Solution cum Scheme of Evaluation

IV/IV B.Tech (Regular) Degree Examination

14ME701 Industrial Engineering &Entrepreneurship Development

Mechanical Engineering

January, 2021

Prepared by
P.Umamaheswarrao
Assistant Professor
Department of Mechanical Engineering
Bapatla Engineering College
Bapatla-522102
Mob: 9440871256

1. **1x12=12M**

a) Concept of Management

Management is an art of getting things done through the efforts of other people.

b) Types of organization structures

- Line organization structure, Line and staff organization structure and Functional organization structure

c) Marketing Vs Selling

Marketing	Selling
1. MARKETINGis a process of transferring a product or service to a buyer at a competitive price in order tosatisfy his or her need"	1. SELLINGis a process of transferring a product or service to a buyer at a price regardless of his or her need"
2. Focuses on the needsof the Customer	2. Focuses on the needsof the Producer
3. Marketing makes use of long-term Strategiesto get sales	3. Selling makes use of short-term tactics to get sales
4. Customers enjoy supreme importance	4. Product enjoys supreme importance
5. Converts customer needs into products	5. Converting products into cash
6. Profits through customer satisfaction	6. Profits through sales volume

d) Productivity

The ratio of output produced to the input resources utilized in the production.

e) Time Study

Time study is used to determine the time required by a qualified and well-trained person working at a normal pace to do a specified task. It should be noted that, whereas motion study is largely design, time study involves measurement. Time study is used to measure work.

f)Work measurement

Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance"

Work measurement is used to determine the length of time a job should take for completion.

g) Double sampling Plan

When a decision on acceptance or rejection of the lot is made on the basis of two samples is known as double sampling Plan.

h) Job Description

Job Descriptionis an important document, which is basically descriptive in nature and contains a statement of job Analysis. It provides both organizational information's (like location in structure, authority etc) and functional information (what the work is).

It gives information about the scope of job activities, major responsibilities and positioning of the job in the organization. This information gives the worker, analyst, and supervisor with a clear idea of what the worker must do to meet the demand of the job.

i) Wage incentive plan

A wage system which provides additional pay for qualitative and quantitativeperformance which exceeds standard or normal levels. Also known as incentivewage system.

j) Characteristics of an Entrepreneur

- Self-confident , Able to make decisions, Determined, Independent, Energetic, Able to lead, Resourceful, Versatile, Achievement-oriented, Able to take calculated risks, Responsive to criticism, Profit-oriented, Initiative-taker, Perceptive

k) Process design

It is concerned with the overall sequence of operations required to achieve the product specifications.

Itspecifiesthetypeofworkstationsthataretobeused,themachinesandequipment'snecessaryandthequantitiesinwhicheachisrequired.

l) Product Analysis

Product analysis enables to understandthe important materials, processing, economic and aesthetic decisions which are required before any product can be manufactured.

2. a) Describe the functions of management? 6M

FUNCTIONS OF MANAGEMENT:

1. **Forecasting:**

Forecasting is a pre-requisite to planning. It determines estimate of future requirement of the business in regard to products and quantities for sale, materials, manpower, machines capacity for production or any other aspect of business activities.

Forecast are of two types i) short term forecast and ii) Long-term forecast. Forecast covering periods less than one year ahead are called short term forecasts and forecasts covering periods over 1 year to 15 years(beyond 15 years future is assumed to be uncertain) are termed as long term forecasts.

Short term forecasts are made for the purpose of materials control, loading and scheduling, and budgeting while long term forecasts are made for product diversification, sales and advertising, budgeting, financial planning and investment planning.

2. **Planning:**

Planning is determining (identifying and listing) activities to be performed in future in order to achieve desired goals. Planning, therefore, is forward looking. Planning is important because

1. It is done ahead of the job and therefore considered key activity for achieving goals
2. It involves making decisions today which will affect future
3. It provides the basis for other steps of the management process-organising, directing and controlling
4. It gives overall idea of the work that is to be done, in advance so that we don't forget anything and run at the last minute.
5. Planning develops manager's capacity to visualize and help foresee problems before they occur.

Planning involves three steps:

1. Listing of all the activities that need to be performed
2. Arranging activities in the sequence in which they need to be performed
3. Incorporating flexibility to meet contingencies

Planning embraces every activity (function) of management. In the absence of planning, there will be confusion, haphazard working and wastage of resources.

3. Organizing:

Organizing is the next phase to planning. Planning establishes objectives and draws a plan of the activities and organizing puts the plan into action.Organising is

1. Identification and classification of various activities necessary for Achievement of objectives (task identification)
2. Separation and grouping of activities(formation of departments)
3. Assigning people to those activities and providing physical factors of environment (resource allocation)
4. Delegation of authority to each individual charged with execution of each respective activity (delegation of authority)
5. Fixation of horizontal and vertical relationships between various positions

Organising facilitates smooth functioning of the organization, greater co-ordination of work performed by different subordinates, and effective channels of communication. Good organizing results in greater utilization of resources, clarity of responsibility and authority, reduced inter and intra departmental problems, effective decision making, and horizontal and vertical co-ordination of authority and information relationships.

