INTERMEDIATE
Group II
Paper 9 : OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT
(SYLLABUS – 2016)

Section A – Operations Management

PART – I : OBJECTIVE QUESTIONS

1. (A) Choose the most correct alternative:

(i) Application of technology or process to the raw material to add use value is known as:
- **(a) Product.**
- **(b) Production.**
- **(c) Technology.**
- **(d) Combination of technology and process.**

(ii) The activity of specifying when to start the job and when to end the job is known as:
- **(a) Scheduling**
- **(b) Follow-up.**
- **(c) Planning.**
- **(d) Timing.**

(iii) Most suitable layout for job production is:
- **(a) Line layout.**
- **(b) Matrix layout.**
- **(c) Process layout**
- **(d) Product layout.**

(iv) Length of active life of the product is known as:
- **(a) Life of the product**
- **(b) Usefulness of the product.**
- **(c) Durability of the product.**
- **(d) Dependability of the product.**

(v) (Total station time/Cycle time x Number of work stations) x 100 is known as:
- **(a) Line Efficiency**
- **(b) Line smoothness**
- **(c) Balance delay of line**
- **(d) Station efficiency**

(vi) Example of production by disintegration is:
- **(a) Automobile**
- **(b) Locomotive**
- **(c) Crude oil**
- **(d) Mineral water.**

(vii) For production planning:
- **(a) Short term forecasting is useful**
- **(b) Medium term forecasting is useful**
- **(c) Long term forecasting is useful**
- **(d) Forecasting is not useful.**

(viii) Tempering is a process of:
- **(a) Joining**
- **(b) Heat Treatment**
- **(c) Surface Treatment**
- **(d) Forming**

(ix) Relaxation Allowances are considered in:
- **(a) Time Study.**
- **(b) Method Study.**
- **(c) Ergonomic Study.**
- **(d) Feasibility Study.**

(x) Scheduling shows:
- **(a) Total cost of production**
- **(b) Total material cost**
- **(c) Which resource should do which job and when**
- **(d) The flow line of materials**

(xi) A process layout is useful when:
- **(a) demand for the product is high.**
- **(b) paper work is to be minimized.**
- **(c) in process inventory is to be low.**
- **(d) flexibility in production is required.**

(xii) Specifying the order in which individual jobs are to be executed:
- **(a) Planning**
- **(b) Loading**
- **(c) Sequencing**
- **(d) Routing**

(xiii) One of the product examples for Line Layout is:
- **(a) Repair Workshop**
- **(b) Welding Shop**
- **(c) Engineering College**
- **(d) Cement.**

(xiv) Gantt chart is concerned with:
- **(a) monitoring progress of job.**
- **(b) wage payment system.**
- **(c) job evaluation.**
- **(d) none of the above.**

(xv) Capacity is :
- **(a) Long term concept.**
- **(b) Maximum available output.**
- **(c) Not related to cost of production.**
- **(d) All of the above.**

(B) Match each item in Column 'A' with appropriate item in Column 'B':

Column 'A'		Column 'B'	
1.	VAM	(A)	Work Study
2.	Productivity	(B)	Metal Cutting
3.	Broaching	(C)	Transportation
4.	Tools	(D)	Job Evaluation
5.	Ranking Method	(E)	Machine Shop

(C) Match the following cases:

Column 'A'		Column 'B'	
1.	Linear Programming	(A)	Quality Control
2.	Average Outgoing Quality	(B)	Automation
3.	Robotics	(C)	Crashing
4.	Programme Evaluation and Review Technique	(D)	Product Mix Determination
5.	Network Analysis	(E)	Project Planning

(D) State whether the following statements are True/False.

(i) Material handling is an integral part of sales process.
(ii) The time horizon selected for forecasting depends on time required for production cycle.
(iii) Rucker plan is a group incentive plan
(iv) Assignment problem is solved by Johnson and Bellman method.
(v) Preventive maintenance is useful in reducing inspection cost.

Answer:

1. (a)

(i) (b) Production. (Note: It is the act of making products (goods and services) through application of technology or process.)

(ii) (a) Scheduling (Note: In manufacturing, the purpose of scheduling is to minimize the production time and costs, by telling a production facility when to make, with which staff, and on which equipment.)

(iii) (c) Process layout (Note: In process layout the machines of similar category are grouped together. In job production the operation differs from product to product. So, it is desirable to arrange the machines on the basis of process rather than on the products.)

(iv) (c) Durability of the product. (Note: Durability is a transcendent, product based, user based, manufacturing based, and value based concept. It is the degree to which a product tolerates stress or trauma without failing.)

(v) (a) Line Efficiency

(vi) (c) Crude oil

(vii) (a) Short term forecasting is useful

(viii) (b) Heat Treatment

(ix) (a) Time Study. (Note: RA provides the worker with an opportunity to recover from the physiological and psychological effects of expending energy in the performance of specified work under specific conditions and to allow attention to personal needs.)

(x) (c) Which resource should do which job and when

(xi) (d) flexibility in production is required.

(xii) (c) Sequencing

(xiii) (d) Cement

(xiv) (a) monitoring progress of job

(xv) (b) Maximum available output

(b) Match the following

Column 'A'		Column 'B'	
1.	VAM	(c)	Transportation
2.	Productivity	(a)	Work Study
3.	Broaching	(b)	Metal Cutting
4.	Tools	(e)	Machine Shop
5.	Ranking Method	(d)	Job Evaluation

(c) Match the following

Column 'A'		Column 'B'	
1.	Linear Programming	(d)	Product Mix Determination
2.	Average Outgoing Quality	(a)	Quality Control
3.	Robotics	(b)	Automation
4.	Programme Evaluation and Review Technique	(e)	Project Planning
5.	Network Analysis	(c)	Crashing

(d) (i) False
(ii) False
(iii) True
(iv) True
(v) False.

PART – II : SUBJECTIVE QUESTIONS

2. What is aggregate Planning? Discuss the properties of aggregate planning.

Ans:

Aggregate Planning:

Aggregate planning is an intermediate term planning decision. It is the process of planning the quantity and timing of output over the intermediate time horizon (3 months to one year). Within this range, the physical facilities are assumed to be fixed for the planning period. Therefore, fluctuations in demand must be met by varying labour and inventory schedule. Aggregate planning seeks the best combination to minimise costs.

Production planning in the intermediate range of time is termed as 'Aggregate Planning'. It is thus called because the demand on facilities and available capacities is specified in aggregate quantities. For example aggregate quantities of number of Automobile vehicles, Aggregate number of soaps etc. Here the total expected demand is specified without regard to the product mix that makes up the specified figure.

Properties of Aggregate Planning:

To facilitate the production manager the aggregate planning must have the following characteristics:

(i) Both output and sales should be expressed in a logical overall unit of measuring. For example, an automobile manufacturing can say 1000 vehicles per year, without giving the number of each variety of vehicle. Similarly a paint industry can say 10,000 litres of paint and does not mention the quantities of each colour.

(ii) Acceptable forecast for some reasonable planning period, say one year.

(iii) A method of identification and fixing the relevant costs associated with the plant. Availability of alternatives for meeting the objective of the organization.
Ability to construct a model that will permit to take optimal or near optimal decisions for the sequence of planning periods in the planning horizon.

(iv) Facilities that are considered fixed to carry out the objective.

3. List the objectives of Good Plant Layout.

Ans:

Good Plant layout- Objectives:

- Efficient utilisation of labour i.e., reduced idle time of labour and equipments,
- Higher flexibility (to change the layout easily),
- Higher utilisation of space, equipment and people (employees),
- Improved employee morale and safe working conditions,
- Improved flow of materials, information and people (employees),
- Improved production capacity,
- Reduced congestion or reduced bottleneck centers,
- Reduced health hazards and accidents,
- To allow ease of maintenance,
- To facilitate better coordination and face-to-face communication where needed,
- To improve productivity,
- To provide ease of supervision,
- To provide product flexibility and volume flexibility,
- To utilise available space efficiently and effectively.

4. (a) The following is the demand for Product A in 5 towns :

Population (in lacs) : X	**9**	**5**	**8**	**5**	**3**
Demand : Y	**12**	**20**	**15**	**10**	**5**

Estimate the demand for Product A for a town with a population of 10 lacs.

(b) The annual sales of TV sets by a dealer in Delhi are as under:

Year	**2013**	**2014**	**2015**	**2016**	**2017**
Sales (thousand units)	**3**	**14**	**36**	**4**	**33**

Fit a linear trend equation to the sales figure and estimate the sales for the year 2018.

