1. **What are the relationship between plant layout and material handling? 2016-5(c)+ 2018-6(c)+ 2019-6(c)**

Answer: There is a close relationship between plant layout and material handling. A good layout ensures minimum material handling and eliminates re-handling in the following ways:

a) Material movement does not add any value to the product. So, the material handling should be kept at minimum though not avoid it. This possible only through the systematic plant layout. Thus a good layout minimizes handling.
b) The productive time of workers will go without production if they are required to travel long distance to get the material tools etc. Thus a good layout ensures minimum travel for workman thus enhancing the production time and elimination the hunting time and travelling time.
c) Space is an important criterion. Plant layout integrates all the movements of man, material through a well design layout with material handling system.
d) Good plant layout helps in building efficient material handling system. It helps to keep material handling shorter, faster and economical. A good layout reduces the material backtracking, unnecessary workmen movement ensuring effectiveness in manufacturing.

Thus a good layout always ensures minimum material handling.

2. **Mention some of popular models which help to identify the ideal location for setting a new factory. 2019-6(a)**

Answer: Various models are available which help to identify the ideal location. Some of the popular models are:

a) Factor rating method.
b) Weighted factor rating method
c) Load-distance method
d) Centre of gravity method
e) Break even analysis

3. **Explain the factors to be considered while selecting for location for new organization. 2019-5(b)+ 2018-5(c)+2016-5(b)**

Answer: It is appropriate to divide the factors which influence the plant location on the basis of the nature of the organization as:

- General locational factors
  a) Controllable factors
  - Proximity to markets
  - Supply of materials
  - Transportation facilities
  - Infrastructure availability

- Labor and wages
- External economics
- Capital

b) Uncontrollable factor

- Govt. policy
- Climate conditions
- Supporting industries
- Community attitude
- Community infrastructure

❖ Specific location factors

a) For manufacturing organization

- Dominant factors
  - Favourable labor climate
  - Proximity to markets
  - Quality of life
  - Proximity to suppliers and resources
  - Utilities, taxes and real estate costs
- Secondary factors
  - Room for expansion
  - Construction costs
  - Accessibility to multiple modes transportation
  - Competition from others for the workforce
  - Community attitude etc.

b) For service organization

- Dominant factors
  - Proximity to customers
  - Transportation costs and proximity to markets
  - Location of competitors
- Secondary factors
  - Retailers activities
  - Residential density
  - Traffic flow and site visibility etc.

4. Discuss the Factors to be considered while selecting Material Handling Equipment. 2016-5(c)

The following factors are to be taken into account while selecting material handling equipment.

1. **PROPERTIES OF THE MATERIAL:** Whether it is solid, liquid or gas, and in what size, shape and weight it is to be moved, are important considerations and can already lead to a preliminary elimination from the range of available equipment under review.
2. **LAYOUT AND CHARACTERISTICS OF THE BUILDING:** Another restricting factor is the availability of space for handling. The layout itself will indicate the type of production operation

(continuous, intermittent, fixed position or group) and also some items of equipment that will be more suitable than others. Floor capacity also helps in selecting the best material handling equipment.

3. **PRODUCTION FLOW:** If the production flow is fairly constant between two fixed positions that are not likely to change, fixed equipment such as conveyors or chutes can be used. On the other hand, the flow is not constant and the direction changes occasionally from one point to another then moving equipment such as trucks would be preferable.
4. **COST CONSIDERATIONS**: The above factors can help to narrow the range of suitable equipment, while costing can help in making a final decision. Several cost elements need to be taken into consideration when comparisons are made between various items of equipment that are all capable of handling the same load. Initial investment and operating and maintenance costs are the major cost to be considered.
5. **NATURE OF OPERATIONS**: The selection of equipment also depends on the nature of operations like whether handling is temporary or permanent, whether the flow is continuous or intermittent and material flow pattern-vertical or horizontal.
6. **ENGINEERING FACTORS**: The selection of equipment also depends on engineering factors like door and ceiling dimensions, floor space, floor conditions, and structural strength.
7. **EQUIPMENT RELIABILITY**: The reliability of the equipment and supplier reputation and the after-sale service also plays an important role in selecting material handling equipment.