4. Directing:

Directing is the process by which actual performance of the subordinates is guided towards attainment of the goals of the organization.

- Directing involves
- Guiding and helping subordinates in performing the job
- Giving instructions to the subordinates to do a job
- Supervising subordinates to ensure that job is carried out as per established plan
- Motivating them (subordinates) for better performance

Directing involves following four functions

1. Leadership
2. Communication
3. Motivation
4. Supervision

1. Leadership

Influencing subordinates and gaining their confidence and trust is critical for every manager. Subordinates must accept their bosses as leaders and latter must possess leadership qualities.

2. Communication

Managers need to give instructions and guide subordinates. Instructions to subordinates may be oral or written, but they must be clear and precise. Communication, therefore, therefore, plays an important role in getting things done through people.

3. Motivation

Motivation is inspiring people for better performance. Since, different people have different needs, every manager must carefully study the employees' needs and make sincere efforts to satisfy them by providing monetary and non-monetary rewards. Motivation, therefore, is important for directing subordinates.

4. Supervision

Supervision and directing are not separatable since a manager must supervise his subordinates to see that work is performed according to laid down plan

5. Staffing:

Management is getting things done through other people and as such staffing-the process of selecting, training, developing and placing of qualified people in the various jobs- is another important function of management. Staffing is a continuous process as people are required to fill newly created positions due to expansion of activity and to fill vacated positions on account of separation (resignations, death, termination, dismissal etc) of employees

6. Co-ordination:

Co-ordination is integrating or synchronizing the work performed by various individuals for attainment of company's objectives. Co-ordination, like communication, is required at every stage of the management process. The problems as well as importance of co-ordination increases with size of the organization. Co-ordination improves communication between different departments (sales, production, administration, finance etc) increases productivity and morale while lack of co-ordination between different departments can cause irreparable damage to the organization. Effective co-ordination involves

- Setting procedures and systems that co-ordinate the activities (e.g. production meetings, or review meetings)
- Reviewing jointly status of the activities with the departments involved
- Regulating communications to convey decisions taken at the review meetings wherever required.

Success of co-ordination depends on effectiveness of administrative controls (procedures and systems in the organization), dynamism of the leadership, and quality of informal relationships within the organization.

7. Controlling:

Controlling is the process of measuring current performance and taking action (if required) to ensure that pre-determined goals are accomplished. Controlling involves

- Setting performance standards
- Measuring actual performance
- Comparing actual performance against pre-set standards
- Identifying gaps in performances (actual and standard performance)
- Initiating corrective and preventing actions.

Planning and controlling are closely related. The objectives set in planning process provide the basis for controlling. And findings of controlling help future planning.

Controlling is a continuous process which monitors progress of the activities on continuous basis and initiates corrective action when performance is not in conformity with the pre-determined plan.

8. Decision making:

Decision making is selecting the best course of action among the available alternatives. Decision making is required in every step of management i.e. planning, organizing, directing and controlling.

Decision making entails identifying the problem, finding out the different possible solutions, selecting the best course of action and implementing the selected alternative

2. b) Discuss on F.W. Taylor Principles of management 6M

Principles of scientific management:

1. Development of science for each element of work

Analyse the work scientifically, rather than using thumb rule. It means that an attempt is made to find out what is to be done by a particular worker, how he is to do it, what equipment will be necessary to do it. This information is provided to the worker so as to reduce wastage of time, material etc and improve the quality of work.

2. Scientific selection, placement and training of workers

This principle states that select the workers best suited to perform the specific tasks, and then train them within the industry in order to attain the objectives of the enterprise. This eliminates the possibility of misfits in the organization and ensures better working. Workers should also be trained from time to time to keep them informed of latest development in the techniques of production.

3. Division of labour (Separation of planning function from doing function)

Division of work in smaller tasks and separation of thinking element of job from doing element of the job. This is the principle of specialization. It is essential for efficiency in all spheres of activities as well as in supervision work. To be more effective and efficient, Taylor, the founder of scientific management introduced functional organization, in which one foreman was made in charge for each function.

4. Standardization of methods, procedures, tools and equipment

Standardization helps in reducing time, labour and cost of production. The success of scientific management largely depends upon standardization of system, tools, equipments, and techniques of production.

5. Use of time and motion study

Taylor introduced time and motion study to determine standard work. Taylor undertook studies on fatigue incurred by the workers and the time necessary to complete the task.

Taylor suggested that for increasing production rate, the work of each person should be planned in advance and he shall be allotted a definite work to complete by a given time by using a predetermined method.

