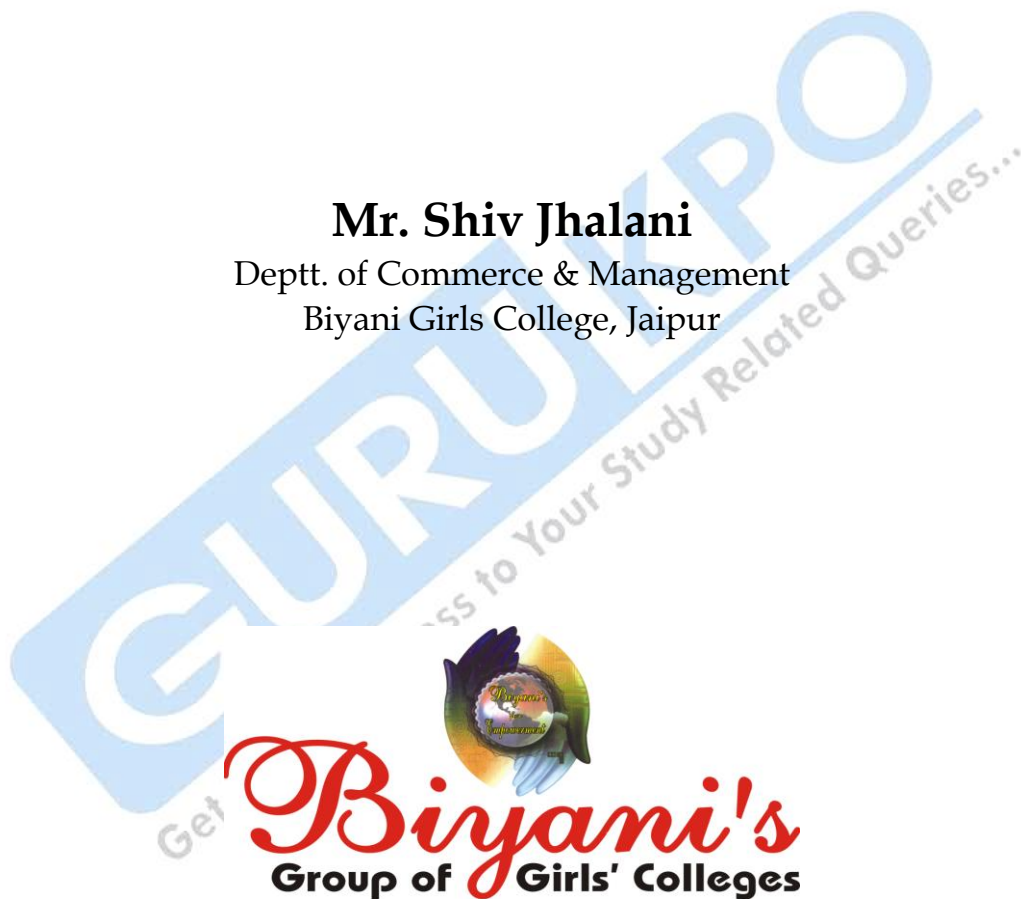


Biyani's Think Tank
Concept based notes
Industrial Management
[BBA]

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Preface

I am glad to present this book, especially designed to serve the needs of the students. The book has been written keeping in mind the general weakness in understanding the fundamental concept of the topic. The book is self-explanatory and adopts the “Teach Yourself” style. It is based on question-answer pattern. The language of book is quite easy and understandable based on scientific approach.

Any further improvement in the contents of the book by making corrections, omission and inclusion is keen to be achieved based on suggestions from the reader for which the author shall be obliged.

I acknowledge special thanks to Mr. Rajeev Biyani, *Chairman* & Dr. Sanjay Biyani, *Director (Acad.)* Biyani Group of Colleges, who is the backbone and main concept provider and also have been constant source of motivation throughout this endeavour. We also extend our thanks to Biyani Shikshan Samiti, Jaipur, who played an active role in co-ordinating the various stages of this endeavour and spearheaded the publishing work.

I look forward to receiving valuable suggestions from professors of various educational institutions, other faculty members and the students for improvement of the quality of the book. The reader may feel free to send in their comments and suggestions to the under mentioned address.

Author

SYLLABUS
INDUSTRIAL MANAGEMENT

Code 305: Industrial Management

Unit-I: **Evolution of Industrial Management** : Evolution –importance of industrial management-scientific Management – meaning and Definitions , principles, importance and criticism.

Unit-II: **Factory Location** : Factors determining location of factory - steps in location , selection of region- selection of locality -Selection of exact site, technology parks , SEZ etc. Role of government agencies in providing assistance. Location related decisions.

Unit-III: **Plant Layout**: Nature, Objectives, importance-factors influencing layout, Types of layout, problems of layout.

Unit-IV: **Work Environment and Plant Utility**: Meaning, importance, factors affecting work environment, plant utility lighting, ventilation and Air-conditioning sanitation, Noise Control.

Unit V: **Industrial Safety**: MSDS-GLP-GMP, Introduction to non conventional energy sources LPG,CNG and Hydrogen as fuels

Industrial Management

CONTENTS

S NO	Name of Chapter/Chapter Name
1	Evolution of Industrial Management
2	Factory Location
3	Technology Park & SEZ
4	Plant Layout
5	Work Environment and Plant Utility
6	Industrial Safety
7	Energy Sources

Chapter -1

Evolution of Industrial Management

Q: Briefly explain the importance of industrial management?

Ans : Importance of industrial management:

- 1- Identification of opportunities to get first mover advantage.
- 2- Sensitization of management to cope with rapid change.
- 3- Formulation of strategies and policies
- 4- Tapping Resources
- 5- Better Performance
- 6- Continuous learning process
- 7- Increasing share of woman in the workforce
- 8- Bring changes in the consumption habits of different segments of population.
- 9- Increase in desire of people for enhancement of quality of life.
- 10- Advances in Production technology
- 11- Advances in information technology
- 12- Use of World Wide Web (www) for information sharing.
- 13- Use of commerce technology like internet and intranet for doing business
- 14- Popularity of e-ticketing in case of airlines, roadways etc.
- 15- Popularity of e-banking
- 16- Increased use of e-payment mechanism like credit card, debit card, electronic fund transfer.
- 17- Simplifying procedures of import and export.
- 18- Making it easier to attract foreign capital and technology to India.
- 19- Free flow of capital across nations.
- 20- Free flow of technology across nations
- 21- Free movement of human resources across nations
- 22- Free movement of human resources across nations.
- 23- Better standard of living of people as a result of available of better goods.
- 24- Technology up gradation.

25- Opportunities in international business.

Q What is meant by scientific management or Define scientific management?

Ans: F W Taylor :

- Born in** - 1856 in Philadelphia, USA
- Career** - Started his career as an apprentice in a small machine making shop in 1870
- Position** - He rose to the position of chief engineer of Midvale steel works in 1884 at the age of 28.
- Experiments** - He experimented in different fields to eliminate wastages, of all types, increase efficiency of worker, and provided for functional management.
- Taylor** - Is regarded as father of scientific management because he launched a new movement which is known as scientific management.
- First Management Thinker** - Who insisted on the introduction of scientific management methods.
- Definition** - Scientific management implies the application of science to the management of an industrial concern. It aims at replacement of traditional techniques by scientific techniques.

“It is the art of knowing exactly what you want men to do and then seeing that they do it in the best and cheapest way”. Scientific management includes finding the most efficient methods of production, scientific selection and training of workers, proper allotment of duties and work and achieving cooperation between workers and management.

Definition of scientific management

1. "Scientific management is the substitution of exact scientific investigations and knowledge for the old individual judgment or option in all matters relating to the work done in the shop"
-FW Taylor
2. "The core of scientific management is the organized study of work , the analysis of work into its simplest elements and the systematic improvement of the worker's performance of each element"
-Peter -f- drucker
3. "Scientific management characterizes that form of organization and procedure in purposive collective effort, which rests on principles or laws derived by the process of scientific investigation and analysis, instead of any tradition or policy determined casually by the process of trial and error."
-H.S. Pearson

Q Discuss briefly the main characteristics of scientific management?

Ans: The characteristics of scientific management are as follows:

- 1- It is a systematic approach to handle management problems
- 2- It implies scientific techniques in method of work, recruitment, selection and training of worker's.
- 3- It rejects the age old method of 'rule of thumb' or hit or miss' approach
- 4- It attempts to discover the best method of doing a work at the lowest cost.
- 5- It attempts to develop each worker to his greatest efficiency.
- 6- It involves a complete change in the mental attitude of the workers as well as of the management.

Q- What are the Principles of scientific management? Explain.

OR

Explain the Taylors principles of scientific management.

Ans: The principles of scientific management developed by F.W. Taylor are meant to be a guide to the practice of management.

A brief review of their principles is given below:

- 1- Science, not rule of thumb [Development and application of scientific methods.]

- 2- Harmony , not discord (conflict) [harmony between management and labor]
- 3- Cooperation, not individualism [cooperation between management and workers]
- 4- Development of each workers [development of each worker to his greatest efficiency]
- 5- Maximum , not restricted output [maximum output in place of restricted output]
- 6- Equal division of responsibility between management and labour.

The details explanation of these given as follows:-

- 1- Science, not rule of thumb
[Development and Application of Scientific Methods]

Taylor advocated that in the traditional 'rule of thumb' There should be harmony (not conflict) between the management and workers. This requires change of mental attitudes of the worker's and the management towards each other. Taylor called it mental revolution, when this mental revolution takes place; workers and management turn their attention towards increasing profits. They do not quarrel over the distribution of profits.

Methods should be replaced with the scientific method. Scientific methods should be used for the following purpose:

- [A] To determine the standard time required to do a job
- [B] To determine a fair days work for the workers.
- [C] To determine the best way of doing the work.
- [D] To select the standard tools and equipment, maintain standard working conditions.

- 2- Harmony, not discord [conflict] [harmony between management and labour]
 - [a] Scientific management also promotes, Cooperation among workers and departments.
 - [b] As activities of all individuals and departments are directly or indirectly linked with one another, interruption of work at any

stage would affect the work of many individuals and departments, resulting in lower production and lower wages.

[c] The fear of reduced earning will force workers to cooperate with each other for the smooth working of their departments.

3- Cooperation not individualism:

[Cooperation between management and worker]

[a] Scientific management is based on cooperation between management and workers, as also between workers themselves.

[b] Management can earn higher profits if the workers perform their jobs efficiently and thus ensure better quality, lower costs and larger sales.

[c] Workers on their part can earn higher wage if the management provides them with standard materials, standard tools, standard working conditions, training in standard methods.

4- Development of each worker to his greatest efficiency

The procedure for the selection of workers should be designed scientifically. The error committed at the time a selection may prove to be very costly later on. If we do not have right workers on the right job, the efficiency of the organization will be reduced. Therefore, every organization should follow a scientific system of selection. The selected workers should be trained to avoid wrong methods of work. Management is responsible for the scientific education and training of workers. It must provide opportunities for the development of workers having better capabilities.

This would ensure greater efficiency and prosperity for both the company and the workers.

