

Solved question paper - Nov 2019

Subject : industrial management and safety

Subject code : 5001

5001 (3) pages

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(REVISION – 2015)



Reg. No.

Signature

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2019

INDUSTRIAL MANAGEMENT AND SAFETY

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. State the term Nominal partners.
2. Define Real wages.
3. Define Inventory.
4. List the applications of PERT and CPM.
5. Write full form of SIDBI and TBI.

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Explain the terms staffing and directing.
2. Explain the advantages of training.
3. List the benefits of ISO 9000 : 2000 Company.
4. Explain EOQ and ABC inventory models.
5. Differentiate between CPM and PERT.
6. Explain the precautions to be observed while working under hazardous environment.
7. Write short notes on unsafe condition and unsafe act.

(5×6 = 30)

5001

②

Marks

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Write short notes on financial incentives, Non-financial incentives and semi financial incentives. 7
- (b) Explain Line and staff organisational structure with a chart. 8

OR

- IV (a) Compare the contributions of FW Taylor and Henry Fayol in scientific management. 7
- (b) State the Partnership organization. Give its advantages and disadvantages. 8

UNIT — II

- V (a) Describe the duties and responsibilities of a store keeper. 7
- (b) Define Total Quality Management and List the Ten Manthra's for TQM. 8

OR

- VI (a) Distinguish between centralised store and de-centralised store. 7
- (b) Explain the store purchasing procedure. 8

UNIT — III

- VII (a) A factory producing two components named A and B. It requires machining and assembly processes. The component A and B requires time and profit as follows. Formulate Linear programming solution for maximization of the profit.

| Process | Components | | Available time |
|------------|------------|----|----------------|
| | A | B | |
| Machining | 5 | 4 | 160 |
| Assembling | 2 | 5 | 100 |
| Profit | 30 | 60 | 6 |

- (b) A small plant assembles PCs through inter linked activities as follows. Draw an arrow diagram (network), find Critical path and the total assembly duration.

| | | | | | | | | | | | |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Activities | 1-2 | 1-3 | 1-4 | 2-5 | 3-6 | 3-7 | 4-6 | 5-8 | 6-9 | 7-8 | 8-9 |
| Duration | 2 | 2 | 1 | 4 | 8 | 5 | 3 | 1 | 5 | 4 | 3 |

OR

5001 (3) 3

Marks

VIII (a) Find out the basic feasible solution by least cost method and Total cost for the given transportation problem.

| | D1 | D2 | D3 | D4 | Supply |
|--------|----|----|----|----|--------|
| S1 | 19 | 30 | 50 | 10 | 7 |
| S2 | 70 | 30 | 40 | 60 | 9 |
| S3 | 40 | 8 | 70 | 20 | 18 |
| Demand | 5 | 8 | 7 | 14 | 9 |

(b) Compute saddle point and optimal strategies for player A and player B by using max-min and mini-max principle.

| | Player A | | | | |
|----------|----------|----|---|----|---|
| Player B | 3 | -1 | 5 | 10 | |
| | -5 | 4 | 3 | 7 | |
| | 8 | 7 | 6 | 8 | 6 |

UNIT — IV

- IX (a) What are the constituents of feasibility study ? 7
- (b) Explain the environmental causes of accident. 8

OR

- X (a) Explain the procedure for registration of a small scale industry. 7
- (b) Discuss about different accident prevention techniques 4E s. 8

SCHEME OF EVALUATION

SCORING INDICATORS

REVISION :2015

COURSE CODE :5001

COURSE TITLE : INDUSTRIAL MANAGEMENT AND SAFETY

| Que No: | Scoring Indicator | Split Up score | Sub total | Total |
|----------------|---|----------------|-----------|-------|
| <u>PART- A</u> | | | | |
| I.1 | Nominal partners do not invest money and do not take part in the management but they lend their reputed name for the company's product or service | 2 | | |
| I.2 | Real wages includes the amount needed to meet the necessities, comforts, luxuries and cash payment which a worker can get in return of his effort and work. | 2 | | |
| I.3 | Inventory is a stock of physical assets having some economic value, which can be ether in the form of material, money or labour. | 2 | | |
| I.4 | Research and development activities, Military operations, Weather forecasting etc. (any two) | 2 | | |
| I.5 | Small Industries development Bank of India, Technology Business Incubator | 2 | | |

