FINAL EXAMINATION
GROUP IV
(SYLLABUS 2008)

SUGGESTED ANSWERS TO QUESTIONS

DECEMBER 2014

Paper-15: MANAGEMENT ACCOUNTING – ENTERPRISE PERFORMANCE MANAGEMENT

Time Allowed : 3 Hours **Full Marks : 100**

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

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

Please (i) Answer all part of a question at one place only.

(ii) Open a new page for answer to a new question.

1. (a) State whether the following statements given below are 'True' or 'False'. If True, simply rewrite the given statement (= 1 mark). If False, state it as False (= ½ marks) and rewrite the correct statement (= ½ mark): 1x5=5

(i) The term 'Control' is used in management parlance in a synergetic sense.

(ii) Redundant Relationship is one in which the connected systems cannot function alone.

(iii) Theory 'Y' style of Management is a highly autocratic style.

(iv) The key factors of 'Theory of Constraints' is Contribution and Profit.

(v) Options, which can be used to increase or decrease capacity to match current demand include : Hire/Lay-off, Overtime, sub-contracting and pricing.

(b) Out of the different options given against each of the following statements, only one is the most appropriate option. You are required to write it down. 2x5=10

(i)

Given :	Proposal A	Proposal B
Standard Deviation:	548	1,140
Expected Value:	4,000	4,000

Ascertain which proposal has a greater degree of risk?

A. Proposal A **B. Proposal B**

C. Both proposals have same degree of risk **D. Insufficient information**

(ii) ABC Co. has the capacity of production of 80,000 units and presently sells 20,000 units at ₹ 100 each. The demand is sensitive to selling price and it has been

observed that for every reduction of ₹ 10 in Selling Price, the demand is doubled. If the Profit Margin on Sale is 25%, the Target Cost at full capacity would be

A. ₹ 60 **B. ₹ 80**

C. ₹ 100 **D. None of these**

(iii) Ramdev Manufacturing Co. produces the following Products, using 5,000 tons of Coal at a cost of ₹ 15 per ton into a common process :

Coke- 3,500 Tons, Tar -1,200 Tons, Sulphate of Ammonia - 52 Tons and Benzol - 48 Tons. 200 Tons of material is lost in Process as waste and air evaporation. Labour and Overheads for the process are ₹ 15,000 and ₹ 6,000 respectively. The Joint-Cost apportioned in the above ratio for Coke will be

A. ₹ 50,000 **B. ₹ 70,000**

C. ₹ 80,000 **D. ₹ 90,000**

(iv) Ganesh Ltd., produces a product, which has a Variable Cost of Materials ₹ 40, Labour ₹ 10 and Overheads ₹ 4. The Selling Price is ₹ 90 per unit. Under a wage agreement, an increase of 10% is payable to all direct workers from the beginning of the forthcoming year, while the Material Cost is expected to increase by 7.5%, Variable Overheads by 5% and Fixed Overhead by 3%. The total Variable cost per unit in the forthcoming year will be

A. ₹ 54 **B. ₹ 58.20**

C. ₹ 60.20 **D. None of these**

(v) Following information is available for the 1st and 2nd quarter of the year for ABC Ltd.:

Quarter	Production in units	Semi-variable cost
Quarter-1	36,000	₹ 2,80,000
Quarter-2	42,000	₹ 3,10,000

The Variable Cost per unit will be

A. ₹ 3 **B. ₹ 6**

C. ₹ 5 **D. None of these**

(c) Define the following terms in one/two sentences only: 1x5=5

i. Coefficient of Variation **ii. Decision Trees** **iii. Zero-defects**

iv. Reverse Engineering **v. Human Resources Planning**

(d) Expand the following abbreviations : 1x5=5

i. DBR **ii. BSC** **iii. PBB**

iv. CWQC **v. FMECA**

Answer: 1. (a)

(i) False. The term' Control' is used in management parlance in a cybernetic sense.

(ii) False. Symbiotic Relationship is one in which the connected systems cannot function alone.

(iii) False . Theory 'X' style of Management is a highly autocratic style.

Or,

False . Theory 'Y' style of Management is a highly participative style.

(iv) False. The key factors of theory of 'Constraints' are throughput, inventory and operating expenses.

(v) False. Options, which can be used to increase or decrease capacity to match current demand include:

Hire/Lay-off, Overtime, Sub-contracting and Cross-training

Answer: 1. (b)

(i) B. Proposal B

	A	B
Co-efficient of Variation:	548/4000	1140/4000
	= 0.14	= 0.29

Hence Proposal B has a greater degree of Risk.

(ii) A. ₹ 60.