6. Differential wage system

Taylor's differential piece rate scheme provides an incentive for a worker to achieve high level of optimum output. It distinguishes the more productive workers from less productive workers and motivates them to produce more. Taylor believed that if labour is suitably rewarded and is satisfied with job, he will work whole heartedly to achieve the objectives of the enterprise.

7. Co-operation between labour and management

Scientific management also strives to get the thinking of management changed so as to make the management feel that mutual respect and co-operation between the workers and the management helps in providing proper and effective leadership. The labour starts thinking that it is their work and they must put their heart and soul in the work assigned to them. In fact the main job of scientific management is to revolutionize the mind of both workers and management for mutual benefit and also for the benefit of the enterprise.

8. Principle of management by exception

In order to make effective utilization of time of top managers, Taylor suggested that only major or significant deviations between the actual performance and standard performance should be brought to the notice of top management. Top management should pay more attention to those areas of work where standards and procedures could not be established and where there is a significant variation between standard performance and actual performance.

3. a) Explain the elements of Marketing Mix 6M

1. **Product**
   Goods manufactured by organizations for the end-users are called products.
   Products can be of two types - Tangible Product and Intangible Product (Services)
   An individual can see, touch and feel tangible products as compared to intangible products.
   A product in a market place is something which a seller sells to the buyers in exchange of money.
2. **Price**
   The money which a buyer pays for a product is called as price of the product. The price of a product is indirectly proportional to its availability in the market. Lesser its availability, more would be its price and vice a versa.
   Retail stores which stock unique products (not available at any other store) quote a higher price from the buyers.
3. **Place**
   Place refers to the location where the products are available and can be sold or purchased. Buyers can purchase products either from physical markets or from virtual markets. In a

physical market, buyers and sellers can physically meet and interact with each other whereas in a virtual market buyers and sellers meet through internet.

4. **Promotion**
   Promotion refers to the various strategies and ideas implemented by the marketers to make the end - users aware of their brand. Promotion includes various techniques employed to promote and make a brand popular amongst the masses.

3. b) What do you understand by channels of distribution 6M

CHANNELS OF DISTRIBUTION

A channel of distribution or trade channel is the path or route along which goods move from producers to ultimate consumers. It is a distribution network through which a producer puts his products in the hands of actual users. A trade or marketing channel consists of the producer, consumers or users and the various middlemen who intervene between the two. The channel serves as a connecting link between the producer and consumers. By bridging the gap between the point of production and the point of consumption, a channel creates time, place and possession utilities. A channel of distribution represents three types of flows:

a. Goods flow from producer to consumers;
b. Cash flow from consumers to producer as payment for goods; and
c. Marketing information flows in both directions, from producers to consumers in the form of information on new products, new uses of existing products, etc. The flow of information from consumers to producers is the feedback of the wants, suggestions, complaints, etc.

KINDS OF DISTRIBUTION CHANNELS

Every small-scale entrepreneur requires a channel that can distribute his product to the right customers at the right time and at the right cost. It consists of all the middlemen which participate in the distribution of goods and which serve as a link between the manufacturer and the consumer.

1. Manufacturer to Customer: This is also known as direct selling because noMiddlemen are involved. A producer may sell directly through his own retail stores, for example, Bata. This is the simplest and the shortest channel. It is fast and economical. Small producers and producers of perishable commodities also sell directly to the local consumers. Big firms adopt direct selling in order to cut distribution cost and because they have sufficient facilities to sell directly to the consumers. The producer or the entrepreneur himself performs all the marketing activities.

2. Manufacturer to Retailer to Customer: This is one stage distribution channelhaving one middleman, i.e., retailer. In this channel, the producer sells to big retailers like departmental stores and chain stores who in turn sell to customer. This channel is very popular in the distribution of consumer durables such as refrigerators, T V sets, washing machines, typewriters,

etc. This channel of distribution is very popular these days because of emergence of departmental stores, super markets and other big retail stores. The retailers purchase in large quantities from the producer and perform certain marketing activities in order to sell the product to the ultimate consumers.

3**. Manufacturer to Wholesaler to Retailer to Customer:** This is the traditionalchannel of distribution. There are two middlemen in this channel of distribution, namely, wholesaler and retailer. This channel is most suitable for the products with widely scattered market. It is used in the distribution of consumer products like groceries, drugs, cosmetics, etc. It is quite suitable for small scale producers whose product line is narrow and who require the expert services and promotional support of wholesalers.

4. a) Define work study. Discuss the procedure involved in conducting work study 6M

work study is a generic term for those techniques, particularly method study and work measurement, which are used in the examination of human work in all its contexts, and which lead systematically to the investigation of all the factors which affect the efficiency and economy of the situation being reviewed, in order to effect improvement.

BASIC PROCEDURE:

SELECT the job or process to be studied

RECORD from direct observation everything that happens, using the most suitable of the recording techniques, so that the data will be in the most convenient form to be analyzed.

