) **(a)** – 2 + 2 = 5

Q. 2. The management of A Ltd. is considering which of the two mutually exclusive project is to select. Details of each project are as follows –

Project K (₹ '000)		**Project L (₹ '000)**	
Probability	**Profit**	**Probability**	**Profit**
0.3	**300**	**0.2**	**(800)**
0.3	**400**	**0.6**	**600**
0.4	**500**	**0.1**	**800**
		0.1	**1600**

Answer 2.

Project K			**Project L**		
Probability	**Profit**	**EV**	**Probability**	**Profit**	**EV**
0.3	300	90	0.2	(800)	(160)
0.3	400	120	0.6	600	360
0.4	500	200	0.1	800	80
			0.1	1,600	160
		410			440

On the basis of EV above, it is observed that project L is marginally preferable to K by ₹ 30,000. Project L is however more risky, offering ₹ 16,00,000 but also loss the extent ₹ 8,00,000.

Let us compute standard deviation of each project as follows :

Project K –

Probability	Profit (₹ '000)		(₹ '000)
P	x	$x-\bar{x}$	$p(x-\bar{x})^2$
0.3	300	–110	3,630
0.3	400	–10	30
0.4	500	90	3,240
			6,900

Hence $\bar{x}$ = 410; Standard deviation = $\sqrt{\sum p(x-\bar{x})^2} = \sqrt{6,900}$ = 83.066 i.e., ₹ 83,066.

Project L —

Probability	Profit (₹ '000)		(₹ '000)
P	x	$x-\bar{x}$	$p(x-\bar{x})^2$
0.2	(800)	(1,240)	3,07,520
0.6	600	160	15,360
0.1	800	360	12,960
0.1	1,600	1,160	1,34,560
	EV= 440		4,70,400

$\bar{x}$ = 440

Standard deviation = $\sqrt{4,70,400}$ = 685.857; i.e., ₹ 6,85,857

As the EV of the projects differs, we have to find out coefficient of variation of each project, as follows –

	Project K	Project L
(a) Standard deviation	83,066	6,85,857
(b) EV of profit	410	440
Coefficient of variation = (a)/(b)	202.6	1588.8

Here, project K is less risky and should be selected.

Q. 3. A firm has received an order from customer A to be executed for ₹ 1,800 (all inclusive). The order requires the following materials, labour etc. :

Materials	Requirements (Kgs.)	In stock (Kgs.)	Book value (₹)	Replacement Cost per Kg. (₹)	Realizable value Per kg. (₹)
Material K	**100**	**50**	**300**	**7**	**4**
Material L	**300**	**140**	**320**	**4**	**1**

Labour :

Department I **10hrs. @ ₹ 15**

Department II **8hrs. @ ₹ 12**

Variable overhead **₹ 150**

Material K is one that is regularly used by the firm and if used on this order has to be replaced for the use of other orders – Material L has no use and is the result of excessive purchase made for an order executed three years ago.

Labour in department I is available for this order but labour in department II is fully engaged an another order which is earning a contribution of ₹ 20 per hour and if the order from customer A is to be executed, labour in department II has to be diverted from current operations.

State whether the order received from customer A has to be accepted. Show workings.

Answer 3.

Relevant cost of Order Received From Customer A

Material:	K	(100kgs. × ₹ 7)	700		
Material:	L	(140kgs. × ₹ 1)	140		
		(160kgs.x ₹ 3)	480		1,320
Labour:	Dept. I	(10hrs. × ₹ 15)		150	
	Dept. II	(8hrs. × ₹ 12)		96	
		Opportinity cost of contribution lost		160	406
Variable overheads					150
Total Relevant Cost of Order					1,876

Conclusion : The relevant cost of order amount to ₹ 1,876 whereas customer A has offered only ₹ 1,800. Thus it cannot be accepted.

Q. 4. A Ltd. has an inventory of 5,000 units of a product left over from last years' production. This model is no longer in demand. It is possible to sell these at reduced prices through the normal distribution channels. The other alternative is to ask someone to take them on "as is where is" basis. The alternative will cost the company ₹ 5,000.

The company produced 2,40,000 units of the product last year, when the unit costs were as under :

Manufacturing cost :

Variable	**5.00**	
Fixed	**2.00**	**7.00**
Selling and distribution cost :		
Variable	**3.00**	
Fixed	**2.00**	**5.00**
Total cost		**12.00**
Selling price per unit		**14.00**

Should the company scrap the items or sell them at a reduce price? If you suggest the latter, what minimum price would you recommend?

Answer 4.

Minimum Recommended Price per unit of 5,000 units of a product (obsolete model) of A Ltd.

(i) Historical cost of ₹ 12.00 per unit of 5,000 units of a product is irrelevant (as it is a sunk cost) for determining the recommended price per unit.

(ii) If at all this model is sold in the market through normal distribution channels it will entail a variable selling and distribution cost of ₹ 3 per unit.