Ans:

(a)

Population (in lacs): X	Demand : Y	Squares of population : X^2	Product of population and sales : XY
9	12	81	108
5	20	25	100
8	15	64	120
5	10	25	50
3	5	9	15
$\Sigma X = 30$ N = 5	$\Sigma Y = 62$	$\Sigma X^2 = 204$	$\Sigma XY = 393$

Let the equation of best fit trend line is: $Y = a + b X$
To find the value of "a" and "b" the following normal equations are to be solved:

$\Sigma Y = na + b\Sigma X$ …… (i)
$\Sigma XY = a\Sigma X + b \Sigma X^2$ ……. (ii)

By putting the values, we get

$62 = 5a + 30b$ ..…….. (iii)
$393 = 30.a + 204b$ …… (iv)

Multiplying equation no. (iii) by 6 and putting it as no. (v) we get

$372 = 30.a + 180b$ ……. (v)

By subtracting equation (v) from (iv), we get

$393 – 372 = (30a – 30a) + (204b – 180b)$
Or, $21 = 24b$
Or, $b = 21/24 = 0.875$

By Substituting the value of b in equation no (iii), we get

$62 = 5a + (30 \times 0.875)$
$= 5a + 26.25$
Or, $5a = 62 – 26.25 = 35.75$
Or, $a = 35.75 / 5 = 7.15$

Now, by putting the values of a, b and X (i.e. 10) in the regression equation of Y on X,
We get, $Y = a + b X$
$= 7.15 + (0.875 \times 10)$
$= 7.15 + 8.75$
$= 15.9$

Hence, the expected demand for Product A for a town with a population of 10 lacs will be approximately 16.

(b)

Year	Time deviation from 2015 (X)	Sales ('000 units) (Y)	Square of Time deviation (X^2)	Product of Time deviation & sales (XY)
2013	-2	3	4	-6
2014	-1	14	1	-14
2015	0	36	0	0
2016	+1	4	1	4
2017	+2	33	4	66
n = 5	$\Sigma X = 0$	$\Sigma Y = 90$	$\Sigma X^2 = 10$	$\Sigma XY = +50$

Let the equation of best fit trend line is: Y = a + b X.

Y = a + b

a = $\sum Y/n$ = 90/5 = 18

b = $\sum XY/\sum X^2$ = 50/10 = 5

Y = 18 + 5X

Y 2018 = 18 + 5(3) = 18 + 15 = 33 i.e., 33000 units of TVs.

5. (a) A company uses 10,000 units per year of an item costing ₹ 5 each. The cost of processing a purchase order is ₹ 100 and the carrying cost amounts to 20% per year of the money value of Inventory. How much should the company buy at a time (single order) in order to minimize the inventory cost?

(b) The annual demand for an item is 3200 units. The unit cost is ₹ 6 and inventory carrying charges are 25% per annum. If the cost of one procurement is ₹ 150, determine:
(a) EOQ
(b) Number of orders per year
(c) Time between two consecutive orders.

Ans:

(a) We are given that

Annual demand = D = 10,000 units
Carrying Cost = C = 20% of ₹ 5 = ₹ 1
Orderly Cost = S = ₹ 100 per order

$$EOQ = \sqrt{\frac{2DS}{C}} = \sqrt{\frac{2\times(10,000)\times100}{1}} = 1414 \text{ units.}$$

(b) We are given that
Annual demand = D = 3200 units
Orderly Cost = S = ₹ 150 per order
Carrying Cost = C = S = 25% of ₹ 6 = ₹ 1.50

(a) $EOQ = \sqrt{\frac{2DS}{C}} = \sqrt{\frac{2\times3200\times150}{1.50}} = \sqrt{\frac{3200\times300}{1.50}} = \sqrt{\frac{960000}{1.50}} = \sqrt{640000} = 800$ units.

(b) Number of orders = $\frac{3200}{800}$ = 4 per year

(c) Time lag between two consecutive orders= $\frac{12 \text{ months}}{\text{Number of orders per year}} = \frac{12}{4}$ =3 months

6. What factors might cause a company to order an amount larger or smaller than EOQ?

Ans:

It is always desirable to be strict to EOQ model. But it is to be kept in mind that EOQ model is useful under condition of certainty. Under real life situation, it is rarely so. Possible reasons for violation of EOQ model may be:

(i) The demand pattern of inventory and lead time is not certain.

(ii) Most of the firm maintains some amount of margin of safety or safety stock to cater to the contingent situation. These are based on own assumption. Hence actual quantity may vary from man to man.
(iii) The amount arrived at through EOQ computation may not be available or may not be accepted by the transporters.
(iv) Mismatch between transportation cost and EOQ associated cost.
(v) Panicky buying tendency of the person engaged.
(vi) Firm may be inclined to take advantage of impeding price hike by the suppliers and /or discount offered. Holding gain in inventory may also be important.

7. (a) There are two industries A and B manufacturing hose couplings. The standard time per piece is 15 minutes. The output of two small scale industries is 30 and 20 respectively per shift of 8 hours. Find the productivity of each per shift of 8 hours. What is the expected production of each per week consisting of 6 days?

(b) The following data is available for a machine in a manufacturing unit:

Hours worked per day	**8**
Working days per month	**25**
Number of operators	**1**
Standard minutes per unit of production	
Machine time	**22**
Operator time	**8**
Total time per unit	**30**

(i) If plant is operated at 75% efficiency, and the operator is working at 100% efficiency, what is the output per month?
(ii) If machine productivity is increased by 10% over the existing level, what will be the output per month?
(iii) If operator efficiency is reduced by 20% over the existing level, what will be the output per month?

Ans:

(a) Productivity = $\frac{\text{Actual Production}}{\text{Standard Production}}$

Standard production of hose compiling per shift = $\frac{8 \times 60}{15}$ = 32 pcs. [$\because$ 1 Shift = 8 hours. Working = (8×60) minutes]

Productivity of industry A = $\frac{30}{32} = \frac{15}{16}$ and productivity of industry B = $\frac{20}{32} = \frac{5}{8}$

If the productivity is expressed in percentage, the same for A is $\frac{15}{16} \times 100 = 93.75\%$

And Productivity of industry B is $\frac{5}{8} \times 100 = 62.5\%$

Production per week of industry A = 30 × 6 = 180 nos.

Production per week of industry B = 20 × 6 = 120 nos.

(b) (i) Hours worked per day = 8
Working days per month = 25
Hours worked per month = 25 × 8 = 200 hrs.
Machine time = 22 minutes & Operators time = 8 minutes
Total time = 22+8 = 30 minutes = ½ hr./unit

No. of units produced / month / operator = $\frac{200}{1/2} = 400$

As the no. of operator is 1, monthly production = 400 units. As the plant operates at 75% efficiency.

Monthly Production = $400 \times \frac{75}{100} = 300$ units.

(ii) If machine productivity is increased by 10% i.e. Machine time = $22 \times \frac{100}{(100+10)} = 20$ minutes.

Then, total time = 20 + 8 = 28 minutes

Monthly production = $\frac{400 \times 30}{28} \times \frac{75}{100} = 321$ units.

(iii) If operator efficiency reduced by 20% i.e.

Operator time = $8 \times \frac{100}{80} = 10$ minutes*.

Total time = 22 + 10 = 32 minutes.

Monthly production = $\frac{400 \times 30}{32} \times \frac{75}{100} = 281.25$ units.

(Efficiency reduced by 20%. Instead of 100%, now 80% job is completed in 8 minutes. That means, operators time is increased to 10 minutes)

8. A soap factory adopts the piece rate system for its packing section, the rate being 10 paise. There is a guaranteed wage of ₹ 20 per day. The following data is available in regard to the number of soap cakes packed per day.

Worker	No. of soap cakes packed
A	**800**
B	**600**
C	**100**
D	**700**

(a) (i) What is the wage payable to each worker?
(ii) What is the average cost of packing per soap cake for the day?

(b) The standard time for packing is 4 minutes in the above example.
(i) What is the labour productivity of each worker for a shift duration of 480 minutes?
(ii) What is the productivity of the group?
(iii) Give your comments on the productivity figures obtained.

Ans.:

(a) (i) Wages payable are – (A) 800 x 0.10 = ₹ 80; (B) 600 x 0.10 = ₹ 60; (C) 100 x 0.10 = ₹10 = ₹ 20 (guaranteed wage); (D) 700 x 0.10 = ₹ 70

(ii) Average cost of packing per soap for the day $= \frac{80+60+20+70}{800+600+100+700} \times 100$ = 23000/2200 =10.45 paise approx.