Target Cost at full capacity

Selling Price/unit	₹100	₹ 90	₹ 80
Demand (units)	20,000	40,000	80,000 (Full Capacity)

∴ Target Cost at full capacity = Selling Price - Profit Margin.

= ₹ 80 - 25% on Selling Price i.e., ₹ 80

= ₹ 80 - ₹ 20 = ₹ 60.

(iii) B. ₹ 70,000

Total Joint Costs = Material + Labour + Overhead = (5,000T x ₹ 15) + ₹ 15,000 + ₹ 6,000
= ₹ 96,000.

Particulars	Coke	Tar	Sulphate of Ammonia	Benzol	Total
Quantity (Ton)	3,500	1,200	52	48	4,800

Jt. cost apportioned at the above ratio= 3,500/4,800 x 96,000 = ₹ 70,000

(iv) B. ₹ 58.20

Particulars	Current year	Change	Forth-coming year
Materials	₹40	+ 7.50%	₹43.00
Labour	₹10	+ 10%	₹11.00
Variable O/H	₹4	+ 5%	₹4.20
	₹54		₹58.20

(v) **C.** ₹ 5

Variable Cost/unit = Difference in costs /Difference in prodn. Qty.

= 3,10,000 - 2,80,000/42,000 - 36,000 = 30,000/6,000 = ₹ 5/unit.

Answer: 1. (c)

(i) **Coefficient of Variation:** is a relative measure of dispersion. It is calculated from the formula; Standard Deviation/ Expected Value.

(ii) **Decision Trees:** are excellent tools for helping one to choose between several courses of action.

(iii) **Zero Defects:** Zero Defects is a management tool aimed at the reduction of defects through prevention. It is directed at motivating people to prevent mistakes by developing a constant, conscious desire to do their job right the first time.

(iv) **Reverse Engineering:** is also known as Product Benchmarking. It involves buying its rival's products and tearing them down to find out how the features and performances etc., compares with its products.

(v) **Human Resources Planning:** is the process of having the right number of employees in the right positions in the organization at the time that they are needed. It involves forecasting, or predicting, the organization's needs for labour and supply of labour and then taking steps to move people into positions in which they are needed.

Answer: 1. (d)

(i) DBR-Drum-Buffer-Rope.

(ii) BSC-Balance Score Card,

(iii) PBB-Performance Based Budget

(iv) CWQC-Company wide Quality Control

(v) FMECA- Failure Mode, Effects and Criticality Analysis

2. (a) What do you mean by 'Outsourcing'? Briefly illustrate. **7**

(b) Srisanth & Co. has installed 200 electric bulbs of a certain brand. The company follows the policy of replacing the bulbs as and when they fail. Each replacement costs ₹ 2. The Probability distribution of the life of the bulbs is as given here below :

Life of bulb (weeks)	1	2	3	4	5
% of bulbs	0.10	0.30	0.45	0.10	0.05

i. Determine the cost/week of the replacement policy in the long run.

ii. Compute the average cost of Group Replacement.

iii. Find out when the Group Replacement is advisable. **2+4+2=8**

Answer: 2. (a)

Outsourcing: is a practice used by companies to reduce costs by transferring portions of work to outside suppliers rather than completing it internally. This strategy is resorted to when the business need expertise/skill that they do not have within their organization. They go for 'Outsourcing' to solve their problem. It is a main part of any business or company. It provides more effective cost saving strategy and improves growth for any business. It is an effective cost-saving strategy when used properly. It is sometimes more affordable to purchase a good from companies with comparative advantages than it is to produce the goods internally. For eg., Dell buying some of its computer components from another manufacturer in order to save on production costs.

Thus in Business, Outsourcing is the contracting out of a business process to a 3rd. party. Two Organizations may enter into a contractual agreement, involving an exchange of services and payments. Outsourcing is said to help firms to perform well in their core competencies and mitigate shortage of skill/expertise in the areas where they want to outsource.

Outsourcing can offer greater budget flexibility and control. Outsourcing lets organizations to pay only for the services they need when they need them. It also reduces the need to hire and train specialized staff, brings in fresh engineering expertise and reduces capital and operating expenses.

Reasons for Outsourcing: There are many reasons that companies outsource various jobs but the most prominent advantage seems to be the fact that it often saves money. Many of the companies that provide outsourcing services are able to do the work for considerably less money, as they enjoy many advantages like lower overhead expenses etc.,

Many companies primarily Outsource to avoid certain costs such as 'non-core' business expenses, high taxes, high energy costs, excessive government regulations/mandates, Production/Labour Costs. Another strong reason for outsourcing is the lack of available resources locally. This is particularly true for IT Outsourcing, where countries like USA has a lack of available resources. The digital workforce of countries like India and China are only paid a fraction of what would be the minimum wage in the US.