5. Write short note:- 2019-5(c)

i) **Virtual proximity:** Virtual proximity refers to the level of emotional closeness between individuals, as developed through the use of information and communications technologies

ii) **Virtual factory**: A virtual factory is defined as an integrated simulation model of major subsystems in a factory that considers the factory as a whole and provides an advanced decision support capability. A basic virtual factory model of a semi-conductor backend factory has been developed for concept demonstration.

6. Classify the plant layout to set-up a new garments factory. Which layout plant is suitable and why? Explain- 2019-5(a)
Or,
Mention the categories of layout. Which layout is suitable for production of one or more products is large and why? 2018-5(b)

Answer: Layouts can be classified into the following five categories:

a) Process layout.
b) Product layout
c) Combination layout
d) Fixed position layout
e) Group layout

Product layout is suitable for set up a new garments factory.

Product Layout: In this type of layout, machines and auxiliary services are located according to the processing sequence of the product. If the volume of production of one or more products is large, the facilities can be arranged to achieve efficient flow of materials and lower cost per unit. Special purpose machines are used which perform the required function quickly and reliably.

The flow of product will be smooth and logical in flow lines. In-process inventory is less, time is less. Minimum material handling cost. It simplified production, planning and control systems are possible. Less space is occupied by work transit and for temporary storage. It reduced material handling cost due to mechanized handling systems and straight flow. Manufacturing cycle is short due to uninterrupted flow of materials.
A breakdown of one machine in a product line may cause stoppages of machines in the downstream of the line.

7. Explain the Alfred Weber's theory of the location. 2018-5(d)

Answer: Alfred Weber's Theory of the Location of Industries: Alfred Weber (1868-1958), with the publication of Theory of the Location of Industries in 1909, put forth the first developed general theory of industrial location. His model took into account several spatial factors for finding the optimal location and minimal cost for manufacturing plants.

8. What is plant layout? Write the importance of plant layout. 2018-5(a)

Answer: Plant layout is the arrangement of machines, work areas and service areas within a factory. Plant layout can be defined as a technique of locating machines, processes and plant services within the factory so as to achieve the greatest possible output of high quality at the lowest possible total cost of manufacturing.

Important:

a) Minimizing material, time and cost.
b) Easy production flow.
c) Economic easy building.
d) Effecting utilization of man power.
e) Provides for employee's convenience, safety, comfort at work.
f) Maximum exposure to natural light and ventilation.

9. What is safety culture? Introducing plant house-keeping. Mention the need for plant house- keeping. 2019-6(d)+2018-7(a)+2017-5(c)

Safety culture: Safety culture is the collection of the beliefs, perceptions and values that employees share in relation to risks within an organization, such as a workplace or community.

Plant house-keeping : Housekeeping and cleanliness refer to the processes which ensure facilities, equipment, work areas and access routes are kept in good condition. This condition is required for supporting safe and reliable operation and maintenance during normal plant operation.

Need for plant house-keeping:

a) For reduction handling to ease the flow of materials
a) For decreasing fire hazards
b) For better control of tools and materials, including inventory and supplies
c) For more efficient equipment cleanup and maintenance
d) For better hygienic conditions leading to improved health
e) For more effective use of space
f) For reduction property damage by improving preventive maintenance

10. Mention some material handling tools used in textile industry. 2018-6(d)

Answer: The equipment used to do so can be broken down into four main categories. Each category has a wide variety of useful equipment that makes safely moving heavy materials or large volumes of materials easier.