(iii) If the stock is disposed of by asking someone to take them on "as is where is basis", the company would have to spend ₹ 5,000 over 5,000 units I.e., ₹ 1 per unit.

(iv) In a view of (ii) and (iii) the option of selling 5,000 obsolete units of the model using regular channels will have a differential cost of ₹ 2 (₹ 3 – ₹ 1) per unit.

Recommendation – Hence, if the company can get anything more than ₹ 2 per unit, then it is worthwhile to sell the stock of 5,000 units and earn an additional contribution.

Q. 5. 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 2011.

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 5.

	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)	8.00	40.00 (₹ 500 × 200/2500)
Set up related		
(₹ 2100 × 150 set ups/25000)	12.60	84.00 (₹ 2100 × 100/2500)
	255.60	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 resources 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. 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 & Assistance	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. J Ltd. has two divisions, K and L, K transfer all its output to L, which finishes the work. Costs and revenues at various levels of capacity are as follows :

Output (units)	K costs (₹)	L Net revenues (i.e., Revenue-costs Incurred in L) (₹)	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 maximized at ₹ 2,800 with output of 1,000 units. If J 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 K and L together to produce 1,000 units, no more and no less?

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

Answer 7.

The transfer Price will be notional revenue to K and notional cost to L.

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

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

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

By a similar argument, L will continue to want more output from K if the incremental revenue exceeds the transfer costs from K. If L 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, L will ask for 1,100 units from K in order to improve its divisional profit further.

In summary :

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

(b) Division K will, want to produce 1,000 units, no more and no less, if the transfer price is between ₹ 2 and ₹ 2.50 (₹ 200 to ₹ 250 per 100 units).

(c) Division L 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 K	Divisions L	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 K and L.

Q. 8. S Ltd. is about to replace its rapidly deteriorating boiler equipment. Three types of boiler system are being considered as a suitable replacement: (A) coal-fired, (B) Gas-fired, and (C) Oil-fired. The associated costs are as follows.

Boiler system	*A*	*B*	*C*
Costs of boiler (including installation and commissioning)	**55,000**	**74,000**	**67,000**
Fuel cost per annum	**27,000**	**23,000**	**25,000**
Operating labour costs per annum	**8,000**	**-**	**-**
Maintenance costs per annum	**4,000**	**3,000**	**3,000**
Electricity costs per annum	**1,000**	**1,000**	**1,000**
Operating costs per annum	**40,000**	**27,000**	**29,000**

The new boiler system is expected to last at least ten years. The company has an opportunity cost of finance of 15% per year. Which system should be chosen? If the new system is expected to last for five years, which system is most economical?

Answer 8.

If the decision is taken on the basis of initial cost only, then the Coal-fired boiler system would be selected. However, over its life time (at least ten years) the annual operating costs are much higher than for the Gas-fired and Oil-fired system. The life cycle costs for ten years are as follows :

(₹)

Boiler system	**A**	**B**	**C**
Costs of boiler	55,000	74,000	67,000
Operating costs (Annual costs × 10 years)	4,00,000	2,70,000	2,90,000
Total costs	4,55,000	3,44,000	3,57,000

However, we need to discount the annual costs at a 15% discount rate to arrive at the present value cost of each system. The discount factor for year 1-10 at 15% is 5.019.

The present value of each system then is :

(₹)

Boiler system	**A**	**B**	**C**
Cost of boiler	55,000	74,000	67,000
Operating costs (Annual costs × 5.019)	2,01,000	1,36,000	1,46,000
Present value of total costs	2,56,000	2,10,000	2,13,000

If the expected life is reduced to five years, the Oil-fired system (C) becomes the most economical, as follows :

Boiler system	**A**	**B**	**C**
Cost of boiler	55,000	74,000	67,000
Operating costs (Annual costs × 3.353)	1,34,000	91,000	97,000
Present value of total costs	1,89,000	1,65,000	1,64,000

Q. 9. (a) Define Activity Based Costing. And Define a Cost Object and Cost Driver.

(b) Enumerate the steps in Activity Based Costing.

Answer 9. (a)

Activity based Costing (ABC) is a technique which involves identification of cost with each cost driving activity and making it as the basis for apportionment /assignment of costs over different cost objects/ jobs/products/customers/services.

Cost Object : It is an item for which cost measurement is required, e.g., a product, a job or a customer.

Cost Driver : It is the factor that causes a change in the cost of an activity. Cost Drivers are classified into–

(a) **Resources Cost Driver :** It is a measure of the quantity of resources consumed by an activity. It is used to assign the cost of a resource to an activity or cost pool.

(b) **Activity Cost Driver :** It is a measure of the frequency and intensity of demand, placed on activities by cost objectives. It is used to assign activity costs to cost objects.

Examples of Cost Drivers :

Function	Cost Drivers
Research and Development	Numbers of Research Projects
	Personnel Hours on a project
Customer Service	Number of Service Cells
	Number of Products serviced
	Hours spent on servicing products
Design of products, services and processes	Number of Products in design
	Number of parts per product
	Number of Engineering Hours
	Number of Advertisements/Insertions
Marketing	Number of Sales Personnel
	Sales Revenue
Distribution	Number of items distributed
	Number of customers
	Weight of items distributed

Note : Multiple Cost Drivers may be indentified for each activity. However, for fixing ABC rate, the most relevant/dominant Cost Driver will be considered.