Answer: 2. (b)

(i)

Week	Probability	Total Product
1	0.10	0.10 x 1 = 0.10
2	0.30	0.30 x 2 = 0.60
3	0.45	0.45 x 3 = 1.35
4	0.10	0.10 x 4 = 0.40
5	0.05	0.05 x 5 = 0.25
		= 2.70

Average no. of Replacements = 200/2.7 = 74.
Therefore, cost per week = 74 x ₹ 2 = ₹ 148.

Computation of expected no. of Replacements:

Week		
0	N0 = N0P0 = 200x0 = 0	0
1	N1= N0P1 = 200x0.1 = 20	20

2	N2 = N0P2 + N1P1 = 200 × 0.3 + 20 × 0.1 = 60 + 2 = 62	62
3	N3 = N0P3 + N1P2 + N2 P1= 200 × 0.45 + 20 × 0.30 + 62 × 0.1 = 90+6+6.2 = 102.2	102.2
4	N4 = N0P4+N1P3+N2P2+N3P1 = 200 × 0.1 +20 × 0.45 +62 × 0.3 +102.2 × 0.1 = 20+9+18.6+10.22 = 57.82	57.82
5	N5 = N0P5+N1P4+N2P3+N3P2+N4P1 = 200 × 0.05+20 × 0.1 +62 × 0.45 + 102.2 × 0.30 + 57.82 × 0.1 = 10+2+27.9+30.66 +5.782 = 76.342	76.342

(ii) Computation of Average Cost of Group Replacements:

Week	Individual Replacement (After rounding off)	Cost of Individual Replacements	Cumulative Individual Replacement Cost (₹)	Average Cost (₹)
1	20	40	40	40
2	62	124	164	82
3	102	204	368	122.67
4	58	116	484	121.00*
5	76	152	636	127.2

(iii) Conclusion: Group Replacement is advisable and is to be done once in every **four weeks**.

3. (a) An investment company wants to study the investment projects based on market demand, profit and the investment required, which are independent of each other. Following Probability distribution are estimated for each of these 3 factors :

Annual demand ('000 units)	**25**	**30**	**35**	**40**	**45**	**50**	**55**
Probability	**0.05**	**0.10**	**0.20**	**0.30**	**0.20**	**0.10**	**0.05**

Profit per unit	**3**	**5**	**7**	**9**	**10**
Probability	**0.10**	**0.20**	**0.40**	**0.20**	**0.10**

Investment required (₹ '000)	**2,750**	**3,000**	**3,500**
Probability	**0.25**	**0.50**	**0.25**

Using Simulation Process, repeat the trial 10 times. Compute the investment on each trial, taking these factors into trial. What is the most likely return?

Use the following random nos. :

(30,12,16), (59,09,69), (63,94,26), (27,08,74), (64,60,61)

(28,28,72), (31,23,57), (54,85,20), (64,68,18), (32,31,87)

In the bracket above, the 1st random no. is for annual demand, the 2nd one is for Profit and the last one is for the investment required. 8

(b) A firm produces 3 types of products A, B and C. The profit on I unit of type A, B and C are ₹ 3, ₹ 2 and ₹ 4 respectively. A firm has 2 m/c s and below is given the required processing time in minutes for each m/c on each product:

	Products		
M/c	**A**	**B**	**C**
G	**4**	**3**	**5**
H	**3**	**3**	**5**

The M/c s G and H are available for not more than 2,000 mins and 2,500 mins respectively.

The firm must manufacture 100 A s, 200 B s and 50 C s.

Only Formulate a LPP. Do not solve the LPP. **7**

Answer: 3. (a)

Let us first prepare the Random no. table for each of the three variables as given under:

Annual Demand:

Units ('000)	Probability	Cumulative Probability	Random no. assigned
25	0.05	0.05	00-04
30	0.10	0.15	05-14
35	0.20	0.35	15-34
40	0.30	0.65	35-64
45	0.20	0.85	65-84
50	0.10	0.95	85-94
55	0.05	1.00	95-99

Profit per unit

Profit (₹)	Probability	Cumulative Probability	Random no. assigned
3	0.10	0.10	00-09
5	0.20	0.30	10-29
7	0.40	0.70	30-69
9	0.20	0.90	70-89
10	0.10	1.00	90-99

Investment Required:

Investments (₹'000)	Probability	Cumulative Probability	Random no. assigned
2,750	0.25	0.25	00-24
3,000	0.50	0.75	25-74
3,500	0.25	1.00	75-99