(b) (i) Labour productivity or each worker (A) : [800÷(480/4)]×100 = 666.7%; (B): [600 ÷ 480/4] × 100 = 500%; (C) : [100 ÷ 480/4] x 100 = 83.3%; (D) : [700 ÷ 480/4] x 100 = 583.3%

(ii) Productivity of the group = $[(800+600+100+700)] \div \frac{480 \times 4}{4} \times 100 = 458.3\%$

(iii) Productivity figures of all the workers except C are excellent. Group productivity is also quite good.

9. (a) A factory has three departments X, Y and Z to manufacture two products A and B. Department 'X' can produce parts for 7000 units of A or parts for 12000 units of B per week but cannot do both at the same time, though parts for some A and for some B can be produced. Similarly Department 'Y' can produce 9000 parts for A or 6000 parts for B or combinations in between.

Final assembly is undertaken in department 'Z' with separate assembly lines for A and B with maximum capacities by 6000 and 4000 units respectively. Both lines can be operated at the same time. What is the optimal Product Mix?

(b) A turning department wants to install enough semi automatic lathes to produce 2,50,000 good components per year. The turning operation takes 1.5 minutes per component. But it is observed that the output of lathes will have 3 per cent defectives. How many lathes will be required, if each one is available for 2,000 hours of capacity per year?

Ans:

(a) Let the optimal quantity of the product 'A' be M numbers and optimal quantity of product 'B' be N numbers.

So constraints of 'X' will be

$M/7000 + N/12000 \leq 1$

Ignoring inequality, so that maximum available time of X department can be used for the purpose of production.

$M/7000 + N/12000 = 1$

Or, $12 M + 7N = 84000$ ..... (i)

From the constraints of 'Y' department,

$M/9000 + N/6000 \leq 1$

Ignoring inequality,

$M/9000 + N/6000 = 1$

Or, $6M + 9N = 54000$ ..... (ii)

From the constraints of 'Z' department,

$M < 6000$ ..... (iii)

$N < 4000$ ..... (iv)

Solving equation (i) and (ii)

$12M + 18N = 108000$ ..... (ii) × 2 ..... (v)

$12M + 7N = 84000$

Subtracting (i) from (v)

$11N = 24000$

$N = 2181.8.$

Substituting the value of N in Eq. (ii)

$6M + 9 \times 2182 = 54000$

Or, $6M = 54000 - 19638$

Or, $6M = 34362$

Or, $M = 5727.$

The values of M & N thus obtained satisfies the constraints (iii) and (iv)

Therefore, the optimal Product Mix is 5728 unit of A & 2182 units of B.

(b) Required system capacity $= \dfrac{\text{Actual Good Components Required}}{\text{System Efficiency}}$

$= \dfrac{2,50,000}{0.97} = 2,57,732$ components per year.

$= \dfrac{2,57,732 \text{ components per year}}{2000 \text{ hours per year}} = 129$ units /hr.

Individual lathe capacity $= \dfrac{60 \text{ minutes per hour}}{1.5 \text{ minutes per component}}$

$= 40$ components per machine hour.

Number of lathes required $= \dfrac{129 \text{ units per hour}}{40 \text{ units per machine hour}} = 3.2$ machines.

Now the firm can go for 3 or 4 lathes. If it installs three machines, it may have to carefully manage the capacity by proper scheduling or using overtime or by over loading of lathes. If it installs 4 machines, the firm will have some excess capacity. This idle capacity may be utilized by accepting orders, which need the services of lathes, or it can lease the capacity to the firms, which needs the capacity.

10. (a) A firm engaged in producing two models viz. Model X_1, and Model X_2 performs only three operations – painting, assembly and testing. The relevant data are as follows:

Unit	Sale Price	Hours required for each unit		
		Assembly	Painting	Testing
Model X_1	₹ 50	1.0	0.2	0.0
Model X_2	₹ 80	1.5	0.2	0.1

Total number of hours available each week are as under:

Assembly	**600**
Painting	**100**
Testing	**30**

The firm wishes to determine its weekly product-mix so as to maximise revenue. Write up the model for the product-mix problem.

(b) The final product of a firm has a requirement that is must weigh exactly 150 kg. The two raw-materials used in the manufacture of this product are A with a cost of ₹ 2 per unit and B with a cost of ₹ 8 per unit. At least 14 units of B and no more than 20 units of A must be used. Each unit of A weighs 5 kg and each unit of B weighs 10 kg.

How much of each type of raw materials should be used for each unit of the final product if cost is to be minimised?

Ans:

(a) In order to write the linear programming model for the problem let us first write the notations as under:

Z = Total revenue

X_1 = No. of units of Model X_1 to be produced

X_2 = No. of units of Model X_2 to be produced

b_1 = Weekly hours available for assembly

b_2 = Weekly hours available for painting

b_3 = Weekly hours available for testing

Since the objective of the firm is to maximize its revenue the Model can be stated as follows:

Maximize

$Z = 50X_1 + 80X_2$ } Objective function

Subject to

$1.0X_1 + 1.5X_2 \leq 600$ } Assembly available hours constraint

$0.2X_1 + 0.2X_2 \leq 100$ } Painting available hours Constraint

$0.0X_1 + 0.1X_2 \leq 600$ } Testing Constraint available hours

and

$X_1 \geq 0; \quad X_2 \geq 0;$ } Non-negativity condition

(b) Let us first write the problem in the form of a Linear Programming model as follows:

Minimise[4]

$$C = 2X_1 + 8X_2$$

Where C is the cost of the final product
X_1 = Number of units used of Raw Material A } Objective
X_2 = Number of units used of Raw Material B } function

[4] Instead of finding the combination of X_1 and X_2 which minimises the function $2X_1 + 8X_2$, the problem can be solved if one maximises (as stated earlier) the function $-2X_1 - 8X_2$.

Subject to:

$5X_1 + 10X_2 = 150$	Since the total weight of the final product must be exactly equal to 150 kg.	} Constraints
$X_1 \leq 20$	Since no more than 20 units of A may be used	
$X_1 \geq 14$	Since at least 14 units of B must be used	
and $X_1 \geq 0, X_2 \geq 0$	The amounts of A & B used cannot be negative	} non-negativity condition

11. A project consists for four (4) major jobs, for which four (4) contractors have submitted tenders. The tender amounts, in thousands of rupees, are given below:

Contractors	Jobs			
	A	**B**	**C**	**D**
1	**120**	**100**	**80**	**90**
2	**80**	**90**	**110**	**70**
3	**110**	**140**	**120**	**100**
4	**90**	**90**	**80**	**90**

Find the assignment, which minimizes the total cost of the project. Each contracts has to be assigned one job.

Ans:

The given problem is a standard minimization problem. Subtracting the minimum element of each row from all its elements in turn, the given problem reduces to

Contractors	Jobs			
	A	B	C	D
1	40	20	0	10
2	10	20	40	0
3	10	40	20	0
4	10	10	0	10

Now subtract the minimum element of each column from all its elements in turn. Draw the minimum number of lines horizontal or vertical so as to cover all zeros.

Contractors	Jobs			
	A	B	C	D
1	~~30~~	~~10~~	~~0~~	~~10~~
2	0	10	40	0
3	0	30	20	0
4	~~0~~	~~0~~	~~0~~	~~10~~

Since the minimum number of lines to cover all zeros is equal to 4 (=order of the matrix), this matrix will give optimal solution. The optimal assignment is made in the matrix below:

Contractors	Jobs			
	A	B	C	D
1	30	10	[0]	10
2	[0]	10	40	~~0~~
3	~~0~~	30	20	[0]
4	~~0~~	[0]	~~0~~	10

The optimal assignment is

Contractors	Jobs	Cost (in thousands of rupees)
1	C	80
2	A	80
3	D	100
4	B	90
	Total	350

Hence, total minimum cost of project will be ₹ 3,50,000.

Alternative Solutions:

Contractors	Jobs			
	A	B	C	D
1	30	10	[0]	10
2	~~0~~	10	40	[0]
3	[0]	30	20	~~0~~
4	~~0~~	[0]	~~0~~	10

Optimal Assignment is

Contractors	Jobs	Cost (in thousands of rupees)
1	C	80
2	D	70
3	A	110
4	B	90
		Total = 350

12. Find the initial feasible solution by North – West Corner Method.

	W_1	**W_2**	**W_3**	**W_4**	**Supply**
F_1	**48**	**60**	**56**	**58**	**140**
F_2	**45**	**55**	**53**	**60**	**260**
F_3	**50**	**65**	**60**	**62**	**360**
F_4	**52**	**64**	**55**	**61**	**220**
Demand	**200**	**320**	**250**	**210**	

W_1 → Warehouse, F_1 → Factory & Cell entries are unit costs.