Answer 9. (b)

Step 1 : Identify the various significant Activities within the Firm. Classify the Activities into: Primary Activities and Secondary Activities.

Step 2 : Relate the Overheads to the Activities using Resources Cost Drivers.

(a) Overheads will be related to support and primary activities, using resource cost drivers (the quantity of resources used by an activity);

(b) All costs will be indentified under the activities, thus creating activity cost pools/activity cost buckets.

Step 3 : Apportion the costs of support Activities over the Primary Activities on suitable basis.

(a) This is similar to re-appointment of service department expenses to production departments;

(b) Cost of support activities are spread over to primary activities to collect cost only under the latter. For this purpose, the measure of how support activities are used, will form the allocation base. For example, canteen expenses will be apportioned based on the number of employees in the primary activities.

Step 4 : Determine the Activity Cost Drivers for each Activity/ Cost Pool.

(a) Activity cost drivers are used to relate the OH collected in the cost pools to cost objects (products);

(b) Activity cost drivers constitute the reason governing cost, i.e. casual factory for cost in each activity. This is based on the factor that derives the consumption of the activity, i.e., the answer to the question: what causes the activity to incur costs?

Step 5 : Calculate | Activity Cost Driver Rate = Total Cost of Activity (Cost Pool) ÷ Activity Cost Driver |

Activity Cost Driver Rates are computed for each activity, just like overhead absorption rates. This rate can be used – (i) to ascertain cost of products, [as in Traditional Absorption costing], (ii) to ascertain cost of other cost objects such as customers/customer segments & distribution channels.

Step 6 : Assign costs to the Cost objects using the formula

Resourced Consumed × Activity Cost Driver Rate

Q. 10. (a) What is Bench trending and how does it differ from Bench Marking?

(b) What are the stages in the process of Bench Marking?

Answer 10. (a)

Bench Trending : Continuous monitoring of specific process performance with a selected group of benchmarking is a systematic and continuous measurement process of comparing through measuring an organization business processes against business leaders (role models) anywhere in the world, to gain information that will help organization take action to improve its performance. The continuous process of enlisting the best practices in the world for the processes, goals and objectives leading to world class levels of achievement.

Benchmarking is the process of comparing the cost, time or quality of what one organization does against what another organization does. The result is often a business case for making changes in order to make improvements.

Benchmarking is a powerful management tool because it overcomes “poaradigm blindness”. Paradigm Blindness can be summed up as the mode of thinking, “the way we do it is the best because this is the way we’ve always done it”. Bench Marking opens organizations to new methods, ideas and tools to improve their effectiveness. It helps crack through resistance to change by demonstrating other methods of solving problems than the one currently employed and demonstrating that they work, because they are being used by others.

(a) Identify your problem areas.
(b) Identify other industries that have similar processes.
(c) Identify organizations that are leaders in these areas.
(d) Survey companies for measures and practices
(e) Visit the "best practice" companies to identify leading edge practices.
(f) Implement new and improved business practices.

Answer 10. (b)

The process of benchmarking involves the following stages :

Stage	Description
1	Planning -
	(a) Determination of Benchmarking goal statement,
	(b) Identification of best performance
	(c) Establishment of the benchmarking or process improvement team, and
	(d) Defining the relevant benchmarking measures
2	Collection of Data and Information
3	Analysis of the findings based on the data collected in Stage 2
4	Formulation and implementation of recommendations
5	Constant monitoring and reviewing

Q. 11. (a) 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 ₹	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 11. (a)

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. 11. (b) Write the dual of the following LP problem

Minimize $Z_x = 3x_1 - 2x_2 + 4x_3$

Subject to constraints

$3x_1 + 5x_2 + 4x_3 \geq 7$

$6x_1 + x_2 + 3x_3 \geq 4$

$7x_1 - 2x_2 - x_3 \leq 10$

$X1 - 2x_2 + 5x_3 \geq 3$

$4x1 + 7x_2 - 2x_3 \geq 2$

And $x_1, x_2 x_3 \geq 0$

Answer 11. (b)

Since the objective function of the given LP problems is of minimization, the direction of each inequality of $\leq$ type has to be changed. The standard primal LP problem so obtaines is :

Minimize $Z_x = 3x_1 - 2x_2 + 4x_3$

Subject to constraints

$3x_1 + 5x_2 + 4x_3 \geq 7$

$6x_1 + x_2 + 3x_3 \geq 4$

$-7x_1 + 2x_2 + x_3 \geq -10$

$X_1 - 2x_2\ 5x_3 \geq 3$

$4x_1\ 7x_2 - 2x_3 \geq 2$

If y_1, y_2, y_3, y_4 and y_5 are dual variables corresponding to the five primal constraints in given order, then the dual of the primal LP problem is:

Maximize $Z_y = 7y_1 + 4y_2 - 10y_3 + 3y_4 + 2y_5$

Subject to constraints

$3y_1 + 6y_2 - 7y_3 + y_4 + 4y_5 \leq 3$

$5y_1 + y_2 + 2y_3 - 2y_4 + 7y_5 \leq -2$

$4y_1 + 3y_2 + y_3 + 5y_4 - 2y_5 \leq 4$

and $y_1, y_2, y_3, y_4, y_4, y_5 \leq 0$

Q. 12. A sports goods manufacturer, in conjunction with a software house, is considering the launch of a new sporting simulator based on videotapes linked to a personal computer enabling much greater realism to be achieved. Two proposals are being considered. Both use the same production facilities and, as these are limited, only the product can be launched.

The following data are the best estimates the firm has been able to obtain :

	Football simulator	Cricket simulator
Annual volume (units)	**40,000**	**30,000**
Selling price	**₹ 130 per unit**	**₹ 200 per unit**
Variable production costs	**₹ 80 per unit**	**₹ 100 per unit**
Fixed production costs	**₹ 6,00,000**	**₹ 6,00,000**
Fixed selling and administrative costs	**₹ 4,50,000**	**₹ 13,50,000**

The higher selling and administration costs for the cricket simulator reflect the additional advertising and promotion cost expected to be necessary to sell the more expensive cricket system.

The firm has a minimum target of ₹ 2,00,000 profit per year for new products. The management recognises the uncertainty in the above estimates and wishes to explore the sensitivity of the profit on each product to changes in the values of the variable (volume, price, variable cost per unit, fixed costs)

You are required **:**

(a) to calculate the expected profit from each product;

(b) to calculate the critical value for each variable (i.e., the value at which the firm will earn ₹ 2,00,000), assuming that all other variables are as expected (express this as an absolute value and as percentage change from the expected value).

Answer 12.

(a)

Expected Profit	**Football simulator**	**Cricket simulator**
Volume per annum (units)	40,000	30,000
Selling price per unit	130	200
Less : Variable costs	80	100
Contribution per unit	50	100
Total contribution	20,00,000	30,00,000
Less : Total fixed costs	10,50,000	19,50,000
Total expected profit	9,50,000	10,50,000

(b) Critical factor, i.e., minimum target profit per annum on new product ₹ 2,00,000

(i) Sensitivity due to change in volume

$$\text{Volume} = \frac{\text{Fixed Cost} + \text{Profit}}{\text{Contribution per unit}}$$

Football = (10,50,000 + 2,00,000) / 50 = 25,000 or 37.5%*

Cricket = (19,50,000 + 2,00,000) / 100 = 21,500 or 28.3%

*(40,000 -25,000) / 40,000 = 37.5%; other percentage calculated similarly.

(ii) Sensitivity due to change in price

Price = (Fixed Cost + Profit + Variable Cost) / Volume

Football: (10,50,000 + 2,00,000 + 32,00,000) / 40,000 = 111.25 or 14.4%

Cricket : (19,50,000 + 2,00,000 + 30,00,000) / 30,000 = 171.67 or 14.2%

(iii) Sensitivity due to change in variable cost per unit

$$\text{Variable cost per unit} = \frac{\text{Volume} \times \text{Price} - \text{Fixed cost} - \text{Profit}}{\text{Volume}}$$

Football = (40,000 × 130 – 10,50,000 – 2,00,000) / 40,000 = 98.75 or 23.4%

Cricket = (30,000 × 200 – 19,50,000 – 2,00,000) / 30,000 = ₹ 128.33 or 28.3%

(iv) Sensitivity due to change in fixed costs

Football : ₹ 20,00,000 – 2,00,000 = ₹ 18,00,000 or 71.4%

Cricket : ₹ 30,00,000 – 2,00,000 = ₹ 28,00,000 or 43.6%

The most critical factor is the price per unit, only 14% variation being sufficient to reduce profit to ₹ 2,00,000. The most critical factors are for the football, the variable cost per unit (23.4%), and for cricket the volume (28.3%) and the variable cost per unit (28.3%). The other factors are the growth potential of the two products, possible export sales, quality of the estimates, reaction of competitors etc.

Q. 13. A manufacturer has three products A, B and C. current sales, cost and selling price details and processing time requirements are as follows :

	Product A	*Product B*	*Product C*
Annual Sales (Units)	**6,000**	**6,000**	**750**
Selling Price (₹)	**20**	**31**	**39**
Unit cost (₹)	**18**	**24**	**30**
Processing time required per unit (hours)	**1**	**1**	**2**

The firm is working at full capacity (13,500 processing hours per year), fixed manufacturing overheads are absorbed into unit costs by a charge of 200% of a variable costs. This procedure fully absorbs the fixed manufacturing overheads. Assuming that

(i) Processing time can be switched from one product line to another.