i. Storage Handling Equipment
- Racks
- Stacking frames
- Shelves Bins and drawers
- Mezzanines:

ii. Engineered Systems:
- Automated Storage and Retrieval System
- Conveyor systems
- Automatic Guided Vehicles (AGV)

iii. Industrial trucks:
- Hand trucks
- Pallet Trucks
- Platform trucks
- Side loaders
- Order pickers

iv. Bulk material handling
- Conveyors,
- Re-claimers
- Stackers
- Grain elevators
- Silos

11. Mention the equipment for handling the material for the following section of a textile mill: (i) Garments section (ii) dyeing section (iii) Ring section (iv)Warehouse – 2016-8(d)

a) **Garments section:**

- cutting department:
    a) Trolleys

b) Baker's trolley
c) Plastic trays and trolleys
d) Fabric Bags
e) Racks

- Stitching department
  a) Conventional side table (with bin)
  b) Centre table: Trolleys
  c) Plastic crates and Bins
  d) Manual hanger system
  e) Semiautomatic hanger system
  f) Computerized hanger system
- finishing department
  a) Trolleys
  b) Bench
  c) Hangers and stand

b) Dyeing section:
  a) Hoppers
  b) Bucket elevator
  c) Grain elevators
  d) Hoppers
  e) Trolley

c) Ring section & Warehouse:
  a) Trolley
  b) Hand truck
  c) Platform truck
  d) Side loaders
  e) Order pickers

12. What is industrial hazard? State the categories of industrial hazard. 2019-7(a)+2016-6(a)

The accidental injuries are mostly occurred due to exposure to unsafe condition and unsafe personal acts. In the industrial environment the unsafe condition and unsafe activities are turned as industrial hazard. Industrial hazards are the main causes of industrial accidents.

Categories of common industrial hazards:

i. Personal hazards:
   - operating machine without clearance
   - operating machine at unsafe speed
   - using unsafe equipment's unsafely
   - taking unsafe position
   - Failure in using personal protective devices.

ii. Hazards due to personal deficiency:

- Lack of knowledge or skill of a person
- Improper attitude of a person
- Bodily defects

iii. Mechanical hazards:

- Inadequately guarded machine tools & parts
- unguarded or absence of required guards
- Defective, rough, sharp, slippery, decayed, cracked machine surface.
- unsafely arranged or poor house keeping

13. Describe the previsions of safety under factory acts of Bangladesh. 2019-7(b)+2018-7(c) +2018-8(a)+2017-6(c)+2016-7(a)+

Provision of Safety under Factory Acts:

a) Fencing and guarding must be provided for rotating parts such as fly wheels, moving motors parts etc.
b) No lifting device should be loaded beyond permissible limits.
c) No women or young person should be allowed to clean, lubricate or adjust a running machine. Only a skilled operator should be permitted to handle such operation is necessary.
d) Suitable mechanism should exist for shifting a belt drive.
e) No young person should be permitted to work on dangerous machine.
f) Workers should be made safety conscious

14. Present a primary accident report (PAR) of an accident. 2019- 7(c)+2017-7(b)

Primary Accident Report (PAR)

Department:	Section:
Ref. No.:	Dated:
Name of injured person:	
Date of accident:	Time:
Shift hours:	Work started at:

Brief narration of the accident:

Signature of Foreman/Supervisor-in-Charge

Note: This report should originate in triplicate from the shop-floor foreman or Assistant Superintendent in whose section or department the accident occurred.