Ans:

Initial Feasible solution by North West Corner Method (NWCM)

	W_1	W_2	W_3	W_4	Supply
F_1	140 48	60	56	58	~~140~~
F_2	60 45	200 55	53	60	~~260~~ ~~200~~
F_3	50	120 65	240 60	62	~~360~~ ~~240~~
F_4	52	64	10 55	210 61	~~220~~
Demand	~~200~~ ~~60~~	~~320~~ ~~120~~	~~250~~ ~~10~~	~~210~~	

13. (a) A learning curve has strategic implications. Discuss.

(b) It is not worthwhile to improve the productivity when the industry is facing recession leading to reduction in profits. Comment.

Ans:

(a) The learning curve is particularly important in productivity improvement results during the rapid development and mature phases of the product life cycle. Its uses in strategic planning is discussed below:

(i) A firm which has the largest market share will produce the largest number of units and will have the lowest cost, even if all the firms are on the same percentage learning curve.

(ii) If through process technology advantages, a firm can establish itself on a lower percent learning curve than a competitor, it will have lower unit cost, even if both firms have the same cumulative output.

(iii) A firm with greater experience can use an aggressive price policy as a competitive weapon.

(iv) A firm can use aggressive process technology policy by allocating resources towards mechanization in earlier stages and automation in the later stages of growth to maintain its position.

(b) This statement is not correct. Productivity improvement has to be constantly done in industry. While productivity improvements during periods, of economic boom can lead to greater profits, productivity improvement during economic recession, is all the more necessary for cost reduction and lesser losses. With improved productivity, the unit cost of production is reduced, thereby minimizing the losses in such a situation. Put in other words, a company would end up with higher losses, if it does not care to improve productivity during recessionary periods.

14. (a) Write a short note on 'Scope of TQM'.

(b) Explain 'Quality certification'.

Ans:

(a) Scope of TQM

1. Are integrated organisational infrastructure
2. A set of management practices
3. A wide variety of tools and techniques.

QM is Japanese approach to quality. The term TQM refers to a quest-for quality in an ganization. TQM is a process that underlines three philosophies. One is never-ending push to improve, which is referred to as continuous improvement; the second is the involvement of every employee in the organization and the third is the goal for customer satisfaction, which means meeting or exceeding customer expectations. It often focuses on benchmarking world-class standards, product and service design and purchasing. In addition, TQM involves a number of other elements such as:

- Team approach,
- Employee empowerment
- Decisions based on facts rather than opinions,
- Knowledge of quality tools [flow charts, check sheets, histograms, pareto analysis, scatter diagrams etc.]
- Quality at the source and
- Inclusive of supplies as a part of quality improvement programme.

TQM is a process of continuous improvement at every level of the organization-the centre of the entire process is customer satisfaction. TQM implies that the organization is doing everything it can to achieve quality at all stages of the process, from customer demands, to product design, to engineering.

TQM seeks to breakdown communication barriers among employees and also between the organization and its external stakeholders, in order to increase cross-functional integration and provide new avenues for co-operation to improve quality. It would be incorrect to think of TQM merely a collection of techniques. Rather, TQM reflects a whole new attitude toward quality. It is about the *culture* of an organization. To truly reap the benefits of TQM, the culture of an organizations must change. In other words, TQM organization strives to develop co-operative relationships with its suppliers and distributors so that continuous improvement of quality becomes their goals too. Ford, Motorola, and GM have taken steps to develop long-term relationships with their suppliers and distributors.

(b) **Quality Certification**

Many international businesses recognize the importance of quality certification. The EU, in 1987, established ISO [International Organisation for Standardisation] 9000 certification. Two of the most well known of these are ISO 9000 and ISO 14,000. ISO 9000 pertains to quality management. It concerns what an organization does to ensure that its products or services are suitable to customers expectations. ISO 14,000 concerns minimization of harmful effects to the environment caused by its operations. Both ISO 9000 and ISO 14000

are related to an organization processes rather than its products and services and they stress continual improvement.

ISO 9000 is composed of the national standard bodies of 91 countries. About 90 countries have adopted ISO 9000 as national standards. This certification is intended to promote the idea of quality at every level in the organisation.

ISO certification is an elaborate and expensive process. Any firm seeking this certification needs to document how its workers perform every function that affects quality and install mechanisms to ensure that, they follow on expected lines. ISO 9000 certification entails a complex analysis of management systems and procedures. Rather than judging the quality of a particular product, ISO 9000 evaluates the management of the entire manufacturing process, from purchasing, to design, to training. A firm that seeks this certification must fill out a report and then be certified by a team of independent auditors. With certification comes *registration* in an ISO directory, that firms seeking suppliers can refer to, for a list of certified companies. They are generally given preference over unregistered companies.

There are essentially five standards associated with the ISO 9000 series. The series, if we place them on a continuum, would range from design and development through procurement, production, installation and servicing. Whereas, ISO 900X3 and 9004 only establish guidelines for operation, ISO 9001, 9002 and 9003 are well-defined standards.

15. (a) In a bank with a single server, three are two chairs for waiting customers. On an average one customer arrives every 10 minutes and each customer takes 5 minutes for getting served. Make suitable assumptions, find

(i) the Probability that an arrival will get a chair to sit on,

(ii) the probability that an arrival will have to stand, and

(iii) expected waiting time of a customer.

(b) P Ltd. quality control deptt. is managed by a single person who takes an average 10 minutes in checking point of each of the machine coming for inspection. The machines arrive once in every 12 minutes on an average. One hour of the machine is valued at ₹20 per hour and that of person is valued at ₹10 per hour. What are the average hourly queuing system costs associated with the quality control deptt.?

Ans.:

(a) Following assumptions are made for solving the given queuing problem:

1. The arrival rate is randomly distributed according to Poisson distribution.
2. The mean value of the arrival rate is λ.
3. The service time distribution is approximated by an exponential distribution and the rate of service is μ
4. The rate of service is greater than the rate of arrivals (i.e. $\mu > \lambda$).
5. The queue discipline is first-come-first-served (FIFO).

From the data of the problem:
Arrival rate, λ = one customers in every 10 minutes i.e., 6 customer per hour.
Service rate, μ = 5 minutes/customer or 12 customer per hour.

There are two chairs excluding the one being served.

(i) The probability that an arrival will get a chair to sit on is given by: P (No of customer ≤ 2)

$$= P_0 + P_1 + P_2 = \left(1-\frac{\lambda}{\mu}\right) + \frac{\lambda}{\mu}\left(1-\frac{\lambda}{\mu}\right)+\left(\frac{\lambda}{\mu}\right)^2\left(1-\frac{\lambda}{\mu}\right)$$

$$=\left(1-\frac{6}{12}\right)+\frac{6}{12}\left(1-\frac{6}{12}\right)+\left(\frac{6}{12}\right)^2\left(1-\frac{6}{12}\right)$$

$$=\frac{1}{2}+\frac{1}{2}.\frac{1}{2}+\left(\frac{1}{2}\right)^2.\frac{1}{2} = \frac{1}{2}+\frac{1}{4}+\frac{1}{8}=\frac{7}{8} = 0.875$$

Alternatively,

Probability of having less than 3 customers in system

$$= 1-\left(\frac{\lambda}{\mu}\right)^n$$

$$=1-\left(\frac{6}{12}\right)^3$$

$$=1-\frac{1}{8}=\frac{7}{8} = 0.875$$

(ii) The probability that an arrival will have to stand is given by:

$1-(P_0 + P,+P_2) = 1-\frac{7}{8} = \frac{1}{8} = 0.125$

Alternatively,

a person will have to stand if the queue has 3 or more customers in it, the probability in such a case is given by:

$$P\ (n \geq 3) = \left(\frac{\lambda}{\mu}\right)^3$$

$$=\left(\frac{6}{12}\right)^3 = \frac{1}{8} = 0.125$$

(iii) Expected waiting time of a customer in the queue is given by:

$$W_a = \frac{\lambda}{\mu\ (\mu - \lambda)} = \frac{6}{12(12-6)} = \frac{1}{2\times 6} \text{ hour or } 5 \text{ minutes}$$

(b) Arrival Rate $= \lambda = 1$ in every 12 minutes $= \frac{60}{12} = 5$ per hour

Service Rate $= \mu = 10$ minutes per machine $= \frac{60}{10} = 6$ per hour

Aveargeno. of machines in system $= \frac{\lambda}{\mu - \lambda} = \frac{5}{6-5} = 5$

Cost per machine hour is ₹ 20

Average hourly queuing system cost = No. of machines in the system × Hourly rate of machines = 5 × ₹ 20 = ₹ 100.