(ii) The demand at current selling price is :

Product A	*Product B*	*Product C*
11,000	**8,000**	**2,000**

(iii) The selling prices are not to be altered. You are required to calculate the best production programme for the next operating period and to indicate the increase in net profit that it should yield. In addition identify the shadow price of processing hour.

Answer 13.

It is given in the question that fixed manufacturing overheads are absorbed into unit costs by a charge of 200% of variable costs. Now variable costs relating to all the three products can be found out by presuming variable cost to be x:

Product A; x + 2x = 18 or x = 6

Product B; x + 2x = 24 or x = 8

Product C; x + 2x = 30 or x = 10

Statement showing contribution per hour

	Product A	**Product B**	**Product C**
Selling price	₹ 20	₹ 31	₹ 39
Variable Cost	6	8	10
Contribution per unit	14	23	29
Processing time required per unit (given)	1hr.	1 hr.	2 hrs.
Contribution per processing hour	₹ 14	23	14.50
Ranking	III	I	II

Existing contribution

	Production (in units)	Production (in units)	Contribution per hour	Total contribution
Product A	6,000	6,000 hrs.	₹ 14	₹ 84,000
Product B	6,000	6,000 hrs.	₹ 23	1,38,000
Product C	750	1,500 hrs.	14.50	21,750
				2,43,750

Company is working at full capacity of 13,500 processing hours per year.

Proposed Optimal Programme

Product	Rank	Hours to be used	Balance hours
Product B	I	8,000 hrs. (maximum)	5,500
Product C	II	4,000 hrs. (maximum)	1,500
Product A	III	1,500 hrs.	

Contribution based on optimum programme

Product	Hrs. used	Contribution per hr.	Total contribution
Product B	8,000	₹ 23	₹ 1,84,000
Product C	4,000	14.50	58,000
Product A	1,500	14	21,000
			2,63,000

The optimal programme will increase profit by ₹ 19,250, i.e., ₹ 2,63,000 – ₹ 2,43,750. The shadow price is the opportunity cost of one unit of resource for the decision maker. In this situation, every extra processing hour will increase contribution by ₹ 14.00.

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 a 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 2012.

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 as follows :

		₹ in lakhs
Sales		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.

(a) A machine which originally cost ₹ 12,000 has an estimated life of 10 years and is depreciated at the rate of ₹ 1,200 per year. It has been unused for some time, however as expected production orders did not materialize.

A special order has now been received which would require the use of the machine for two months. The current net realizable value of the machine is ₹ 8,000. If it is used for the job, its value is expected to fall to ₹ 7,500. The net book value of the machine is ₹ 8,400. Routine maintenance of the machine currently cost ₹ 40 per month. With use, the cost of maintenance and repairs would increase to ₹ 60 per month. What would be the relevant cost of using the machine for the order so that it can be charged as the minimum price for the order?

(b) X Ltd. has been approached by a customer who would like a special jobto be done for him and is willing to pay ₹ 22,000 for it. The job would require the following materials :

Material	Total units required	Units already in stock	Book value of units in stock ₹/unit	Realisable Replacement value ₹/units	Replacement cost ₹/units
A	1,000	0	-	-	6
B	1,000	600	2	2.5	5
C	1,000	700	3	2.5	4
D	200	200	4	6	9

(i) Material B is used regularly by X Ltd. and if stocks are required for this job, they would need to be replaced to meet other production demand.

(ii) Materials C and D are in stocks as the result of previous excess purchase and they have a restricted use. No other use could be found for material C but material D could be used in

another job as substitute for 300 unit of material E which currently cost ₹ 5 per unit of (of which the company has no units in stock at the moment).

What are the relevant costs of material, in deciding whether or not to accept the contract? Assume all other expenses on this contract to be specially incurred besides the relevant cost of material is ₹ 550.

Answer 16.

Relevant costs of using the machine for the order.

(i) Loss in the net realizable value of machine by using it on the order (₹ 8,000 – ₹ 7,500)	₹ 500
(ii) Additional maintenance and repair for two months i.e., (₹ 60 – ₹ 40) × 2	₹ 40
	₹ 540

Notes :

(a) Books value of ₹ 8,400 is irrelevant for decision.

(i) Net realizable value form ₹ 8,400 to ₹ 7,500. This loss of ₹ 500 is relevant for decision, because it is influenced exclusively by the decision.

(ii) ₹ 7,500 will be realized after two months at least. Therefore time value of ₹ 7,500 for two months at least is relevant. Therefore present value of the future realizable value of ₹ 7,500 should be found out and this present value should be deducted from ₹ 8,000. This will be the correct relevant cost in place of ₹ 500 shown above in absence discounting factor.

(b) (i) Material A is not yet owned. It would have to be purchased in full at the replacement cost of ₹ 6.00 per unit.

(ii) Material B is used by the company regularly. There is already existing stock of 600 units. If these are used in the contract, a further 600 units would have to be purchased.

Relevant cost is therefore 1000 units at the replacement cost of ₹ 5 per unit.

