ANNAMALAI UNIVERSITY

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DEPARTMENT OF CIVIL & STRUCTURAL ENGINEERING

(DST-FIST Sponsored Department)

(NBA Accredited)

(Annamalainagar - 608 002)

ASSIGNMENT QUESTION & ANSWERS

DECEMBER 2019 - APRIL2020

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DESIGNATION: Professor Civil and Structural Engineering.

FACULTY: Faculty of Engineering & Technology

PROGRAM: M.E Construction Engineering & Management.

COURSE: Safety in construction

COURSE CODE: CZCMPC21

CREDIT : 3

YEAR/SEMESTER: I/II

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CZCMPC21- SAFETY IN CONSTRUCTION

ANNAMALAI UNIVERSITY

Name of the Faculty	**Dr.R.BASKAR**			Designation	**Professor**
Name of the Course	**Safety in Construction**				
Course code	**CZCMPC21**			Credits	**3**
Year	**I**	Semester	**II**	Section	**Nil**
Compulsory/Elective course	**Compulsory**				
Course offered to the Department	**CIVIL & STRUCTURAL**				
Academic Year	**2019-2020**	Batch	**2019-2021**		
ASSIGNMENT QUESTIONS AND ANSWERS					

Assignment I: Construction Accidents

3 Mark Questions

1. What are the different causes of Accidents?

In the following list, the causes of accidents have been grouped according to their nature:-

- Planning, organization
- execution of work
- equipment
- management and contractor of work
- worker's behaviour

2. What are the different types of construction accidents?

According to the cause of occurrence

1. According to the nature of injury sustained
    a. Temporary disablement
    b. partial disablement
    c. total disablement
2. According to severity of injury
    a. minor accidents
    b. Major accidents
    c. accidents.

3. What are the Human factors to be considered in the construction site safety?

a. Designer and architect:-The structural designer and architect should take Into account the safety problems associated with subsequent maintenance of structures where, According to them, special hazards are involved. Special care should be taken at the time of designing the structure.
b. Employer: - The employers should provide and maintain buildings, plants, Equipments and work passages and should organize the work in such a Manner that workers are protected against risk of accidents.
c. Workers: - all workers should do everything within their power to maintain their own safety and the safety of their co-workers.
d. Manufacturer or dealer: - the manufacturer or dealer of equipment should Ensure that the machines, vehicles, and other equipment used in construction Industry comply with the safety laws and regulations and that these machines All are as safe as possible.

12 Mark Questions

1) What are the Legal implications in construction accidents?

Now the ministry has prepared her preliminary draft on code on Occupational Safety, health and working conditions, 2018 byamalgamatimg13 Labor laws relating to safety and health standards, health and it working condition, welfare provision for the employees and leave and hours of work.

The legal implications in construction accidents are:

- the factories act, 1855
- the building and other construction workers (Regulation of employment and conditions of service)
- The fatal accidents act, 1855
- the contract labor act (regulation and abolition-1970)

1. The factories act 1855

This is an act consolidate and amend the law regulating labor in factories. It came into force under first day of April 1949 as the factories act 1948 and extends to the whole of India

That provides for health, safety, welfare and other aspects of OHS for workers in factories.

Some important provisions of the factories act regarding to construction accidents are given below

- Section 35: protection of eyes.
- section 37: explosive of inflammable dust ,gas, etc.,
- section 38 :precaution in case of fire
- section 23 :employment of young person's on dangerous machines
- section 40 :safety off buildings and machinery
- section 41 E :emergency standards
- section 45 :first aid appliances
- section 51 :weekly hours
- section 54 :daily hours

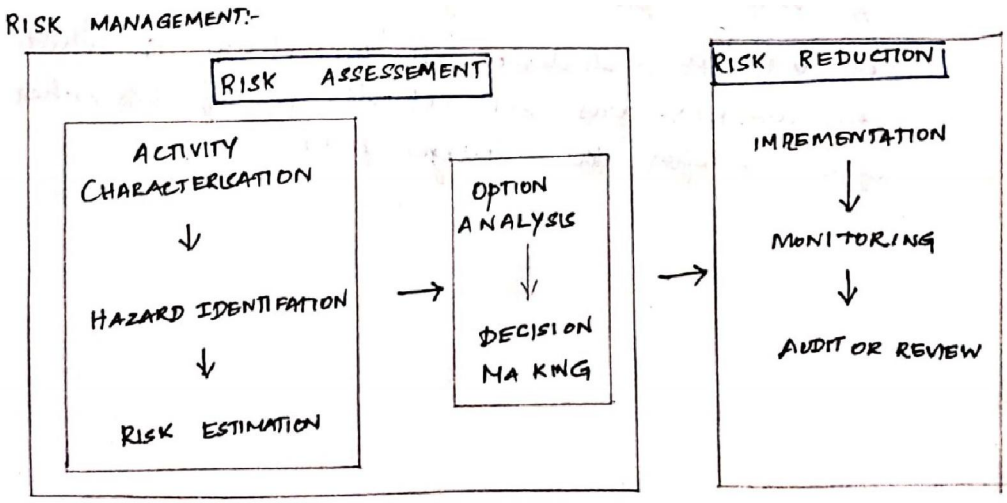
- section 55 :intervals for rest
- section 67 :prohibition of employment of young children
- Section 88 A :notice of certain accidents
- section 89 :notice of certain diseases
- section 90 :power off direct inquiry into case of accidents or diseases
- section 91 A: safety and occupational health surveys

2) What are the occupational and safety hazards assessment?

In construction, unanticipated hazards can arise due to the changes in project timeline sequence of events and the fast pace of some construction projects. Hazard identification and assessment is a crucial part of an effective safety and health program

- To identify and access hazards, employers and workers
- collect existing information about job site hazards
- inspect the job site for safety hazard
- identify health hazard
- contact incident investigation
- identify hazards associated with emergency and non routine situations
- characterize the nature of identify hazards identify interim control measures and prioritize the hazards for control
- Risk management.

3) a) Write about the cost of construction injuries.