EXAMINE the recorded facts critically and challenge everything that is done, considering in turn: the purpose of the activity; the place where it is performed; the sequence in which it is done; the person who is doing it; the means by which it is done.

DEVELOP the most economic method, taking into account all the circumstances

MEASURE the quantity of work involved in the method selected and calculates a standard time for doing it.

DEFINE the new method and the related time so that it can always be identified

INSTALL the new method as agreed standard practice with the time allowed.

MAINTAIN the new standard practice by proper control procedures.

Step1, 2 and 3 occur in every study, whether the technique being used is method study or work measurement. Step 4 is part of method study practice, while step 5 calls for the use of work measurement.

4.b) Explain the different methods of performance rating 6M

Performance rating is the step in the work measurement in which the analyst observes the worker's performance and records a value representing that performance relative to the analyst's concept of standard performance.

1. **Skill and effort rating:**

   Around 1916 Charles E.Bedaux introduced the Bedaux system of wage payment and labor control in this country. His plan was based on time study and his time standards were expressed in points or “Bs”. A point or B was simply another name for what we

now call a standard minute. His time study procedure included the rating of the operator's skill and effort and the use of a standard table of fatigue allowances.Bedaux used 60 points equal to standard performance. In another words, an operator working at a normal pace was expected to produce 60 Bs per hour, and it was expected that the average incentive pace would be around 70 to 85 points per hour.

Before Bedaux, performance rating had been done mainly by selecting stop-watch readings from the time study data. Thus, if the operator was judged to be working at a fast tempo, a watch reading considerably above average would be selected as the representative time for the element; if the operator was judged to be working at a slow tempo, then a watch reading below average would be selected. The bedaux system was a definite improvement over this informal method of rating operator performance.

2. **Westing house system of rating:**

A four-factor system for rating operator performance was developed at Westinghouse and originally published in 1927.These four factors are i)skill ii) effort iii) conditions, and iv) consistency. A scale of numerical values for each factor was supplied in fig. and the selected time obtained from time study was normalized or leveled by applying the sum of the ratings of the four factors.

For example, if the selected time for an operation was 0.50 minute and if the ratings were as follows:

Excellent skill, B2	+ 0.08
Good effort, C2	+ 0.02
Good condition, C	+ 0.02
Good consistency, C	+ 0.01

Total	+ 0.13

Then the normal time for this operation would be 0.565 minute (0.50X1.13 = 0.565)

3. **Synthetic rating:**

Synthetic rating is the name given to a method of evaluating an operator's speed from predetermined time values. The procedure is to make a time study in the usual manner, and then compare the actual time for as many elements as possible with predetermined time values for the same elements. A ratio can be established between the predetermined time value for the element and the actual time value for that element. This ratio is the performance index or rating factor for the operator in so far as that one element is concerned. The formula for computing the performance rating factor is

$$R = \frac{P}{A}$$

Where R = performance rating factor

P = predetermined time for the element, expressed in minutes

A = average actual time value (selected time) for the same element

The selected times for elements 1 and 3 were 0.12 and 0.17 minute, respectively. The time values for these two elements as determined from a table of predetermined time values were 0.13 and 0.19 minute, respectively. In the first case the rating factor was 108 percent (0.13/0.12 X 100 = 108%), and in the second case it was 112 percent (0.19/0.17X100 = 112%).The average rating factor was the average of 108 and 112, or 110 percent. The average rating factor was then applied to all elements in this study. The rating factor, of course, is applied only to manually controlled elements.

4. **Objective rating:**

Another method of rating performance has been given the name objective rating. First, the operators speed is rated against a single standard pace which is independent of job difficulty. The observer merely rates speed of movement or rate of activity, paying no attention to the job itself. After the pace rating is made, an allowance or a secondary adjustment is added to the pace rating to take care of the job difficulty. Job difficulty is divided into six classes, and a table or categories are 1. Amount of body used 2. Foot pedals 3.Bimanual ness 4. Eye-hand coordination 5.Handling requirements 6.weight

EXAMPLE:

If the selected time for an element is 0.26 minute, the pace rating is 95 percent, and if the sum of all secondary adjustments amounts to 20 percent, then the normal time will be 0.297 minute (0.26X0.95X1.20)

5. **Performance rating**

By far the most widely used system of rating in this country is that of rating a single factor –operator speed, pace, or tempo. This system is called performance rating. The rating factor may be expressed in percentage, in points per hour, or in other units. Here we shall use the percentage system, with normal performance equal to 100 percent.

5. a) Define Method Study. How do you carry it out? 6M

Method Study

Method study is the systematic recording and critical examination of existing and proposed ways of doing work as a means of developing and applying easier and more effective methods and reducing costs"

From the definition it is clear that method study is concerned with the development of efficient and economical work methods. Proper development of these methods calls for the co-operative efforts of the design engineer, process engineer, and method analyst. There is a continuing need for analyzing existing methods even in the case in which special efforts are made to develop efficient original work method.