(iii) Material C: 1,000 units of material C are required 700 units are already in stock. If it is used for the contract, a further 300 units will have to be purchased at a replacement cost of ₹ 4.00 each. The existing stock of 700 units will not be replaced. If they are used for the contract, they cannot be used @₹ 2.50 each unit. The realizable value these 700 @ ₹ 2.50 per units represent opportunity cost.

(iv) Material D is already in stock and will not be replaced. There is an opportunity cost of using D in the contract. It has following two uses :

It can be sold to fetch ₹ 1,200 i.e., 600 × ₹ 2

It can also be used for E which would cost ₹ 1,500 i.e., 300 × ₹ 5.

Since substitution is more useful, ₹ 1,500 is the opportunity cost.

(c) Summary of relevant costs

Material A	1,000 × 6	₹ 6,000
Material B	1,000 × 5	5,000
Material C	7,00 × 2.5	1,750
	300 × 4	1,200
Material D	300 × 5	1,500
Other expenses		550
Total relevant cost		16,000

Contract should be accepted since offer is for ₹ 22,000 in relation to relevant cost of ₹ 16,000.

Q. 17. (Evaluation of R&D Programme – use of joint probability concept). O.B.C Ltd. is evaluating its Research and Development programme for the year 2012. 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 17.

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. 18. (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 18. (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.

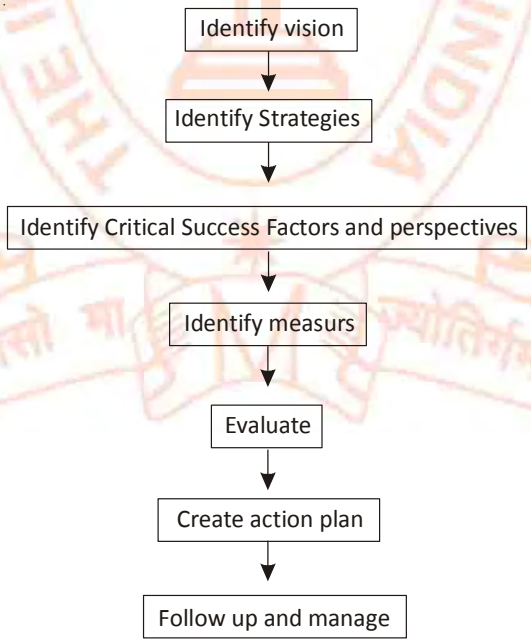
3. Generally, the BSC has the following perspectives from which a Company's activity can be evaluated.
   (a) Customer perspective i.e., How customers see us? In order to translate effective internal processes into organizational success, customers/clients must be happy with the service they receive. 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 18. (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. 19. 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 19.

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. 20. (a) What is Aggregate Planning? What are the two planning strategies available to the Aggregate Planner?

(b) For a particular product, the following output is planned for the next 6 months :

Months	Output in units
1	100
2	150
3	300
4	300
5	500
6	150

The constant capacity of production per month in normal time is 200 units at an output cost of ₹ 15 per unit. Production carried out by overtime working, which will gave to be limited to 50 units per month, will incur an output cost of ₹ 25 per unit. Any excess requirement of production unit will have to be obtained from a subcontractor at an output cost of ₹ 30 per unit.

The company policy prevents utilizing back orders.

The inventory carrying Cost is ₹ 5 per unit.

Calculate cost of aggregate plan.

(c) What is MCS? List its characteristics.

Answer 20. (a)

Aggregate Planning is the process of developing, analyzing and maintaining a preliminary approximate schedule of the overall operations of an organization. The aggregate plan generally contains targeted sales forecast, production levels, inventory levels and customer backlogs. The schedule is intended to satisfy demand forecast at a minimum cost. In simple terms aggregate planning is an attempt to balance capacity and demand in such a way that the costs are minimized.

Two planning strategies available to the aggregate planner are :

(i) Level Stragety and

(ii) Chase Strategy.

Level strategy seeks to produce an aggregate plan that maintains a steady production rate and / or a steady level of employment.

Chase Strategy implied demand and capacity period by period. Although it implies greater degree of flexibility for the firm, there is likely to be uneven level of employment from period to period.

Answer 20. (b)

Period		**1**	**2**	**3**	**4**	**5**	**6**
Forecast		100	150	300	300	500	150
Output	Regular	200	200	200	200	200	200
	Overtime					250	
	Subcontract					250	
Forecast		100	50	(–) 100	(–) 50	0	50
Inventory	Beginning	0	100	150	50	0	0
	Ending	100	150	50	0	0	50
	Average	50	125	100	25	0	25

Cost of Aggregate Plan:- ₹

Regular Time ₹ 15 × 1200	= 18,000
Overtime ₹ 25 × 50	= 1,250
Subcontract ₹ 30 × 250	= 7,500
Inventory Carrying Cost ₹ 5 × 325	= 1,625
Total Costs	28,375

Answer 20. (c)

Management Control System (MCS) is the process by which the managers assure that resources are obtained and used effectively in the accomplishment of organizational objectives. It is a step by which top management ensures that the company's objectives are achieved.