Average hourly cost for the employee = ₹ 10 per hour

Total costs associated with deptt. = ₹ 100 + ₹ 10 = ₹ 110 / hour

16. The following table lists the activities of a maintenance project:

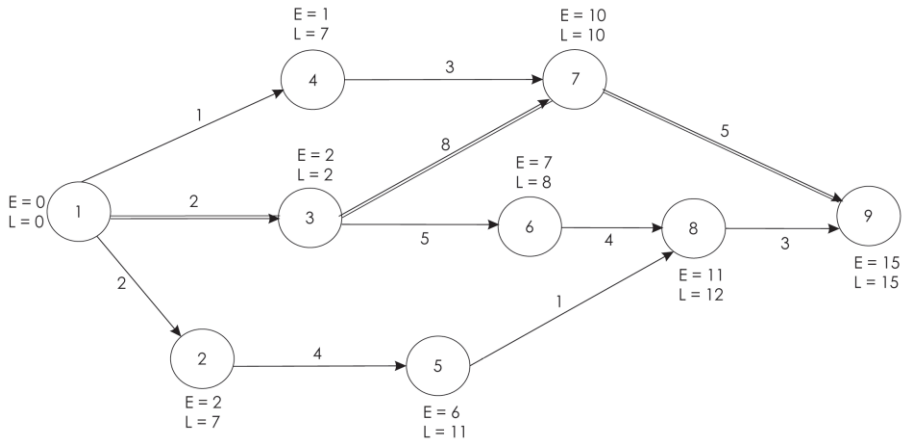
Activity	Duration (in months)
1-2	2
1-3	2
1-4	1
2-5	4
3-6	5
3-7	8
4-7	3
5-8	1
6-8	4
7-9	5
8-9	3

(i) Draw the project network.

(ii) Find the critical path and duration of the project

Ans.:

(i) **The network for the given project is drawn below:**



(ii)

Various paths	Duration of paths in months
1 – 3 – 7 – 9	2 + 8 + 5 = 15
1 – 3 – 6 – 8 – 9	2 + 5 + 4 + 3 = 14
1 – 2 – 5 – 8 – 9	2 + 4 + 1 + 3 = 10
1 – 4 – 7 – 9	1 + 3 + 5 = 9

Hence the critical path is 1 – 3 – 7 – 9 with project duration of 15 months

17. A small project consist of six activities with the following information:

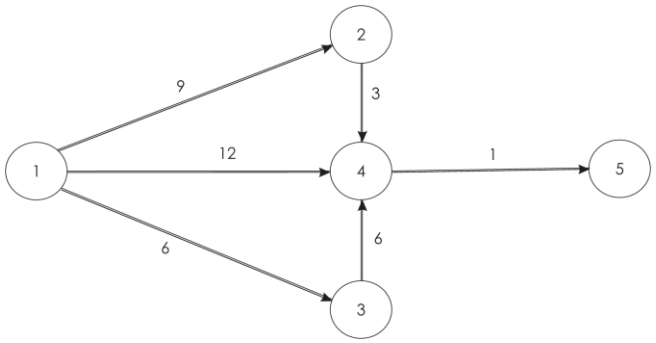
Activity	Normal Duration (days)	Minimum Time to Complete Activity (days)	Reduction Cost per day
1-2	**9**	**6**	**20**
1-3	**6**	**5**	**25**
1-4	**12**	**10**	**30**
2-4	**3**	**3**	**-**
3-4	**6**	**6**	**-**
4-5	**1**	**1**	**-**

(a) Draw the network and find Critical Path and normal Project duration

(b) Find out the various alternatives to reduce the normal duration to 12 days with the help of minimum time given for completing each activity and associated cost and suggest best alternative.

Ans.:

(a)



Various paths	Duration of paths (Days)
1 – 2 –4 – 5	9 + 3 + 1 = 13
1 – 3 – 4 – 5	6 + 6 + 1 = 13
1 – 4 – 5	12 + 1 = 13

As the project duration by following either of the paths as interpreted above is same, all the paths are critical path & Normal Project durations is 13 days.

(b) Statement showing various alternatives to reduce Normal project Duration and Associated Cost.

Activity	Days reduced	Reduction Cost per day	Total cost [(2) × (3)]
(1)	(2)	(3)	(4)
1- 2	1	20	20
1- 3	1	25	25
1- 4	1	30	30
		Total =	75

Since only one alternative exist, hence the minimum cost to reduce project duration to 12 days is ₹ 75.

18. (a) A workshop has 20 nos. of identical machine. The failure pattern of the machine is given below:-

Elapsed time after Maintenance attention (in month)	Probability of failure
1	**0.20**
2	**0.15**
3	**0.15**
4	**0.15**
5	**0.15**
6	**0.20**

It costs ₹150 to attend a failed machine and rectify the same. Compute the yearly cost of servicing the broken down machines.

(b) A Public transport system is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:

Number of breakdowns	**0**	**1**	**2**	**3**	**4**
Number of months this occurred	**2**	**8**	**10**	**3**	**1**

Each break down costs the firm an average of ₹ 2,800. For a cost of ₹ 1,500 per month, preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Which policy is suitable for the firm?

Ans.:

(a) Expected time before failure.
= 0.20x1+0.15x2+0.15x3+0.15x4+0.15x5+0.20x6 = 3.5 months/machine
Therefore number or repair / machine / annum = 12 / 3.5
Considering 20 machines and ₹150 to attend a failed machine the yearly cost of servicing = 12/3.5x20x150 = ₹10286

(b) Converting the frequencies to a probability distribution and determining the expected cost / month of breakdowns we get:

No. of breakdowns (x)	Frequency in months (f)	Probability = p = f/∑f	Expected Value (px)
0	2	0.083	0.000
1	8	0.333	0.333
2	10	0.417	0.834
3	3	0.125	0.375
4	1	0.042	0.168
	∑f = 24	∑p = 1	Total 1.710

Expected No. of breakdowns per month = ∑px = 1.71

Expected breakdown cost per month = 1.710 x ₹2800 = ₹4788.

Preventive maintenance cost per month: -

Average cost one breakdown /month =		₹2,800
Maintenance contract cost /month	=	₹1,500
Total		₹4,300.

Thus, preventive maintenance policy is suitable for the firm.

19. (a) A Firm is considering the replacement of a machine. The purchase price of the machine is ₹16,600 while its scrap value is ₹1,600. The data on maintenance cost in various years are as follows:

Year Maintenance	**: 1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Cost (in ₹)	**: 300**	**700**	**1000**	**1500**	**2100**	**2800**	**3600**	**4800**	**6200**

What is the optimum replacement interval?

(b) The following mortality rates have been observed for a certain type of light bulbs:

Week	1	2	3	4	5
Per cent failing by end of week	10	25	50	80	100

There are 1,000 bulbs in use, and it costs ₹2 to replace an individual bulb which has burnt out. If all bulbs were replaced simultaneously it would cost 50 paise per bulb. It is proposed to replace all bulbs at fixed intervals, whether or not they have burnt out, and to continue replacing burnt out bulbs as they fait. At what intervals should all the bulbs be replaced?

Ans.:

(a) Here we are given the maintenance cost M (t), the scrap value S (t) and the cost of machine as C = ₹16,600. We now compute the average cost per year during the life of the machine as shown in the following table:

Year (t)	Maintenance cost M (t)	Cumulative maintenance cost ∑M (t)	Loss in Purchase Price C – S	Total cost C – S + ΣM (t)	Average annual cost T_A
1	300	300	15,000	15,300	15,300
2	700	1,000	15,000	16,000	8,000
3	1,000	2,000	15,000	17,000	5,667
4	1,500	3,500	15,000	18,500	4,625
5	2,100	5,600	15,000	20,600	4,120
6	2,800	8,400	15,000	23,400	3,900
7	3,600	12,000	15,000	27,000	3,857
8	4,800	16,800	15,000	31,800	3,975
9	6,200	23,000	15,000	38,000	4,222

According to the above table, the lowest average cost per year is achieved by replacing the machine at the end of seventh year.

