

INTERMEDIATE EXAMINATION

December 2022

**P-9(O MSM)
Syllabus 2016****Operations Management and Strategic Management**

Time Allowed: 3 Hours

Full Marks: 100

*The figures in the margin on the right side indicate full marks.**All Sections are compulsory. Each section contains instructions regarding the number of questions to be answered within the section.**All working notes must form part of the relevant answer.**Wherever necessary, candidates may make appropriate assumptions and clearly state them in answer.***Section-A****Operations Management****PART-I**

Part-I contains Question No.1. All parts of this question are compulsory.

Answer the following questions:

1. (a) **Choose the correct answer from the given alternatives (You may write only the Roman numeral and the alphabet chosen for your answer):** 1×10=10
- (i) While referring to the customer service objective of Operations Management, primary consideration "Movement of a given, requested or acceptable specification" can be associated with which one of the following principal function?
- (A) Manufacture
(B) Supply
(C) Transport
(D) Services
- (ii) Which one of the following is *not* the factor influencing effective capacity of a plant?
- (A) Forecasts of demand
(B) Plant and labour efficiency
(C) Multiple shift operation
(D) Proper record keeping of maintenance
- (iii) Which one is the objective of product design?
- (A) Profit reduction in long run
(B) To increase the development time to maximum
(C) To increase the cost of the product
(D) To achieve the desired product quality

- (iv) The type of production control which is typically found where a particular bottleneck machine exists in the process of manufacturing is
 - (A) Block control
 - (B) Load control
 - (C) Flow control
 - (D) Batch control
- (v) The ratio of "Value of output of goods of services" to "Capital assets employed" is
 - (A) Manpower Productivity
 - (B) Materials Productivity
 - (C) Capital Productivity
 - (D) Energy Productivity
- (vi) With reference to project planning, which one of the following signifies the "freedom for rescheduling or to start the job"?
 - (A) Slack
 - (B) Float
 - (C) Free Float
 - (D) Total Float
- (vii) Which one of the following is the benefit of preventive maintenance?
 - (A) Increased breakdowns
 - (B) Increased downtime
 - (C) Higher large scale repairs
 - (D) Less standby or reserve equipment or spares required
- (viii) ZAB Ltd. a large scale industry manufactures product-M of 24 units per shift of 8 hours. The standard time per unit is 15 minutes. What is the productivity of the per shift of 8 hours?
 - (A) 50%
 - (B) 60%
 - (C) 75%
 - (D) 80%
- (ix) Which one of the following ISO standards concerns minimization of harmful effects to the environment caused by the operations of an organization?
 - (A) ISO 9001
 - (B) ISO 14000
 - (C) IS 9002
 - (D) ISO 9004

(x) The type of basic process types, which is used when a very highly standardized product is desired in high volume is

(A) Job shop

(B) Batch

(C) Project

(D) Continuous

(b) Match the statement in Column I with the most appropriate statement in Column II (You may opt to write only the Roman numeral and the matched alphabet): 1×6=6

Column-I	Column-II
(A) OLAP	(1) Change for the better
(B) KAIZEN	(2) Value Analysis
(C) Ranking Method	(3) Analysis of Information from a data warehouse
(D) Gantt Chart	(4) Difference in time length of any path and the critical path
(E) Brainstorming	(5) Job Evaluation
(F) Path Slack	(6) Visual aid to plan and monitor individual activities

(c) State whether the following are 'True or False' (You may write only the Roman numeral and whether 'True' or 'False' without copying the statements into the answer books): 1×6=6

(i) Short-term planning deals with day-to-day work, scheduling and sometimes inventories problems.

(ii) The term Operations Management is more used for a system where tangible goods are produced.

(iii) Simulation is an optimizing technique.

(iv) There are essentially four standards associated with the ISO 9000 series.

(v) CPM Technique is designed for repetitive projects.

(vi) Preventive maintenance includes lubrication, cleaning, periodic overhaul etc.

PART-II

Answer any three from the question nos. 2 to 5:

16×3= 48

2. (a) (i) Enumerate what are the Activities which are listed under the production and Operations Management functions. 4

(ii) Recent trends in production/operations management relate to Global Competition and the impact it has on manufacturing firms. In this context list down what are the recent trends in production/operations management. 4

- (b) The productions (in thousand tones) of a fertilizer factory of ROMY Ltd. for the year 2013 through 2022 are given below:

Year	2013	2015	2016	2017	2018	3019	2022
Production (in thousand tones)	70	75	90	98	85	91	100

(Present calculation upto three decimal points.)