Characteristics of a sound Management Control System (MCS) :

(i) MCS is all pervasive.

(ii) It is a continuous exercise.

(iii) Functional areas like Research, Marketing, Advertising, Production etc, must be decided upon and adjusted continuously.

(iv) MCS has a periodicity. It is a regular and is disciplined.

(v) Coordination amongst different departments is needed.

(vi) In MCS the emphasis is on both planning and control.

Q. 21. Illustrate the use of learning curves for calculating the expected averaged cost of making:

(a) 4 machines

(b) 8 machines

using the data given below :

Data :

Direct labour needed to make the first machine 1,000 hours

Learning curve : 90%

Direct labour cost : ₹ 15 per hour

Direct material cost : ₹ 1,50,000

Fixed cost for either size orders : ₹ 60,000

Answer 21.

Cumulative units	**Cumulative average time Per unit (hours)**
1	1,000
2	1,000 × 0.9 = 900
4	900 × 0.9 = 810
8	810 × 0.9 = 729

Expected average cost of making 4 machines :

Direct material cost	₹ 1,50,000
Direct labour cost ₹ 15 × 810	₹ 12,150
Fixed cost ₹ 60,000 / 4	₹ 15,000

Expected average cost of making 8 machines :

Direct average cost of making 8 machines :

Direct materials cost	₹ 1,50,000
Direct labour cost ₹ 15 × 729	₹ 10,935
Fixed cost ₹ 60,000 / 8	₹ 7,500
	₹ 1,68,435

Q. 22. List of few Cost Factors and Non – Cost Factors in an asset Replacement Decision.

Answer 22.

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. 23. 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 23.

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. 24. (a) A2Z p.l.c supports the concept of tero technology or life cycle costing for new investment decisions covering its engineering activities. The financial side of this philosophy is now well established and its principles extended to all other areas of decision making. The company is to replace a number of its machines and the Production Manager is torn between the Exe Machine, a more expensive machine with a life of 2 years, and the Wye machine with an estimated life of 6 years. If the Wye machine is chosen it is likely that it would be replaced at the end of 6 years by another Wye machine. The patter of maintenance and running costs differs between the two types of machine and relevant data are shown below :

	Exe	*Wye*
Purchase price	**₹ 9,000**	**₹ 13,000**
Trade in value/brakeup/scrap	**₹ 3,000**	**₹ 3,000**
Annual repair costs	**₹ 2,000**	**₹ 2,600**
Overhaul costs	**(at year 8) ₹ 4,000**	**(at year 4) ₹ 2,000**

Estimated financing costs averaged over machine life

10% p.a -Exe; 10% p.a. -Why

You are required to : recommend with supporting figures, which machine to purchase, stating any assumptions made.

Answer 24. (a)

Computation of present value of outflows and equivalent annualo

		Exe machine		**WYE machine**
Initial cost (₹)	19,000.00		13,000.00	
Less : Scarp at the end of the life (₹)	(3000 × 0.32)	960.00	(3000 × 56)	1.680.00
	18,040.00		11.320.00	
Present value of total annual cost (₹)	(2000 × 6.81)	13,620.00	(2600 × 4.36)	11,336.00
Overhaul cost (₹)	(4000 × .47)	1.880.00	(2000 × .68)	1,360.00
		33,540.00		24,016.00
Capital recovery factor	(1/6.81)	0.15	(1/4.36)	0.23
Equivalent annual cost (₹)		4,925.00		5,508.00

As the equivalent annual cost is less for exe machine, it is better to purchase the same.

Q. 24. (b) Chakra Ltd. manufactures Mixer Grinders. The manufacture involves an assembly of various parts which are proceeds in the machine shop and purchased components. The on/off switch is presently being purchased form a vendor at ₹ 4.50 each, annual requirement being 20,000 pieces. The production manager has put up a proposal two months back to make the switch in the machine shop. He had suggested that the company would make profit and save taxes on bought out switch. The costing department was asked to make an estimate of making the item which showed that the cost of making was ₹ 4.73. The purchase department continues buying the item on the basis of the cost estimate given to them. Recently, the Vendor has sent a letter requesting the purchase department to grant increase in price of 10% minimum per switch as the input costs had gone up. The costing department was once again requested to estimate cost of making the switch.

The costing department re-estimated the costs using current prices and observed that the cost of making has gone up to ₹ 5.33. Purchase department again decided to continue buying as it was cheaper to buy than make. The cost estimate prepared by the costing department was as under :

	Annual costs	
	Previous (₹)	**Current (₹)**
Direct Materials	**40,000**	**48,000**
Direct Labour ` 2 per hour	**20,000**	**22,000**
Overheads at ` 3 per hour	**30,000**	**31,500**
Total cost at current price	**90,000**	**1,01,500**
Add : expected increase 5%	**4,500**	**5,075**
Expected manufacturing cost	**94,500**	**1,06.575**
Cost per price	**4.73**	**5.33**

Twenty-five per cent of the overheads are fixed.