Let us simulate the process for 10 trials. The results of the Simulation are shown in the tables given below:

Trial	Random No. of Demand	Simulated Demand ('000 units)	Random no. for Profit/unit	Simulated Profit/unit	Random No. for Investment	Simulated Investment (₹ '000)	*Simulated Return %
1	30	35	12	5	16	2,750	6.36
2	59	40	09	3	69	3,000	4.00
3	63	40	94	10	26	3,000	13.33
4	27	35	08	3	74	3,000	3.50
5	64	40	60	7	61	3,000	9.33
6	28	35	28	5	72	3,000	5.83
7	31	35	23	5	57	3,000	5.83
8	54	40	85	9	20	2,750	13.09
9	64	40	68	7	18	2,750	10.18
10	32	35	31	7	87	3,500	7.00

* Simulated Return % = Demand x Profit/unit /Investment x100

The above table shows that the highest likely return is 13.33%, which is corresponding to the annual demand of 40,000 units, resulting into a profit of ₹10 per unit and the required investment will be ₹30,00,000.

3. (b)

Let X_1, X_2 and X_3 be the no. of commodities of type A, type B and type C respectively.

$Z_{max} = 3X_1+2X_2+4X_3$ subject to

$4X_1+3X_2+5X_3 \leq 2,000$ Eq. 1

$3X_1+3X_2+5X_3 \leq 2,500$ Eq. 2

$X_1 \geq 100$ Eq. 3

$X_2 \geq 200$ Eq. 4

$X_3 \geq 50$ Eq. 5

X_1, X_2 and X_3 are ≥ 0 (Non-negative factors)

4. (a) XYZ Company manufactures a product ABC by mixing three raw materials. For every 100 kg. of ABC, 125 kg. of raw materials are used. In April, 2014, there was an output of 5,600 kg. of ABC. The standard and actual particulars of April, 2014 are as follows:

Raw Material	**Standard**		**Actual**	
	Mix%	**Price per Kg. (₹)**	**Mix%**	**Price per Kg. (₹)**
Raw Material I	**50**	**40**	**60**	**42**
Raw Material II	**30**	**20**	**20**	**16**
Raw Material III	**20**	**10**	**20**	**12**

Calculate:

(i) Material Cost Variance.

(ii) Material Price Variance.

(iii) Material Mix Variance. **7**

(b) Shri Kiran manufactures lighters. He sells his product at ₹ 20 each and makes a profit of ₹ 5 on each lighter. He worked at 50% of his machinery capacity at 50,000 lighters. The cost of each lighter is as follows:

Direct Material	**₹ 6**
Wages	**₹ 2**
Workers overhead	**₹ 5 (50% fixed)**
Sales expenses	**₹ 2 (25% variable)**

His anticipation for the next year is that the cost will go up as under:

Fixed cost	**10%**
Direct wages	**20%**
Material	**5%**

There will not be any change in selling price. There is an additional order for 20,000 lighters in the next year.

What will be the lowest rate he can quote so that he can earn the same profit as the current year? **5**

(c) In what circumstances is a company justified in selling its products at a price below variable cost? **3**

Answer: 4. (a)

Working note :

For every 100 kg of ABC, 125 kg of raw materials are used.

For output of 5,600 kg, 5,600/100 x 125 =7,000 kgs of raw materials are used.

	Standard Cost (SC)				Actual Cost (AC)				
Raw Material	1 Mix %	2 Kg	3 Rate (₹)	4 Amount (₹)	5 Raw Material	6 Mix %	7 kg	8 Rate (₹)	9 Amount (₹)
I	50	3,500	40	1,40,000	I	60	4,200	42	1,76,400
II	30	2,100	20	42,000	II	20	1,400	16	22,400
III	20	1,400	10	14,000	III	20	1,400	12	16,800
Input		7,000		1,96,000	Input		7,000		2,15,600
Loss		1,400		—	Loss		1,400		—
Output		5,600		1,96,000	Output		5,600		2,15,600

Standard Yield Rate (SYR) = 1,96,000/5,600 = ₹ 35 per kg output of ABC.

Standard Cost of Standard Mix (SCSM) = ₹1,96,000

Standard Cost of Actual Mix (SCAM):

Material	Actual Mix (Kg)	Std. rate (₹)	SCAM (₹)
I	4,200	40	1,68,000
II	1,400	20	28,000
III	1,400	10	14,000
Total	7,000		2,10,000

Variances:

(i) Material Cost Variance (MCV) = SC-AC= 1,96,000 -2,15,000 = ₹19,600 A

(ii) Material Price Variance = (MPV) =AQ (SR-AR)

I = 4,200 (40-42) = 8,400 A

II = 1,400 (20-16) = 5,600 F

III = 1,400 (10-12) = 2,800 A

5,600 A

(iii) Material Mix Variance (MMV) = SCSM - SCAM = 1,96,000 - 2,10,000 = 14,000A.