The construction worker who is injured, suffered Financials losses as well as pain and discomfort, the construction employer who discuss safety suffers an indirect cost which could ultimately affect his survival also .with at least half of construction cost consisting of Labor any construction type of safety program will result.

- Direct cost - The direct cost is insurance. These include medical costs and other workers compensation insurance benefits as well as liability and property damage insurance.
- Indirect cost - Below is the list of indirect cost transportation costs :
  Until the cost of emergency transportation together with the cost of other personally that were necessary to get to the injury worker to proper medical facilities.
  Wages paid to enjoy the worker for time not working include all the time in which the worker was not actually doing his or her job for the wages paid
  Cast incurred because of delays which resulted from accidents -other crews affected or delayed; equipment idled; duration of project lengthened; Play song wages rental fees under indirect supervision cost that occurred as a result of accident.
- cost of overtime necessity by accident ;because of the accidents
- Loss of efficiency of crew- decrease of crew efficiency due to low morale or reshuffling that might occur to replace an injured worker.
- Cost to break in and or teach replacement Or standby
- Cast for clean up, repair or replacement.
- extra wages cost , slow down returned workers
- Cost to reschedule work
- Cost of wages for supervision as a result of accidents
- Cost for safety and clerical personnel as a result of the accident typical investigation forwarding forms time with press etc.
- Cost of legal assistance.

b) Write about the types and causes of accidents in terms of construction

The construction accidents can be classified under the following three groups:-

1. According to the path of occurrence
2. According to the nature of injury
   a. Temporary disablement
   b. Partial disablement
   c. Total disablement
3. According to the Severity of accident injury
   a. Minor accident
   b. Major accident
   c. Accident.

Causes of accidents

There are many possible causes of accident as there are occasions. Among these are technical defects in equipment and methods of work defects in organization and dangerous acts by workers. So these have to be added more those classes that come from nature of construction operation from them, defects in planning under construction. constant changes in workplace and the friction when found workers from different traders are

working in close approximates to each other in the following list the cause of accidents having group according to the nature:

1. Planning, organization
    a. Defect in technical planning
    b. fixing unsuitable time limits
    c. assignment of works to incompetent contractors
    d. insufficient or defective supervision of work
    e. lack of cooperation between different traders
2. execution of work
    a. constructional defects
    b. you of unsuitable materials
    c. defective processing of materials
3. equipment
    a. lack of equipment
    b. unsuitable equipment
    c. defect in equipment
    d. lack of safety devices or measures
4. management and conduct of work
    a. inadequate preparation of work
    b. inadequate examination of equipment
    c. impressions are inadequate instruction from supervisor
    d. unskilled or untrained of operators
    e. inadequate supervision
5. worker's behavior
    a. irresponsible acts
    b. unauthorized acts
    c. carelessness

ASSIGNMENT II: CONSTRUCTION SAFETY MANAGEMENT

3 Mark Questions

1) Define safety management in construction?

Safety management system for construction is a systematic way of identifying hazards and managing risks relating to the construction work place.

2) What kind of reports was being prepared as safety aspects in construction?

The information from your daily safety reports should be aggregated into a construction report.

- A construction safety report allows you to see the trends of your project and a high level view of issues on your site
- A safety report is a detailed document, prepared by an employer in control of a MHF that outlines the X type of safety studies under taken.

3) List out types of safety training programmes?

- Work place orientation
- Fire safety and emergency procedures
- First aid
- Healthy and safety (such as risk assignments (or)accidents reporting procedure) Welfare facilities
- Safe use of workplace tools ,machinery equipment
- Risk assessments
- Maintenance (or) storage of personal protective equipment

4) What are the factors governing safety in construction?

- Economic factor
- Psychological factor
- Frequency factor
- Impact factor
- Technical factor
- Procedural factor
- Environmental factor
- General factor

5) Define Safety committee?

- Safety committee is a key part of safety in the workplace. Safety committee trying together Workers and employers through regularly scheduled meetings where safety issues are addressed.
- Goal of safety committee is to create and nature culture of safety.

6) What are the functions of supervisors?

The functions of supervisors

- Facilities control
- Optimum utilization of resources
- Maintenance of discipline
- Feed back
- Improves communication
- Improves motivation
- To find flaws in the work
- Activities are closely monitored
- Better utilization of the resources
- Guidance of the employees
- Respect the sub ordinates
- Communication between two parties
- Responsibilities of an employee

7) Who is the responsible person for safety in construction?

Construction safety officers is the responsible person

- Construction safety officer implements safety policies and regulations in a construction site, and makes secure.
- Their main responsibility is creating a safe environment for construction workers, but they may take additional A rules and responsibilities during a project.

Construction safety officer responsibilities:

- Continuous inspections of project sites , to ensure a hazard free environment
- Assessments and approval of safety plans
- Verification of tools and equipment to ensure good quality

8) Write about the importance of safety training?

- Organization such as construction companies that use dangerous equipments and hospitals exposed to deadly diseases use safety training to ingrain safety in to the workplace.
- The importance of safety training extends beyond a workers introducing to the job.
- It also encompasses situation when his job changes or when working conditions change.
- Without an understanding of safety practices relates her job, a worker will be of a higher risk for workplace injury illness or death

9) What are the responsibilities of general employees?

- Obey a lawful, reasonable order within the terms of the contract of employment
- Serve faithfully
- Cooperate with the employer
- Perform duties with proper care and diligence
- Account for all money or property received
- Identifying the employer in appropriate cases

10) What are the advantages of monitoring?

- Cost effectiveness
- While you cannot predict disaster, you can anticipate incoming network errors
- Better security
- Sometimes it's not network errors but a malignant attack that leads to down time

I) Increased productivity
II) Fewer it concern
III) Flexibility

12 Mark questions

1) Write the need and uses of construction safety manual?

This is safety procedure manual management process is designed to ensure effective reviews of existing procedures and implement of new (or) reused procedures so that compliance and prevention requirements are maintained on site.