5- Maximum not restricted output [Maximum output in place of restricted output]

Both the management and the worker's should try to achieve maximum output in place of restricted output. This will be beneficial to both the parties. Maximum output will result in higher wages for the workers and greater profit for the management. Increase productivity is also in the interest of the consumer and the society at large.

EQUAL DIVISION OF RESPONSIBILITY BETWEEN MANAGEMENT AND WORKERS

There should be almost equal division of responsibility between the manager and the workers, The management should assume responsibility for the work for which it is better position of success. For instance, management should decide the method of work, working Conditions, time for completion of work etc., instead of leaving there to the discretion of workers.

Q- Write a short note on

Ans Mental Revolution Concept of Taylor

The basic idea behind the principles of scientific management is to change the mindset or attitudes of the workers and the management towards each other. Taylor called it 'Mental Revolution'

Without the revolutionary change in attitudes of the workers and the management, it is not possible to implement scientific management. Taylor called upon the management and the workers to cooperate with each other to attain maximum output.

Mental revolution has three implications:

- all out efforts for increase in production.
- Creation of the spirit of mutual trust and confidence, and
- Developing the scientific attitude towards all problems

Mental revolution on the part of management: The management should try to find the best methods of doing various jobs. It should introduce standardized materials, tools, and equipment so that wastages are reduced. The management should select right types of people and give them adequate training so as to increase the quantity and quality of production.

Q- Explain the techniques of scientific management?

Ans : Techniques of Scientific Management Taylor and his colleagues laid down the following Techniques or mechanism to put scientific management into practice:

[1] Standardization and simplification of work [work study]

- The management must carry out work study to standardize and simplify work in order to increase efficiency.
- Work study implies an organized, objective, systematic, analytical, and critical assessment of the efficiency of various operations in an enterprise.
- It is a generic term for those techniques which are used in the examination of human work in its entire context and which lead systematically to the investigation of all factors which affect the efficiency and economy of operations.

Work study includes the following techniques:-

- **Method study:** This study is conducted to know the best method of doing a particular job. It helps in reducing the distance travelled by materials, and brings improvements in handling, transporting, inspection, and storage of raw materials and goods.
- **Motion Study :** A technique which involves close observation of the movement of body and limb of an individual required to perform a job a worker of reasonable skills and ability to perform each element of the tasks in a job.
- Through time study, the precise time required for each element of a man's work is determined.
- It helps in fixing the standard time required to do a particular job.
- Time study purpose:
 - To scientifically determine the standard time for doing job under given conditions.
 - It helps to measure the efficiency of workers
 - It creates time consciousness among the workers.
 - Saving in time leads to cost reduction and increased efficiency
- It is the study of the movement of an operator or a machine to eliminate useless motions and find out the best method of doing a particular job.

- Purpose of motion study is :
 - i- To find and eliminate wasteful motions among the workers
 - ii- To find the best method of doing various operations
 - iii- It helps to increase the efficiency of workers
 - iv- It results in higher production and productivity

[C] TIME STUDY OR WORK MEASUREMENT

- Time study is the technique of observing and recording the time required by worker to complete a work.

[D] Fatigue Study :

- Fatigue, physical or mental, has an adverse effect on the workers health and efficiency.
- Fatigue is generally caused by long working hours without rest pauses, repetitive operations, excessive specialization, and poor working conditions.

Purpose of fatigue study is to reduce fatigue at work and maintains the operational efficiency of workers.

2 Standardization of tools and equipment

- Efforts should be made to provide standardized working environment and methods of production to the workers.
- Standardization would help to reduce spoilage and worker of materials, improve quality of work, reduce cost of production and fatigue among the workers.

3 Scientific Task setting :

- It is essential to set the standard task which an average worker should do during a working day.
- Taylor called it a fair days work

4 Scientific setting of wage rates:

- Taylor suggested differential piece wage system
- Under this system, higher rates are offered to those workers, who produce more than the standard quantity.

Taylor was of the view that the efficient workers should be paid from 30% to 100% more than the average workers

5 Scientific selection and training

- Management should design scientific selection procedure so that right men are selected for the right job.

6 Functional Foremanship

- Taylor advocated that specialization must be introduced in a factory.
- Functional foremanship is a form of organization which involves supervision of a worker by several specialist foremen.
- The purpose of it is to improve the quality of supervision.

7 Differential Piece-rate plan

- Taylor suggested this plan to attract highly efficient workers.
- Under this system, there are two piece work rates, one is lower and another is higher.
- The standard of efficiency is determined in terms of number of units during a day or standard time
- The worker who produces more than standard output with is the standard time, he will be given higher piece rate.
- On the other hand, if a worker is below the standard, he had be give lower rate of wages.
- This slow worker is this penalized as he gets wage at a lower piece rate.

Q: Differentiate between

TIME STUDY AND MOTION STUDY

BASIC	TIME STUDY	MOTION STUDY
1- Meaning	It is the technique which is used to measure the time that may be taken by a workman of reasonable skill and ability to perform various elements of the tasks in a job	It is a technique which involves close observation of the movements of the body and limbs required to perform a job.

2- Purpose	Its Objectives are : i- To determine time normally required to perform a certain job and ii- To fix a fair day work for the workman	Its objective are : i- To detect and eliminate waterfall motions and ii- To determine the best way of doing a job.
3- Tool of study	It is conducted with the help of stopwatch	It is conducted with the help of movie camera connected with micro chronometer (a kind of clock)

Q-1 Discuss the importance of scientific management?

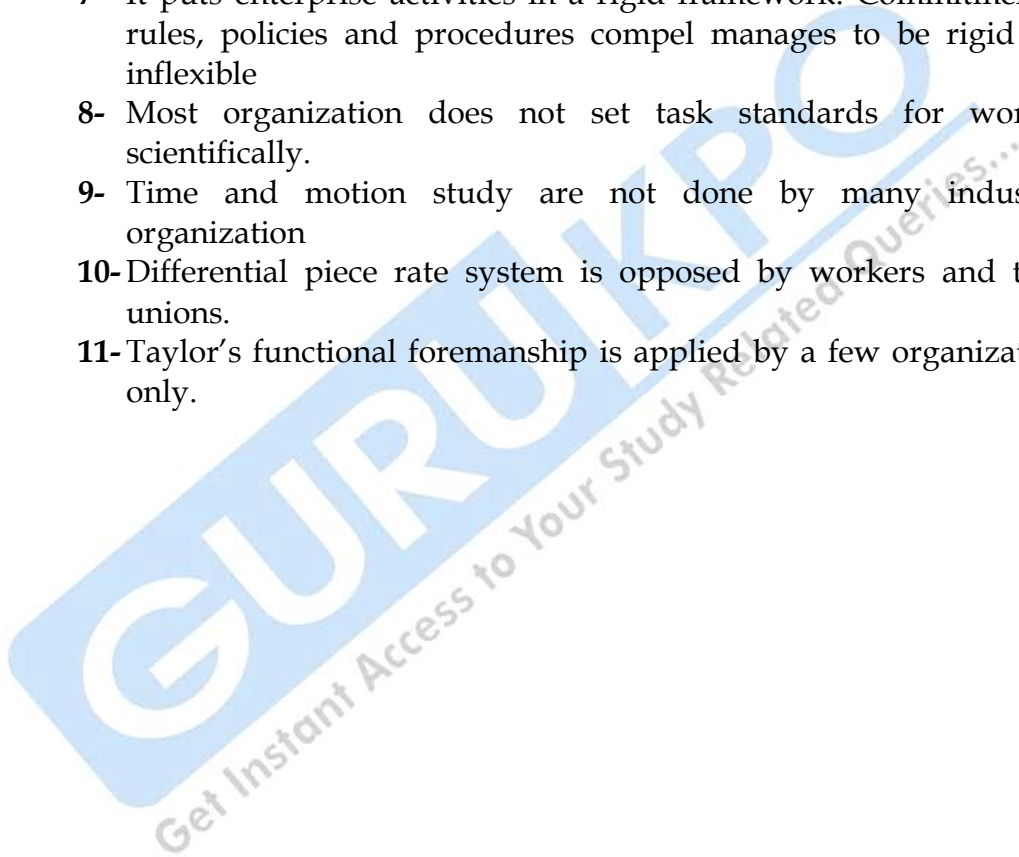
Ans : IMPORTANCE OF SCIENTIFIC MANAGEMENT

- 1- Contribution to organizational goals
- 2- Efficient use of resources
- 3- Employees feel motivated while performing their duties and work
- 4- Judging accuracy of standard
- 5- Better results
- 6- Facilitates coordination of the activities of various units
- 7- It insists on continuous check on the employees and thus creates an atmosphere of order and discipline.
- 8- It helps in building high morale of the employees.
- 9- It facilitates decision making
- 10- It facilitates delegation and decentralization of authority
- 11- It is forward looking
- 12- It is continuous process
- 13- Communication with the subordinates.

Q- Discuss the criticism of scientific management

Ans: CRITICISM OF SCIENTIFIC MANAGEMENT:

- 1- Difficulty in setting standard for product, process and quality.
- 2- Lack of control on external factors
- 3- Costly process
- 4- Time consuming
- 5- Difficulty in fixing responsibility
- 6- Difficulty is measurement of actual performance
- 7- It puts enterprise activities in a rigid framework. Commitment to rules, policies and procedures compel managers to be rigid and inflexible
- 8- Most organization does not set task standards for workers scientifically.
- 9- Time and motion study are not done by many industrial organization
- 10- Differential piece rate system is opposed by workers and trade unions.
- 11- Taylor's functional foremanship is applied by a few organizations only.



Q-1 **What is the meaning and definition of factory or plant location?**

Ans : **Definitions** : Factory or Plant Location : According to Prof . R C Davis, " The function of determining where the factory should be located for maximum operating economy and effectiveness".

Holmes defines plant location problem as one of determining. "That location which, in consideration of all factors affecting delivered-to-customers cost of product (s) to be manufactured will afford the enterprise the greatest advantages obtained by virtue of location".

The factory location issue is an important strategic level decision making for an organization one of the key features of a manufacturing system is the efficiency with which the products are transferred to the customers. This fact will include the determination of where to place the plant or factory.

A Selection on pure economic consideration will ensure.

- 1- An easy and regular supply of raw materials, & labor force
- 2- Efficient plant layout
- 3- Proper utilization of production capacity
- 4- Reduced cost of production.

An ideal location may not, by itself guarantee success, but it certainly contributes to the smooth and efficient working of an enterprise or organization.

A bad location is a severe handicap for an enterprise and it finally bankrupts it.

It is therefore, very essential that utmost care should be taken in the initial stages to select a proper place. Once a mistake is made in locating a plant it becomes extremely difficult and costly to correct it, especially where large factory or plants are concerned.