Reconciliation: MCV = MPV + MMV

19,600 A = 5,600 A +14,000 A.

Answer: 4. (b)

Present Profit = 50,000 x 5 = ₹2,50,000.

Present Fixed cost = 50,000 (2.5+1.5) = ₹2,00,000.

Computation of Profit after increase in prices:

	Particulars	Amount (₹)	Amount (₹)
I	Selling Price		20.00
II	Variable Cost		
	Material (6 x 105/100)	6.30	
	Wages (2 x 120/100)	2.40	
	Works overhead	2.50	
	Sales Expenses	0.50	11.70
III	Contribution		8.30
IV	Total Contribution (50,000 x 8.30)		4,15,000
V	Fixed Cost (2,00,000 x 110/100)		2,20,000
VI	Profit		1,95,000

Computation of Selling Price of the order:

Contribution of profit required for unit (2,50,000-1,95,000)/20,000	₹2.75
Add: Variable Cost per unit	₹ 11.70
Therefore Required Selling Price	₹14.45

Conclusion: The lowest rate that Shri. Kiran can quote for earning the same profit as the current year = ₹14.45 per unit.

Answer: 4. (c)

A company is justified in selling its product below the variable cost under the following circumstances:

(i) Where the product is of perishable nature

(ii) Where heavy stocks have been accumulated.

(iii) Where it is decided to use the product as loss leader i.e. to boost the sales of other products

(iv) Where the product is intended to be popularized by an introductory/temporary offer

(v) Where it is intended to be an entry barrier to the would-be competitor

(vi) Where it is to serve some social purpose.

5. The following figures relate to the current year's position in an engineering industry operating at 70% capacity level:

BE Point ₹ 80 Crores.

P/V ratio = 40%.

Margin of Safety = ₹ 20 Crores.

The Board at its last meeting has taken a decision to increase the output to 98% capacity level with the following modification:

(i) Reduction in selling price by 5%.

(ii) Fixed cost increase by *X* 8 crores (including depreciation on additions but excluding interest burden).

(iii) Reduction in variable on cost by 5% on sales.

(iv) Additional finance for capital expenditure and working capital ₹ 20 crores.

(a) You are required to determine the revised sales figures necessary to yield the existing quantum of profit plus additional profit of ₹ 4 crores on account of increased activity and 20% interest burden on fresh capital inputs. 3

(b) Also determine the revised—(i) BE Point (ii) P/V Ratio (iii) Margin of Safety. 2x3=6

(c) Speedy Airlines can carry maximum of 10,000 passengers per month on one of its routes at a fare of ₹ 85. Variable costs are ₹ 10 per passenger and fixed costs are ₹ 3,00,000 per month.

Calculate:

(i) BE Quantity.

(ii) BE Sales.

(iii) Suppose that the management aims at sales for a profit target of ₹ 2,00,000. What would be required profits before taxes to achieve this profit target, if the corporate tax rate of the company is 46%? 2x3=6

Answer: 5. (a)

Existing Position

We know that B.E. Sales x P/V ratio = Fixed Cost.

Or Fixed Cost = ₹80 Crs. x 40% = ₹32 Crs.

Sales - B. E. Sales = Margin of Safety.

Sales - ₹80 Crs. = ₹20 Crs.

Hence Sales = ₹100 Crs.

If P/V ratio is 40%, Variable Cost is 60% of Sales = 60% of ₹100 Crs. = ₹60 Crs.

	(₹ Crs.)
Sales	100
Variable Cost	60
Contribution	40
Less : Fixed Cost	32
Profit	8

Revised Position:

Let the existing selling price per unit be ₹ 100, then -

1. Revised Selling Price =	₹95.00
2. Variable Cost 60% less 5% of 100 = 55% of Sales =	₹52.25
3. Contribution	₹42.75
4. Revised P/V ratio=42.75/95 x 100=	45%

	₹ in Crs.
Fixed Cost	32
Increase in Fixed Cost (including depreciation)	8
Interest (20% of ₹ 20 Crs.) =	4
Revised Fixed Cost	44
Revised Profit (8+4) =	12

Sales = (Fixed Cost + Profit)/ P/V ratio = (₹44 Crs + ₹12 Crs) /45% = ₹124.44 Crores.