Need for safety manual

- Safety should be the top most concern for every one working on the site while the safety training session and contribution are conducted many times; it is most practical to remember everything.
- Main thing is not let an accident happen, so most personal would not have the experience of managing any accidents if they happen.
- Manual is reference material for site operation.

Uses of safety manual

- Safety manual aims to explain the ways and means to create a safe and healthy work environment at every construction project site for protection activities.
- If identifies standards applicable to the hazards most commonly found at work sites and those most likely to have a significant position important at on the safety and health practices.
- It helps to create safety awareness to every individual including contractors, suppliers, labours, employees and the principle employer.
- In case of accidents, it provides sample proof of the fact that the accidents were not a result of system failure, negligence but it occurred of most safety standards.

2) What are the different types of safety training?

Induction training:

Induction training is provided for new employees to help them to settle into the new work place environment and activities.

- This basic training will give the new employees an outline of the organization and services it provides.

- Work place orientation
- Fire safety and emergency procedures
- First aid
- Health and safety
- Welfare facilities
- Safe use of workplace tools, machinery, equipment.
- Risk assessments
- Maintenance

Refresher training:

Refresher training is given to employees on the assumption that existing skills have become out-dated or absolute. This could be because of the advancement of technology or simply that people can forget things.

Toolbox talks:

The talks focus on various safety topics that are related to any specific workplace activity.

- Hazards
- Safe systems of work
- Risk assessments
- Training needs
- Health and safety updates
- Incidents and accident investigation
- New equipments

3) What are the Roles and responsibilities of construction workers?

A worker is anyone working for (or) under the control of a contractor on a construction site.

Examples of workers include:

- ❖ Plumbers
- ❖ Electricians
- ❖ Scoff-folders
- ❖ Painters
- ❖ Decorators
- ❖ Steel workers
- ❖ Labourers

As well as supervisors like foremen.

- Workers have an important role and should take an part in helping to manage health and safety risks.
- Working in construction, if they have the relevant skills, knowledge, training or experience. They are provided with the training and supervisors that enables them to do it safety and without risk to health.

4) Explain about the labour safety in Construction industry?

Rapid growth of construction industry in India today is out of proportion to practical development in terms of safety and health aspects of the construction workers.
Indian construction workers:

- From 7.5 % of world labour force, but it contributes to 16.4% of fatal global occupational accidents.
- It accounts for about 11% of occupational injuries and 20% of rescuing from occupational accidents.
- In the past decade, need for safety awareness among construction companies has physically increased.
- Occupational safety and health administration (OSHA) examined the causes of construction facilities.

33% - Of fatalities in construction were caused by falls
22% - Were struck by objects
18% - Were caught in between accidents
17% - were caused by Electric accidents
10% - Were caused by other reasons.

Techniques for labour safety:

- Safety organization
- Hazard analysis
- Safety training
- Safety officer

Safety organization:

The organization of safety on the construction site is well determined by the work site, the system of employment and the way in which the project is being organized.

Hazard analysis:

The analysis should address the sequence of work, the hazards of each activity and control measures to eliminate or minimize the hazard.

Safety training:

Training should be at the core of every safety program. It is important to identify the areas in which training is required.

Safety officer:

One commonly accepted pre requisite for administering a successful safety program is the designation of a safety officer at the project level.

It is standard practice on many large projects to require a safety officer.

5) Explain the responsibilities of safety officers?

- Layout a vision for safety
- Lead and model safety excellence
- Identify and monitor hazardous situations, often including risk categorization.
- Minimize hazards and pro actively reduce risk in the work place
- Communicate and collaborate about safety and health throughout the organization.

- Create and track safety – related objectives, metrics and goals for the organization.
- Investigate incident or near – misses and lead root cause analysis
- Enforce safety standards and processes
- Create and share a formal occupational health and safety policy
- Drive employee engagement and meaningful involvement
- Act as the representative that can speak to safety and health as needed for the organization
- Create, maintain, and improve policies and systems related to safety – all designed to create a culture of continuous improvement
- Perform regular inspection, evaluations and walk – troughs of facilities and properties.
- Control conduct toolbox meeting and other ongoing learning opportunities for staff
- Promote and reinforce safe behaviors across projects and job sites
- Take measures to drive accountability for safety. Organize and maintain all safety and compliance – related forms.
- Use emergency authority when needed to stop unsafe behaviors. Contribute to help and lead the project safety council and safety committee.
- Review and approve sub contractor plans and safety standards conduct job hazard analysis.

ASSIGNMENT III: SAFETY IN CONSTRUCTION OPERATIONS

3 Mark Questions

1) What are the different types of construction project?

Here are a few types of construction project:

- Residential: these projects include townhouse, house, condominiums, apartments, cottages, subdivisions and single-unit dwellings.
- Building: constructions buildings are the most common type of project.
- Commercial and institutional.
- Industrial.
- Highway.
- Heavy.

Type of work at construction sites:

- Construction site work to be done by any engineer will depend on the size and complexity of the project.
- Engineers during their professional education and training are gives the necessary skills and knowledge in all aspects of engineering and trades to provide supervisory and supporting roles in the construction field.

2) Define Safety in construction.

- Construction work is a hazardous land-based job. some construction site jobs include :building houses ,roads, tree forts, work places and repair and maintain infrastructures.
- Construction work has been increasing in developing and undeveloped countries over the past few years.

Safety measures:

- Avoid dragging electric cables on the ground or allowing the cables to coming in to contact with water.
- Use electrical tools installed with an earth leakage circuit breaker.
- Use &handle chemicals with care.

3) Explain the prevention measures in construction.

Here are some more specific ways constructions employers and employers can prevent an accident at a construction site.

- Provides safety training for all employees.
- Hold frequent crew safety meetings.
- Utilize protective clothing and gear.
- Keep the workspace clean.
- Prevent falls.

4) What are the equipments used for construction at site?

Equipment used in construction are,

- Excavators.
- Back hoe.
- Dragline excavator.

- Bulldozers.
- Graders.
- Wheel tractors scrapers.
- Trenchers.
- Loaders.

5) What are the electrical components involved in construction?