Q- **What are the requirements for selecting an appropriate location?**

Ans: Following are the requirements for selecting an appropriate location:-

- 1- For starting a new factory
- 2- For expanding the existing factory

- 3- To overcome the drawbacks and disadvantages of the existing factory
- 4- Introduction or launching a new product.
- 5- Whether to look for new locations for additional facilities.
- 6- Whether to close down existing facilities to take advantage of new location
- 7- Changes in the cost and supply of labor
- 8- Changes in the policy decisions of the industry
- 9- Changes in regulation and law's

Q- **What are the factors that determine the location for a factory?**

Ans: Hardly any location can be perfect. One has to strike a balance between various factors affecting plant location, which are discussed as follow:

- 1- **Nearness to Raw Material:** It will reduce the cost of transporting raw material from the vendor's end to the plant. Especially those plants, which consumes raw material in bulk or raw material is heavy
- 2- **Nearness to Markets:** It reduces the cost of transportation as well the chances of the finished products getting damaged and spoiled in the way (especially perishable products) Moreover a plant being near to the market can catch a big share of market and can render quick service to the customers.
- 3- **Climatic Conditions:** With the developments in the field of heating, ventilating and air conditioning, climate of the region does not present much problems, of course, control of climate needs money.
- 4- **Transport Facilities:** A lot of money is spent both in transporting the raw material and the finished goods. Depending upon the size of raw material and finished goods, and appropriate method of transportation like, roads, rail, water or air, is selected and accordingly the plant location is decided. It must be kept in mind that cost of transportation should remain fairly small in proportion to the total cost.
- 5- **Availability of labour:** Stable labour force, of right kind, of adequate size (number) and at reasonable rates with its proper attitude towards work is a few factors which govern plant location to a major extent. The purpose of the management is to face less

boycotts, strike or lockouts and to achieve lower labor cost per unit of production.

6- **LAND:** Topography , area, the shape of the site, cost, drainage and other facilities, the probability of floods , earthquake , etc, influence the selection of plant location.

7- **Financial and other aids:** Certain states give aids as loans, feed money, machinery, built up sheds etc, to attract in industrialists.

8- **Availability of Fuel:** Electricity should remain available continuously, in proper quantity and at reasonable rates.

9- **Availability of water :** water is used for

1- Processing in paper and chemical industries

2- Drinking purpose

3- Sanitary purpose

Depending upon the nature of plant water should be available in adequate quantity and should be of proper quality (clear and pure)

10- **Community attitude :** Success of an industry depends very much on the attitude of the local people and whether they want to work or not

a- Presence of related industries

b- Security

c- Housing facilities

d- Existence of schools, post offices, clubs, banks, marketing, centres, hospitals etc.

e- Facilities for further expansion.

11- **Availability of services like**

a- National highway

b- Gas

c- Drainage

d- Disposed of waste

e- Means of communication example mobile connectivity, internet, post office, and courier fax, etc.

f- Banks , ATM's

12- Political , economic and cultural situation

“The business climate of any area”, Political stability of local government and state government.

Q- Discuss the steps in selection of a factory location?

Ans: A very careful and step by step approach to selecting the plant location is necessary. Usually, the managerial decision on plant location is taken in the following three stages.

I- SELECTION OF THE REGION

II- SELECTION OF THE LOCALITY OR COMMUNITY

III- SELECTION OF THE EXACT SITE

I- SELECTION OF THE REGION:- It is influenced by the following factor :

- A-** Availability of raw material and other essential supplies
- B-** Proximity or closeness to markets
- C-** Availability of transport facilities: A place which is well connected by rail, road, air and water transport facilities is best for selection.
Transport facilities are very important for bringing raw material to the factory and carrying finished goods to the market.
- D-** Availability of communication facilities post office, internet, mobile connectivity, fax, etc. is a must.
- E-** Availability of fuel , electricity and water
Electricity should be available continuously, in proper quality and at reasonable rates.
- F-** Appropriate climate as per requirements
- G-** Proper law and order situation
- H-** Existence of congenial industrial atmosphere
- I-** Government policies like, licensing policy, government subsidies etc.

II- SELECTION OF THE LOCALITY OR COMMUNITY

The factors that influence the selection of community or locality are:-

- 1- Availability of labour force as per the quality and quantity required.
- 2- Availability of banking , research and transport facilities
- 3- Living condition of people in the community
- 4- Government restrictions and control
- 5- Government tax policy
- 6- Community attitude

7- Prevailing wage scales in the industry

Generally the following alternates are available:-

- a- Urban area or city are
- b- Rural Area
- c- Semi urban area near the urban area

(A) URBAN AREA OR CITY AREA :- A preference is there for the city area as the location of the factory or industrial units.

ADVANTAGE OF URBAN OR CITY AREA:

- (i) Excellent communication network good and prompt postal and communication services are available
- (ii) Sufficient passenger transport by road and railway are available to employees
- (iii) Good transportation facilities for material
- (iv) Availability of skilled and diversified labour
- (v) Due to large population the local demand for the product is fairly high
- (vi) Availability of good quality ,
 - 1- Educational facilities
 - 2- Recreational facilities
 - 3- Social facilities
 - 4- Medical facilities
 - 5- Banking facilities
 - 6- Insurance facilities
- (vii) Availability of service of consultants, training institutes, and trainers
- (viii) Sufficient storage facilities including cold storage are available.
- (ix) Proximity to allied industries and service units
- (x) Easy availability of water supply , drainage , fire fighting

DISADVANTAGES OF URBAN OR CITY AREA

- i. The cost of land is high. Even at high cost sufficient land is not available

- ii. There are greater restrictions on the construction of factory building
- iii. The rates of taxes are relatively high
- iv. Due to high standard of living the cost of labor is relatively high
- v. High labor turnover because of large number of industries
- vi. The trade union movement is very strong which often results in strikes and lock out etc
- vii. Concentration of man and industries in urban area creates problems of water population air pollution and sanitation etc.
- viii. Industrial city area becomes the target of air attacks in war time
- ix. To avoid concentration of industries government imposes restrictions for starting new industries in urban areas.

(B) RURAL AREA

ADVANTAGE OF RURAL AREA

- 1- Sufficient land is available at cheaper rates.
- 2- Cheaper labour rates
- 3- No municipal restrictions
- 4- Good industrial relations
- 5- Scope for expansion and diversification
- 6- No slums and environmental pollution
- 7- Less danger of bombardment in war time
- 8- Government gives financial assistance.

Disadvantages of Rural Area:

- 1- Poor transportation network
- 2- No good communication facilities
- 3- Far away from market
- 4- High absenteeism during harvest season
- 5- Non availability of facilities like :-
 - (i) Educational facilities
 - (ii) Medical facilities
 - (iii) Recreational facilities
 - (iv) Training facilities
 - (v) Management institute
- 6- Strong and warehouse facilities are not available

(C) **Sub-Urban Area :**

- 1- Educational , medical facilities are available because of nearness to the city
- 2- Availability of skilled man, labour because of nearest to the city
- 3- Land available at cheaper rate as compared to city location
- 4- Infrastructure facilities are developed by promotion agencies

Disadvantages:

- 1- Government incentive and subsidies to promote industries
- 2- High labour turnover
- 3- Due to concentration the suburban area will become crowdie and will become urban in turn with in short period

III. SELECTION OF THE EXACT SITE:-

The factors that effects are-

1. Transport facilities
2. Soil characteristics
3. Parking space
4. Space for expansion
5. Accessibility by workers
6. Cost of land
7. Existing building
8. Attitude of local people
9. Flood and drought conditions
10. Good scenery
11. Existence of religious temple and institutions in nearby area

CHAPTER-3 TECHNOLOGY PARK & SEZ

Q- What do you understand by technology parks? What are its goals and objectives?

Ans Technology park is a development to accommodate companies national and multinationals engaged in commercial application of high technology with very little or no institutional linkages.

Some science parks are termed as technology parks

According to international association of science parks:-

- 1- A science park is organization managed by specialized professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and competitiveness of its associated business and knowledge based institutions.
- 2- Science Park stimulates and manages the flow of knowledge and technology among, universities, R&D institutions, companies and markets.

Goals and objectives of technology parks:

- 1- Promote culture of innovation
- 2- Improvement in knowledge
- 3- Helps in flow of knowledge and technology amongst universities R&D institutions companies and markets
- 4- Provides other value added services
- 5- Provides all services with high quality space and facilities
- 6- Helps in technology transfer
- 7- Helps in technology commercialization
- 8- Helps in interaction between education, research and technology development.
- 9- Generation of employment
- 10- Helps in different fields
 - Informatics and software
 - Electronics and telecommunications
 - Public health
 - Energy
 - Environment

Q- What are the benefits of Technology Park?

Ans: The benefits of the technology park are:-

- 1- Easy availability of advisory services, telephone services
- 2- An environment liked by entrepreneur
- 3- Infrastructure and premises are flexible
- 4- Better networking
- 5- It attracts customers, suppliers, employers, media, business partner etc.
- 6- Helps in better interaction between scientists, promoters of business and client of business through modes.
 - Seminars
 - Guest lectures
 - Joint project
 - Shared facilities
- 7- Helps in sharing of knowledge
- 8- Helps in Research , research and development projects
- 9- Promotes the culture of innovations, inventions, and discoveries.
- 10- Easy flow of knowledge and technology
- 11- Helps in research and development process.

Q- What are the contents and facilities of science technology parks?

Ans: An science technology park in its complete form shall provide the following facilities and aspects.

- 1- Dedicated sector of the university
- 2- Research and development center (R&D)
- 3- Business center
- 4- Centre for auxiliary industries
- 5- Technological centers
- 6- Training center for staff
- 7- A Congress center
- 8- Sports grounds
- 9- Recreational and commercial services.
- 10- It should be near to institutions of higher learning
- 11- Be close to national or international airport
- 12- Facilities like, conferencing , state of the art communication , secretarial services

- 13- Testing and quality control services
- 14- Cafeteria, bank, gymnasium, crèche, guest house etc.
- 15- Air conditioned offices and landscaped surrounding

Q- Write an explanatory note on SEZ special economic zones?

Ans: SEZ (Special Economic Zone):

Introduction

Who can set up SEZ

Objective of SEZ

Types of SEZ

ADVANTAGES of SEZ

Disadvantages of SEZ

SEZ incentives and facilities

SPECIAL ECONOMIC ZONES (SEZ)

SEZ: INTRODUCTION

SEZ is a geographically bound zone where the economic laws in matters related to export and import are more broadminded and liberal as compared to rest parts of the country.

SEZ are projected as duty free are for the purpose of:

- Trade
- Operations
- Duty
- Tariffs

SEZ units have their own infrastructure and support services.

In SEZ a unit may be setup for:-

- a- Manufacture of goods
- b- Processing of goods
- c- Assembling
- d- Repairing
- e- Reconditioning
- f- Making of gold/silver, platinum, jewellery

Who can set up SEZ?

- 1- Central government
- 2- State government
- 3- Private and public company
- 4- Foreign Company
- 5- Jointly by any one of the above

Objective of SEZ

- 1- Provide an easy and simplified compliance procedures and documentations with stress on self certification.
- 2- For single window clearance on matters relating to central government and state government.
- 3- Provide single window clearance for setting up of a SEZ and a unit in SEZ.
- 4- Simplify procedures of conducting business
- 5- Additional economic activity generation
- 6- Promotion of exports of service and goods.
- 7- Development of infrastructure facilities
- 8- Creation of new employment opportunities
- 9- Increase in investment of capital from domestic and foreign sources.