The basic procedure for method study, selecting the proper steps, is as given below:

1. SELECT the work to be studied
2. RECORD all the relevant facts about the present method by direct observation
3. EXAMINE those facts critically and in an ordered sequence, using the techniques best suited to the purpose.

4. DEVELOP the most practical, economic and effective method, having due regard to all contingent circumstances
5. DEFINE the new method so that it can always be identified
6. INSTALL that method as standard practice
7. MAINTAIN that standard practice by regular routine checks.

These are the seven essential stages in the application of method study; none can be excluded. Strict adherence to their sequence, as well as to their content, is essential for the success of an investigation.

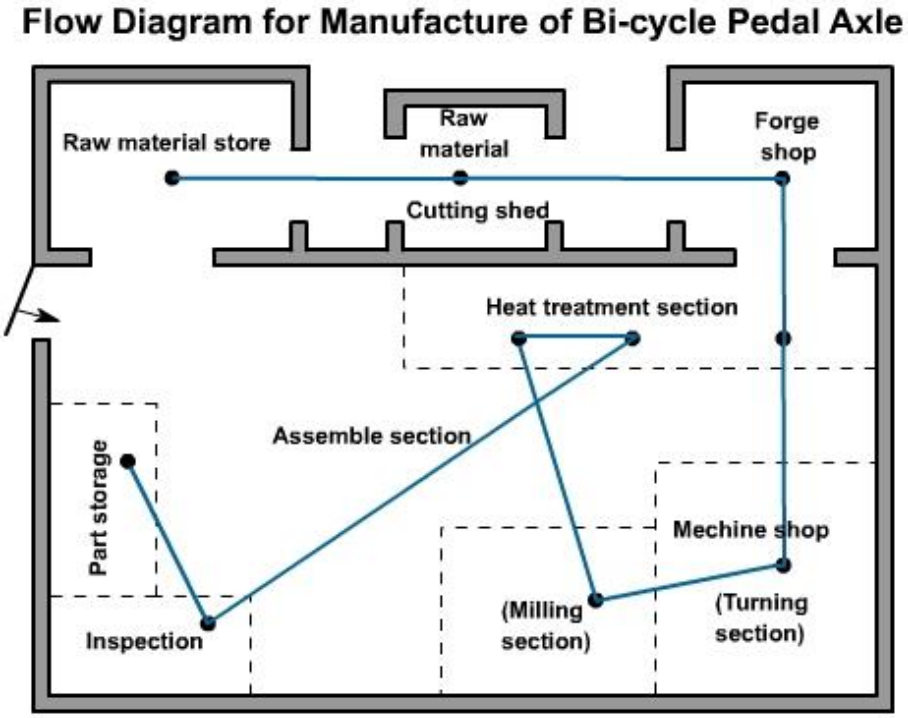
5. b) Discuss any two techniques of recording the current method of doing the job 6M

FLOW TYPE DIAGRAMS:

These diagrams are the pictorial representation of flow of material in the factory while different sequence of operations, transportation, inspection, delay and storage takes place. There are three types of flow diagrams that are common in use

FLOW DIAGRAM:

It shows the location and sequence of all the activities, which are carried by the workers. It also shows the route, followed by material, components or sub-assemblies.



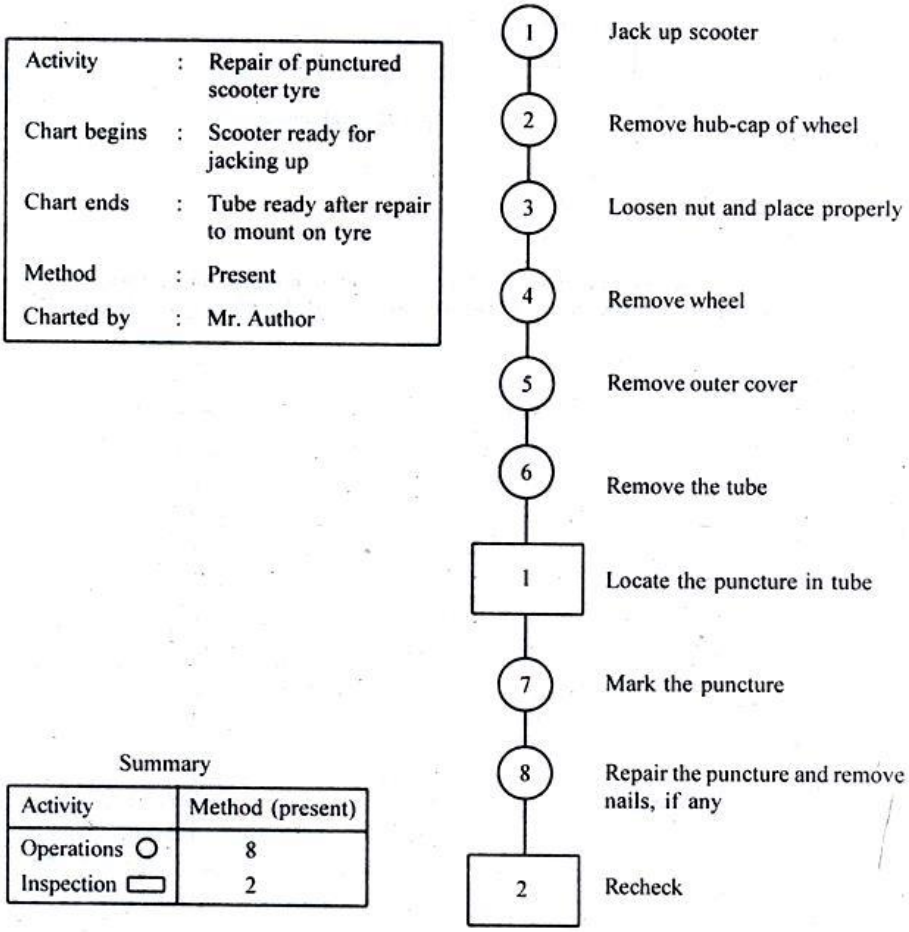
DEFINITION:

- It is a diagram of model substantially to scale which shows the location of specific activities carried out and the routes followed by workers, materials or equipment in their execution.

AMOUNT OF DETAILS:
IT shows location of each department and sequence of principal activities.

APPLICATIONS:
mainly used in studying plant layout

<u>OUTLINE PROCESS CHART:</u>
It records principle operations and inspection of the processes
DEFINITION:
A process chart giving an overall picture by recording in sequence only the main operations and inspections
AMOUNT OF DETAILS:
IT shows only two principal elements: i) operation, and ii) inspection



APPLICATION:

- - Used in the preliminary investigation
- - When operation activities are subject to frequent changes or a more detailed analysis.

6. a) Describe the concept of variable control charts **6M**

Variables control charts are used to evaluate variation in a process where the measurement is a variable--i.e. the variable can be measured on a continuous scale (e.g. height, weight, length, concentration).

The control chart for variables is a means of visualizing the variations that occur in the central tendency and the mean of a set of observations. It shows whether or not a process is in a stable state.

Xbar Chart

An Xbar-chart is a type of control chart used to monitor the process mean when measuring subgroups at regular intervals from a process.

R chart

An R-chart is a type of control chart used to monitor the process variability (as the range) when measuring small subgroups ($n \leq 10$) at regular intervals from a process.

Control Limits for the Xbar chart

$$UCL\bar{x} = \bar{\bar{x}} + A_2\bar{R}$$

$$Center \quad Line = \bar{\bar{x}}$$

$$LCL\bar{x} = \bar{\bar{x}} - A_2\bar{R}$$

Control Limits for the R chart

$$UCL_R = D_4\bar{R}$$

$$Center \quad Line = \bar{R}$$

$$LCL_R = D_3\bar{R}$$

6. b) Explain the methods of job evaluation **6M**

Methods of job evaluation:

a) Non-quantitative methods
   1. Ranking method
   2. Classification method

b) Quantitative methods
   1. Factor comparison method
   2. The point rating method

1. Ranking method

This is the easiest and simplest method of job evaluation. In this method the jobs are ranked from the most important one to the least important. Each departmental head arranges the jobs in their department in the order of importance. The individual departments pass on their ranking to a central committee who groups the jobs into grades/classes.

While ranking, following points are considered:

1. Amount of work involved
2. Supervision needed
3. Extent of responsibility required

4. Difficulties involved in the work
5. Monotony of work
6. Working conditions required
7. Knowledge and experience needed

2. Classification method

In this method jobs are classified or graded in groups or levels of equal skill, difficulty, responsibility, importance and other requirements. It may be production job, a sales job or an office job, each job family can be broken into a number of grades. For example, production jobs may be classified into five grades, namely grade 1 to grade 5. Grade 1 involves simple tasks requiring less skill, precision and accuracy while grade 5 involves skilled, precise and highly accurate work.

The job evaluation by job classification involves following major steps:

1. Deciding the number of grades(five, six etc)
2. Writing grade level descriptions
3. Identifying/listing of the jobs to be evaluated
4. Preparing job descriptions
5. Comparing job descriptions with grade level descriptions and assigning jobs to grades

3. Factor comparison method

In this method detailed analysis of the jobs is carried out by employing following five main factors:

1. Skill
2. Mental effort
3. Physical effort
4. Responsibilities
5. Working conditions

The various steps involved in the factor comparison method are:

1. Identify a few key jobs in the organization which can be described accurately and assumed to be correctly paid
2. Analyse the key jobs for each of the five factors mentioned above
3. The salary paid for each key job is amongst the factors in proportion to their importance in the job
4. This provides a money rating scale for each of the factors
5. Each of the remaining jobs is evaluated for each of the factors on its money rating scale of the key jobs. The monetary value of the job is obtained by adding up the individual money values assigned to the job for each of the factors depending upon their importance in the job.