| | | | | |
|------|--|---|---|--|
| II 1 | <p>Staffing</p> <p>Staffing is the process of selecting, training, promoting, and retire the work force.</p> <ul style="list-style-type: none"> • Manpower planning, i.e. assessing manpower requirements in terms of quality; • Recruitment, selection and training; • Placement of manpower; • Development, promotion, transfer. • Determination of employee remuneration. | 3 | | |
| | <p>Directing</p> <ul style="list-style-type: none"> • Giving instructions to subordinates. • Guiding the subordinates to do the work. • Supervising the subordinates to make certain that work done by them is as per the plans established. • Finding variance or deviations, if any; and • Taking corrective actions or measures. | 3 | 6 | |
| II.2 | <p>Training is absolutely necessary to attain a competent work force at the highest level of all technical phases. Workers and managers should be systematically trained upon a specific requirement. Advantages of training are as follows</p> <ul style="list-style-type: none"> ○ To increase the efficiency of workers/ supervisors. ○ To reduce wastage of materials ,machine and man hour ○ To increase productivity and reduces production cost ○ Reduced supervision and improved product quality ○ It gives job satisfaction | | 6 | |

| | | | | |
|------|--|--|---|--|
| II.3 | <ul style="list-style-type: none"> ○ It reduces labour turnover and chances of accident ○ Less fatigue to the workers ○ It helps to build team spirit ○ It can boost the morale, cooperation and good relation <p>Countries affiliated to European free trade association made it as mandatory to have bilateral trade with only those having ISO 9001 certification</p> <p>It builds customer satisfaction by supplying assured quality products at reasonable price</p> <p>If an Indian industry adapts ISO 9001 quality system, it will get entry into the global market and can compete with the developed countries because Indian products are cheaper compared to European products. The government of india in its export import policy has given certain concessions to the ISO 9001 companies</p> <p>It motivates the employees and develops pride in them</p> <p>It improves the efficiency and reduces the wastages and inspection</p> <p>It enhances the quality image of the company and gives credit in competition market.</p> <p>In some countries the companies without ISO 9001 have to pay more insurance premium. In some countries they denied insurance coverage. Systematic operations and processes reduce the work hazards</p> | | 6 | |
| II.4 | <p>Economic Order Quantity is referred to as the size of the order that gives maximum economy in purchasing the materials. It helps in finding adequate levels for holding inventories. It facilitates the fixation of ordering sequence and the quantities so as to minimize total material cost. Inventory control parameters are Maximum stock, Minimum stock, Reorder point, Average stock and Standard order quantity.</p> <p>ABC analysis is a selective approach popularly known as Always(A) Better(B) Control(C). Here the materials are classified as high valued, medium valued and low valued items. Maximum attention is given to</p> | | 6 | |

| II.5 | <p>high valued items, moderate attention to medium valued items and least attention to low valued items.</p> <p>A-items constitute 10% of the total number of items and 70% of the total money.</p> <p>B-items constitute 20% of the total number of items and 20% of the total money.</p> <p>C-items constitute 70% of the total number of items and 10% of the total money.</p> | 3 | 6 | 3 | | | | | | | | | | | | |
|--|--|------|-----|---|---|-------------------------|--------------------------|----------------|-------------------|---|---------------------------------------|---|---|--|--|--|
| <table border="1"> <thead> <tr> <th data-bbox="199 629 628 667">PERT</th> <th data-bbox="651 629 1034 667">CPM</th> </tr> </thead> <tbody> <tr> <td data-bbox="199 685 616 779">It is a probabilistic model with uncertainty in activity duration</td> <td data-bbox="651 685 1002 779">A deterministic model with well-known activity timing</td> </tr> <tr> <td data-bbox="199 792 507 831">Has three time estimate</td> <td data-bbox="651 792 963 831">Has only 1 time estimate</td> </tr> <tr> <td data-bbox="199 846 392 884">Event oriented</td> <td data-bbox="651 846 863 884">Activity oriented</td> </tr> <tr> <td data-bbox="199 900 568 994">Does not give importance to critical path</td> <td data-bbox="651 900 959 994">Gives due importance to critical path</td> </tr> <tr> <td data-bbox="199 1010 552 1104">It uses statistical method to calculate expected time</td> <td data-bbox="651 1010 986 1104">Need not require statistical techniques</td> </tr> </tbody> </table> | | PERT | CPM | It is a probabilistic model with uncertainty in activity duration | A deterministic model with well-known activity timing | Has three time estimate | Has only 1 time estimate | Event oriented | Activity oriented | Does not give importance to critical path | Gives due importance to critical path | It uses statistical method to calculate expected time | Need not require statistical techniques | | | |
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| It is a probabilistic model with uncertainty in activity duration | A deterministic model with well-known activity timing | | | | | | | | | | | | | | | |
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| Event oriented | Activity oriented | | | | | | | | | | | | | | | |
| Does not give importance to critical path | Gives due importance to critical path | | | | | | | | | | | | | | | |
| It uses statistical method to calculate expected time | Need not require statistical techniques | | | | | | | | | | | | | | | |
| II 6 | <p>The management may create a full-fledged safety department according to the degree of hazardous.</p> <p>Conduct safety progress to prevent accident through 4Es like Engineering method, Education, Enterprising, Enforcement</p> <p>Give safety instruction and training</p> <p>Educate employees to develop safety consciousness.</p> <p>Conduct job safety analysis, plant safety inspection and accident investigation and analysis.</p> <p>Analysis the progress of the safety movement.</p> | | 6 | | | | | | | | | | | | | |