(TO BE FILLED IN BY MEDICAL OFFICER)

1. Nature & Extent of injury :
2. Classification of Accident :
    a) Minor (Does not cause disablement for 48 Hours) :
    b) Reportable (cause disablement for 48 hours) :
3. Cause of injury :
4. How the injury could have been prevented :

I certify that the employee was/was not under the influence of any intoxicating drink or drugs at the time of accident. The employee is fit to resume duty/not fit to resume duty and advised treatment and rest for ____ days with effect from ____ to ____

Name_____
Signature of Medical Officer

15. An undertaking with 600 workers, working 48 weeks of 48 hours each, had 80 accidents during one year. Owing to illness, accidents and other reasons the workers were absent during 5% of the aggregate working time. The no. of days lost due to 80 accidents along were 1200. Calculate the frequency rate and severity rate of accident. 2019-7(d)

Solution: Total no. of man hours worked= 600*48*48=1382400

Absence man hours=1382400 * 5%= 69,120= Lost time

Manpower exposure= 1382400-69120=1313280

Frequency rate= (80*1000000)/ 1382400=60.92=61; this indicates that in a year about 61 accidents occurred per million man hours worked

Severity rate= (1200*1,000,000)/ 1382400=868;

This mean that in year under 1000 man days were lost per 1,000,000 man hours (Accident per 1000 workers employed gives a rough index of incidence of accident. This is so good as the frequency rate is under 1000)

This value is under 1000; so severity rate is minor.

16. **An undertaking with 500 workers, working 50 weeks of 48 hours each, had 60 accidents during one year. Owing to illness, accidents and other reasons the workers were absent during 5% of the aggregate working time. The no. of days lost due to 60 accidents along was 1200. Calculate the frequency rate and severity rate**. 2017-6(e)

Total no. of man-hours worked= 500 x 50 x 48=1,200,000

Absence man-hours=1,200,000 x 5%=60,000= Lost time

Manpower exposure= 1,200,000 - 60,000=1,140,000

Frequency rate= (60 x 1,000,000) / 1,140,000=52.63=53; t his indicates that in a year about 53 accidents occurred per million man-hours worked

Severity rate= (1,200 x 1,000,000) / 1,140,000=1053; This mean that in year over 1000 man-days were lost per 1,000,000 man-hours (Accident per 1000 workers employed gives a rough index of incidence of accident. But this is not so good as the frequency rate)

17. **Which item should be in a first aid-box? 2019-8-(a)+ 2018 7(d)+2017-7(a)+2016-6(c)**

Items	Numbers
1.Rolled bandages 10 cm wide	12
2.Rolled bandages 5 cm wide	12
3.Pair of scissors	1
3. Bottle of allative having the dose and mode of administration indicated on labels	1
4.Large size sterilized dressing	12
5.Medium size sterilized dressings	12
6.Small size sterilized dressings	24
7.Safety-pins	2 packets
8.Large size burn dressings	12
9.Packets of sterilized cotton wool	2
10. Eye-drops	1 small bottle

18. What is PPD? Mention some important PPDs which are essential for dyeing and garments worker. Why is it necessary for industrial workers. 2019-8(b)+ 2017-8(b)

Answer: Personal protective device, commonly referred to as PPD, is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards.

Some Important PPD:

a) Mask, Surgical mask
b) General & Laser safety glasses
c) Chemical splash goggles
d) Face shields
e) Light latex, vinyl or nitrile gloves
f) Light to heavy chemical resistant gloves
g) Insulated gloves
h) Traditional, Flame resistant, Barrier body protection.

Necessary: PPE is equipment that will protect workers against health or safety risks on the job. The purpose is to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective to reduce these risks to acceptable levels. Head Protection, Eye and Face Protection, Respiratory protection, Hand & Skin protection, Hearing protection.

19. List some important maintenance tools. 2019-8(c)

a) Hammer
b) Slide Wrench
c) Spanner
d) Pliers
e) Hacksaw
f) Pipe Wrench
g) Chisel
h) File
i) Clamp
j) Vice

20. . "Scientific Material Handling reduces the Product Cost"-Explain this statement. 2018-6(b)

Answer: No company wants to undergo product damage and loss in their warehouse which will decrease profit margin. That's why we need the practicing of scientific material handling. By following given steps, we can reduce product cost through scientific material handling:

a) By reducing the cost using a material handling: The first and foremost objective of material handling is lowering the cost of production. By using of sophisticated methods, the cost of production can be reduced to a significant amount.