Required.

- (i) Fit a straight line by the method of least squares and tabulate the trend values.
 (ii) Estimate production (in thousand tones) of fertilizer in the year 2020 and year 2025. $6+2=8$
3. (a) **State in brief** what are the characteristics of Good Product Design (*any seven*). $1 \times 7 = 7$
- (b) The following table shows the time remaining (number of days until due date) and the work remaining (number of days still required to finish the work) for 5 jobs of ZBA Ltd. which were assigned the letters A to E as they arrived to the shop.

Job	Number of days until due date	Number of days of work remaining
A	12	13
B	7	9
C	2	5
D	8	4
E	4	1

Required:

Sequence the jobs according to priority rules established by (i) First cum first served (FCFS) (ii) Early due date job first (EDD) (iii) Least slack (LS) (iv) Shortest processing time job first (SPT) and (v) Longest processing time job first (LPT).

$1+2+3+1+2=9$

4. (a) MABUN Ltd. a company producing industrial adhesives has four sales representatives who are to be assigned to four outlets in metro cities. The monthly sales (₹ in lakh) increase estimated for each salesman for different sales territories is shown in the following table:

Salesman	City A	City B	City C	City D
I	47	40	33	26
II	35	30	25	20
III	35	30	25	20
IV	29	25	21	17

Required:

- (i) Find the optimum assignment of salesmen to outlets (cities).
 (ii) Find the total maximum sales (₹ in lakh) increase per month.

$6+2=8$

- (b) The counter of a **Ration shop** experiences the arrival of 25 customers during peak working hours. Service time will have Poisson Distribution. Experience suggests that mean service time should average about two minutes per customer.

Determine each of the following:

- (i) System utilization,
 - (ii) Percentage of time the server (agent) will be idle,
 - (iii) The expected number of customers waiting to be served,
 - (iv) The average time customers will spend in the system. 2×4= 8
5. (a) ANEX Ltd. an Engineering firm is using a machine whose purchase price is ₹ 13,000. The installation charges amount to ₹ 3700 and the machine has a scrap value of only ₹ 1400 because the firm has a monopoly of this type of work. The maintenance cost in various years as is shown below:

Year	1	2	3	4	5	6	7	8	9
Cost (₹)	300	850	1300	1900	2600	3300	4200	6000	7500

Required:

- (i) Determine after how many years should the machine be replaced on economic considerations (Assuming that machine replacement can be done only at the year end).
 - (ii) What will be the average cost of Replacement? 5+1=6
- (b) AXON TECH Ltd. has recently won a contract for the installation of a die casting machine and its associated building construction work at a local factory of large national firm of electronic engineers. Project manager has listed down the activities in the project as under:

Activity Identification	Preceding Activities	Duration (Days)
A	1-2	-
B	2-3	A
C	2-4	A
D	2-5	A
E	3-5	B
F	4-5	C
G	5-6	D,E,F
H	6-7	G
I	6-8	G
J	7-8	H

Required:

- (i) Draw the network for the project.
- (ii) What are the possible paths with duration of the project?
- (iii) Identify the critical path with duration of the project.
- (iv) Find Total Float, Free Float and Independent Float of the activities D,E,H and J of the Project. 3+2+2+3=10

Section-B

Strategic Management

PART-I

Part-I contains Question No. 6 which is compulsory.

- 6. Choose the correct answer from the given four alternatives (You may write only the Roman numeral and alphabet chosen for your answer):** 1×6=6

- (i) Strategic Management can be defined as
 - (A) the direction and scope of an organization over the long run.
 - (B) a stream of decisions and actions which leads to the development of an effective strategy or strategies to help achieve objectives.
 - (C) the statement of the future.
 - (D) a statement of the activities or steps needed to support a strategy.
- (ii) PEST analysis refers to the following factors:
 - (A) Political, environmental, structural and technical
 - (B) Portfolio, energy, solar and transformation
 - (C) Purchase, economic, supply and transportation
 - (D) Political, economical, social and technological
- (iii) Business Process Reengineering could be applied to companies that confront problems such as
 - (A) low operational costs.
 - (B) high performance of middle level managers.
 - (C) appropriate distribution of resources and jobs in order to achieve maximum performance etc.
 - (D) low quality offered to customers.
- (iv) Vision is associated with—
 - (A) Types of markets
 - (B) Customer need or requirement
 - (C) Road map to Company's future
 - (D) Distinctive competencies