- Power substation
- Distribution cabinet
- Power cables and wire for consumers
- Aggregates
- Lighting
- Suspended materials and electrical fittings
- Installation of structural cable network

12Mark Questions

1) Explain the different types of accidents in construction site.

There are many causes of accidents on a construction site.

- Construction accidents are the result of injuries and/or damage sustained as a result of endeavours to build, improve, repair, clean, demolish, or generally construct that take place in a specific facility. Construction accidents can range from property damage to personal injury.

Accident Types

- Accidents at Work. You may have been involved in an accident whilst at work. .
- Slip/Trip Claims (public liability) .
- Industrial Diseases and Illnesses.
- Road Traffic Accidents.
- Accidents Abroad.
- Accidents involving Animals.
- Sports Related Injuries.
- Clinical Negligence.
-

Falls:

- Construction workers often perform their job from high places such as scaffolding, rooftop or ladder.
- Falling from high places is the number one most common construction accident causing almost -35% of construction injuries.

A few examples of emergencies that should be planed for at construction sites include:

- Chemical Spill
- Fire
- Floods
- Explosion
- Electrocution

- External Power loss
- Medical injuries

2) How to prevent accidents in construction site?

Accident prevention refers to the plans, preparations and actions taken to avoid or stop an accident before it happens. Many accidents occur due to human factors. These factors include unsafe acts, un-mindfulness, negligence, lack of knowledge and training.

Prevention of Accidents Are,

Here are some more specific ways construction employers and employees can prevent accidents at a construction sites are.

- Provide safety training for all employees.
- Hold frequent crew safety meeting.
- Keep the workplace clean.
- Maintain the equipment and tools.
- Prevent

Accident causes and prevention:

Such causes may be direct, involving workplace conditions, or indirect, as a result of management systems and cultural factors.

Causes of Accidents

One means of preventing accidents is by making safe places of work, in particular through design and assessment of the physical factors involved in work activities.

Tips for Preventing Accidents on Construction Site:

- Daily safety meting
- Reduce the amount of high work
- Proper safety gear
- Reflective or high-visible-clothing
- Regular and frequent break
- Clear signage to warn danger
- Avoid sunlight to minimize fatigue

3) What is the role of Safety Committee in Construction.

Safety committees bring together workers and employers through regularly scheduled meetings where safety issues are addressed. The goal of a safety committee is to create and nurture a culture of safety.

Safety committee definition:

A safety committee is an organizational group within a workplace with members from management, the workforce as well as from all departments and staffs.

The safety committee will share with management the responsibility for implementing the company safety program.

Committee Formation:

- Standing members to the committee will include a representative from Management, Maintenance and Safety.
- The committee's other members represent a cross-section of employees from various departments with membership rotated on an annual basis with staggering terms to ensure continuity.

Creating Successful Project Safety Committees,

- One of the most familiar –and freest rating aspects of life on most construction sites is the tendency of workers to participates in the strange contest called the blame game.
- Anyone who has been a supervisor on a site for any length of time is certain to have encountered this odd contest.
- The blame game is always coveter productive and can be amazingly expansive, especially when it is played out repeatedly on the same jobsite.
- While it may be annoying most of the time, it can even become deadly when safety factors are involved.
- Neglected by one contractor that is ignored by another can cascade into an incident that consults in injury.
- That's why coroners and contractor cannot afford to have works waste time with the blame game where safety issues are involved.

4) What are the safety measures to be taken while using Electrical Appliances?

- It's vitally important to take safety precautions when working with electricity .safety must not be compromised and some ground rules need to be followed first.
- avoid water at all times when working with electricity never touch or try repairing any electrical equipment or circuits with wet hands.
- Precaution Should Be Taken While Using Electrical Appliances

Safety Precautions Every Electrician Student Should Know,

- Don't touch someone who's been electrocuted.
- Know your electrical code.
- Always use GFCIS in damp or wet work areas.
- Inspect &maintain your electrical tools.
- follows' proper lockout /tag out procedure
- Wear the right safety gear.
- Choose the right ladder.
- Avoid lower lines.

Electrical Safety Tips:

- Replace or repair damaged power cards exposed wiring is a danger that cannot go overlooked, the NFPA wrote.
- Don't overload your outlets.
- Avoid extension cords as much as possible.
- Keep electrical equipment or outlets away from water.
- Protect small children from hazards.

Important Rule of Electrical Safety:

- Never work on a energized circuit except if the power cannot be disconnected.
- A piece of equipment can help us think before acting.
- While any amount of current over 10 mille amps (0.01 amps)is capable of producing painful to severe shocks,(0.1to0.2 amp)are the that is the electric current range death.

5) What are the different types of accident and their Causes in Dam Construction.

Dam Construction:

A dam is usually constructed across a river to create reservoir in the valley behind by storing the water in the flows into it naturally, sometimes, they are build across dry valleys, or valley with small streams, to create a storage area for water that is transported from elsewhere.

Dam Failure:

- A dam failure or dam bust is a catastrophic type of failure characteristized by the sudden rapid and uncontrolled release of impounded water or the likelihood of such an uncontrolled release .between the year 2000 and 2009 more than notable dam failure happened worldwide.
- A dam is a barrier across flowing water that obstructed ,that direct or slow down the flow ,creating a reservoir, lake or impoundment .most dams have a section is called a spillway or weir over or through which water flows ,and some have hydromel trice lower generations .system is installed.
- Dam failure comparatively rare, but can cause immense damage and loss of life when they occur.
- In 1975 the failure of the BANQIAU RESERVOIRDAM and other in HENAN PROVINCE china caused more casualties than any other dam failure in history.
- The disaster killed an estimated 171,000 people and 11 million people lost their homes.

Major Causes of Dam Failures:

- SUB-standard construction materials /technique
- SPILLWAY design error
- Extreme inflow
- INTRERNAL EROSION or piping ,especially, in earthen dams
- EARTHQUAKES

ASSIGNMENT IV: VARIOUS SAFETY EQUIPMENT AND GEAR USED ON SITE

3 Mark Questions

1) Define first aid?