b) By implementing good materials handling practices in warehouse: It will go a long way to preventing product damage and loss.

c) By Reducing waste of material: An appropriate material handling not only concerns about the movement of material but also takes care of placing orders of the right amount, making the use of the material at the right time, keeping the right amount of inventory, and moving material using better techniques and with caution. All of this is taken care of to reduce the wastage of material. Moreover, lower wastage for material results in lower costs

d) By improving flow of material: It improves the circulation of material in the organization as a result of which material stays for less time in the warehouse and is used for production at earliest.

e) By ensuring Workers' safety: The last but not least objective is the safety of workers. Poor material handling can result in accidents in the factory, which are very risky for workers working there.

21. What are Industrial Hazard? How you'll improve Safety System by Automation in Textile Engineering?2018-7(b)+ 2016-6(b)

The accidental injuries are mostly occurred due to exposure to unsafe condition and unsafe personal acts. In the industrial environment the unsafe condition and unsafe activities are turned as industrial hazard. Industrial hazards are the main causes of industrial accidents.

Improve Safety System by Automation in Textile Engineering:

1. Elimination or substitution: automated material handling, reduce energy, substitute less hazardous chemical.
2. Guards and safety guarding devices: Barrier, interlocks, present sensing devices
3. Awareness device: Computer warning, light, alarm, signs and labels, beepers, horns and sirens
4. Training and procedures: Safe work protection, safety equipment inspection, training,
5. Personal Protective Equipment (PPE): Safety guard and face shields, ear plugs, gloves, protective footwear.

22. State the General Safety Rules According to Bangladesh Factory Act. 2018-8(a)+2016-7(b)

a) No smoking
b) Horseplay prohibited
c) Wearing protective equipment's

d) Maintain good house keeping
e) Get first aid promptly
f) Wearing proper clothing
g) Running prohibited
h) Do not operate unless authorized
i) Observe all safety tags
j) Use safety devices and guards

23. If during the preliminary survey 200 observations were made and of these 50 were unsafe observations. Calculate, how many observations and tours will be required to ascertain the various unsafe practices. 2018-8(d)+2017-7(e)

Observation Calculation:

% of unsafe operations, P=50/200 x100%=25%

No. of observations, N=4(1-0.25) / 0.10* 0.10 * 0.25=1200

This means that 1200 observations would be required to as certain

No of Tours Required:

The various unsafe practices with an accuracy of +_ 10%. If 200 observations had been observed in one inspection tour.

No. of tour= 1200/200=6

24. What measures are adopted for Preventing Accidents of a factory? Explain.2017-5(d)

a) Reform of working condition
b) Pay attention of individual difference
c) Training in right work methods
d) Means of removing fatigue
e) Proper Speed of work
f) Organization of safety committee
g) Safety Campaign and Posters
h) Provision of safety methods

25. Define & explain the types of accidents. 2017-6(a)

An event that happened unexpectedly all on a sudden resulting in something bad is called an accident.

Types of accident:

A. Lost time accident
B. Home case
C. First aid cases
D. Other accident:

i. Traffic accidents
ii. Passenger accidents
iii. Machine accident
iv. Non machine accidents
v. Natural accidents
vi. Nature of accidents: They include-
- Fatal
- Fracture
- Cuts
- Burns

26. Describe the effects & causes of an accident.2017-6(b)

Effect of an accident:

1) Personal effects:

a) Death
b) Disability
c) Physical suffering
d) Loss of earning capability
e) Loss of ability for efficient working
f) Psychological suffering

2) Social effects:

a) Social status may be lost
b) Family humiliation the disability is permanent
c) An asset in the form earning hand becomes a liability

3) Other effects:

a) Loss of man hours
b) Loss of machine hours
c) Loss of materials
d) Damaged machinery
e) Loss of capital
f) Loss of reputation
g) Compensation costs

Causes of an accident:

1) Improper Working Condition:

a) Improper temperature
b) Improper humidity

c) Insufficient light
d) More working hours
e) Layout plan
f) Machine arrangement etc.