- (v) While performing SWOT analysis, which one of the following can be treated as a Threat?
- (A) Price cutting war
 - (B) Reduction in financing cost
 - (C) Lesser competition
 - (D) Industrial stability
- (vi) Which one of the following 'S' is not a part of McKinsey's 7s Framework?
- (A) Skills
 - (B) Style
 - (C) Synergy
 - (D) Structure

PART-II

Answer *any two* questions out of three questions:

12×2= 24

7. (a) Enumerate the need for an Explicit Mission. How does a company's mission statement differ from its strategic vision? 5+1=6
- (b) State the aims of analyzing the product market portfolio. How value system influences the strategy? 4+2= 6
8. (a) Robert Linneman and Rajan Chandran have suggested that a seven step process in contingency planning. **In this context**, describe in brief what are the said steps in contingency planning. 6
- (b) Explain with examples, why do we need the Strategic Business Unit. 6
9. Write short notes on *any three* out of following four questions: 4×3= 12
- (a) Enumerate what are the characteristics of Core Competence.
 - (b) State what are the steps involved in formulation of production strategy.
 - (c) The **3-Rs of Re-Engineering**
 - (d) Enumerate the approaches that can be adopted to strategic planning.
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SUGGESTED ANSWERS TO QUESTIONS

SECTION – A (PART – I)

Answer to Question No. : 1 (a)

1X10 = 10 Marks

- (i) – (C)
- (ii) – (D)
- (iii) – (D)
- (iv) – (B)
- (v) – (C)
- (vi) – (A)
- (vii) – (D)
- (viii) – (C)
- (ix) – (B)
- (x) – (D)

Answer to Question No. : 1 (b)

1X6 = 6 Marks

- (A) – (3)
- (B) – (1)
- (C) – (5)
- (D) – (6)
- (E) – (2)
- (F) – (4)

Answer to Question No. 1 (c) :

1X6 = 6 Marks

- (i) – TRUE
- (ii) – FALSE
- (iii) – FALSE
- (iv) – FALSE
- (v) – TRUE
- (vi) – FALSE

PART – II

(Any three from the questions 2 to 5)

16X3=48 Marks

Answer to Question No. 2 (a) (i) :

4 Marks

The following are the activities which are listed under Production and Operations Management functions :

1.	Location of facilities.
2.	Plant Layouts and Material Handling.
3.	Product Design.

4.	Process Design.
5.	Production Planning and Control.
6.	Quality Control.
7.	Materials Management.
8.	Maintenance Management.



Answer to Question No. : 2 (a) (ii) :

4 Marks

Recent trends in Production/Operations Management:

1.	Global Market Place
2.	Production/Operations Strategy
3.	Total Quality Management (TQM)
4.	Flexibility
5.	Time Reduction
6.	Technology
7.	Worker Involvement
8.	Re-Engineering
9.	Environmental Issues
10.	Corporate Downsizing (or Right Sizing)
11.	Supply-Chain Management
12.	Lean Production

Answer to Question No. : 2 (b)

6+2 = 8 Marks

- (i) The equation of Straight line Trend is $Y = 86.55 + 3.146\chi$
- (ii) **The estimated production (in Thousand Tons) for the year :**
 Year 2020= $(Y_{20})= 95.988$
 Year 2025= $(Y_{25})= 111.718$

The Characteristics of Good Product Design are stated below : (Any Seven)