TYPES OF SEZ

- 1- Free trading and warehousing zones
- 2- SEZ in a port or airport
- 3- SEZ for sector's specific
- 4- SEZ for multi product

SEZ Advantages:

A key advantage of SEZ units in India is mentioned as below:

- 1- 10 year tax holiday in a block of the first 20 yrs.
- 2- Exemption from duties on all imports for project development
- 3- Exemption from excise/VAT on domestic sourcing of capital goods for project development.
- 4- No foreign ownership restrictions in developing Zone infrastructure and no restrictions on repatriation.

- 5- Freedom to develop township in to the SEZ with residential area, markets, play grounds, clubs, recreation centers without any restriction on foreign ownership.
- 6- Income tax holiday on business income.
- 7- Exemption from import duty, VAT and other taxes
- 8- 10% FDI allowed through the automatic route for all manufacturing activities.
- 9- Procedural ease and efficiency for speedy approvals, clearances, and custom procedures, and dispute resolution.
- 10- Simplification of procedures and self certification in the labour acts.
- 11- Artificial harbors and handling bulk contains made operational throughout the year.
- 12- Houses both domestic and international air terminals to facilitate transit, to and from major domestic and international destinations.
- 13- Has host of public and private Bank Chains to offer official assistance for business houses.
- 14- A vibrant city with abundant supply of skilled manpower, covering the entire spectrum of industrial and business expertise.
- 15- Well connected with network of public transport, local railway and cabs.
- 16- Pollution free environment with proper drainage system.
- 17- In house custom clearance facilities.
- 18- Easy access to airport and local railway station
- 19- Full authority to provide services such as water, electricity, security, restaurants and recreational facilities within the zone on purely commercial basis.
- 20- Abundant supply of technically skilled manpower
- 21- Abundant supply of semi skilled labor across all industry sectors.

DISADVANTAGES

- 1- Revenue losses because a various tax exemption and incentives.
- 2- SEZ will displace and uproot lac of farmers and send land price very high

Some of the established special economic zones in India are given as below:

- 1- Falta food processing unit , West Bengal
- 2- Mani Kanchan – Gems and Jewellery, West Bengal
- 3- Calcutta leather complex , West Bengal
- 4- Navi Mumbai – Multiproduct Mumbai
- 5- Khopata- Multiproduct , Mumbai
- 6- SEEPZ- Andheri (East), Mumbai
- 7- Hewlett Packard India Software operations Pvt. Ltd.-SEZ on it
- 8- Wipro Infotech- SEZ on IT/ITES, in Surajpur Bangalore
- 9- Shipco Infrastructure –fine trade ware housing zone in Karnataka over area of 120 hectares
- 10- Divyashree infrastructure, SEZ in the IT/ITES sector in Bangalore

SEZ : INCENTIVES AND FACILITIES

- 1- **Custom and Excise:-** (a) SEZ units are free from the periodic examination by customs of export and import cargo.
 - (a) SEZ units are free to import from the domestic sources without paying any duty, without any license or specific approval
- 2- **Income Tax:** (a) Deduction of 100% profit on exports for the first five years from the year in which manufacturing commences
Interest exemption in off share banking units
- 3- **Service Tax:**
SEZ units enjoy exemption from service tax.
- 4- **Foreign Direct Investment (FDI) :**
 - a- 100% FDI is freely allowed in manufacturing sector in SEZ unit under automatic mode
 - b- No cap of foreign investments for SSI reserved items
- 5- **Banking/Insurance/External Commercial Borrowings:**
 - a- ECB by units of SEZ up to US 500 million a year allowed without any maturity
 - b- Freedom to bring in export proceeds without any time boundation
 - c- Exemption from interest rate surcharge on import finance
 - d- SEZ units allowed to write off unrealized exports bills
- 6- **Central Sales Tax Act:**
 - a- SEZ units are exempted to make sales from domestic tariff area to SEZ units.
- 7- **Exemptions in matters related to environment**

- a- SEZ units are exempted from public hearing under environment impact assessment notification.
- b- SEZ permitted to have non-polluting industries IT Sector,
- c- SEZ permitted to have facilities like, golf courses, desalination plants, Hotels, and non-polluting services industries

8- **Companies Act:**

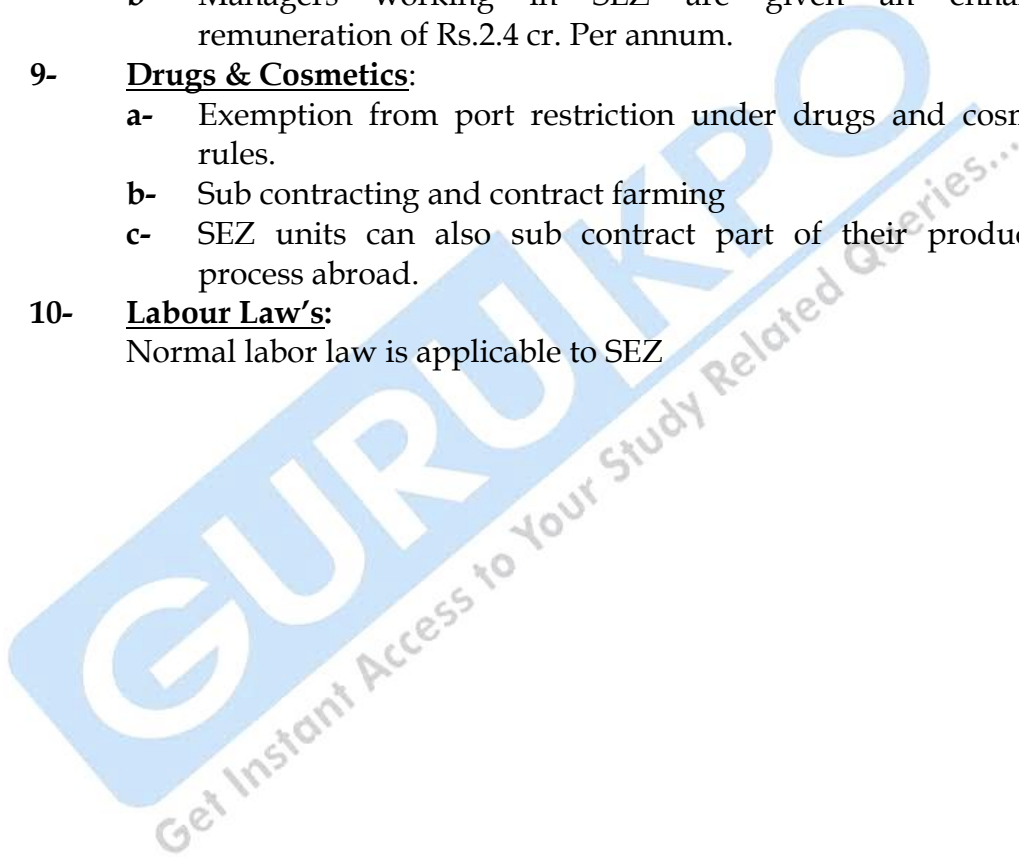
- a- Agreement to opening of regional office of registrar of companies in SEZ
- b- Managers working in SEZ are given an enhanced remuneration of Rs.2.4 cr. Per annum.

9- **Drugs & Cosmetics:**

- a- Exemption from port restriction under drugs and cosmetic rules.
- b- Sub contracting and contract farming
- c- SEZ units can also sub contract part of their production process abroad.

10- **Labour Law's:**

Normal labor law is applicable to SEZ



CHAPTER-4**PLANT LAYOUT**

Q-1 What is plant layout? What are the essential of plant layout? What are the objectives of a good plant layout?

Ans: Plant layout refers to the physical arrangement of production facilities. It is the configuration of departments, work centers and equipment in the conversion process.

Some of the important definitions of plant layout are as following:

- 1- According to RIGGS, 66 The overall objective of plant layout is to design a physical arrangement that most economically meet the required output- quantity and quality”.
- 2- According to J L Zundi “Plant layout ideally involves allocation of space and arrangement of equipment in such a manner that overall operating costs are minimized.”
- 3- According to Moore, “Plant layout is a plan of an optimum arrangement of facilities including personal, operating equipment, storage space, material handling equipment and all other supporting services along with the design of best structure to contain all their facilities.
- 4- Reduce accidents :
- 5- Providing for volume and product flexibility
- 6- Provide ease of supervision and control
- 7- Provide for employee safety and health
- 8- Allow ease of maintenance
- 9- Allow high machine or equipment utilization
- 10- Improve productivity
- 11- Quick disposal of work
- 12- Worker convenience and job satisfaction
- 13- Eliminates physical efforts required of operative workers

THE ESSENTIALS/OBJECTIVE OF GOOD PLANT LAYOUT

An efficient plant layout is one that can be instrumental in achieving the following objectives:

- A. Proper and efficient utilization of available floor space
- B. to ensure that work proceeds from one point to another without any delay

- C. Provide enough production capacity
- D. Reduce material handling costs
- E. Reduce hazards to personnel
- F. Utilize labor efficiently
- G. Increase employee morale

Q- Write a note on advantages of good plant layout?

Ans Advantages of good plant layout are:

- i- Manufacturing unit cost will be lower
- ii- Maintenance cost will be lower
- iii- There will be savings in electric expenses
- iv- There will be less spoilage and scrap
- v- Higher wages will be possible
- vi- The number of accidents would be reduced
- vii- Fire hazards will often be eliminated
- viii- Plants and equipment of solescence may be less
- ix- Set up time will be reduced
- x- Floor congestion and bottle necking of production will be eliminated
- xi- Back tracking and side tracking of materials will be eliminated
- xii- Balancing of operations will be facilitated
- xiii- Adequate storage area will be provided
- xiv- Materials more shorter distance for each time moved.
- xv- Less efforts will be required of workers
- xvi- Improved and better located employee service facilities will be available
- xvii- Specialization of operations is facilitated
- xviii- Output per man hour and total output of the plant will be increased
- xix- Idle time will be les both for skilled personnel and machines
- xx- Work in progress will be reduced in amount, together with rupee investment in it.
- xxi- The supervision burden will be reduced
- xxii- Production control will be easier to achieve
- xxiii- Less inspections will be required
- xxiv- Motion time, study work will be facilitated

Q- What is the importance of plant layout?

Ans: Importance of plant layout:

I lower production costs

- a- Low material handling costs
- b- Low labour costs
- c- Low cost of scrap
- d- Less manufacturing time
- e- Reduction in maintenance cost of tools
- f- Cost control
- g- Improvement in quality
- h- Maintenance and replacement cost decreased

II- Effective supervision and Management:

- a- Reduction in inspection
- b- Reduction in cost of supervision
- c- Low burden of supervision
- d- Easy to supervise and control

III- High turnover:

- a- Faster flow of work in process
- b- More effective utilization of machine and manpower
- c- High inventory turnover
- d- Smooth functioning

IV- Satisfaction of workers, employees, and staff

- a- Better working conditions
- b- Better facilities
- c- Increased productivity - less wastage of time
- d- Safety and security
- e- Fewer accidents
- f- Easy movement
- g- Less physical efforts

V- Excellent and quality customer service :

- a- Quick and efficient delivery system
- b- Better quality of production
- c- Competition price

Q- Write names of principles of plant layout?