2) Improper Working methods

a) Lengthy period working
b) Severity of work
c) The rapidity of production etc.

3) Factors concerning the workers

a) Immature age
b) Less experience
c) Bad state of health
d) Physical defects
e) Un-favorable mental and emotional conditions etc.

27. Mention the type of safety inspection. 2018-8(c)+ 2017-6(e)- (mark-12)

i) Periodic inspection:
ii) Intermittent inspection:
iii) Continuous inspection:
iv) Special inspection:

28. Draw a Board Check-List for Plant Inspection. 2017-8(c)

Broad check list for plant inspection:

a) House-keeping.
b) Material handling methods.
c) Adequacy of aisle space and working place.
d) Guarding of transmission machinery.
e) Point of operation guards.

29. "Material Handling is a Composite activity"- Justify this statement. 2017-8(d)

i. Material handling is a fancy term for handling goods and materials within in your warehouse, facility, or storage area.

ii. Material handling can be broken down into to the movement, protection, storage, and control of materials and products within your facility.

iii. Material handling is made easier using Material Handling Equipment such as forklifts and order pickers and includes activities such as loading/unloading trucks, palletizing goods, retrieving goods from storage to be shipped out, and more.

30. Importance of Material Handling in industrial situation. 2016 5(a) 10

Material handling can be defined as**:** "art and science of conveying, elevating, positioning, transporting, packaging and storing of materials". Material handling plays a vital role in any manufacturing industry by easily transporting the material from one place to another place. A material may be handled even 50 times or more before it conversion to finished product.

Importance:

a) It is essential because a large portion of the manufacturing cost is made of material handling costs. The cost of production can be reduced to an exceptional level with the help of proper handling.
b) Moreover, the material is needed to move to several places before it is converted into final goods. Therefore, the lack of appropriate handling can result in the damage of products before they can be converted into final products. The cost of damaged goods also adds to the manufacturing costs, and as a result, the overall profit of the organization reduces.
c) If we talk about the importance of material handling from the safety of workers working in the organization and the safety of machines and equipment used for the production process, then it has a significant role to play. Workers are responsible for loading and moving material across the organization.
d) Poor material handling can result in accidents during this process and due to accidents not only the material will get damaged but the risk to the life of workers also increases. Therefore, it is necessary for the sake of workers working in the organization as well as to minimize production costs.

31. A New Textile Industry will be set-up in 3 sites; 1) Tongi 2) Savar 3) Gazipur. Which is the best location based on Factory Rating Method. (Assume location factors, Factor Rating & Scores)—2018-6(a)

Answer:

Serial No	Location Factor	Factor Rating	Rating		
1	Land	10	**Tongi**	**Savar**	**Gazipur**
2	Land Cost	20	3	6	8
3	Transportation	12	6	12	15
4	Communication	8	12	9	10
5	Labor Available	7	3	5	6
6	Housing	6	2	5	6
7	Utilities	5	5	3	4
8	Wages	10	2	3	4

Serial No	Location Factor	Factor Rating, a	Tongi		Savar		Gazipur	
			Rating, b	Total= a*b	Rating, b	Total= a*b	Rating, b	Total= a*b
1	Land	10	3	30	6	60	8	80
2	Land Cost	20	6	120	12	240	15	300
3	Transportation	12	12	144	9	108	10	120
4	Communication	8	3	24	5	40	6	48
5	Labor Available	7	2	14	5	35	6	42
6	Housing	6	5	30	3	18	4	24
7	Utilities	5	2	10	3	15	4	20
			Total	**372**	Total	**516**	Total	**634**