First aid is the immediate treatment or care given to someone suffering from an injury or illness until further advanced care is accessed or the individual recovers.

The aims of first aid are to:

1. Preserve life,
2. Prevent illness or injury from become worse,
3. Relieve pain, if possible,
4. Promote recovery,
5. Protect the unconscious.

2) What is safety awareness?

It's a responsibility, a commitment an obligation. Its common sense, teamwork and safe work procedures. It's recognizing hazards and showing a willingness to act to control any hazard present.

The program has been designed for all personnel. It can be used as a general safety training program and also be utilized as an introduction program for new personnel to introduce safety concepts.

3) Define labour law?

Labour law (also known as labour law or employment law) meditates the relationship between workers, employing entities, trade unions and the government. Collective labour law relates to the tripartite relationship between employee, employer and union.

Individual labour law concerns employee's rights to work also through the contract for work.

4) Write the legal requirements for safety, health and welfare at work act 2005?

Employers manage and conduct their work activities in such a manner as to ensure the safety, health and welfare of employees.

That a risk assessment is carried out by the employer or person in control of the place of work.

Transport hazards that exist in the workplace must be assessed as part of this risk assessment and appropriate steps taken to eliminate or reduce any risks found.

5) What does safety incentives means?

Safety incentives are rewards given to the employees for their achievements in reporting injuries, newly detected potential safety hazards and recommendations or suggestions for safety hazard improvements in the workplace and workplace procedures.

6) What are the first aid requirements for sites?

The healthy and safety (First aid) regulations 1981 require all construction sites to have:

- A first aid box with enough equipment to cope with the number of workers on site.
- An appointed person to take charge of first aid arrangements
- Information telling workers the name of the appointed person or first aider and where to find them. A notice in site hut is a good way of doing this.

7) What are the goals of first aid?

First aid is the medical attention that is typically administered immediately after an injury or illness occurs. It usually consists of one – time, short-term treatment, such as cleaning minor cuts, treating minor burns, applying bandages, and using non-prescription medicine. The overall goals of first aid are:

- Keep the victim alive.
- Prevent the victim's condition from worsening.
- Give first aid until help arrives.
- Ensure that the victim receives needed medical care.

8) Is workplace safety training required?

Workplace safety training is as vital as workplace safety itself. It enables the management to ensure a safe and healthy work environment. It also helps the employees to recognize safety hazards and correct them. It enables them to understand best safety practices and expectations.

Safety training is vital for employees or workers with regard to understanding of safety practices related to their jobs; otherwise, a worker will find himself/herself at a higher risk for workplace injury, illness or death.

9) Write about Contract Labour Act?

The Contract Labour (Regulation and abolition) Act, 1970:

- If an establishment has 20 or more than 20 workers employed there for the past 12 months as contract labour.
- 20 or more than 20 workers employed by the contractor in he past 12 months as contract labour.

It is not applicable places where the nature of the work is casual. If the employer does not register under the act, then the employer cannot contract labour.

10) What is meant by cost of construction accident?

Construction workers injuries or illness have cost implications attached which, arguably, can have a major impact on a construction organization. It is not possible to insure against all the costs arising from accidents. However, it is possible to prevent accidents from occurring. Consequently, the costs of accidents can be avoided, time and money saved and harm to people prevented.

12 Mark Questions

1) What are the steps for an effective safety awareness program?

A safety awareness program is essential for any professional company. It may include mandated inspections and certification as well as other steps you take to ensure the well being and efficiency of your employees. There are many specifications that depend on your industry and size, but whatever your situation, the steps outlined below can be useful for developing a safety awareness program that is effective.

1. **Form a safety committee** with managers and workers from each department. They should review the hazards your workers face and run the awareness program, starting with the following steps
2. **Go over your accident history** to see what kinds of accidents have happened and what could have been done to prevent them, such as wearing protective gear or adding non-skid coatings.
3. **Assess your worker's actions and environment** to pinpoint possible hazards involved in each procedure.
4. **Make an inventory of safety issues** relevant to your company, using the information gathered in steps 2 and 3. This should be updated at least once a year.
5. **Hold safety meetings**. Workers can meet by department to go over their current tasks and identify dangers. Committee representatives may lead these meetings and use them to provide instruction on a given safety issue.
6. **Provide materials** to all employees that clearly communicate your company's safety policies and guidelines. Also, find materials on each safety issue that your committee will need to cover in their regular meetings. A good place to start is OSHA's website.
7. **Keep meetings interesting** with a variety of instructional methods, such as videos and training exercises. Include some of employee response to make sure it's working, such as asking for examples or giving occasional tests.
8. **Make necessary changes** in your facilities, such as marking pathways, fireproofing or other safety features. A painting contractor can help you with many such safety-related facility improvements.

2) What is construction accident law?

This deals with the personal injury and wrongful death cases resulting from construction accidents, as well as the safety laws, regulations and standard governing the construction industry. The Occupational Safety and Health Administration (OSHA) is the

governing regulatory body for construction site safety. Most states have also adopted same form of safety regulations.

Construction accidents can range from minor to catastrophic, and frequently result in death. The types of injury one can sustain from these accidents include: amputations; blindness; deafness; broken bones, back; coma; concussion; paralysis; severed spinal cord; traumatic brain injury; and much more. These accidents can result from the negligence of others, faulty construction equipment; defective products; defective machines; inadequate safety or equipment training, as well as negligent or reckless co-workers.

Some construction workers are limited by law to receiving only worker's compensation for their construction injuries. However, in many cases, workers can also recover damages from partially or completely responsible parties, who are not their employer, for causing their injuries, based upon theories of negligence and product liability. If a worker is hurt due to factors other than job safety, such as defective tools or equipment, the injured worker may be able to file a personal injury claim against the manufacturer. They also may be able to recover damages from the owner of the site and the general contractor. The responsible party may be held liable for damages, including medical bills, loss of wages, and pain and suffering.