Ans. Principles:

- a- Principles of cubic space utilization
- b- Principles of minimum handling
- c- Principle of maximum flexibility
- d- Principle of safety, security and satisfaction
- e- Principle of minimum distance
- f- Principle of integration
- g- Principles of flow
- h- Principle of minimum distance
- i- Principle of efficient process flow

Q Write a note on symptoms of good plant layout?

Ans The following are the symptoms of a good and well designed layout

- a. safe, neat, clean, and comfortable
- b. less amount of work in process
- c. No traffic congestion in plant
- d. Better utilization of available space and material
- e. Short material flow and production cycle
- f. Steady and smooth flow and minimum of back tracking
- g. Absence of bottle necks
- h. Flexible to meet variations in output and varieties
- i. Production is economical
- j. Easy to supervise and control
- k. less mental or physical strain on workers
- l. less handling by skilled workers
- m. All machines loaded according to capacity

Q- What are the factor influencing plant layouts?

Ans: 1. Main factor: the main is very flexible element. Main consideration are-

- a. Safety and working conditions
- b. Manpower requirements skill level of worker , their number required and their training program
- c. Human relations
- d. Manpower utilization in the plant

2. **MATERIAL FACTOR:** It includes the various input material like raw material, semi finished parts, material in process scrap, finished products, packing material, tools and other services. The main considerations are:
 - a- Design and specification of the product to be manufactured
 - b- Quantity and variety of products and materials
 - c- Physical and chemical characteristics of various inputs materials
- 3- **MACHINERY FACTOR:-**
 - a. he process and methods should be standardized first
 - b. Selection for machinery and other supporting equipment should be selected on the basis of volume of production.
 - c. Machinery requirements is monthly based on the process/method
 - d. Maintenance of machines and replacement of parts is also important
4. **MOVEMENT FACTOR:-** Mainly death with movement of men and materials a good plant layout should ensure short move and should always tends towards completion of product
- 5 **WAITING FACTOR:-** When even men and material is stopped, waiting occurs which costs money. Waiting cost includes handling cost in waiting area, money tied up with idle material etc. Waiting may occur at materials in process, between the operations. The important considerations in this case are:
 - a- Location of storage or delay
 - b- Method of touring
 - c- Space for waiting
 - d- Safeguard equipment for storing and avoiding delay.
- 6 **SERVICE FACTOR:-**

It includes the activities and facilities for personnel such as fire protection, lighting, and ventilation etc. services for material such as quality control, production control, services for machinery such as repair and maintenance and utilities like fuel/gas, and water etc.

- 7 **BUILDING FACTOR:-** It include outside and inside building features , shape of building , type of building single or multi storage etc.
- 8 **FLEXIBILITY FACTOR:**
It includes considerations due to changes in materials, machinery, process, man, supporting, activities, and installations defects. It means easy changing to new arrangement or it includes flexibility and expendability of layouts
- 9 **TYPES OF INDUSTRIES FACTOR:**
- a- Synthetic process brand industry
 - b- Analytic process brand industry
 - c- Conditioning process brand industry
 - d- Extractive process brand industry
- 10 Facilities of future expansion.

Q What are the major types of layout? Write in brief about each type.

Ans: Plant layouts can be classified as:-

- A. Process layout or functional layout**
 - B. Product layout or line layout**
 - C. Static/stationery/Fixed layout**
 - D. Mixed layout or combined layout**
- A. Process layout or Functional layout:** This is type of production where the equipment performing similar operation is grouped together.
- Process layout is best for:
- a.** Job order production
 - b.** Light and heavy engineering industries
 - c.** Job and batch type of manufacturing system.
- Advantages:**
- i.** Greater flexibility and scope of expansion exist in this layout
 - ii.** The overhead cost is low
 - iii.** Initial investment low
 - iv.** Easy, effective and specialized supervision of each function area is easy to achieve

- v. varied degree of machine utilization may be achieved
- vi. Better team work in each section
- vii. different product design and different production volumes can be easily adopted
- viii. Low maintenance and setup cost
- ix. easy maintenance of machine

DISADVANTAGES:

- 1- Total cycle time is high
- 2- Higher supervision cost due to frequent inspection
- 3- More skilled labour required
- 4- More production time required
- 5- Greater volume of work in progress
- 6- Raises inspection work and clerical work
- 7- Excessive material handling

B. PRODUCT LAYOUT OR LINE LAYOUT:

- 1. The machines are arranged according to the orders in which they are to be used in the manufacturing process
- 2. Required high investment in equipment and machine
- 3. Required less manufacturing time
- 4. Breakdown of any unit/component to immobilizes the whole system
- 5. Inflexible as each machine can perform pre designed operation only
- 6. Requires less space
- 7. Man and equipment utilization to full capacity
- 8. Specialized and expertise control in required , thus increasing supervision costs

PRODUCT LAYOUT: ADVANTAGES:

- 1- High speed of Production
- 2- Work in process quantity is reduced
- 3- Supervisory and clerical work is minimized
- 4- Facilitates planning and control
- 5- Reduces material handling
- 6- Less work in progress
- 7- Flow of material smooth and continuous

PRODUCT LAYOUT: DISADVANTAGES:

- 1- Ineffective supervision of production process
- 2- Idle production facility
- 3- Low morale of workers
- 4- Inflexible nature
- 5- Involves huge capital investment

STATIC/STATIONERY/FIXED LAYOUT:

In this layout, the material remains in a fixed position, but the machinery, tools, workman, etc. are brought to the material.

This layout is best under the following conditions.

- 1- When only one or few pieces of an item are to be manufactured
- 2- When the cost of moving the major piece of material is high
- 3- Construction industry

ADVANTAGES:

- 1- Flexibility for change in design, operation sequence, labor availability exists in this layout
- 2- Easy for products which are difficult to move

DISADVANTAGES:

- 1- High capital investment due to long duration to complete a product
- 2- Space requirement for storage of material and equipment is large
- 3- It requires careful project planning.

MIXED OR COMBINED LAYOUT:

The basic feature of these two types linked together and a new combined layout is introduced.

Chapter-5

Work environment and plant utility

Q- What is work environment? List the factors that affect work environment.

Ans Work environment is environment of the place that one works. Example – an office building, or at home. The work environment should satisfy the physical and mental requirements of the people who work in it. It includes building design and age, workplace layout, workstation setup, furniture and equipment design quality ventilation lighting, noise, air quality.

FACTOR AFFECTING WORK ENVIRONMENT:

- i. **Lighting and Illumination**
- ii. **Ventilation**
- iii. **Temperature and humidity**
- iv. **Air Conditioning**
- v. **Sanitation**
- vi. **Noise in industry**
- vii. **Factory plant layout, & Housekeeping office**

i. Lighting and Illumination:

- a. At the workplace, in industrial work, proper lighting becomes even more important. Indoor lighting system will of course vary in different area as per specific requirements.
- b. Proper lighting leads to increase in production
- c. Improper lighting will lead to health problems such as headache, fatigue,
- d. Required level of lighting depend on the type of work, example – casual work, rough work, inspection work, line work
- e. If possible use natural light

ii. Ventilation:

- a. Industrial ventilation means exhausting contaminated air away from the work area and replacing it with clear air.
- b. It is fresh and free supply of air.

- c. Improper air circulations will have negative effects on the health of workers
- d. Following shall be driven out from factory premises
 - Smoke
 - Fumes
 - Dusts
 - Vapor
 - Heat
- iii. **Temperature and humidity:**
 - a- Appropriate temperature and humidity shall be there in plant premises, leading to conditions of comfort and health safety.
 - b- Special precautions must be prescribed where nature of work generates excessive heat.
 - c- Directing prescribed test for determining humidity.
 - d- Regulating the method of artificially increasing humidity
 - e- The water employed for humidification shall be from a source of drinking water.
- iv. **Air conditioning:**
 - a- Air condition is referred as AC or aircon, and it is appliance, system or machine designed to change the air temperature of humidity with in the area.
- v. **Sanitation:** Sanitation refers to the provision of facilities and series for the safe disposal of human urine and feces.
- vi. **Noise:** Noise is unwanted and unpleasant sound. Whether a sound is pleasant or not, depends on the person hearing it and the circumstances in which it is heard.
- vii. **Factory plant layout and housekeeping :** -
 - a- Good workplace layout and housekeeping play important roles in providing better working condition.
 - b- There should a place reserved for every material and every material should be stored in its place
 - c- Tolls and other production aids must be stored systematically in their own location.

Q- What is plant utility? Explain the types of utility in brief?

Ans Proper environment shall be provided to workers for high level of productivity and performance. A work environment with appropriate facilities and utilities will give the workers greater satisfaction.

Different types of plant utilities or facilities are:

- i. **Factory building**
- ii. **Lighting**
- iii. **Ventilation**
- iv. **Air Conditioning**
- v. **Sanitation**
- vi. **Noise control**
- vii. **Good house keeping**

i. **Factory Building:**

Factory building acquires great importance.

A factory building is required to provide protection for men, machines, materials, products or even the company secrets. It has to serve as a part of the production facilities.

Factory building should be designed to provide a number of facilities such as:

- Washing facilities shall be easily accessible and kept clean for male & female workers.
- Facilities for sitting shall be provided for all worker obliged to work in standing position so that they may take rest if an opportunity occurs in the course of their work
- A canteen shall be provided in each industry/factory.
- Shelters, rest rooms and lunch rooms. They shall be adequate , clean, sufficiently lighted and ventilated
- Minimum one first aid appliance first aid box shall be kept available during all working house.
- Creches- clean, adequately lighted and ventilated rooms for small kids.(under age of six year) of women worker.
- Cleanings , effective arrangements for disposal of waste and effluents
- Building shall have proper ventilation, temperature, humidification, drinking water, latrines urinals, and spittoons

ii. **Lighting:**

Light whether artificial or natural or both, should be sufficient in all work rooms. Sky light and glazed windows for lighting the workrooms should be kept clean. Uniform light distribution shall be there.

Advantages of Lighting:

- Increase in output
- Decrease in cost
- Product quality improvement
- Reduced labor turnover
- Better maintenance of plant neatness and cleanliness
- Improved housekeeping
- Less scrap, spoilage and waste while production.

iii. **Ventilation:**

- In every factory industry, effective provision shall be made for securing and maintaining in every workroom.
- Appropriate temperature to provide condition of comfort and prevent injury to the health of worker.
- Adequate ventilation by fresh air circulation.
- Special precautions must be prescribed where nature of work generates excessive heat.
- Remove heat generated by people, lighting ,and equipments inside the occupied space
- Proper ventilation projects from toxic fumes, vapours , gases

iv. **AIR CONDITIONING:**

- In popular belief air conditioning means refrigeration.
- In modern context air conditioning is the control of the relationship between certain characteristics of air, such as :
 - a- Temperature
 - b- Humidity
 - c- Purity
 - d- Movement
 - e- distribution
- Air conditioning to the control of air temperature, humidity, cleanliness and distribution of air.