| | | | | |
|------|--|---|---|--|
| II.7 | Unsafe conditions <ul style="list-style-type: none">○ Improper lighting and ventilation○ Inadequate machine guarding○ Worn out equipment○ Inadequate personal protective equipments such as helmets○ High temperature○ High humidity○ Excessive noise○ Inadequate warning system | 3 | | |
| | Unsafe act <ul style="list-style-type: none">○ Failing to wear protective equipments○ Rendering machine guards inoperative○ Operating equipments without authority○ Operating equipments at excessive speed○ Engaging in useless activities○ Severity of work○ Long hours of work○ Using drugs○ Improper loading or placement of equipment○ Throwing materials on the floor carelessly | 3 | 6 | |

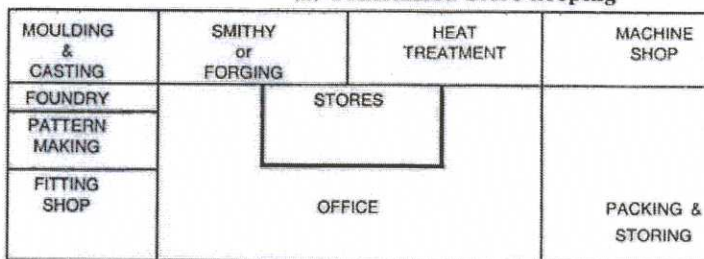
| Que No: | Scoring Indicator | Spl it Up sco re | Su b tot al | T ot al |
|---------|---|------------------|-------------|---------|
| III a | <p style="text-align: center;"><u>PART- C</u></p> <p style="text-align: center;">Financial incentives</p> <p>Any incentive that pays off either directly or indirectly is termed as financial incentives. Financial incentives are strong motivation to the employee to do more work. Financial incentives are calculated by different methods like Straight piece rate method, Straight piece rate with guaranteed wage, Differential piece rate method, Halsey plan, Rowan plan, and Gantt plan etc.</p> <p style="text-align: center;">Non-financial incentives</p> <p>These are the incentives given to an employee other than money to motivate him and to increase the job satisfaction. Non-financial incentives are in the form of</p> <ul style="list-style-type: none"> Earning higher status Greater responsibility Chance of participation in decision making Rewards like mementos Opportunity for quick promotion Training and higher study opportunity etc. | | 7 | |
| III.b | <div style="text-align: center;"> <pre> graph TD GM[General Manager] --> WM[Works Manager] WM --> SI1[Superintendent Dept. I] WM --> SI2[Superintendent Dept. II] SI1 --> F1[Foreman] SI1 --> F2[Foreman] SI1 --> F3[Foreman] SI2 --> F4[Foreman] SI2 --> F5[Foreman] SI2 --> F6[Foreman] F1 --> W1[Workers] F1 --> W2[Workers] F1 --> W3[Workers] F2 --> W4[Workers] F2 --> W5[Workers] F2 --> W6[Workers] F3 --> W7[Workers] F3 --> W8[Workers] F3 --> W9[Workers] F4 --> W10[Workers] F4 --> W11[Workers] F4 --> W12[Workers] F5 --> W13[Workers] F5 --> W14[Workers] F5 --> W15[Workers] F6 --> W16[Workers] F6 --> W17[Workers] F6 --> W18[Workers] </pre> </div> <p>This is the simplest form of organization. In this the authority flows directly from top to bottom. Line organization is direct and people at different levels know to whom they are accountable. The supervisor gives orders to subordinates officers, assign duties, and take disciplinary actions against them.</p> <p>Advantages of Line or military or scalar organisation</p> <ol style="list-style-type: none"> 1. It is simple and very easy to understand. 2. It is flexible. 3. It gives clear division of authority and responsibility. | 4 | | |