***Required* : Do you agree with the decision of buying considering the relevant costs? If the cost of making or buying is more or less same, what factors other than cost will influence making decision?**

Answer 24. (b)

Statement showing computation of making on/off switch before and after price increase.

Particulars	**Previous (₹)**	**Current (₹)**
Materials	40,000	48,000
Labour	20,000	22,000
Overhead	22,500	23,625
	82,500	93,625
Cost per Switch	4.125	4.68
	(82500/20000)	(93625/20000)
Cost of Buying	4.50	4.95
		(4.50 × 110/100)

It is not agreeable that purchase department continue to buy the switch because variable cost of making are less than buying cost.

Note : Expected increased cost is not relevant cost.

Q. 25. (a) Write short notes on Value Added and Non-Value Added activities

Answer 25. (a)

Value Added Activities (VA)	**Non-Value Added Activities (NVA)**
1. These are activities necessary for the performance of the process	These are additional and extraneous activities, not fully necessary for the performance of the process.
2. These represent work that is valued by the external or internal customer	These represent work that is not valued by the external or internal customer.
3. They improve the quality or function of a product. Hence, the customers are usually willing to pay for the service. VA activities result in "costs" and not in losses.	NVA activities do not improve the quality or function of a product or service, but they can adversely affect costs and prices. NVA activities create waste, result in delay of some sort, add cost to the products or services for which the customer is not willing to pay.
4. **Example :** Making product more versatile for certain other uses.	**Example :** Expediting due ot work delays, cost for re-work of defectives, etc.

Q. 25. (b) State whether each of the following independent activities is value-added or non-value-added :

(i) Polishing of furniture used by a Cost Accountant in his firm.

(ii) Maintenance by a software company of receivables management software for a banking company.

(iii) Painting of pens manufactured by a pen factory.

(iv) Cleaning of customers' computer key boards by a computer repair centre.

(v) Providing, brake adjustments in cars received for service by a car service station.

Answer 25. (b)

Sl. No.	Item	
(i)	Polishing of furniture used by a Cost Accountant in his firm	Non-value added
(ii)	Maintenance by a software company of receivables management software for a banking company	Value added
(iii)	Painting of pens manufactured by a pen factory	Value added
(iv)	Customers' computer key board cleaning by a computer repair centre	Value added
(v)	Providing break adjustments in cars for repaired by a care service station.	Value added

Q. 26. (a) Your company has been approached by a customer to supply four units of a new product made to the customer's individual specification. The company experiences a 90% learning rate. The estimated labour time for the first unit of this product is 150 hours and the companies direct labour cost is ₹ 5 per hour. Estimate the labour cost for this order.

(b) After receiving the first order, if the customer places a repeat order, what will be the labour cost for the second order.

(c) If the customer had ordered all eight units at the same time, calculate the labour cost per unit for the combined order.

Answer 26.

(a)

Units produced Time per unit (hours)	Total units	Cumulative average	Total hours
1	1	150.00	150
1	2	(90% × 150) = 135.0270	
2	4	(90% × 135) = 121.5486	270.05
		486.19	

Estimated labour cost = 486 ₹ 5 = ₹ 2,430 (₹ 607.5 per unit)

(b) A further order doubles total output again, from four units to eight units.

Cumulative average time per unit = 90% × 121.5 hours = 109.35

Total hours spent to data = 8 × 109.35 = 874.8 hours

Less: Hours spend on the first order = 486.0 hours

Additional time for this order = 388.8 hours

Estimated labour cost for this order = 388.8 × ₹ 5 ₹ 1,944 (₹ 486 per unit)

If the company's pricing policy were cost-based, the customer would thus be charged a lower price per unit for the second order.

(c) The total labour time for eight units would be 874.8 hours as calculated in (b), Thus, total labour cost for eight units is 874.8 × ₹ 4,374 (₹ 546.75 per unit).

The total cost would be the same whether the two successive orders are placed or an order for the whole quantity was place at a time.

Q. 27. (a) What is lean manufacturing? Briefly describe the lean/JIT system.

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

Answer 27. (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 27. (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. 28. (a) Write a note on Total Quality Management.

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

Answer 28. (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 28. (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. 29. Write Short Notes on :

(a) Value Analysis
(b) Supply Chain Management
(c) Target Costing
(d) Economic Value Added (EVA)
(e) Value Chain Management

(f) Shewhart Cycle

(g) KAIZEN Costing

Answer 29. (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 29. (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 29. (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 29. (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 29. (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.

Answer 29. (f)

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.

Answer 29. (g)

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.

Q. 30. Write Short Notes on :

(i) Product Life Cycle Costing

(ii) Five S Concept

(iii) ERP

(iv) Quality Function Deployment

(v) Zero Defects and Right First Time-Philip Crosby

(vi) Six Sigma

Answer 30. (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 30. (ii)

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. (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 30. (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 30. (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.

Answer 30. (vi)

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 quality management methods, including statistical methods, 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 processes. 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.