- Under concept temperature control we mean heating the air in winter and cooling it in summer.
 - Air condition objective are :
 - a- For avoiding precision measurement error due to expansion of instrument part.
 - b- For promoting quality of work among workers at workplace
 - c- For minimization of deterioration of fruits, vegetables, certain oils and chemicals.
 - d- For increasing employee efficiency
 - e- For better public relations
 - f- For reducing deterioration of certain materials in process
 - g- For protection of workers against harmful dust, smoke, poisonous gas
 - h- Promote plant cleanliness
- v. **SANITATION:**
- a- Sanitation generally refers to the provision of facilities and services for the safe disposal of human latrine and human urine and feces.
 - b- Word sanitation after refer to the maintenance of hygienic conditions through services such as garbage collection and waste disposal.
 - c- Food sanitation refers to the hygienic measures for ensuring food safety.
 - d- Environmental sanitation is the control of environmental factor that form links in distance transmission.
 - e- Sanitation within the food industry means the adequate treatment of food.
 - f- Quality of sanitation affects the quality of life of people and those live near them.
 - g- Good sanitation system of must for privacy, dignity, convenience and safety for individuals.
 - h- Better sanitation better health of worker
 - i- It leads to saving in health care cost

CHAPTER-6

INDUSTRY SAFETY

Q- What do you mean by industrial safety? What are objectives and importance of industrial safety?

Ans: In an organization, there are number of machines and other equipments which have large number of moving parts and other dangerous projections, which may cause hazardous accidents, fatal injuries if proper measure is not taken for safeguarding against them. It is thus very essential for a worker to know the basic engineering principles and he should be aware of danger which may exist in an industry. Every worker should be made to understand practice the safe working procedures, to avoid accidents.

OBJECTIVES OF INDUSTRIAL SAFETY

The objectives of industrial safety are as follows:

- To increase production as a means to a higher standard of living.
- To reduce cost of production
- To conserve and make the best use of labour available
- To have better morale of employee
- To have better human relations in the industry
- To reduce sufferings and human wastage
- To reduce work main compensation insurance rate and all the cost of accidents
- To flourish a higher standard of living of workers

IMPORTANCE OF INDUSTRIAL SAFETY

- Reduce the possibility of industrial accidents
- Reduce compensation and medical cost
- Better labour relations
- Reduce human resource cost
- If there is no safety breakdowns will be there.
- Increase in productivity
- Employee safety complies with all the laws governing the safety and health of the employee at workplace.
- Formalizing the safety process and program.

Q- Write an explanatory note on accidents in industries and factories.

Ans : ACCIDENTS IN INDUSTRIES AND FACTORIES:

- (A) Definition
- (B) Cause of accidents
- (C) Effects
- (D) Job Safety Analysis
- (E) Accident Control and Prevention

(A) ACCIDENT DEFINITION: An accident is any unplanned, uncontrolled, unwanted, or undesirable event, or sudden mishap which interrupts an activity or function.

The accident may be due to worker over fault which may be prevented by his own precautions.

Accident may also be due to employees default for not making safe working condition.

The accident may be minor, serious or fatal.

(B) CAUSES OF ACCIDENTS: Accidents are caused, they do not just happen. Whenever there occur some accidents, there must be some cause, which may be either oblivious or difficult to trace.

1. Technical causes : Unsafe conditions :

- i. Mechanical factors
- ii. Environment factors

2. Human causes

- (i) unsafe acts
- (ii) unsafe personal factors

Discussion about there is as follows:

(i) TEHCNICAL CAUSES

- a. Improper plant layout
- b. Improper material handling system
- c. Unsafe design and building structure
- d. Voilation of the safety practices prescribed as per Act
- e. Boiler and pressure untested
- f. Machine and equipments improper guarded
- g. Poorly maintained and unsafe old equipments

- h. Unsafe clothing, goggles, gloves, masks, smoking in nonsmoking area

(ii) ENVIRONMENT FACTORS :

- a. Excess shift duty and long look duration hour
- b. Behaviour of management towards worker is of dominating nature
- c. Presence of fumes, smoke, dust
- d. Illumination is either defective or inadequate
- e. Varying temperature and humidity
- f. Poor house keeping
- g. Bad plant layout and arrangement of machines
- h. Work arrangement of machines
- i. Work assignment leading to fatigue

(2) HUMAN CAUSES:

(i) UNSAFE ACTS :

- a. Doing a particular work without authority
- b. Improper use of tools
- c. Working on dangerous or moving equipment
- d. Unsafe loading , placing, mixing , combining etc.
- e. Taking unsafe posture or position
- f. Safety devices made non operative
- g. Working or operating at unsafe speed

(ii) UNSAFE PERSONAL FACTOR :

- a. Mind worry
- b. Defects of body
- c. Feelings of job insecurity among workers
- d. Lack of knowledge
- e. Lack of skills
- f. Day dreaming
- g. Carelessness
- h. Forgetfulness
- i. Ignorance
- j. Improper home environment

Q- What is MSDS Material safety Data Sheet?

Ans: Material Safety Data Sheet:

- (1) **Meaning-** It is detailed information bulletin. Prepared by: The manufacture or importer of chemical. Contents: It describes:
- a- The physical and chemical properties
 - b- Physical and health hazards
 - c- Routes of exposure
 - d- Precaution for safe handling and use
 - e- Emergency and first aid control measures
 - f- Control measures.

- (2) **PURPOSE:** The hazard information and protective measure should be the focus of concern
- Hazards of all chemical produced imported are evaluated, and the information transferred to employer and employees

- (3) **Section of an MSDS and their significance** No prescribed precise format for an ideal MSDS is there as per law and OSHA(Occupational safety and health administration). MSDS must be in English and must include at least the flowing information

SECTION: 1_Chemical identity

SECTION: 2 Hazardous Ingredients

SECTION: 3 Physical and Chemical Characteristics

SECTION: 4 Fire and explosion hazard data

SECTION: 5 Reactivity data

SECTION: 6 Health hazards

SECTION: 7 Precautions for safe handling and use

SECTION: 8 Control Measures

ADVANTAGES OF MSDS:

- A- MSDS are created by manufactures to warn users of potential danger and risks to encourage proper handling and use.
- B- Employer can work with less chance of negative exposure
- C- Provide precautionary information for day to day use
- D- Contains much useful information such as - name and information about each specific material hazards, name location manufacture, first aid procedure, and emergency telephone number.

DISADVANTAGES OF MSDS

- A- OSHA does not require specific formatting
- B- Required information can be in a different and potentially confusing order
- C- Lack of uniform format of MSDS
- D- Difficult for comparison.

Q-2 What is Good Laboratory Practice (GLP)?**Ans: GOOD LABORATORY PRACTICE**

- 1- It is concerned with the quality system concerned with the organizational process and the conditions under which laboratory studies are planned, performed, monitored, recorded, and reported.
- 2- Objectives :
 - a- It makes sure that the data submitted are a true reflection of the results that are obtained during the study.
 - b- It makes sure that data is traceable
 - c- Promotes international acceptance of tests
 - d- Staff trained and follow written instruction
 - e- Records generated during the test are verified and authenticated.
- 3- **ELEMENTS OF GLP**
 - a- **Personnel:**
 - (i) Medical checkup,
 - (ii) Health,
 - (iii) Trainer of personnel and
 - (iv) Job description of personnel.
 - b- **Building and Facilities:**
 - (i) Maintenance of building and facilities as arrangements,
 - (ii) Have sufficient space for storage layout of laboratory
 - c. **Documentation:**
 - (i) Keep records in real time,
 - (ii) No recopies, only original entries,
 - (iii) Permanent ink and data for recording,
 - (iv) Change control procedure,

- (v) calibration management,
 - (vi) operation of technical audit personnel in conducting and reporting audits inspection , reports and review., and validation a analytical methods
 - d. Verification testing
 - e. Validations of analytical methods.
 - f. Change control
 - g. Laboratory reagents and solution
 - h. Control animal house
 - i. safety
- 4- **GLP : Advantages:**
- 1. It leads to laboratory better management, control
 - 2. Better results
 - 3. Studies performed to a certain standard
 - 4. Less repetitions
 - 5. More acceptable studies by law and regulatory authorities
- 5- **Disadvantage of GLP**
- a. Len freedom
 - b. Stereotyped approach
 - c. Documents proliferation

Q- What is GMP?

Ans **Goods manufacturing practice: [GMP]**

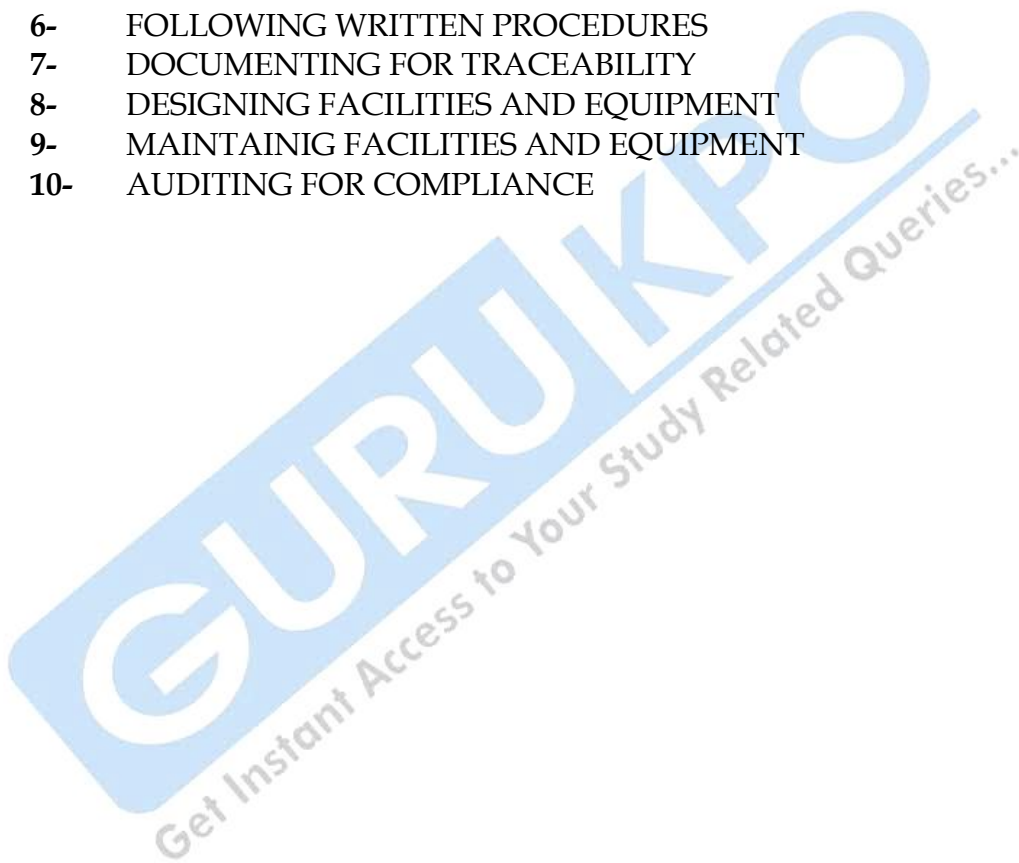
- 1. GMP stands for good manufacturing practices
- 2. GMP are regulations that describe a set of principles and procedures convincing the methods, equipments , facilities, and control required for producing human and veterinary products , medical devices and proceed food to the required quality.
- 3. It is for building quality into their products
- 4. GMP adopted by most nations are very similar, with the set of basic requirements as below:-
 - A- Equipment and facilities to be properly designed , maintained and cleaned
 - B- Standard operating procedures be written , approved and followed
 - C- An independent quality unit be established like quality control and or quality assurance

D- Both personnel and management should be well trained.