(b) Chart Showing Optimal Replacement Period

Initial cost = 1000 x ₹ 0.5 = ₹ 500

Week	1	2	3	4	5
% failing during the week	10	15	25	30	20

Week	Expected no. of bulbs to be replaced by the end of the week cost	Weekly cost (₹)	Cumulative cost (₹)	Total Cost* (₹)	Avg. weekly cost (₹)
1	1,000 x 0.1 = 100	200	200	700	700
2	1,000 x 0.15 + 100 x 0.1 = 160	320	520	1020	510
3	1,000x 0.25 + 100 x 0.15 + 160 x 0.10 = 281	562	1,082	1,582	527

* total Cost = Initial cost + Cumulative cost.

It should be replaced by the end of Second Week.

20. A faculty in a college is planned to rise to strength of 50 staff members and then to remain at that level. The wastage of recruits depends upon their length of service and is as follows:

Year:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Total % who left up to the end of year:	**5**	**35**	**36**	**65**	**70**	**76**	**80**	**86**	**95**	**100**

(i) Find the number of staff members to be recruited every year.

(ii) If there are seven posts of Head of Deptt. for which length of service is the only creterion of promotion, what will be average length of service after which a new entrant should expect promotion?

Ans.:

Let us assume that the recruitment per year is 100. From above it is clear that the 100 who join in the first year will become zero in 10th year, the 100 who join in the 2nd year will (serve for 9 years) and become 5 at the end of the 10th year and the 100 who join in the 3rd year will (serve or 8 years) and become 14 at the end of the 10th year and so on. Thus, when the equilibrium is attained, the distribution length of service of staff members will be as under:

Year	No. of staff members
0	100
1	95
2	65
3	44
4	35
5	30
6	24
7	20
8	14
9	5
10	0
Total	432

(i) Thus if 100 staff members are recruited every year, the total number of staff members after 10 years of service = 432

100 to maintain a strength of 50, the number to be recruited every year = $\frac{100}{432}x50$=11.6
It is assumed that those staff members who completed x years' of service but left before (x + 1) years' of service, actually left immediately before completing (x + 1) years.

If it is assumed that they left immediately after completing x years' of service, the total number will become 432 – 100 = 332 and 100 the required intake will be 50 x $\frac{100}{332}$ = 15

In actual practice they may leave at any time in the year so that reasonable number of recruitments per year = $\frac{11.6+15}{2}$ = 13 (approx)

(ii) If we recruit 13 persons every year then we want 7 seniors. Hence if we recruit 100 every year, we shall require $\frac{7}{13}$ x 100 = 54 (approx.) seniors.

It can be seen that 54 seniors will be available if we promote them during 6th year of their service ($\because 0 + 5 + 14 + 20 + 24 = 63 < 54$).

$\therefore$The promotion of a newly recruited staff member will be due after completing 5 years and before putting in 6 years of service.

SECTION – B
STRATEGIC MANAGEMENT

PART - I – Objective Questions

1. (a) M.C.Q.

(i) The BCG growth matrix is based on two dimensions:
(A) market size and competitive intensity
(B) relative market share and market/industry growth rate
(C) profit margins and market size
(D) market size and market share

(ii) What are enduring statements of purpose that distinguish one business from other similar Firms?
(A) Policies.
(B) Mission Statements.
(C) Objectives.
(D) Rules.

(iii) Marketing Research studies are undertaken:
(A) to measure brand loyalty of a class of consumers
(B) to predict market potential of a product on a future date
(C) to understand product-price relationships
(D) all of the above.

(iv) The Product Market matrix comprising of Strategies of Penetration, Market Development, Product Development and Diversification was first formulated by
(A) Ansoff
(B) Drucker
(C) Porter
(D) Andrews

(v) The strategy of the Reliance Group in India would be a good example of
(A) Conglomerate diversification
(B) Market development
(C) Price Transfers
(D) Concentric Diversification

(vi) Which of the following market structures would be commonly identified with FMCG products?
(A) Monopoly
(B) Monopolistic competition.
(C) Oligopoly
(D) Perfect competition

(vii) In product life cycle, 'cash cows' indicates
(A) High share
(B) Low growth and negative cash flow
(C) High share, low growth and large positive cash flow
(D) Low share, high growth and large positive cash flow

(viii) If an organisation acquires its supplier, it is an example of:

(A) Horizontal integration
(B) Forwards vertical integration
(C) Backwards vertical integration
(D) Downstream vertical integration.

(ix) Typically Profits are highest in which stage of the industry life-cycle?

(A) Introduction
(B) Growth
(C) Maturity
(D) Decline

(x) Business Process Re-engineering is:

(A) Eliminating loss-making process;
(B) Redesigning operational processes;
(C) Redesigning the product and services;
(D) Recruiting the process engineers.

Ans.:

1. (i) (B) relative market share and market/industry growth rate

   (ii) (B) Mission Statements

   (iii) (D) all of the above

   (iv) (A) Ansoff

   (v) (A) Conglomerate diversification

   (vi) (B) Monopolistic competition

   (vii) (C) High share, low growth and large positive cash flow

   (viii) (C) Backwards vertical integration

   (ix) (B) Growth

   (x) (B) Redesigning operational processes

Part II: Subjective Questions

2. (a) What does Corporate Mission mean? (b)What is a Mission Statement?

Ans.:

(a) A mission can be defined as a general objective. It is the fundamental unique purpose that sets it apart from other firms of its type. It indicates the nature and scope of business operations in terms of product, market and technology.

Corporate mission establishes the principal concentration of company effort in terms of customers.

It provides a systematic yet somewhat visionary overview of a company's position in the competitive world. A mission provides the basis of awareness of a sense of purpose, the competitive environment, the degree to which the firm's mission fits its capabilities and the opportunities which the environment offers.

A PSU supplying energy describes its mission as follows: To achieve and maintain a leading position as suppliers of quality equipment, systems and services to serve the national and international markets in the field of energy. The areas of interest would be the conversion, transmission, utilisation and conservation of energy for applications in the power, industrial and transportation fields. To strive for technological excellence and market leadership in these areas'.

Through its mission, a company indicates what it is trying to achieve and in what field. Mission represents company's objectives in qualitative terms. Ackoff refers to such objectives as stylistic objectives. It may be noteworthy that corporate missions are more ethical and philosophical in character-and reflect the top management's values. They do not have a fixed time period. While stating its mission the company's management should go further and spell out in precise terms what the company has to accomplish and the extent of managerial action required to fill the gap. This is why an enterprise develops a set of long-range objectives.

(b) A Mission Statement is a document, embodying some of the matters as outlined above. A Mission Statement provides a statement to insiders and outsiders on what the organisation stands for. It conveys the grand design of the firm and conveys what it wants to be. A Mission statement might be a short sentence, or a whole page. It is intentionally unquantified and vague and is sometimes seen as a statement of an organisation's values, rather than its distinctly commercial objectives. It should be a statement of the guiding priorities that govern a firm's behaviour. Mission statement should be simple to understand and as such jargons and buzzwords should be avoided. It should be appropriate to the organisation in terms of its culture, history and shared values. It should be consistent with the present situation. It should be written in a positive tone. Mission statement should be unique to the organisation. Further, it should be enduring and should guide and inspire the organisation for many years to come. Mission Statements are rarely changed as otherwise they have less force, and become mere slogans. However, there is no standardised content or format of Mission Statement.

3. Examine the BCG Matrix for the evaluation of Business Portfolio. List the weaknesses of the method.

Ans.:

The Boston Consulting Group (BCG) model, popularly known as the BCG Matrix and Growth-Share Matrix, is based on two variables, viz., the rate of growth of the product-market and the market share in that market held by the first relative to its competitors.

The market growth rate is an indicator of the attractiveness of the industry and the relative market share is an indicator of the strength of the firm in that industry relative to its competitors.
In the following figure, the vertical axis measures the annual growth rate of the market and the horizontal axis shows the relative market share of the firm. Each of these dimensions is divided into two categories of high and low, making up a matrix of four cells. These four cells are described below.