- (i) **Function or performance :** The function or performance is what the customer expects the product to do to solve his / her problem or offer certain benefits leading to satisfaction. **For example,** a customer for a motor bike expects the bike to start with a few kicks on the kick peddle and also expects some other functional aspects such as pick-up, maximum speed, engine power and fuel consumption etc.
- (ii) **Appearance or aesthetics :** This includes the style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.
- (iii) **Reliability:** This refers to the length of time a product can be used before it fails. In other words, reliability is the probability that a product will function for a specific time period without failure.
- (iv) **Maintainability :** This refers to the restoration of a product once it has failed. High degree of maintainability is desired so that the product can be restored (repaired) to be used within a short time after it breaks down. This is also known as serviceability.
- (v) **Availability:** This refers to the continuity of service to the customer. A product is available for use when it is in an operational state. Availability is a combination of reliability and maintainability. High reliability and maintainability ensures high availability.
- (vi) **Productibility:** This refers to the ease of manufacture with minimum cost (economic production). This is ensured in product design by proper specification of tolerances, use of materials that can be easily processed and also use of economical processes and equipments to produce the product quickly and at a cheaper cost.
- (vii) **Simplification:** This refers to the elimination of the complex features so that the intended function is performed with reduced costs, higher quality or more customer satisfaction.
- (viii) **Standardisation:** This refers to the design activity that reduces variety among a group of products or parts. For example, group technology items have standardised design which calls for similar manufacturing process steps to be followed.
- (ix) **Specification:** A specification is a detailed description of a material, part or product, including physical measures such as dimensions, volume, weight, surface finish etc. These specifications indicate tolerances on physical measures which provide production department with precise information about the characteristics of products to be produced and the processes and production equipments to be used to achieve the specified tolerances (acceptable variations).
- (x) **Safety:** The product must be safe to the user and should not cause any accident while using or should not cause any health hazard to the user. **For example,** a pharmaceutical product while used by the patient, should not cause some other side effect threatening the user.

Answer to Question No. 3 (b) :

1+2+3+1+2 = 9 Marks

- (i) FCFS (First come first served): Since the jobs are assigned letters A to E as they arrived to the shop, the sequence according to FCFS priority rule is: A, B, C, D, E.
- (ii) EDD (Early due date job first) rule: Taking into account the number of days until due date, the sequence of jobs as per EDD rules is :

Jobs	C	E	B	D	A
No. of days until due date	2	4	7	8	12

- (iii) LS (Least slack) rule also called as Minimum slack rule.

Calculation of slack :

Slack = (Number of days until due date) – (Number of days work remaining)

Jobs	Number of days until due date	Number of days of work remaining	Slack (Days)
A	12	13	12-13 = -1
B	7	9	7-9 = -2
C	2	5	2-5 = -3
D	8	4	8-4 = 4
E	4	1	4-1 = 3

Sequence is thus :

Jobs	C	B	A	E	D
Slack	-3	-2	-1	3	4

- (iv) **SPT** (Shortest Processing Time job first) also referred as **SOT** (Shortest Operation time job First) rule or **MINPRT** (Minimum Processing time job first) rule.

Sequence is thus :

Jobs	E	D	C	B	A
Processing time (days)	1	4	5	9	13

- (v) **LPT** (Longest Processing time job first) also referred to as **LOT** (Longest Operation time job first) rule. Sequence is thus :

Jobs	A	B	C	D	E
Processing time (days)	13	9	5	4	1

Answer to Question No. 4 (a) : (i)

6+2 = 8 Marks

Relative Loss Matrix

Sales Man \ City	A	B	C	D
I	0	7	14	21
II	12	17	22	27
III	12	17	22	27
IV	18	22	26	30

As this is a problem of Maximization, the same is converted to one of Minimization by forming a Relative Loss Matrix where all the elements of the given matrix are subtracted from the highest element of the matrix (which is 47 in this case).

Matrix after Row Operation

Sales Man \ City	A	B	C	D
I	0	7	14	21
II	0	5	10	15
III	0	5	10	15
IV	0	4	8	12

Matrix after Column Operation

Sales Man \ City	A	B	C	D
I	0	3	6	9
II	0	1	2	3
III	0	1	2	3
IV	0	0	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 2 \neq Order of the matrix (4)

So the solution is non optimal.

Improved Matrix (Non Optimal)

Sales Man \ City	A	B	C	D
I	0	2	5	8
II	0	0	1	2
III	0	0	1	2
IV	1	0	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 3 \neq Order of the matrix (4)

So the solution is non optimal.

Further Improved Matrix [(Optimal Solution (i))]

Sales Man \ City	A	B	C	D
I	0	2	4	7
II	0	0	0	1
III	0	0	0	1
IV	2	1	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 4 = Order of the matrix.

So the solution is optimal.