Principle of GMP

Ten GMP Principles are:

- 1- Cleanliness
- 2- COMPONENT CONTROL
- 3- OB COMPETENCE
- 4- VALIDATING WORK
- 5- WRITING PROCEDURES
- 6- FOLLOWING WRITTEN PROCEDURES
- 7- DOCUMENTING FOR TRACEABILITY
- 8- DESIGNING FACILITIES AND EQUIPMENT
- 9- MAINTAINING FACILITIES AND EQUIPMENT
- 10- AUDITING FOR COMPLIANCE



CHAPTER -7

ENERGY SOURCES

Q-1 What is LPG? What is application of LPG?

Ans : LPG is Liquefied Petroleum Gas:

- 1- LPG is Liquefied Petroleum Gas.
- 2- Liquefied Petroleum Gas is also called LPG, GPC, LP Gas, Liquid Petroleum Gas, or simply propane.
- 3- It is flammable mixture of hydrocarbon gases used as a fuel in heating appliances and vehicles.
- 4- When used as a vehicle fuel it is often referred as auto gas .
- 5- It is extracted from crude oil and natural gas .
- 6- Normally gas is stored in liquid form under pressure in a steel container, cylinder or tank.
- 7- LPG is highly in flammable and must therefore be stored away from sources of ignition and in a well-ventilated area.
- 8- Normally, the gas is stored in liquid form under pressure in a steel container, cylinder or tank.

APPLICATION OF LPG

Various uses of LPG are:-

- 1- LPG can provide an alternative to electricity and heating oil (kerosene)
- 2- For motor fuel i.e. in automobile industry
- 3- For refrigeration
- 4- For cooking purpose -LPG is used in food industry like hotels, restaurants, bakeries, canteen, and resorts. LPG is most preferred fuel in the food industry.
- 5- LPG is used in Cement industry manufacturing process
- 6- For cutting, heating and melting in metal industry
- 7- Ideal fuel for production of food by agriculture and animal husbandry
- 8- Steam raising
- 9- Engineering sector.

Q- Write a note on CNG?

Ans: CNG (Compressed Natural Gas)

- 1- It is a fossil fuel substitute for gasoline (petrol), diesel, or propane/ LPG.
- 2- Its combustion does not produce greenhouse gases.
- 3- It is more environmentally clean alternative to fuels
- 4- CNG can also be mixed with biogas
- 5- It is colorless, odorless, tasteless, and non corrosive
- 6- It is drain from gas wells or is obtained in conjunction with crude oil production
- 7- **Main use of CNG:**
Cars-and locomotives, any existing gasoline vehicle can be converted to a bi-fuel (gasoline/CNG) vehicle.
- 8- **Advantages of CNG**
 - a- Can be safely stored
 - b- Can be safely burnt
 - c- It is cheap (less expensive than petrol) so cost saving
 - d- More environment friendly than oil or coal.
 - e- CNG fuel systems are sealed, which prevents any spill or evaporation.
 - f- CNG mixes easily and evenly in air being a gaseous fuel.
 - g- Less pollution and more efficiency
- 9- **Disadvantages of CNG:**
 - a- Detection of it very difficult task as the CNG is odorless, colorless, tasteless.
 - b- It is highly volatile (highly inflammable) can be dangerous if handled carelessly
 - c- Constructing and managing pipelines of CNG gas costs a lot

Q- Write a short note on 'Hydrogen' as a source of energy?

Ans- Hydrogen as a Fuel:

- 1- Hydrogen is a simplest element known to exist
- 2- Hydrogen is the most abundant gas in the universe, and the source of all the energy we receive from the sun.
- 3- Hydrogen has the highest energy content of any common fuel by weight, but the lowest energy content by volume. It is the lightest element and a gas at normal temperature and pressure

- 4- Hydrogen is a transplatable fuel. It hydrogen escapes from its container, it rapidly disperse into the air.
- 5- Hydrogen burns cleanly
- 6- **Hydrogen uses:**
Used for industrial applications such as refining, treating metal, and food processing.
At the present time, hydrogen main use as a fuel is in the NASA space program
To produce electricity
To fuel aircraft
- 7- Production methods of hydrogen as a fuel are :
 - a- Kuaerner process
 - b- Biological production
 - c- Biological productions
 - d- Biocatalyed electrolysis
 - e- Electrolysis of water
- 8- **Advantages of using hydrogen:**
 - a- It is good
 - b- It does not produce any harmful by products
 - c- It is available in plenty i.e. large quantity
 - d- More energy can be obtained from using the hydrogen as a fuel.
Disadvantages of Using Hydrogen
 - a- High cost of hydrogen extraction, refining, transportation, and production cost.
 - b- High cost on transportation and distribution
 - c- Hydrogen pipelines are more expensive
 - d- Setting up a hydrogen economy would require huge investment in the infrastructure to store and distribute hydrogen to vehicle.

Multiple Choice Questions

- Q-1 Management is called a process because:-**
- (a) It is applicable to the manufacturing process
 - (b) It is relevant for social organizations
 - (c) It involves a series of functions
 - (d) None of the above
- Q-2 Management principles have been formed:**
- (a) In a science laboratory
 - (b) By practice and experience of managers
 - (c) By experience of customers
 - (d) Enforced by the government
- Q-3 Principles of management are:**
- (a) Static
 - (b) Absolute law
 - (c) Rigid
 - (d) Universal
- Q-4 Significance of Management principles does not include**
- (a) Initiative
 - (b) Increase in efficiency
 - (c) Optimum utilization of resources
 - (d) Coping with changing environment
- Q-5 F.W. Taylor was:**
- (a) A Mechanical engineer
 - (b) An Accountant
 - (c) A mining engineer
 - (d) A social scientist
- Q-6 The 'principle of division of work' is best described by:**
- (a) Work should be divided into smaller elements
 - (b) Resources should be divided among jobs
 - (c) Works should be divided among jobs.
 - (d) Profit should be divided among the manager and workers equally

Q-7 Which of the following is not a Taylor's scientific management principle?

- (a) Science, not rule of thumb
- (b) Functional Foremanship
- (c) Harmony, not discard
- (d) Maximum, not restricted output

Q-8 One best way to perform a task is described by the following technique of scientific management:-

- (a) Method Study
- (b) Motion Study
- (c) Fatigue Study
- (d) Time Study

Q-9 Under Functional Foremanship, machines, material, tools, etc. are arranged for operation by :

- (a) Speed BOSS
- (b) Gang BOSS
- (c) Instruction card clerk
- (d) Route clerk

Q-10 Mental resolution calls for:

- a- Change of mental attitude on the part of both management and workers
- b- Bargaining between management and workers
- c- Higher wages for workers
- d- None of the above

Q-11 Which principle of Taylor advocate scientific enquiry as opposed to hit list and trial method?

Ans: Science, not rule of thumb

Q-12 Which technique of scientific management does provide for eight specialist foremen over worker?

Ans: Functional Foremanship

Q-13 Name any two principles of scientific management?

- Ans:**
- i- Science, not rule of thumb
 - ii- Harmony , not discard

Q-14 What is required to ensure harmony among workers and management?

Ans: Mental resolution

Q-15 Which technical of scientific management does help in finding one best methods doing the job?

Ans: Method study

Q-16 "The aim of this study is to determine the standard time taken by an average worker to perform a well defined job "Which study is emphasized in the above statement?

Ans: Time study

Q.17 Industrial location analysis typically attempts to

- a. reduce costs
- b. maximize sales
- c. focus more on human resources
- d. be environmentally friendly

Q-18 Service location decisions typically attempt to

- a. minimize costs
- b. consider global implications
- c. decrease labor costs
- d. be environmentally friendly
- e. none of the above

Q-19 A location decision for an appliance manufacturer would tend to have a(an)

- a. cost focus
- b. labor focus
- c. revenue focus
- d. environmental focus
- e. education focus

Q-20 A location decision for a traditional department store (Macy's) would tend to have a(n)

- a. cost focus
- b. labor focus
- c. revenue focus
- d. environmental focus

Q-21 In location planning, environmental regulations, cost and availability of utilities, and taxes are

- a. global factors
- b. country factors
- c. regional/community factors
- d. site-related factors
- e. none of the above

- Q-22** Which of the following is usually not one of the top considerations in choosing a country for a facility location?
- a. availability of labor and labor productivity
 - b. exchange rates
 - c. attitude of governmental units
 - d. zoning regulations
 - e. location of markets
- Q-23** When making a location decision at the country level, which of these would be considered?
- a. corporate desires
 - b. land/construction costs
 - c. air, rail, highway, waterway systems
 - d. zoning restrictions
 - e. location of markets
- Q-24** Which of these factors would be considered when making a location decision at the Region/Community level?
- a. government rules, attitudes, stability, incentives
 - b. cultural and economic issues
 - c. zoning restrictions
 - d. environmental impact issues
 - e. proximity to raw materials and customers
- Q-25** When making a location decision at the region/community level, which of these would be Considered?
- a. government rules, attitudes, stability, incentives
 - b. cultural and economic issues
 - c. cost and availability of utilities
 - d. zoning restrictions
 - e. air, rail, highway, waterway systems
- Q-26** Which of these factors would be considered when making a location decision at the site level?
- a. government rules, attitudes, stability, incentives
 - b. cultural and economic issues
 - c. zoning regulations
 - d. cost and availability of utilities
 - e. proximity to raw materials and customers
- Q-27** Tangible costs include which of the following?
- a. climatic conditions
 - b. availability of public transportation
 - c. taxes
 - d. quality and attitude of prospective employees
 - e. zoning regulations