Various entities may be liable for construction accidents. They include the construction site owner, architects and engineering professionals, contractors, construction managers, and manufacturers of construction machinery or equipment. In some states if an injury results from an OSHA regulation violation, the construction company is negligent and liable for injuries.

3) What is the hazard control in construction site safety?

Construction work is a hazardous land-based job. Same construction site jobs include: building houses, roads, tree forts, workplaces and repair and maintain infrastructures.

Site preparation aids in preventing injury and death on construction sites. Site preparation includes removing debris, levelling the ground, filling holes, cutting tree roots, and marking gas, water, and electric pipelines. Another prevention method on the construction site is to provide a scaffold that is rigid and sufficient to carry its own weight plus four times the maximum intended load without settling or displacement.

Ways to prevent injuries and improve safety include:

- Management safety
- Integrated safety as a part of the job
- Create accountability at all levels
- Take safety into account during the project planning process
- Make sure the contractors are pre-qualified for safety
- Make sure the workers are properly trained in appropriate areas
- Have a fall protection system
- Prevent and address substance abuse to employees
- Review accidents and near misses, as well as regular inspections
- Innovative safety training e.g. adoption of virtual reality in training

- Replace some of the works by robots (many workers may worry that this will decrease their employment rate)
- Adoption of BIM with three dimensional printing to make the building model first before put into real practice

The employees or employers are responsible for providing fall protection systems and to ensure the use of systems. Fall protection can be provided by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and warning line systems.

Making sure that ladders are long enough to safety reach the work area to prevent injury. Stairway treads, and walkways must be free of dangerous objects, debris and materials. A registered professional engineer should design a protective system for trenches 20 feet deep or greater for safety reasons. To prevent injury with cranes, they should be inspected for any damage. The operator should know the maximum weight of the load that the crane is to lift. All operators should be trained and certified to ensure that they operate forklifts safely.

Operational Excellence Model to improve safety for construction organizations

There are 13 safety drivers associated with this model to improve safety for construction organizations:

1. Recognition & Reward
2. Employee Engagement
3. Subcontractor Management
4. Training & Competence
5. Risk Awareness, Management & Tolerance
6. Learning Organization
7. Human Performance
8. Transformational Leadership
9. Shared Values, Beliefs, and Assumptions
10. Strategic Safety Communication
11. Just & Fair Practices and Procedures
12. Worksite Organization
13. Owner's Role

Each safety driver mentioned above has some sub-elements attributed to it.

4) What are the keys or guidelines for successful safety incentive program?

a) Keep rewards small

Materials rewards should not be perceived as the major payoff. The promise of incentives and rewards should only serve as reminders to work safely, and delivery of such rewards should be viewed by employees as a token of appreciation for performing the desired safe behaviours. If the focus is on the material reward, then the focus is not on working safely. A good rule of thumb is to try and equate the value of the safe behaviour

with the value of the reward. Therefore, giving away a $20 gift certificate to everyone who completed their observations for the month might be excessive.

b) Involve workers

Include as many workers as possible in the construction, selection, and the delivery of the reward system. By doing this, buy-in is generated up front and support or lack thereof will be evident early on so changes can be made prior to launching the program. Also, by involving workers, you are more likely to choose appropriate reinforces rather than having management choose what they THINK workers would like.

c) Specify the behaviours you desire

Behaviours required to achieve a safety reward should be clearly spelled out and perceived as achievable by participants. If safe behaviours are not specified, then employees will not know what they need to do in order to receive the reward of you haven't had any accidents in the past year. Good example: Receiving a reward for achieving a percent safe goal for a behaviour or set of behaviour on a checklist.

d) Collect data and post it

Progress toward achieving a safety reward should be systematically monitored using checklist data, and publicly posted for all participants. If safety performance is not monitored, then it will be impossible to accurately determine which employees deserve the reward.

e) Provide meaningful rewards

Carefully determine the rewards given as a part of your program. If employees do not find the rewards meaningful, then the reward program will not be an incentive to work safely. Some organizations have done plant-wide surveys to determine what types of social, tangible, and work process rewards are meaningful to employees.

f) Never penalize all group members for failure of one member

Groups of employees should not be penalized or lose their rewards/incentives for the failure of one group member. Group rewards should be tied to the overall performance of the group, but some control must be in place to assure that each member of the group who gets the reward actually earned it.

g) Give the reward to everyone who meets the criteria

You should design a reward program with this principle in mind. If you can't afford to reward who meets your criteria, you should reinvestigate your criteria. Everyone who meets the behavioural criteria you have specified should be rewarded. Otherwise, some employees who have worked safely will not be rewarded. These employees will perceive they have been punished. Some guidelines to follow: it is better for many participants to receive small rewards than for one person to receive a big reward. Example: An organization decides to use a lottery incentive program where there is a raffle for a television set, a stereo, or a vehicle; usually participants accumulate chances for the

drawing and then at the end of a specified period of time, the drawing occurs. One person wins. The problems with this are:

- Everyone worked safely many times but was not rewarded.
- The person who won did so by chance
- The focus might be on the big price, not safety.

h) Keep the program rules simple

The most successful reward programs are also usually the simplest. The less complicated the program, the better the chances that all workers will understand and participate in it, and that the safe behaviours will occur consistently. Launch the program with a special kick-off event to let everyone know the "rules", and to show that the program has the support of management.

i) Follow through with rewards

Nothing kills a reward program quicker than failure to deliver the promised rewards. Make` a commitment to follow through with all aspects of the program. It may seem frivolous, but an effective safe performance reward program can play a very important role in workplace accident prevention.

All of these guidelines can be applied to safety programs that focus on automobile fleet safety, employee safety to control Worker's Compensation costs and the WC Experience Mod, or customer/3rd party safety as it relates to general liability.

ASSIGNMENT 5: STUDY OF SAFETY POLICIES

3 Mark Questions

1) What is the first rule of safety?

- The safety-first rule is a tenet of modern portfolio theory (MPT), which believes that risk is an inherent part of reaping a higher level of reward.
- Safety first-Minimizing the probability of negative returns.

2) Define Safety policy.