Further Improved Matrix [(Optimal Solution (ii))]

City Sales Man	A	B	C	D
I	0	2	4	7
II	∅	∅	0	1
III	∅	0	∅	1
IV	2	1	∅	0

(ii)

(Rs. In Lakh)					
Assignment as per Solution (i)			Assignment as per Solution (ii)		
Sales man	City	Sales	Sales man	City	Sales
I	A	47	I	A	47
II	B	30	II	C	25
III	C	25	III	B	30
IV	D	17	IV	D	17
Total		119	Total		119

Answer to Question No. 4 (b) :

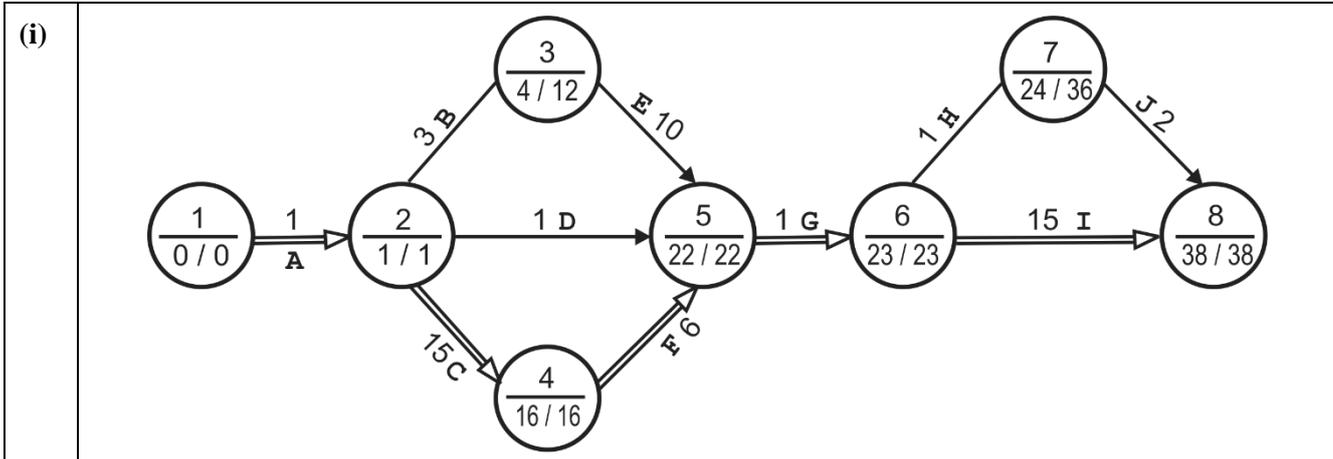
2X4 = 8 Marks

- (i) System Utilization = 0.8333
- (ii) Percentage of time the Server (agent) will be idle : = 0.1667, or 16.67 %
- (iii) Expected no. of customers waiting to be served. = 4.17 customers
- (iv) Average time customers will spend in the system = 0.200 hours = 12 minutes

Answer to Question No. 5 (a) :

5+1 = 6 Marks

- (i) The machine may best be replaced every **7th year.**
- (ii) The average cost of Replacement is **Rs 4250** approximately



- (ii) **The Possible Paths :**
- 1 – 2 – 3 – 5 – 6 – 7 – 8 = 18 Days
 - 1 – 2 – 5 – 6 – 7 – 8 = 6 Days
 - 1 – 2 – 5 – 6 – 8 = 18 Days
 - 1 – 2 – 4 – 5 – 6 – 7 – 8 = 26 Days
 - 1 – 2 – 4 – 5 – 6 – 8 = 38 Days

(iii) **Critical Path & Duration :**
 1 – 2 – 4 – 5 – 6 – 8 and duration is 38 Days

(iv)	Activity	Total Float (Days)	Free Float (Days)	Independent Float (Days)
	D	20	20	20
	E	8	8	0
	H	12	0	0
	J	12	12	0

SECTION – B

(PART – I)

Answer to Question No. : 6

1X6 =6 Marks

- (i) (B)
- (ii) (D)
- (iii) (D)
- (iv) (C)
- (v) (A)
- (vi) (C)

(PART – II)

(Any two from the questions 7 to 9)

12X2=24 Marks

Answer to Question No. : 7 (a)

5+1 = 6 Marks

The need for an explicit mission arises for varied reasons:

1. Unanimity of purpose,
2. Motivating the use of the organization's purpose,
3. Develop a basis for use of the organization's resources,
4. Facilitate the translation of objectives into a work structure.
5. Cost, time, and performance parameters can be controlled.
6. Specify organizational purpose and assign tasks.