- Q-28 Intangible costs include which of the following?
- a. quality of prospective employees
 - b. quality of education
 - c. availability of public transportation
 - d. all of the above
- Q-29 Community attitudes, zoning restrictions, and quality of labor force are likely to be considered in which of the following location decision methods?
- a. transportation method
 - b. locational break-even analysis
 - c. center-of-gravity method
 - d. simulation
 - e. factor rating method
- Q-30 Which of the following methods best considers intangible costs related to a location decision?
- a. crossover methods
 - b. locational break-even analysis
 - c. factor rating analysis
 - d. the transportation method
 - e. the assignment method
- Q-31 evaluating location alternatives by comparing their composite (weighted-average) scores involves
- a. factor rating analysis
 - b. cost-volume analysis
 - c. transportation model analysis
 - d. linear regression analysis
 - e. crossover analysis
- Q-32 An approach to location analysis that includes both qualitative and quantitative considerations is
- a. locational cost-volume
 - b. factor rating
 - c. transportation model
 - d. assignment method
 - e. make or buy analysis
- Q-33 The crossover chart for location break-even analysis shows where
- a. fixed costs are equal for alternative locations
 - b. variable costs are equal for alternative locations
 - c. total costs are equal for alternative locations
 - d. fixed costs equal variable costs
- Q-34 The center of gravity method does not take into consideration
- a. the location of markets
 - b. the volume of goods shipped to the markets
 - c. the value of the goods shipped,
 - d. the combination of volume and distance

- Q-35** The center-of-gravity method is used primarily to determine what type of locations?
- a. service locations
 - b. manufacturing locations
 - c. distribution center locations
 - d. supplier locations
- Q-36** A regional bookstore chain is about to build a distribution center that is centrally located for its eight retail outlets. It will most likely employ which of the following tools of analysis?
- a. assembly line balancing
 - b. load-distance analysis
 - c. center-of-gravity model
 - d. linear programming
- Q-37** Production and/or shipping costs are always considered in which of the following location decision methods?
- a. factor rating method
 - b. transportation method
 - c. location break-even analysis
 - d. center-of-gravity method
- Q-38** The transportation method, when applied to location analysis
- a. minimizes total fixed costs
 - b. minimizes total production and transportation costs
 - c. maximizes revenues
 - d. minimizes the movement of goods
- Q-39** Which of the following are not among the eight components of revenue and volume for the service firm?
- a. quality of the management
 - b. shipment cost of finished goods
 - c. purchasing power of the customer-drawing area
 - d. uniqueness of the firm's and the competitor's locations
 - e. competition in the area
- Q-40** Which of the following are among the eight components of revenue and volume for the service firm?
- a. uniqueness of the firm's and the competitor's locations
 - b. quality of the competition
 - c. quality of management
 - d. purchasing power of the customer-drawing area
 - e. all of the above
- Q-41** Traffic counts and purchasing power analysis of drawing area are techniques associated with
- a. an industrial location decision
 - b. a manufacturing location decision

- c. a retail or professional service location decision
 - d. the factor rating method
 - e. the transportation method
- Q-42** La Quinta Motor Inns has a competitive edge over its rivals because it
- a. uses regression analysis to determine which variables most influence profitability
 - b. picks better locations than its rivals
 - c. picks larger locations than its rivals
 - d. builds only along Interstate highways
 - e. all of the above
- Q-43** Traffic counts and demographic analysis of drawing areas are associated with
- a. industrial location decisions
 - b. manufacturing location decisions
 - c. service location decisions
 - d. the transportation method
- Q-44** Which one of the following factors does not affect the volume and revenue for a service firm?
- a. affluence of customer drawing area
 - b. competition in the area
 - c. physical qualities of facilities and neighboring businesses
 - d. quality of the competition
 - e. environmental regulations
- Q-45** Location analysis techniques typically employed by service organizations include
- a. factor rating method
 - b. center of gravity method
 - c. purchasing power analysis of area
 - d. traffic counts
 - e. all of the above
- Q-46** Which of the following is most likely to affect the location decision of a service firm rather than a Manufacturing firm?
- a. energy and utility costs
 - b. attitude toward unions
 - c. parking and access
 - d. cost of shipping finished goods
 - e. labor costs

- Q-47 Which of the following is a location analysis technique typically employed by a service organization?
- a. purchasing power analysis
 - b. linear programming
 - c. queuing theory
 - d. crossover charts
 - e. cost-volume analysis
- Q-48 A jewelry store is more likely than a jewelry manufacturer to consider _____ in making a location decision.
- a. transportation costs
 - b. cost of raw materials
 - c. parking and access
 - d. climate
 - e. taxes

Multiple Choice Questions Answers Key-

- 1 - C
- 2 - b
- 3 - d
- 4 - a
- 5 - a
- 6 - a
- 7 - b
- 8 - a
- 9 - b
- 10 - a
- 17 - a
- 18 - e
- 19 - a
- 20 - c
- 21 - c
- 22 - d
- 23 - e
- 24 - e
- 25 - c
- 26 - c
- 27 - c
- 28 - d

29	-	e
30	-	c
31	-	a
32	-	b
33	-	c
34	-	c
35	-	c
36	-	c
37	-	b
38	-	b
39	-	b
40	-	e
41	-	c
42	-	a
43	-	c
44	-	e
45	-	e
46	-	c
47	-	a
48	-	c

Industrial Management Glossary terms

KEY TERMS

Introduction

- What to Produce?** - Product planning and development including product design.
- How to Produce?** - Process planning, material planning, toll planning etc.
- Where to produce?** - Facilities planning, capacity planning and sub contract planning.
- When to produce?** - Production scheduling and machine loading.
- Who will produce?** - Human resource planning.
- How much to produce?-** Planning for quantity, economic batch size etc.

- Time Study** - Time study is a work measurement technique for recording the time and rates of working for the elements of a specified job carried out under specified condition and for analyzing the data so as to obtain the time necessary for carrying out the job at a defined level of performance.
- Materials** - Raw material, spare parts, and components which must be available in the correct quantities and specifications at the right time.
- Operations** - Performance in accordance with the details set out in the production plan.
- Scientific Management** - is concerned with knowing exactly what you want men to do and then seeing that they do it in the best and cheapest way.
- Special Economic Zone(SEZ)**- Is a geographically bound zone where the economic laws in the matters related to export and import are more broad minded and liberal as compared to rest parts of the country.
- Export Promotion Zones** - or export processing zones can be defined as unit bearing clusters of specially designed zones of aggressive economic activity for the promotion of export.
- NOISE** - Is an unwanted and unpleasant sound.
- Sanitation** - Is any system that promotes sanitary, or healthy, living conditions.
- Effective Capacity** - Is the capacity which is used within the current budget period.
- Product Structure** - Indicates the level of components required to produce an end product.
- Quality** - Quality may be defined as the sum total of features of a product which influence its ability to satisfy a given demand.
- JIT-Just in time** - Is defined as a philosophy of manufacturing based on planned elimination of all waste and continuous improvement of productivity.

- Scheduling** - Scheduling may be defined as the assignment of work to the facility with the specification of times. (When to start and when to complete) and the sequence in which work has to be carried out
- Fixed Capacity** - The capital assets (building and equipments) the company will have at a particular time are known as the fixed capacity.
- Adjustable capacity** - It is in the size of workforce, the number of hours per work they work, the number of shifts and the extent of subcontracting.
- Non-Conventional Renewable energy** - is a source of energy that can never be exhausted.
- Sun, wind, water, agricultural residue, fire wood and animal dung.
- Conventional/non Renewable energy** - Comes from sources that cannot be replenished during a man's life time.
for example- Fossil fuels such as coal, oil, natural gas and propane, LPG, CNG, Hydrogen.
- Good Laboratory Practice** - GLP is concerned with the organizational process and the conditions under which laboratory studies are planned, performed, monitored, recorded and reported.
- Industrial accident** - May be defined as "an occurrence, which interrupts or interferes with the orderly progress of work in an industrial establishment.
- Industrial Safety** - is primarily a management activity which is concerned with reducing, controlling and eliminating hazards from the industries or industrial units.
- Plant Layout** - Is a plan of an optimum arrangement of facilities including personnel, operating equipment, storage space, material handling equipment, and all other supporting services along with the design of best structure to contain all these facilities?
- Process layout** - This is typical of the job-shop type of production where the equipment performing similar operation is grouped together.

- Production System** - Is having combination of four factors viz-quantity, quality, cost, and time.
- Method Study** - Is the science of eliminating wastefulness resulting from ill directed and in efficient motions.
- Factory** - A place where ten or more persons are working and in which a manufacturing process is going on using electricity, steam, oil, etc.
- Work Environment** - Is the place that one works i.e. In an office building, at home or at a construction site
- Industrial Safety** - Is primarily a management activity which is concerned with reducing controlling and eliminating hazards from the industries or industrial units.
- Research & Development** - It refers to organized efforts, which are directed towards increasing scientific knowledge and product/process innovation.
- Hydrogen** - Is the simplest element known to exist?
- Solar energy** - This energy is from sun and is the most readily available and free source of energy.
- Wind energy** - Is harnessing of wind to produce electricity
- Bio-Energy** - Is energy derived from the carbonaceous waste of various human natural activities?
- Hydro energy** - Is energy for water
- Tidal Energy** - Is energy from tides
- Ocean energy** - Is energy from ocean waves, tides or on the thermal energy(heat) stored in the ocean.
- Production management** - refers to the application of management principles to the production function in a factory.

Total Quality Management

TQM approach has been adopted by many firms to achieve customer satisfaction by a never ending quest for improving the quality of goods and devices.

Process: - A process is a sequence of activities that is intended to achieve some result, typically to create added a value for the customers.

Operations Management: "The management of direct resource. (Machine , material, man), which are required to produce goods and services. It involves, planning, organizing, controlling, directing, and coordinating, directing, and coordinating all the activities of production system, which converts resource inputs into products or service."

Strategy: A Strategy is a broad, long-term plan, conceived in order to achieve business objective

Motion Study: Is the science of eliminating waster fullness resulting from using unnecessary ill directed and efficient motion.

Qualified workers : A qualified worker is one who is accepted as having the necessary physical attributes, possessing the required intelligence, and education and having acquired the necessary skill and knowledge to carry out the work in hand to satisfactory standards of safety, quantity and quality.

IM	-	Industrial Management
SM	-	Scientific Management
FICCI	-	Federation of Indian Chamber of Commerce & Industry
CSO	-	Central Statistical Organization
FC	-	Fixed Cost
VC	-	Variable Cost
TC	-	Total Cost
Q	-	Quantity
P	-	Price
SEZ	-	Special Economic Zone
EPZ	-	Export Promotion Zone or Export Processing Zone
MSDS	-	Material Safety Data Sheets
GLP	-	Good Laboratory Practice
GMP	-	Good Manufacturing Practices
LPG	-	Liquefied Petroleum Gas
CNG	-	Compressed Natural Gas

Recommended Books:

- 1- Industrial Management-William Spriegel and Lansburgh New York
- 2- Elements of Industrial Management-Smith Russel
- 3- Industrial Management -J.Jain -Kitab Mahal ,Allahabad
- 4- Industrial Engineering Management -O.P Khanna-Dhanpat Rai Pub Pvt. Ltd. New Delhi

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- 1- Industrial Management: Author : William Spriegel and Lansburgh New York
- 2- Elements of Industrial Management :
- 3- Industrial Management :Author -J. Jain, kitab mahal Allahabad
- 4- Industrial Engineering Management : O P Khanna
- 5- Industrial management: Dr. Shobha Khinvasara Dr jyotsna diwan Mehta RBD Publications
- 6- Industrial Management: Dr. Neha Sharma /Nidhi Gupta (Thakur Pub Jaipur)