The employer's commitment to managing health and safety and the goal of the policy

3) Why health and safety is important in construction?

- Construction sites are high risk working environments. Employees are expected to work at great heights with heavy machinery and potentially dangerous building materials.
- It's crucial that health and safety regulations are closely followed to reduce the chance of injury and protect the lives of workers.

4) What is CFR in safety?

The rules created by all federal regulatory agencies are collected into a multi-part document called the Code of Federal Regulations (**CFR**).

5) How many types of hazards are there in OSHA?

- Safety Hazard
- Biological Hazard
- Physical Hazard
- Ergonomic Hazard
- Chemical Hazard

6) State the three general sections in a safety policy.

- Statement of the policy - The employer's commitment to managing health and safety and the goal of the policy
- Responsibility - Stating who is responsible for implementing, enacting, and tracking each element of the policy
- Arrangements or procedures - Outlines the details of procedures including the reduction of hazard policy

7) Briefly Hazard identification and Assessment.

- Effective controls protect workers from hazards; help avoid injuries, illnesses, and incidents.

- Minimize or eliminate safety and health risks; and help employers provide workers with safe and healthful working conditions.

8) Explain Communication for employers on worksites.

- Construction job sites typically have workers who are employed by general contractor and other workers who are employed by a contractor or subcontractor, or workers from other sources.
- Examples include electrical or mechanical contractors working for the general contractor at a building construction site.

9) Give Impact of Building Information Modelling on site safety.

- A large percentage of the firms that use BIM report that BIM use has a positive impact on site safety, with almost no respondents reporting negative impacts.
- Many of the benefits of BIM have a direct impact o safety, including clash detection, detecting jobsite hazards I preconstruction, more effective scheduling of work on the jobsite and use of the prefabrication.

10) State Emergency Action Plan.

- Project site accidents and injuries
- Smoke and fire conditions
- Spills and releases of chemicals or other hazardous materials
- Structural or equipment failure or collapse
- Security threats, including public demonstrations, bomb threats, or the discovery of suspicious materials
- Severe weather conditions, including high winds.

12 Mark Questions

1) Explain about the protection of the public on construction management.

- The general contractor/construction manager should take all necessary precautions to prevent injury to the U-M community and the general public. For example, the entire project site should be secured against unauthorized access and provided with appropriate warning signage.
- Where roadways or walkways must be encroached or closed due to work, adequate barriers shall be installed to safely redirect the flow of vehicles and pedestrians and protect them from construction activities.
- Whenever it is necessary to maintain public use of work areas (such as sidewalks, ramps, entrances to buildings, lobbies, corridors, or stairways), the public shall be protected with appropriate guardrails, barricades, temporary fences, overhead protection, or temporary partitions.
- The public must also be adequately protected from any work created hazards, such as excavation. Appropriate warnings, signs, warning lights and instructional safety signs shall be conspicuously posted and placed where necessary.
- The public must also be protected from falling debris and objects from the project site. Overhead protection shall be provided that will fully protect the public and be capable of withstanding the maximum forces that could be applied from potential falling objects. Special attention shall also be given to developing adequate means to protect against wind-blown debris and construction-related materials

- A common problem in this area involves masonry cutting and repointing, which generates large amounts of fine dust that must be controlled at their source through the application of local exhaust ventilation capture, use of appropriate work methods, or other controls, with a special emphasis on protecting occupants, pedestrians, and workers from the hazards of silica and other fine dusts.

2) Give an account on Safety and Rescue Equipment

Whenever work is to be carried out in a confined space, the following equipment should be provided:

- An atmospheric testing device (proprietary meters and lamps are available)
- Two rescue harnesses with adequate lengths of rope taking into account the location of the work site
- Hand torches or lamps safe for use in a flammable atmosphere
- At least one set of suitable breathing apparatus (cartridge, canister or filter) and an emergency breathing pack
- First-aid equipment
- Firefighting apparatus
- An audible alarm for summoning help
- Resuscitation equipment
- Means of communicating with surface workers.

Points to remember:

- Never work alone in a confined space.
- Never rely on your senses to tell you whether an atmosphere is hazardous.
- Never attempt to clear fumes and gases with pure oxygen because of the risk of being enveloped in fire if there is a source of ignition.
- Never rely on cartridge, canister or filter respirators in confined spaces

3) State Workplace -Health, Safety and Welfare Regulations 1992

The regulations impose a duty on employers (and other applicable individuals) to ensure:

- All equipment, devices and systems and the workplace itself is maintained in an efficient state, in good repair and in good working order.
- All equipment, devices and systems are suitably maintained.
- Effective and suitable ventilation should be provided.
- The internal temperature of the workplace is reasonable and thermometers are provided for employees.
- The heating or cooling method used should not result in the escape of fumes, gases or vapours which could cause offence or injury.
- The lighting levels within the workplace should be maintained so that they do not cause risk to health and safety and wherever possible, natural lighting should be used.
- The workplace, surfaces and the furniture, furnishings and fittings should be clean.
- Waste should be appropriately stored and disposed of regularly.
- Rooms should be of sufficient size to ensure good health, safety and welfare.

- All workstations and seating must be arranged suitably and not endanger health and enable the user to exit swiftly if need be. A footrest should be provided if required.
- All floors and traffic routes must be constructed of a material suitable for the purpose they are to be used and not be uneven or slippery. Suitable drainage must be provided where necessary.
- Employees must be protected from dangerous substances including those that are poisonous, toxic, may burn or scald or any fume, vapour or other substance which is likely to cause danger to any person.
- Any windows, skylights, translucent doors, walls and ventilators must be constructed from safety material or be protected against breakage. Fittings must also present no risk to health or safety.
- The workplace must be organised in such a way that pedestrians and vehicles can circulate freely in a safe manner.
- Suitable and adequate sanitary conveniences must be provided at readily accessible places.
- An adequate supply of drinking water must be provided.
- Where the nature of the work deems it appropriate, a suitable and sufficient supply of the following must be provided:

    - Washing facilities including showers.
    - Suitable storage for work clothes.
    - Changing facilities.
    - Facilities for rest and to eat meals.