Answer: 5. (b)

(i) Revised BEP = Fixed Cost/P/V ratio = ₹44 Crs/45% = ₹97.78 Crores.

(ii) Revised P/V ratio = 45% (as at (a) above)

(iii) Margin of Safety = Sales-BEP = ₹124.44 Cr. - ₹97.78 Crs = ₹26.66 Crs.

Answer: 5. (c)

Sales =	₹ 85 per passenger
Variable Cost =	₹ 10
Contribution =	₹ 75

P/Vratio = 75/85 = 15/17

(i) Revised BE Point (Quantity) = Fixed Cost ÷ Contribution/unit = ₹3,00,000 ÷ 75 = 4,000 Passengers

(ii) Revised BE Point (Value) = Fixed Cost ÷ P/V ratio = ₹3,00,000 ÷ 15/17 = ₹3,40,000

(iii) Suppose Profit before Tax is = 100

Tax = 46

Profit after tax 54

If Profit after tax is 54, then Profits before tax = 100.

" " ₹ 2,00,000, then Profit before tax = 100/54 x 2,00,000 = ₹ 3,70,370.37 ≅ ₹3.70 Lakhs.

6. A company makes a single product which sells at ₹ 800 per unit and whose variable cost is ₹ 500 per unit.
Production and Sales are 1,000 units/month. Production is running to full capacity and there is market enough to absorb an additional 20% of output each month.

The company has 2 options :

***Option-1:* Inspect the finished goods at ₹10,000/month. 4% of the production is detected as defectives and scrapped at no value. There will be no warranty replacement, since every defect is detected. A small spare-part, which wears out due to defective materials is required to be replaced at ₹2,000 per spare-part for every 20 units of scrap generated. This repair cost is not included in the manufacturing costs mentioned above.**

***Option-2:* Shift the finished goods inspection at no extra cost, to raw material inspection (since defective raw materials are entitled to free replacement by the supplier) and take up machine set-up tuning and machine inspection at an additional cost of ₹ 8,000 per month, so that the scrap of finished goods is completely eliminated. However, delivery of uninspected finished products may result in 1% of the quantity sold to be replaced under free warranty due to minor variations in dimensions, which does not result in wearing out the spare-part as stated under option-1.**

Using the monthly figures relevant for decision-making, advice which option is more beneficial to the company, from a financial perspective. 15

Answer: 6.

"Production is running to full capacity." It means we cannot produce more than 1,000 units (Gross).

(i) Statement showing Quality Costs under each of the two alternatives:

	Option-I	Option-II
Gross Production (Units)	1,000	1,000
Scrapped/Free Replacements (units)	40	10
Quality Costs	₹	₹
i. Variable cost of scrapped or free replaced units	20,000 (40x500)	5,000 (10x500)
ii. Inspection Cost	10,000	10,000

iii. Repair Cost (spare part)	4,000	—
iv. Contribution lost	12,000 (40x300)	3,000 (10x300)
v. Machining Cost		8,000
Total Quality Costs	46,000	26,000

Conclusion: Cost of Option-II is cheaper when compared to those of option-I. Hence Option-II will be more beneficial to the company.

7. (a) What do you mean by "Supply Chain Management"? 5

(b) The following table gives the result of 20 samples of 100 items, each taken on working days. Draw a P-chart (Not to scale):

Sample No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
No. of Defectives	**0**	**2**	**4**	**6**	**6**	**4**	**0**	**2**	**4**	**8**
Sample No.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
No. of Defectives	**8**	**0**	**4**	**6**	**14**	**0**	**2**	**2**	**6**	**2**

Find out:

(i) Upper Control Limit.

(ii) Lower Control Limit.

(iii) Central Line. 3x3=9

Is the Production Process under Statistical Quality Control? 1

Answer: 7. (a)

Supply chain management (SCM) is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. Supply chain management involves coordinating and integrating these flows both within and among companies. It is said that the ultimate goal of any effective supply chain management system is to reduce inventory (with the assumption that products are available when needed).

Commonly accepted definitions of supply chain management include:

- The management of upstream and downstream value-added flows of materials, final goods, and related information among suppliers, company, resellers, and final consumers
- The systematic, strategic coordination of traditional business functions and tactics across all business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.
- "Supply chain strategies require a total systems view of the links in the chain that work together efficiently to create customer satisfaction at the end point of delivery to the consumer. As a consequence, costs must be lowered throughout the chain by driving out unnecessary expenses, movements, and handling. The main focus is turned to efficiency

and added value, or the end-user's perception of value. Efficiency must be increased, and bottlenecks removed. The measurement of performance focuses on total system efficiency and the equitable monetary reward distribution to those within the supply chain. The supply chain system must be responsive to customer requirements."