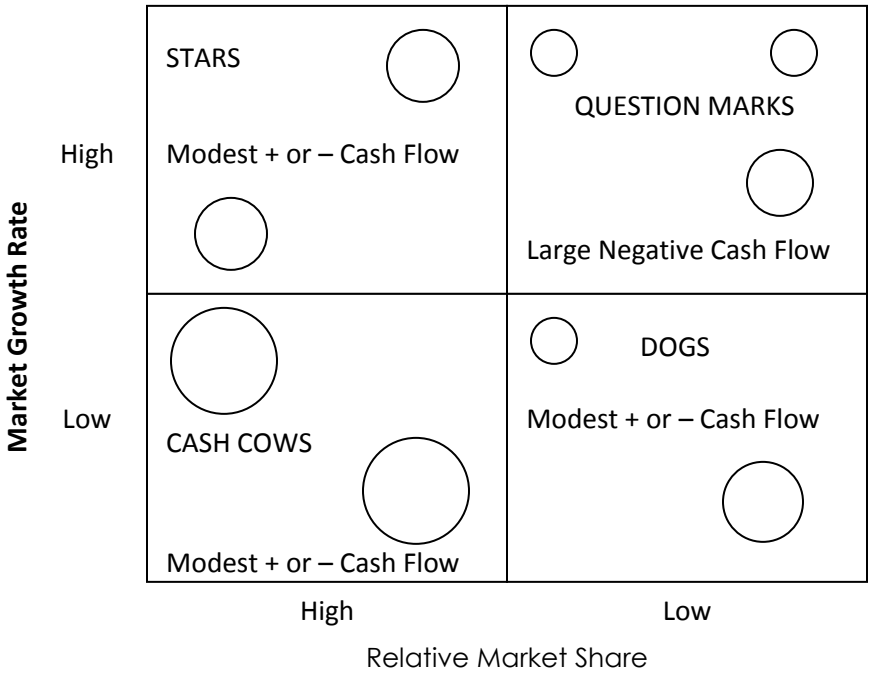
High Growth-Low Market Share: Products in this cell are in fast growing markets but their relative market shares are low. They are, therefore, aptly described as question marks - the company confronts the critical question of whether to make further investments in these businesses to build up market share or to divest and get out.

A question mark may call for heavy investment and other capabilities to increase its market share and become a star. If the company has the strength to increase its market share, the right strategy would be to build, i.e., to build up the market shares so that the question mark becomes a star.

High Growth- High Market Share: Products in this cell are called stars. They are promising products because they have a relatively high market share and the market is growing fast. Stars are usually profitable and would be the future cash cows. Many stars call for substantial investment to maintain their market share in the fast growing market. This may necessitate reinvestment of internal accruals and sourcing external funds. Several stars, therefore, may not produce cash flow for the company until the market matures and the stars become cash cows.

In the figure, there are two stars. The appropriate strategy for stars often is to hold, i.e., to maintain the market share which usually requires, as indicated above, large investments to increase supply and to fight competition.

Low Growth - High Market Share: As the market matures or when the market growth rate becomes low the stars would become cash cows. Cash cows are, thus, high market share business in slow growth industries. Being in slow growth industries, they do not normally require significant reinvestment. Cash cows generate lot of cash which may be used to finance the development of other businesses of the company like stars and question marks. A company which does not have cash cows would find it difficult to develop its business.



BCG Matrix

Low Growth - Low Market Share:

Businesses with low market share in low growth industries are described as dogs.

Dogs may produce low profits or loss. If a dog does not generate satisfactory return and if there is no chance of improving it, one may be tempted to advocate divestment. A dog may be harvested before liquidation.

The Weaknesses of B.C.G. Matrix: The criticism of the GSM approach tends to focus on its oversimplified and somewhat misleading representation of possible strategy position.

(i) This approach to strategy development encourages the use of general rather than specific criteria,

(ii) It implies assumptions about mechanism of corporate financing and market behaviour that are either unnecessary or false.

(iii) The BCG also ends to overlook other important strategic factors that are a function of the external competitive environments. For example, technological change, barriers to entry, social, legal, political and environmental pressure, unions and related human factors, elasticity of demand and the cynical nature of sales.

(iv) The application of the BCG to strategic decision-making is in the manner of the diagnostic rather than a prescriptive aid in the instances where observed cash flow pattern do not confirm with those on which the four product market categories are based. This commonly occurs where changes in product market strategies have short term transient effects on cash flow.

4. Discuss on strategic levels in organization.

Ans.:

There are primarily three levels of strategies in the organisation.

1. Corporate Level
2. Business Level
3. Functional Level

1. Corporate Level:

The corporate level of management consists of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff. These individuals occupy the top-committee of decision making within the organisation. The CEO is the principal general manager. In consultation with other senior executives, the role of corporate-level managers is to oversee the development of strategies for the whole organisation. This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation. For example, strategies formed for Unilever Limited would be at corporate level.

2. Business Level:

A business unit is a self-contained division (with it's own functions-for example, finance, purchasing, production, and marketing departments) that provides a product or service for a particular market. The principal general manager at the business level, or the business-level manager, is the head of the division. The strategic role of these managers is to translate the general statements of direction and intent that come from the corporate level into concrete strategies for individual businesses. Thus, whereas corporate-level general managers are concerned with strategies that span individual businesses, business-level general managers are concerned with strategies that are specific to a particular business. At GE, a major corporate goal is to be first or second in every business in which the corporation competes. Then the general managers in each division work out for their business the details of a strategy that is consistent with this objective. For example, strategies formed for Kwality Walls, a subsidiary of Unilever Limited would be at business level.

3. Functional Level:

Functional-level managers are responsible for the specific business functions or operations (human resources, purchasing, product development, customer service, and so on) that constitute a company or one of it's divisions. Thus, a functional manager's sphere of responsibility is generally confined to one organisational activity, whereas general managers oversee the operation of a whole company or division. Although they are not responsible for the overall performance of the organisation, functional managers nevertheless have a major strategic role: to develop functional strategies in their area that help fulfill the strategic objectives set by business & corporate-level general managers. Moreover, functional managers provide most of the information that makes it possible for business & corporate-level general managers to, formulate realistic and attainable strategies. Indeed, because they are closer to the customer than the typical general manager is, functional managers themselves may generate important ideas that subsequently may become major strategies for the company. Thus, it is important for general managers to listen closely to the ideas of their functional managers. An equally great responsibility for managers at the operational level is strategy implementation: the execution of corporate and business-level plans. For example, strategies formed for employee retention by HR manager at Kwality Walls would be at functional level.

5) Distinguish between:
(a) Plan and Policies;
(b) Corporate Planning and Long-Range Planning;

Ans.:

(a) Planning is an intellectual process of determining the objectives of an organisation. It is based on an analysis of the organisations
(i) strengths and weakness &
(ii) competitive and environmental factors.

It identifies and evaluates alternative courses of achieving such objectives with a view to choosing one or more of the alternatives and finally developing programmes and operational plans for achieving these objectives.

- Planning is futuristic. It involves formal rational process.
- Policy is a guideline for action for subordinates.

It could be a major policy or a minor policy, the corporate policy or a divisional policy. The purpose of policy, as a guide to decision making is to spell out and clarify strategy. It sharpens the meaning of the strategy and guides specific decisions in a direction that supports the strategy. It is key administrative tool for effective implementation and execution of strategies.

(b) Corporate Planning and Long-Range Planning: Corporate planning is concerned with determination of objectives treating the company as a whole and developing means to achieve the overall Company's objectives. It may encompass both short periods as well as long periods. It is an integrated system approaching plans of different components of the organisation. Corporate Planning is done at the corporate level.

Long Range Planning is a systematic and formalised process concerned with directing and controlling future options of an enterprise towards desired objectives for periods spreading generally over 5 or more years. It provides an opportunity to management to anticipate future problems and to have greater freedom of action to resolve them in an orderly manner.

6. (a) Discuss the approaches to Strategic Planning.

(b) Define a SBU structure. What are its characteristics?

Ans.:

(a) It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

(i) A top-down process, in which managers are given targets to achieve which they pass on down the line.

(ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.

(iii) An iterative process, which involves both the top-down and bottom-up setting of targets.

There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

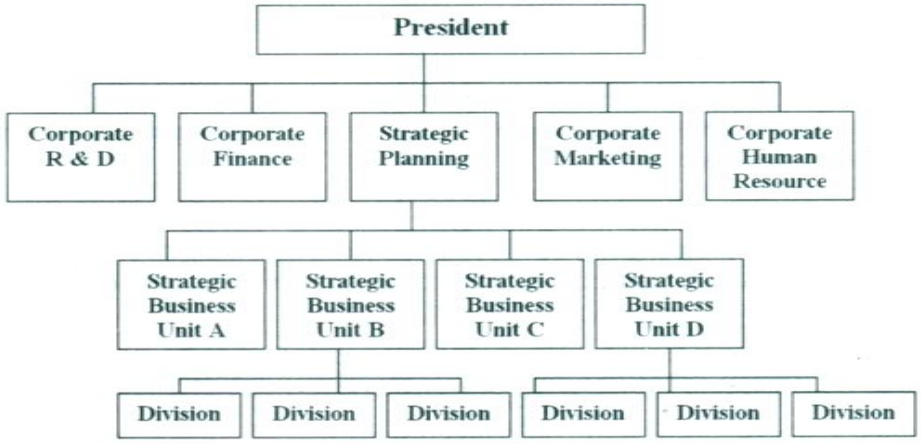
(b) Strategic Business Unit (SBU) implies an **independently managed division of a large company**, having its own vision, mission and objectives, whose planning is done separately from other businesses of the company. The vision, mission and objectives of the division are both distinct from the parent enterprise and elemental to the long-term performance of the enterprise.