		Factors				
Key job	Salary	Skill	Mental effort	Physical effort	Responsibility	Working conditions
J1	1300	240	100	200	600	160
J2	1640	500	100	600	200	240

J3	2160	400	750	140	800	120
J4	2500	540	380	900	320	360
J5	3200	800	400	200	1100	700
X	Job to be evaluated	200	160	240	500	300

4. Point method

The point system a widely used method is based on dividing the jobs into a number of factors which in turn are further subdivided into grades or degrees. Certain points (weightage) is assigned to each grade.(for example, effort is one of the factors which may be subdivided in two grades-physical and mental) when such points for all the factors are added they indicate the importance of the job in the organization. The points or weightage assigned to each factor will vary from industry to industry. Point method involves the following major steps:

a) Decide the type of jobs to be evaluated
b) Select and define job factors which may vary from five to ten.

A few job factors commonly selected are as given below

1. Skill
   a) Education and training
   b) Experience
   c) Judgement and initiative
2. Effort
   a) Physical
   b) Mental
3. Responsibility towards
   a) Materials or product
   b) Equipment or process
   c) Safety of others
   d) Work of others
4. Working conditions
   a) Exposure to hazards
   b) Dust, smoke, fumes and noise
   c) High temperature
   d) Glares and harmful radiations

While selecting the factors it should be noted that:

1. The factors selected must be rateable. For example, education is a rateable factor as it can be specified in varying degrees such as middle school, trade certificate, graduation, postgraduationetc
2. The number of factors should be as few as possible

3. Only important factors should be selected factors which are present to the same degree in all jobs should not be selected
4. Each factor should measure only one aspect of the job

Select and define grades or degrees to each factor. For example, education and training may have the following factors:

1. Diploma in engineering with no training
2. Diploma in engineering with 2 years apprentice training
3. Diploma in engineering with 2 years training in machine shop and certificate course in computer applications
4. Diploma in engineering A.M.I.E and 2 years experience

7. a)Discuss on theFunctions of HRM 6M

Operative functions:

The operating functions of personnel management are concerned with the activities specifically dealing with procuring, developing, compensating and maintaining an efficient workforce.

1. **The procurement** is concerned with the obtaining of a proper kind and number of personnel necessary to accomplish an organization's goals. It deals with specifically with such subjects as the determination of manpower requirements their recruitment, selection and place (comprising activities to screen and hire personnel, including application forms, psychological test, interviews, medical check-up reference calling), induction follow up, transfers, layoffs, discharge and separation etc.

2. **The development** is concerned with the personnel development of employees by increasing their skill through training so that job performance is properly achieved. Drafting and directing training programmes for all levels of employees, arranging for their on-the-job, office and vestibule training, holding seminar and conferences providing for educational and

Vocational counseling and appraising employee potential and performance are undertaken under this function.

3. The **compensating** is concerned with securing adequate and equitable remuneration to personnel for their contribution to the attainment of original objectives. Functions related to wage surveys, establishment of

Job classifications, job descriptions and job analyses, merit ratings, the establishment of wage rates and wage structure, wage plans and policies, wage system, incentives and profit sharing plans etc. full under this category.

4. **The integration function:** after the employee has been procured, his skill and ability developed and monetary compensation determined, the most important,

Yet difficult of the personal management is to bring about an "integration" of human resources with organization, and to cope with inevitable reconciliation of individual, societal, and organization interests. It rests upon the premise that significant overlapping of interests do exist in the organization in such programmes as job enlargement, job evaluation, variable

compensation plans. The greater they overlap, the more productivity would coincide with employees that they would prefer to avoided assignment to narrow and respective tasks, meeting high output standards, acceptance of managerial decisions. For this reason, the organization has disciplinary action programmes as well as some freedom to do away with the services of particular employees. On the other hand, there are certain things that employees desire which the organization is reluctant to provide **e.g.** increased wages; totally, safe working conditions time off with pay, shorter hours of work, premium pay for overtime work etc.

5**. The maintenance function** deals with sustaining and improving the conditions that have become established. Specific problems of maintaining the physical conditions of employees (health and safety measures) and employee service programmes are the responsibility of the personnel department.

7. b) For each of the 14 days, a number of magnets used in electric relays are inspected and the number of defectives is recorded. The total number of magnets tested is 14,000.The following are the particulars of the number of defectives found every day.You are required to construct P-Chart 6M

Day Number	Number of defectives	Fraction defective
1	100	0.00714
2	50	0.00357
3	150	0.0107
4	200	0.0142
5	150	0.0107
6	50	0.00357
7	80	0.00571
8	120	0.00857
9	60	0.00428
10	14	0.001
11	50	0.00357
12	70	0.005
13	40	0.00285
14	140	0.01

P bar **=** Total No.of defectives/Total No.ofmagnets inspected

= 1274/14000 = 0.091

Average defective = 1274/14 = 91

UCL_P = 0.1814

$LCL_P = 0.0006$

Draw a P-Chart and state whether the process is within control or out of control.