4) Explain the Safety Policy Suggested for a Residential Project.

Benefits of an Effective Safety Program

- Employees have a safe work environment
- Increased employee morale
- Lower workers compensation rates
- Defence against injury lawsuits
- Professional image

Basic Principles of Good Safety Management

- Management Commitment
- Documented Safety Philosophy
- Safety Goals and Objectives
- Committee Organization for Safety
- Line Responsibility for Safety
- Supportive Safety Staff

Steps to an Effective Safety Program

Establish Achievable Goals

Goals for a safety program must be realistic. Items such as a time frame and existing safety efforts must be considered as well as the following factors:

- ✓ Company size

- ✓ Nature of work
- ✓ Budget
- ✓ Commitment to safety policy enforcement

Create and Maintain a Budget

Once policies and procedures have been established an investment must be made to maintain the program. Such items may include

- ✓ Equipment
- ✓ Materials
- ✓ Training
- ✓ Safety Incentives

Identify Safety Supervision

Someone within the company must fulfil the role of safety coordinator.

- ✓ The employee chosen must understand the safety program and all its requirements.
- ✓ Employees that spend most of their work day in the field are ideal.
- ✓ Project supervision will most often be the eyes and ears of the jobsite. For small and medium sized companies the Jobsite Superintendent could be critical in this role.
- ✓ If the Superintendent must cover multiple projects a system must be in place to insure that employees will work safely without constant direct supervision.

Develop and Implement

Once a formal plan has been developed it is up to the business owner and associated management to implement the directives.

- ✓ The formal safety program should incorporate operational information that reflects the type of work.
- ✓ The goal of any successful safety program is to establish a positive safety culture.

Discipline Measures

Good documentation is critical.

- ✓ Direct and Subcontracted Employees must be aware of all company safety policies.
- ✓ All employees/subs must be accountable.
- ✓ Three strike system is most common, discipline measures are at the discretion of management:
  - Verbal Warning
  - Written Reprimand
  - Dismissal from project or employment

Employee Education

The direct link between the Safety Program and safe jobsite operations.

- ✓ Training should incorporate all aspects of the project and type of work.
- ✓ Certain operations or machinery & tools may require special training:
- ✓ Powder Actuated Tools • Forklifts of all types
- ✓ “Competent Person” requirements
- ✓ Periodic documented safety talks

Jobsite Incidents

The Safety Program should have a dedicated section covering all aspects related to an incident:

- ✓ Emergency Contacts Jobsite crisis control
- ✓ Transport of Injured Party
- ✓ Drug Testing at Medical Facility

- ✓ Injury notification
- ✓ Incident Investigation

Jobsite Inspection

- ✓ Every supervisor and worker plays a part in safety responsibility.
- ✓ Anytime a potential safety hazard is identified it should be dealt with immediately
- ✓ Hazard is addressed on the spot
- ✓ All persons exposed to hazard are notified
- ✓ Process is stopped or faulty equipment decommissioned until exposure is removed.

Annual Program Audit

Each year management must complete an evaluation of the safety program.

- ✓ Is the plan working?
- ✓ Are changes necessary to achieve safety goals?
- ✓ Policies and procedures are adjusted accordingly.

5) Explain any one case study related to Safety in Construction.

Recent news on Construction safety (SAFETY NEWS ALERT-19 FEB 2020)

OSHA sets sights on 2 big construction industry hazards for FY 21

The construction industry will remain a primary focus for OSHA inspectors for the foreseeable future, judging from information contained in the agency's fiscal year 2019 annual performance report.

OSHA intends to focus its efforts within the industry toward falls – the leading cause of death in construction – and trenching hazards.

The report, which is packaged with the president's FY 2021 budget proposal, indicates:

- falls continue to be the No. 1 violation cited by OSHA
- OSHA exceeded its abatement target for trenching hazards, but improvement is still needed
- Streamlined investigative procedures led to an increase in completed whistleblower cases in FY 19.

More inspections targeting fall hazards

A 2018 Office of Inspector General report pointed out OSHA's need to use its limited resources to address construction hazards, and the agency seems to have taken that criticism seriously.

Falls are the leading cause of death in the construction industry and account for 20% of all serious injuries, and OSHA has national and local emphasis programs to address the hazard with 10,570 inspections in FY 19 as a result of those programs.

Because of the inspections, 8,096 fall-related hazards were abated in FY 19 – 95 more than in 2018.

However, despite surpassing its target goal of abating 7,810 fall hazards, the number of inspections completed was limited by resources and other priorities.

OSHA plans to implement more resources on fall hazards in FY 21, with more inspections, enforcement emphasis and outreach programs and compliance assistance focused on fall-related hazards.

Bigger focus on trenching hazards

The agency also stepped up its inspection efforts toward trenching and excavation to abate 2,710 hazards, beating its 2,572 target goal in FY 19 and surpassing FY 18's 2,324 goal. But OSHA feels general awareness on trenching and excavation hazards still needs improvement, despite it's already "substantial outreach efforts."

With that in mind, the agency's FY 21 plans include supporting trench safety stand down events and distributing materials and other resources on trenching and excavation safety.

The agency wants to work with industry associations and the public utilities that typically require trenching work to create a public-private effort to impact trenching-related fatalities.

OSHA is also setting a more ambitious goal for trenching and excavation inspections, looking to achieve a 12% improvement over FY 17's abatement target of 2,338 by targeting workplaces with a greater potential of having trenching and excavation hazards.

Improved whistleblower investigations

OSHA completed 3,091 whistleblower investigations in FY 19 – compared to 2,929 in FY 18 – awarding more than $16 million to complainants and reinstating 34 workers.

This was the result of continued use of the agency's administrative closure procedure and implementation of new, streamlined investigative procedures which led to increased efficiency in processing cases.

To improve upon 2019's numbers, the FY 21 budget proposal includes funding for additional OSHA staff, including 10 full-time equivalent positions to hire more whistleblower investigators.

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