There are **three levels** in a strategic business unit, wherein the **corporate headquarters** remain at the top, **SBU's** in the middle and divisions clustered by similarity, within each SBU, remain at the bottom. Hence, the **divisions** within the SBU are associated with each other, and the SBU groups are independent of each other. From the strategic viewpoint, each SBU is an independent business.

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

The three most important Characteristics of SBU are:

- It is a single business or a collection of related businesses which offer scope for independent planning and which might feasibly stand alone from the rest of the organisation.
- Has it's own set of competitors.
- Has a manager who has responsibility for strategic planning and profit performance, and who has control of profit-influencing factors.



SBU Structure

7. Explain the Mc Kinsey's 7-S framework.

Ans.:

The Mckinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

- Strategy: A set of decisions and actions aimed at gaining a sustainable competitive advantage.

- Structure: The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- Systems: The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- Style: How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- Staff: How companies develop employees and shape basic values.
- Shared Values: Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves— its corporate culture.
- Skills: An organisation's dominant capabilities and competencies.

8. Explain the significance of Strategy Evaluation?

Ans.:

Evaluation of strategy of an enterprise is as important as strategy formulation because it provides an insight into the efficacy and effectiveness of the overall plan as well as sub-plans in attaining the desired results. It also enables the management to judge the suitability of the on-going strategy in changing socio-economic, political and technological developments and corporate conditions and points out to the need for modification in strategy in order to seize emerging opportunities and minimise new threats.

On the basis of periodic strategy evaluation, the central management can determine precisely whether programmes are being carried out in such a way that corporate objectives will be attained satisfactorily.

Strategy evaluation also influences the behaviour of events and ensures that they conform to plans. It serves the 'steering function' - to steer the organisation and the various sub-systems within it on the right track and to negotiate their way through a turbulent environment. It aims at promoting integration between short-range and long-range plans and between the enterprise and the environment.

Strategy evaluation serves as a valuable instrument for the purpose of achieving stability and continuity on the one hand and adaptation and adjustment on the other. Organisational stability is sought through appraisal of operational policies and procedures. This ensures the steady state of the organisation to establish itself, to derive and consolidate the gains from resources already committed, to preserve the system's vitality and viability. Periodic appraisal of strategy provides an opportunity to the management to make requisite adjustments in objectives, strategies and policies in tune with the dynamics of the external environment.

Finally, strategy evaluation can help the management in making effective use of scarce and valuable resources of the enterprise. It strives for minimising the variability in the deployment of resources so that the intended goals are achieved with the least cost and few untoward consequences.

9. Write short note on:
(a) Business Process Re-engineering
(b) Benefits of Strategic management
(c) Strategic cost analysis in marketing
(d) Preventive Maintenance
(e) Four planning activities of Corporate Strategic Planning
(f) Strategic Management Process

Ans.:

(a) It is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organization. Business Process Re-engineering (BPR) aims to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. BPR seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes. It involves the redrawing of organizational boundaries, the reconsideration of jobs, tasks and skills. This occurs with the creation and the use of models. Whether those are physical models or mathematical/computer/structural models, the engineers build and analyse models to predict the performance of designs or to understand the behavior of devices. More specifically, BPR is defined as the use of scientific methods, models and tools to bring about the radical restructuring of an enterprise. That results in significant improvements in performance. Redesign, retooling and re-orchestrating form the key components of BPR that are essential for an organization to focus on the outcome that it needs to achieve.

(b) Strategic management is defined as a set of decisions and actions resulting in formulation and implementation of strategies designed to achieve the objectives of an organisation.

The following are some of the benefits that would accrue to any company if it practices sound strategic management.

(i) Financial benefits: Improved financial performance in terms of both profit and growth
(ii) Enhanced capability of problem Prevention:
(iii) Improved quality of strategic decisions through group interaction,
(iv) Greater Employee Motivation.
(v) Reduction of gaps and overlaps in activities
(vi) Minimum resistance to change,
(vii) Positive impact on the long-term prosperity of the firm
(viii) Leads to better analysis and diagnosis of the current and likely future environment, identifying opportunities and threats.

(c) Cost analysis with reference to marketing relate mostly to the traditional approaches and some modern approaches too. The discipline called strategic cost management has the important tenets of total cost management, activity based costing; value chain analysis etc.

According to Porter (Competitive Strategy), industry's profitability is a function of the collective strength of five competitive forces, bargaining power of suppliers, bargaining power of buyers, the threat of substitutes, the entry of new competitors, and the rivalry among the existing competitors. These five forces determine the industry's profitability

because they influence the prices, cost and required investments of firms in an industry, Cost analysis oriented towards strategic advantages should therefore address all these five areas.

(d) Preventive Maintenance

Preventive Maintenance is based on the premise that good maintenance prevents breakdowns. Preventive Maintenance means preventing breakdowns by replacing worn-out machines or their parts before their breakdown. It anticipates likely difficulties and does the expected repairs required at a convenient time before the repairs are actually needed. Preventive Maintenance depends upon the past knowledge that certain parts will need replacement after a normal interval of use. Another and quite different kind of Preventive Maintenance is there concerned with designing machines which will be both trouble-free and can be easily repaired. The most strategic decision which a production manager has to make in this regard is to determine whether Preventive Maintenance is more expensive than repairing on call. This requires comparison of total costs involved in preventive Maintenance with those involved in repairing. There are more elaborate models for special maintenance problems such as an inspection policy for equipment that can be restored to an operating condition and policy for equipment renewal after a certain length of service. However, such sophisticated analyses are appropriate when the investment involved is large or service reliability is critical. A typical Preventive Maintenance strategy is otherwise simple as compared to the sophisticated mathematical modeling. The guidance principle is that the time spent on Preventive maintenance should be less than the time required for repairs and the value imported to machines by Preventive Maintenance should exceeds the cost.

(e) Four planning activities of Corporate Strategic Planning are as below:

(a) Developing a clear mission for the company in terms of its industry, product & competence.

(b) Identifying the company's Strategic Business Units (SBU's) which can benefit from separate planning and be managed as separate profit centres.

(c) Allocating resources to SBUs based on their market attractiveness and business strength, or market growth rate and Relative Market Share matrix. The two most important portfolio models are Boston Consulting Group (BCG) model and General Electric (GE) model. Careful use of the portfolio models helps in isolating SBUs to be built, maintained, harvested or divested.

(d) Expanding present business and developing new ones to fill the strategic planning gap: The Company can identify opportunities by considering intensive growth (market penetration, market development and product development), integrative growth (backward, forward and horizontal integration) and diversification (concentric, horizontal and conglomerate diversification).

(f) Strategic Management Process:

Strategic management can be defined as the art and science of formulating, implementing and evaluating cross-functional decisions that enable an organisation to achieve its objectives.

Strategic Management is the means by which the management establishes purpose and pursues the purpose through co-alignment of organisational resources with environment, opportunities and constraints.

The Strategic Management process is most often described as a rational and an analytical process consisting of the following activities in 2 Phases viz., Phase-I & Phase-II.

Phase – I : Strategy Formulation

- Environmental scanning basically for analysing each threat facing the company and opportunities;
- Developing Corporate Vision, Mission, Goals/Strategic Objectives;
- Organisational Analysis analysing the Mission, Strengths and Weaknesses, Opportunities and Threats;
- Strategic Goals Setting, which would be easy to understand, easily measurable and achievable.
- Strategic Actions Formulations/An Action Plan to achieve the goals set;
- Developing the Functional Level Strategy, Business Level Strategy, Global Strategy and Corporate Level Strategy;
- Initiating Planning Process-Corporate Planning, Long Range Planning& Business Policy Planning;

Phase-II : Strategy Implementation:

- Laying down Principles for Corporate Performance, Governance and Ethics;
- Operationalising Strategy;
- Executing the strategy, using various tools;
- Introduce Controls;
- Detect Variance, Measure Variance, Match against Control & Initiate Feedback for Revision, if necessary;
- Strategy Evaluation and Control;