A strategic vision portrays a company's aspirations for its future destination. A company's mission describes its purpose and its present business.

A company's mission describes its purpose and its present business (who we are, what we do, and why we are here). It announces what the company is providing to society; either a service or a product. The mission contains few specific directives, only broadly outlined or implied objectives and strategies. Characteristically, it is a statement of attitude, outlook, and orientation rather than of details and measurable targets.

Answer to Question No. : 7 (b)

4+2 = 6 Marks

Portfolio Analysis is the process of reviewing or assessing the elements of the entire portfolio of securities or products in a business. The review is done for careful analysis of risk and return. The Analysis is used in describing a product-market portfolio with the following aims:

- (i) To identify the current strengths and weaknesses of an organization's products in its markets, and the state of growth or decline in each of these markets.
- (ii) To identify what strategy is needed to maintain a strong position or improve a weak one.

Several matrices have been developed over the years to analyze market share, market growth, and market position.

Value system : A factor very much complimentary to the mission that influences the portfolio strategy is the value system of the promoters or major stockholders. After the Murugappa group took over the EID Parry, the liquor business of the EID Parry group was sold off as the Murugappa group management felt that it was unethical to be in the liquor business.

Answer to Question No. : 8 (a)

6 Marks

The Seven Steps in Contingency Planning are enumerated below :

- **Step 1** – Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.
- **Step 2** – Specify trigger points. Calculate about when contingent events are likely to occur.
- **Step 3** – Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.
- **Step 4** – Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.
- **Step 5** – Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.
- **Step 6** – Determine early warning signals for key contingency event. Monitor the early warning signals.
- **Step 7** – For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

Answer to Question No. : 8 (b)

6 Marks

A Strategic Business Unit is a relatively autonomous division of a large company that operates as an independent enterprise with responsibility for a particular range of products or activities. These strategic business units are responsible for their own profit or loss but are answerable to the top management.

SBU or a Strategic Business unit mostly targets a particular market segment and it provides expertise in product management and operations which help the parent company manage and track the different products that are produced in the company. The SBU is given the authority to make its own strategic decisions within corporate guidelines as long as it meets corporate objectives. A big organization like Unilever etc. has many SBUs for their different categories of products like Cosmetics, Food products, Beverages, etc., and each is managed through a separate unit head. It promotes accountability.

Since units' heads are responsible for individual SBU profitability. Career development opportunities are further higher in this structure.

It allows better control of categories of products manufacturing, marketing, and distribution.

Short Notes : (Any Three)

(a) Characteristics of Core Competence :

The Core Competences have the following Characteristics:

- (i) Provide distinctive advantage for the firm.
- (ii) Difficult for the competitors to imitate.
 - Competence is rare.
 - Competence is concerned with managing complex activities or processes.
 - Competitors are not clear which resource or competences have caused the success of the firm. This is known as causal ambiguity.
 - The competence is embedded in the culture.
- (iii) They make a significant contribution to customer value and the end products offered by the firm.
- (iv) They provide access to a wide variety of markets.

For example : Honda’s Core competence lies in design and manufacture of Engine and its end products includes motorcycles, cars, generators etc.

(b) Steps involved in formulation of Production Strategy :

The following steps are involved in the formulation of production strategy —

- (i) Study the overall corporate plan and define the Objectives.
- (ii) Analyse the present production operations and the present and future environment.
- (iii) Review sales- forecast and marketing.
- (iv) Make strategic decisions for production.

(c) The 3-Rs of Re-engineering:

The 3 Rs of Re-engineering are enumerated are as shown in below Table :

REDESIGN	RETOOL	RECORCHESTRATE
<ul style="list-style-type: none"> • Simplify • Standardize • Empowering • Employee ship • Groupware • Measurements 	<ul style="list-style-type: none"> • Networks • Intranets • Extranets • Work Flow 	<ul style="list-style-type: none"> • Synchronize • Process • IT • Human Resources

(d) The approaches that can be adopted to Strategic Planning :

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.