| | | | | |
|------|--|---|---|----|
| | <p>4. It permits quick decisions and speedy actions.</p> <p>5. Strong in discipline like in military.</p> <p>6. Shifting of responsibility is not possible.</p> <p>7. It is capable of developing the all-round executive at the higher levels of authority.</p> <p>8. It gives increased efficiency and operations.</p> <p>Disadvantages of Line or military or scalar organization</p> <p>1. It neglects specialist role.</p> <p>2. Overloads few key executives.</p> <p>3. Chances of wastage and accident are more, because of insufficient knowledge of all the work by one man.</p> <p>4. No means for rewarding good workers.</p> <p>5. Department heads are overloaded with various routine works, hence no time to think for future expansion and planning.</p> <p>6. As the orders flow from top to bottom chance of loss and distortion of information possible.</p> | 4 | 8 | 15 |
| IV.a | <p>Similarity</p> <p>Universality of Management : Both of them are realised the universality of management</p> <p>Scientific Methods: Both applied scientific methods to the problems of management</p> <p>Importance of Personnel: Both realised the importance of personnel and its management</p> <p>Improvement of Practice: Both wanted to improve the management practice</p> <p>Idea through Experience: They developed ideas through practical experience</p> <p>Books: Both of them expressed their ideas through their books</p> <p>• Dissimilarity</p> <p>Shop floor v/s Manager: Taylor focused his attention on the problems of shop floor while Fayol concentrated on the functions of managers at top level.</p> <p>Bottom v/s Top: Taylor worked from the bottom of the industrial hierarchy upwards, while Fayol concentrated on the chief executive and worked downwards.</p> <p>Productivity v/s Theory: The main aim of Taylor was to improve productivity of labour and eliminate wastage. Fayol attempted to develop a universal theory of management.</p> <p>Management v/s Administration: Taylor called his philosophy or work as 'Scientific Management' whereas Fayol described his work as 'General Theory of Administration'.</p> | | 7 | |

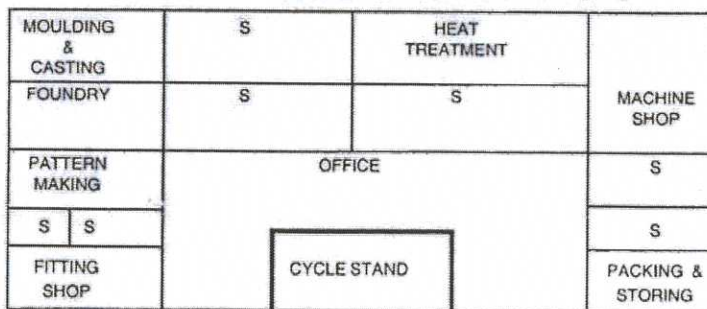
| | | | |
|------|--|---|----|
| IV.b | <ul style="list-style-type: none"> Partnership organisation is an association of two or more persons (upto 20 persons in case of non-banking business and upto 10 persons in case of banking business). To avoid any complication at a later stage, the constitution of the company may be written in an agreement form. This agreement is known as partnership-deed. <p>Advantages</p> <ol style="list-style-type: none"> 1) Large capital can be collected than that of the sole trade. 2) The firm possesses much better talent / skills from different partners. 3) There is a definite legal status. 4) Partnership can borrow money easily from various financial institutions. <p>Disadvantages</p> <ol style="list-style-type: none"> 1) Mistake of one partner may cause a big loss to all the partners. 2) Due to unlimited liability, risk involved is more. 3) Chances of misunderstanding among partners which affect adversely on the efficiency and expansion of business. 4) It is unsuitable for modern industries because they require huge capital. Not subjected to strict government supervision. 6) For all losses there are more than one person to share. | 8 | 15 |
| V.a | <p>Duties of the store keeper</p> <ul style="list-style-type: none"> To receive materials, goods and equipments and check them for identification. To receive parts and components which have been processed in the industry To record the receipt of goods To maintain stocks safely and in good condition from damage, theft and pilferage. To record and update receipts and issues of materials To prevent unauthorized person from entering the stores To plan store for optimum utilization of the cubic space Coordinate and cooperate to the full extend with all departments | 7 | |