SCM is a cross-functional approach that includes managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other firms that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing managerial control of daily logistics operations. Less control and more supply chain partners led to the creation of the concept of supply chain management. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement.

Main functions of Supply Chain Management are as follows:

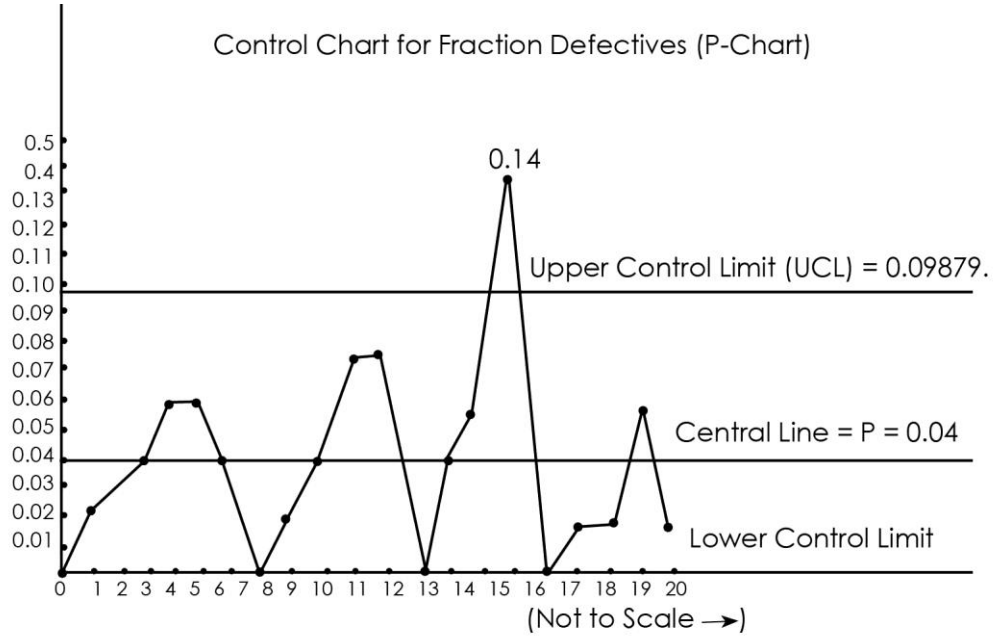
- Inventory Management
- Distribution Management
- Channel Management
- Payment Management
- Financial Management
- Supplier Management
- Transportation Management
- Customer Service Management

Answer: 7. (b)

Given sample size n =100.

Sample no.	di	Pi = di/100
1	0	0
2	2	0.02
3	4	0.04
4	6	0.06
5	6	0.06
6	4	0.04
7	0	0
8	2	0.02
9	4	0.04
10	8	0.08
11	8	0.08
12	0	0
13	4	0.04
14	6	0.06

15	14	0.14
16	0	0
17	2	0.02
18	2	0.02
19	6	0.06
20	2	0.02
Total	-	0.80



we have $\bar{P} = 0.8/20 = 0.04$

$\bar{q} = 1 - \bar{p} = 0.96$

Therefore, the 3σ control limits for P-Chart are $\bar{P} \pm 3\sqrt{\frac{\bar{p}\bar{q}}{n}}$

Therefore Central Line C.L. = $\bar{P} = 0.04$

Lower Control Limit (L.C.L) = $\bar{P} - 3\sqrt{\frac{\bar{p}\bar{q}}{n}} = 0.04 - 3\sqrt{\frac{(0.04)(0.96)}{100}}$

$= 0.04 - 0.05879 = 0.01879 \approx 0$

Upper Control Limit (UCL) = $\bar{P} + 3\sqrt{\frac{\bar{p}\bar{q}}{n}} = 0.04 + 3\sqrt{\frac{(0.04)(0.96)}{100}}$

$= 0.04 + 0.05879 = 0.09879.$

Conclusion: It is observed from the graph chart of P that the 15th sample value lies above UCL. Hence the production process is not in the state of statistical quality control.