8. a) Define Entrepreneurship. Explain the Functions of Entrepreneur 6M

Entrepreneurshipistheprocessofcreatingsomethingnew,withvalue,bydevotingthenecessarytimeand effort,assumingtheaccompanyingfinancial,psychic,andsocialrisks,andreceivingtheresultingreward sofmonetaryandpersonalsatisfactionandindependence.

1. Manages business and takes decisions
2. Studies the market and selects the business
3. Makes a selection of plant size
4. Selects plant site
5. Organizes sales and holds the customers
6. Promotes new inventions
7. Coordinates different factors of production
8. Arranges raw material, machinery and finance
9. Employs laborers
10. Deals with government departments such as sales tax, labour, electricity, export-import, railways.
11. Decides pricing policies
12. Distributes wages of labourers, interest to the capitalist.

8. b) Explain the steps involved in product design process 6M

Product design may seem like a relatively easy process to many, but there are several steps and processes that need to be taken in order to have a successful design. Here are seven steps in this process.

Step 1 – Assessing the problem

This is where you will identify a problem within the market and then come up with ideas and solutions to rectify this problem. This idea could stem from a gap in the market, or a product that doesn't function as well as it should.

Step 2 – Research

This involves researching in depth to see if there are other similar products on the market, this ensures that no product is replicated. This means you can also identify problems with current products that are similar and work to improve it.

Step 3 – Ideas

After forming extensive research, this is where you can begin to brainstorm ideas and concepts to come up with a solution. From here you will pick a few sketches that you think, may well work.

Step 4 – Prototypes

You can then begin to create prototypes of these sketches, these should be basic 3D models that show the basic form of the product, but don't necessarily have to be fully functioning.

Step 5 - Final design

From here you will pick a final design that incorporates all the functions that work that you have extensively researched.

Step 6 – Testing

One of the most crucial parts of the process, extensive testing will be carried out, not only by experts, but by potential customers too. This will give a good indication as to whether the product will be successful.

Step 7 – Manufacturing

If the testing stage has gone well then plans are put in place for mass manufacturer. If not, the whole process is repeated again.

9. a) Explain the need of training for enterprises 6M

Need of training for enterprises:

1. In order to motivate and assist the prospective entrepreneurs for the success of their industry, proper training is essential in production techniques, management, marketing and other aspects. Small industries service institutes and their extension centresorganise training for
2. Improving technical skills of workers and employees
3. Providing acquaintance to entrepreneurs with modern and latest production and management techniques.

The training courses for workers are organised in the following fields/areas:

- **Shop oriented courses:** These are the courses such as tool room practices, machine shop practice, foundry,forging,meteorology and electrical shop practice.
- **Trade oriented courses:** These are the courses such as tool making, sheet metal, fitter and pattern making etc
- **Process oriented courses:** These are the courses providing training in welding, heat treatment and electroplating etc.
- **Product oriented courses:** These are the courses related with production of goods such as foot wear, sports goods, paints and varnishes etc.

In order to provide training and for the purpose of technology upgradation, specialized institutions have been established. Some institutions of this type in the different parts of the country are:

1. National Institute for Entrepreneurship and small business development ,New Delhi
2. National Federation of industrial cooperatives limited, New Delhi
3. Central Institute of hand Tools, Jalandhar
4. Central pulp and paper research institute, Saharanpur
5. Process and product Development centre, Agra
6. Central machine tool institute, Banglore
7. Indian plywood industries research institute, Banglore
8. National institute of design, Ahmedabad

9. Centre for the improvement of glass industry, Firozabad
10. Hand tool design development and training centre, Nagpur
11. Central tool room and training centre, calcutta
12. Central Institute of tool design, Hyderabad

9. b) Discuss the Role of communication in entrepreneurship 6M

Communication has a pivotal role to play in the development of an entrepreneurial society. It will open vast information activities that will create the necessary climate for entrepreneurial development. This will open up new opportunities otherwise inaccessible to ordinary entrepreneurs.

• Communication plays a vital role even to small enterprise, where control by one person makes interpersonal communication of the essence. Many businesses fail simply because partners would not talk with each other. Interpersonal communication is important for an entrepreneur. Here's how communication really helps an entrepreneur.

• Essential in marketing and sales promotion. An entrepreneur should develop a marketing strategy for his product or service. He must be familiar with basic advertising strategies and packaging his product.

• Important in communicating with employees and other partners. Communication is a vital component in all stages of the business production process. A breakdown may occur because the employer may not be clear on the message he wishes to convey due to lack of information while the message is not understood by the receiver. The challenge is in getting the message across and that needs skills specifically communication skills.