| | | | |
|------|--|---|----|
| V.b | <p>TQM is defined as an integrated management approach in satisfying customer needs in quality on a continuous basis through involvement of each and every employee in the organisation.</p> <ul style="list-style-type: none"> • . Quality is never an accident; it is always the result of untiring and intelligent effort. There has to be the will to produce a quality product. • Quality will never come out without hard work and devotion. • Quality is everybody's business. • Quality begins with the cleanliness of the workplace. • Take care of quality; quantity will take care of it. • Make it right for first time and all times. • Quality is achieved through team work. • Document is dependable but, not the memory. • Quality begins and ends with education. • Quality is the attribute that a customer uses to evaluate products and services. | 8 | 15 |
| VI.a | <p>In Centralized stores system the main store located centrally fulfills the needs for each and every department</p> <p>Advantages of centralised stores</p> <ul style="list-style-type: none"> ○ Better supervision and control ○ It requires fewer personnel to manage ○ Better layout of stores ○ Better security arrangements can be made ○ Optimum stores can be maintained <p>In de-centralised stores system, each section of the industry has separate stores attached with it.</p> <p>Advantages of de- centralised stores</p> <ul style="list-style-type: none"> ○ Reduced material handling and associated works ○ Less risk of loss by fire or theft ○ Less chance of production stoppages owing to easy availability of materials ○ Convenient for every department to draw materials | 7 | |

(a) Centralised Store-keeping



(b) Decentralised Store-keeping



VI.b

Purchase procedure means the entire steps to be carried out in a purchase transaction.

Following are the basic steps

- Purchase requisition
- Selection of possible sources of supply
- Determining the time, price, quality and quantity
- Making request for quotations or tender
- Selection of right source of supply
- Placing the purchase order
- Follow up and expediting of the order
- Inspection
- Checking and approval invoices for payment
- Closing completed orders
- Maintenance of Records and files

8

15

VII.a

| Process | Components | | Available time |
|------------|------------|----|----------------|
| | A | B | |
| Machining | 5 | 4 | 160 |
| Assembling | 2 | 5 | 100 |
| Profit | 30 | 60 | |

Let the company produces X_1, X_2 units of components A and B respectively

Total profit $Z = 30X_1 + 60X_2$

Constraints for machining : $5X_1 + 4X_2 \leq 160$

Constraints for Assembling : $2X_1 + 5X_2 \leq 100$

Non-negativity Constraints : $X_1 \geq 0, X_2 \geq 0$

So in order to maximize the profit of the company in the form of LPP as follows

Maximize $Z = 30X_1 + 60X_2$

Subject to the constraints:

$5X_1 + 4X_2 \leq 160$

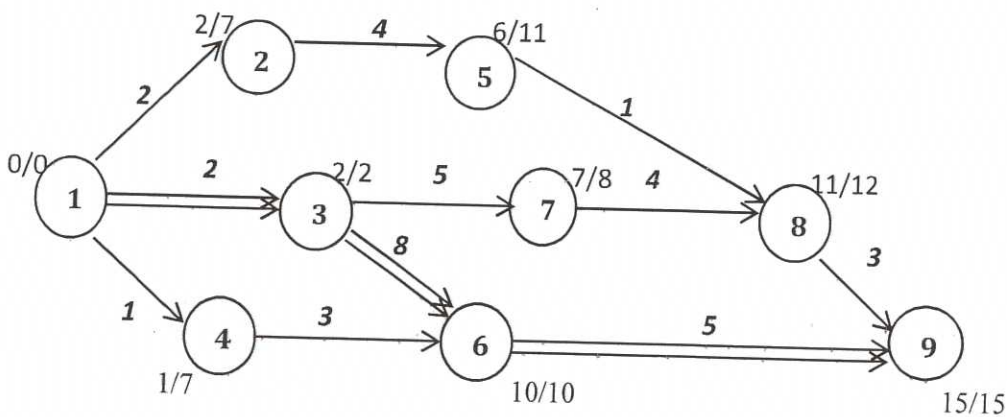
$2X_1 + 5X_2 \leq 100$

$X_1 \geq 0, X_2 \geq 0$

6

VII.b

EFT/LFT



Critical Path is 1-3-6-9 with duration 15 Hours

9

15

VIII.a

| | D1 | D2 | D3 | D4 | Supply |
|--------|-------|-----|-----|--------|-----------|
| S1 | 19 | 30 | 50 | 10 | 7/0 |
| S2 | 70 | 30 | 40 | 60 | 9/2/0 |
| S3 | 40 | 8 | 70 | 20 | 18/10/3/0 |
| Demand | 5/2/0 | 8/0 | 7/0 | 14/7/0 | |