The total score for location Gazipur is higher than that of locations

Savar and Teagan. Hence **Gazipur is the best place for setting up a factory.**

32. A New Textile Industry will be set-up in 3 sites; 1) Tongi 2) Savar 3) Gazipur. Which is the best location based on weighted Factory Rating Method. (Assume location factors, weight & Scores; 1=poor, 5= excellent) 2019-6(d)

Answer:

Serial No	Location Factor	Factor Rating	Location 1	Location 2	Location 3
1	Facility Utilization	25	**3**	**5**	**4**
2	Total Patient km per month	25	4	3	3
3	Average time per emergency trip	25	3	3	5
4	Land & Construction Costs	15	1	2	2
5	Employee Preference	10	5	3	2

The weighted score for this particular site is calculated by multiplying each factor's weight by its score and adding the results:

Weighed score location 1 = 25 × 3 + 25 × 4 + 25 × 3 + 15 × 1 + 10 × 5

= 75 + 100 + 75 + 15 + 50 = **315**

Weighed score location 2 = 25 × 5 + 25 × 3 + 25 × 3 + 15 × 2 + 10 × 3

= 125+75 + 75 + 30 + 30 = 335

Weighed score location 3 = 25 × 4 + 25 × 3 + 25 × 5 + 15 × 2 + 10 × 2

= 100+75 + 125 + 30 + 20 = 350

Location 3(gazipur) is the best site based on total weighted scores

33. Explain the factors considered for an industrial building. 2019-8(e)

a) Types of manufacturing system.
b) Plant location
c) Material handling tools
d) Factory layout
e) Provision of service facilities
f) Future expansion plans
g) Safety and security
h) Convenience and facilities tools.

34. How to improve the health and safety conditions in textile industry? Suggest the best ways. 2019-8(d)

As an employer, you must identify hazards in your workplace and take steps to eliminate or minimize them. Develop a safety plan. Hazards can include: a cleaner working with heavy duty cleaning products, a mechanic working with large machinery or a warehouse manager stacking heavy boxes.

A. Inspect Workplace: Regularly check all equipment and tools to ensure that they are well maintained and safe to use. Also check storage areas and review safe work procedures.

B. Train Employees: Proper training is necessary for all employees, especially if there is a risk for potential injury associated with a job. Provide written instructions and safe work procedures so they can check for themselves if they are unsure of a task or have forgotten part of their training.

C. Keep an Open Dialogue: Meet regularly with your staff and discuss health and safety issues. Encourage them to share their ideas and thoughts on how to improve safety in the workplace.

D. Investigate Accidents: Even if an incident does not result in a serious injury, conduct an incident investigation to help determine why an incident happened.

E. Maintain Records: Keep records of all first aid treatment, inspections, incident investigations, and training activities.

F. Make Improving Health and Safety a Key Part of Business: Safety shouldn't be an after-thought; it's just as important to a successful business as customer service, inventory control, and financial planning.

35. Present the scientific method of the investigation of an industrial accident. 2018-8(b)+2017-7(c)+2016-8(d)

INVESTIGATIVE PROCEDURES

The actual procedures used in a particular investigation depend on the nature and results of the accident. The agency having jurisdiction over the location determines the administrative procedures. In general, responsible officials will appoint an individual to be in charge of the investigation. The investigator uses most of the following steps:

1. Define the scope of the investigation.

2. Select the investigators. Assign specific tasks to each (preferably in writing).

3. Present a preliminary briefing to the investigating team, including:

    a. Description of the accident, with damage estimates.

    b. Normal operating procedures.

    c. Maps (local and general).

    d. Location of the accident site.

    e. List of witnesses.

    f. Events that preceded the accident.

4. Visit the accident site to get updated information.

5. Inspect the accident site.

    a. Secure the area. Do not disturb the scene unless a hazard exists.

    b. Prepare the necessary sketches and photographs. Label each carefully and keep accurate records.

6. Interview each victim and witness. Also interview those who were present before the accident and those who arrived at the site shortly after the accident. Keep accurate records of each interview. Use a tape recorder if desired and if approved.