8. Write Short notes on *any three* of the following : 3x5=15

(a) Divisional Structure

(b) Difference between Strategic Planning and Management Control

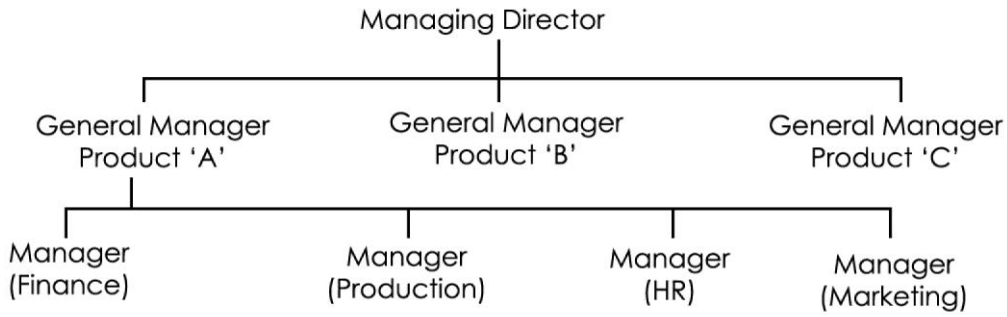
(c) Options for adjusting capacity

(d) Buffer Management
(e) Merits of Contribution Approach

Answer: 8. (a)
Divisional Structure:

A type of organizational configuration that groups together those employees who are responsible for a particular product type or market service according to workflow. The Divisional Structure of a business tends to increase flexibility and it can also be broken down further into product, market and geographic structures. In a Divisional Structure, each of the decentralized division operates as a complete business unit in itself, like a semi-independent part of the company.

The diagrammatic representation of this structure is as follows:



This structure helps the firms to be more market/customer-focused when the firm is engaged in unrelated product businesses. Full authority and accountability is given to the head of divisions as a separate profit and/or investment responsibility center. This type of Structure produces greater managerial motivation to run their own business within broad company policies, thus acting as a good training ground for leadership.

Note: Similar set up for Product 'B' and Product 'C'.

Answer: 8. (b)

Difference between Strategic Planning and Management Control:

Characteristic	Strategic Planning	Management Control
Focus of plans	On one aspect at a time	On whole organization
Complexities	Many variables	Less complex
Degree of structure	Unstructured and irregular; each problem will be different	Rhythmic; Prescribed procedures.
Nature of Information	Tailor-made for the problem; Less accurate.	Integrated; more accurate
Communication of information	Relatively simple	Relatively difficult.
Purpose of estimates	Show expected results	Lead to desired results.
Persons primarily involved	Staff and middle level management	Top management
No. of persons involved	Small	Large
Mental activity	Creative; analytical	Administrative; Persuasive
Time horizon	Tends to be long	Tends to be short
End result	Policies and precedents	Action within Policies and precedents

Answer: 8. (c)

Options for adjusting Capacity: The following are some of the options which can be used to increase or decrease capacity to match current demand:

- **Hire/Layoff :** By hiring additional workers as needed or by laying off workers not currently required to meet demand, firms can maintain a balance between capacity and demand.
- **Overtime :** By asking or requiring workers to work extra hours a day or an extra day per week, firms can create a temporary increase in capacity without the added expense of hiring additional worker.
- **Part-time or Casual Labour:** By utilizing temporary/Part-time or Casual Labour.
- **Inventory :** Finished goods inventory can be build up in periods of slack demand and then used to fill demand during periods of high demand. In this way, no new workers have to be hired.
- **Outsourcing :** Sometimes firms choose /allow another manufacturer or service provider to provide the product or service to the subcontracting firm's customer. By Outsourcing work to an alternative source, additional capacity is temporarily obtained.
- **Cross-training :** Cross-trained employees may be able to perform tasks in several operations, creating some flexibility when scheduling capacity.

Answer: 8. (d)

Buffer Management: provides the means by which the schedule is managed on the shop-floor. Buffer management is a process in which all expediting in a shop is motivated by what is scheduled to be in the buffers (constraints, shipping and assembly buffers). Buffers can be maintained at the constraint, convergent points, divergent points and shipping points. By expediting this material into the buffers, the system helps to avoid idleness at the constraint and missed customer due dates. Also, the causes of items missing from the buffer are identified and the frequency of occurrences is used to prioritize improvement activities.

Answer: 8. (e)

Merits of Contribution Approach:

The following are some of the merits of Contribution Approach:

- Aids in Decision Making: The major utility of this technique lies in the assistance it gives to the management in vital decision-making-like Make or Buy, Selling at prices below the marginal cost, Product-mix problems, Whether to accept an export order at a price less than the prevailing market price etc.,
- Cost control: This technique is essentially a tool for cost analysis and cost presentation.
- Profit Planning: Profit Planning is a planning of future operations to attain maximum profit or to maintain a specified level of profit. Contribution Approach can be used for Profit Planning.
- Evaluation of Performance: Contribution Approach can be used for evaluation of performance.

- Contribution per Limiting Factor: Contribution/Limiting Factor could be the deciding criteria in many managerial decision-making cases.