$$\begin{aligned}
 \text{Total cost} &= (7 \times 10) + (2 \times 70) + (7 \times 40) + (3 \times 40) + (8 \times 8) + (7 \times 20) \\
 &= 70 + 140 + 280 + 120 + 64 + 140 \\
 &= 814 \text{ rupees}
 \end{aligned}$$

VIII.b

| | Player A | | | | Rowmin |
|----------|----------|----|---|----|--------|
| Player B | 3 | -1 | 5 | 10 | -1 |
| | -5 | 4 | 3 | 7 | -5 |
| | 8 | 7 | 6 | 8 | 6 |

Column Max 8 7 6 10

Maximin = Maximum of row minimum = 6

Minimax = Minimum of Column max = 6

Minimax = Maximin

Therefore Saddle point exists at (B3,A3)

Optimal strategy for B is B3 and for A is A3

9

6 15

IX.a A feasibility study is an analysis used in measuring the ability and likelihood to complete a project successfully including all relevant factors. It must account for factors that affect it such as economic, technological, legal and scheduling factors. Project managers use feasibility studies to determine potential positive and negative outcomes of a project before investing a considerable amount of time and money into it.

Feasibility studies allow companies to determine and organize all the details to make a business work. A feasibility study helps identify logistical problems, and nearly all business-related problems and their solutions. Feasibility studies can also lead to the development of marketing strategies that convince investors or a bank that investing in the business is a wise choice.

The constituents or components of feasibility study are as follows

Market and demand survey

Product and production analysis

Material and manpower input

Location of site

Economical and technical evaluation

Preparation of feasibility/project report

Cost –Volume, profit relationship and break even analysis

IX.b Environmental factors of accident includes

Too low temperature to cause shivering

Too high temperature to cause headache and sweating

Too high humidity to cause uncomforte, fatigue and drowsiness.

Defective and inadequate illumination

Presence of dust, fumes and smokes and lack of proper ventilation

High speed of work because of huge work load or incentives

Lengthy working hours

Inadequate rest

Poor house keeping

7

8

15

Xa

Procedure for Registration of small scale industry

Registration would be done in two stages : Provisional registration and Permanent registration

Provisional registration

It helps the party to take necessary steps to bring the unit into existence. It should be converted into a permanent registration after the unit comes into existence.

Apply for a space/shed in industrial area

Apply for power connection

Apply for financial assistance

Apply for hire purchasing machinery

Obtain sales tax, excise tax registration

Take other steps such as obtaining import license for capital goods or raw materials

Provisional registration certificate will be issued on submission of duly filled application form with registration fee at taluk / District industries office. This is valid for five years.

Permanent Registration

When the party has completed all steps to establish the unit that is factory building is ready, all machinery and testing equipments are installed, power connection is obtained and application for permanent registration is made.

On being satisfied after inspection, a permanent registration certificate may be issued by the Directorate of industries or District Industries Centre within one month of receipt of application

7

Xb

Engineering

- Use safe material handling equipment
- Use mechanical means of conveyance
- During transport sharp material and sharp edged goods must be covered
- Use personal protective devices for head face, eye and lungs
- Inflammable material should be stored separately away from general store
- Electrical connections and insulation should be checked at regular intervals
- Control air temperature, purity, humidity and heat radiation
- Provide sufficient illumination and ventilation

- Take measures to control noise pollution

Education

- Safety instruction and training
 1. Induction and orientation to new recruits
 2. Explaining safety functions
 3. Forming employee safety committees
 4. Displaying charts, posters films etc.

Enterprising

- Developing safety consciousness among workers and management
- Hold safety competitions and award prizes to Winners
- Cross mark accident areas
- Give due respect to safe workers
- Hold regular safety meetings
- Provide simple and convenient safety devices

Enforcement

- It means enforcement of safety rules and safe practices
- Enforce severe penalties when safe practices are violated
- Safety is every bodies business
- Managers must also obey safety regulations

8

15