7. Determine
    a. What was not normal before the accident.
    b. Where the abnormality occurred.

36. What is safety culture? Explain the characteristics of a safety culture. 2017-5(a)

An organization's safety culture is ultimately reflected in the way that safety is managed in the workplace. A strong safety culture has a number of characteristics in common:

a) **Communication:** Communication is most effective when it comprises a combination of top-down and bottom-up interaction. Senior management sets the strategic goals and vision for the company's safety program.
b) **Commitment:** It is one thing to **say** that safety is a priority; it is another thing to **show** that it is. When it comes to safety, actions truly speak louder than words.
c) Caring: Caring takes commitment a step further. It involves showing concern for the personal safety of individuals, not just making a commitment to the overall idea of safety.
d) Cooperation: Safety works best if management and workers feel like they are on the same team.
e) Coaching: It is difficult for everyone to remember everything required to maintain a safe working environment. Coaching each other—peer to peer, supervisor to employee, even employee to management— is an important way to keep everyone on track.
f) Procedures: There should be documented, clear procedures for every task. This not only prevents disagreement about what is required.
g) Training: Training is a more formal, documented process for ensuring that employees follow safety processes and procedures.
h) Tools: All equipment and tools should be in good repair, free of debris, and functioning as designed.
i) Personnel: There must be enough workers to do each task safely. The company should not sacrifice individual safety because of being understaffed
j) Trust: Trust in the safety program, in senior management, and in each other is built when each of these characteristics is present and treated as a company-wide priority.

37. What is safety culture? Describe the types of safety culture briefly. 2017-5(b) +2016-7(c)

Safety culture: Safety culture is the collection of the beliefs, perceptions and values that employees share in relation to risks within an organization, such as a workplace or community.

a) **Forced Culture:** The forced culture uses bribes and threats to motivate employees
b) **Protective Culture:** The protective culture implements safety programs for employees; its main feature is that it produces endless "policies and procedures,"
c) **Involved Culture:** The involved culture is characterized by high levels of safety training sessions held for employees but not attended by top management
d) **Integral Culture:** The integral culture is characterized by high levels of safety training for employees—training sessions that are attended by top management, including the CEO.

38. Mention the importance of safety education and training for industrial workers. 2017-6(d)+ 2016-6(d)

Importance:

a) It is the Law. This might seem like an obvious point, but one of the key reasons why health and safety training is important is because it isn't optional – it's the law. Introduced in 1974, The Health and Safety at Work Act is a key piece of legislation that requires employers and employees to take reasonable and practicable steps to ensure health and safety in the workplace.
b) Risk Can Be Found in Any Workplace
c) Increases Efficiency
d) Reduces Costs Across the Board
e) Creates a Safe Company Culture

39. Define Industrial toxicology. What types of biological hazards commonly occur in industry and how it can be prevented? 2017-8(a) +2016-8(a)+2016-8(b)

Industrial toxicology: industrial toxicology, which simply defined is the study of the harmful effects of chemicals, biological agents and physical agents encountered in the "workplace."

Biological hazards include:

a) viruses
b) toxins from biological
c) sources
d) spores
e) fungi
f) pathogenic micro-organisms
g) bio-active substances.

Prevented: If the contact with biological hazards cannot be prevented, the employees must use personal protective equipment and adhere strictly to the practice of personal hygiene. The personal protective equipment includes masks, gloves, protective clothing, eye shields, face shields and shoe covers.

40. Write down the objectives of material handling.

a) It should be able determine appropriate distance to be covered.
b) Facilitate the reduction in material damage as to improve quality.
c) Reducing overall manufacturing time by designing efficient material movement
d) Improve material flow control
e) Creation and encouragement of safe and hazard-free work condition
f) Improve productivity and efficiency
g) Better utilization of time and equipment
h) In the current competitive and globalized environment, it is important to control cost and reduce time in material handling