8. a. Explain various types of respiratory protective devices. 10M.

→ Following are different types of respiratory protective devices.

1. Air Purified Respinators (APR)
It prevents dusts, all types of gases vapors.

2. Powered Air Purifying Respinators (PAPR) - these are battery operated drawing ambient air passing through filter into headpiece. without any breathing resistance.

3. Self Contained Breathing Apparatus (SCBA)
It is used where hazardous substances exists with Low oxygen level.

4. Airline and compressed air system Non. freely portable breathing apparatus supplying oxygen with pressurised air connected by hose.

5. b. Discuss about health considerations at workplace.

→ Common types of health hazards at workplace include

- chemical - (asbestos, solvents, Cl_2)
- Biological - (T.B, HIV, hepatitis, mould, covid)
- Physical - (noise, heat, cold, radiation, vibration)
- Ergonomics - (CTD's, back injuries)
- Psychological (stress)

They enter body - via

- Breathing (inhalation)
- Swallowing (ingestion)
- Skin (absorption)
- Cuts (injection)

Harm caused depends on

- strength and potency of the agent
- exposure time
- Part of body exposed

Depending upon these they will be either Acute or chronic.

They can be again divided into carcinogenic, sensitizing, reproductive

- Apart from these the health hazards could be from slips, trips, falls

To prevent all these or to minimize these proper engonomic considerations should be given at work place.

- People should be trained for safety and use of PPES should be made.

9. a. Write a note on safety in handling of chemicals in water and wastewater treatment plants. 10M.

→ Physical hazards - include confined spaces, inadvertent energizing of machine slipping and fall hazards. These also might be spilling of chemicals on floor such as polymeric coagulants.
Gases such as chlorine which is used as disinfecant is poisonous if inhaled. UV. irradiation could also cause damage.
Similarly ozone used in water treatment can cause health hazard.
Biological activities generate gases such as H_2S, CH_4 which might cause fire and explosive hazards in waste water treatment.
often acids and base are used to neutralize wastewater if they come in contact with skin, eyes & body parts could cause serious issues.
Similar effect will be with CaO, often used along with coagulant.
Apart from these microbial hazard is always associated with wastewater.

b. Discuss the roles and responsibilit
of managen in construction industry.

→ Role of safety managen in construction
industry is wide and variety of
duties that centen on the safety of
construction work sites.
- He should identify potential areas
of hazard which require intervention
- He should train subordinates for
safety
- He should have preventive educati
to ensure the understanding of
policies and regulations.
- He should set an example for
others by using PPE's at site.
- He a should acknowledge the
safety practice of othens.
- He should record the incidents
happening on site and make sure
they do not happen in future.
- He should cooperate and coordinate
with agencies to develop better
safety programs.

10 a. Discuss various safety considerations in construction industry. 4

→ There are number of hazards at construction site such as

fire
unguarded machinery
unsafe access
unsafe scaffolds
unsafe working at heights
unsafe lifting conditions
struck by foreign body.
falling objects
openshafts and edges
unsafe working platforms
unstable structural member.
unstable mobile crane
unsafe cantilever loading platform
overloaded vehicle & forklifts.
unsafe electrical equipments.
unsafe excavations.

These problems can be resolved by following safety practice.

General site safety inspections should be carried out.
Use of PPE should be made mandatory.
safety boards with instruction should be displayed.
fire prevention along with safe route should be given
Electrical safe working should be practiced.
Emergency management plan should be developed.
Training should be given to people.

10. Write a brief note on hazard prevention and control in control construction material manufacturing industries.

→ one such industry where construction manufacturing is made is ready mix concrete (RMC).

Occupational risks to which operator is exposed to

Trip, stumble, fall

Impact and mechanical hazard

Ergonomic risks

Noise - exposure to loud noise

Limited area - heat, limited O_2

Silica exposure - leads to silicosis

Chemical burns - due to lime in cement

Foreign objects in eyes - dust, flying objects

Driving safety - heavy equipment movement, trucks etc

Preventive measures :-

- Fall arrestors should be used like belts, nets.
- Use of PPE should be promoted proper training should be given.
- Enclosures to be practiced for noise control.
- Use of masks in dusty environment should be practiced
- First aid should be available
- Vehicle speed limit should be set with alarm systems when heavy vehicle is moving.

9. b. Discuss the handling of chemicals in laboratory. 08.M

→ Chemicals can be hazardous for many reasons. Their properties have to be taken into account before we store and use them.
Chemical hazard depend on: it's physical property, toxicity, the way it is used, the environment in which it is used
Chemical forms include. Liquid, solid dust, fume, mist, vapour and gas.
mode of entry - injection, skin absorption eyes, inhalation
one should proper Personal protective Equipments when handeling the chemicals
Material safety Data sheet (MSDS) should be read and should be maintained incase of emergency.
Disposal of chemical waste should be done in scientific manner.
Provision of first aid, fire protection and fighting should be available in laboratory
People who are working with chemicals should be trained.

2. a. Enumerate the axioms of industrial safety. 08 M.

→ Axioms of industrial safety given by H. W Heinrich.

1. Injuries result from a series of preceding factors.
2. Accident occur as the result of a physical hazard or an unsafe act.
3. Most accidents are result of unsafe behavior.
4. Unsafe acts and hazards do not always result in immediate accidents and injuries.
5. Understanding why people commit unsafe acts helps to establish guidelines for corrective actions.
6. The severity of accident ~~that~~ injury is largely fortuitous and the accident that caused it is preventable.
7. The best accident prevention techniques are analogous to best quality / Productivity techniques.
8. Management should assume safety responsibilities.
9. The supervison is the key person in the prevention of industrial accidents.
10. Cost of accidents include both direct costs and indirect costs.

9. a. Write a note on safety in handling of chemicals in water and wastewater treatment plants. JOM.

→ Physical hazards - include confined spaces, inadvertent energizing of machine slipping and fall hazards. These also might be spilling of chemicals on floor such as polymeric coagulants.
Gases such as chlorine which is used as disinfecant is poisonous if inhaled. UV. irradiation could also cause damage.
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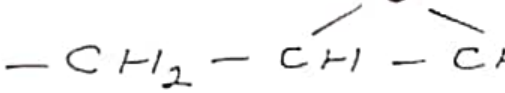
often acids and base are used to neutralize wastewater if they come in contact with skin, eyes & body parts could cause serious issues.
Similar effect will be with CaO, often used along with coagulant.
Apart from these microbial hazard is always associated with wastewater.
- use of PPE's will help to reduce risk.
* Hand Gloves - will prevent from infection
* Mask - will reduce ~~ex~~ inhalation of toxic gases & microbes inhalation.
* Safety shoes - will help to get protection from spilled chemicals
* Safety goggles will prevent eye injury due to splashes of wastewater or chemicals.
* Hand hat will prevent head injury due to fall on hit in congested places.

10. a. Discuss the occupational health hazard posed in an epoxy manufacturi unit. JOM.

→ Epoxy resins are class of synthetic resins (Polymers) that are chemically characterized by very reactive epoxide group.



They are often used in construction sites.

The ingredients of epoxy products a moderate to strong irritants as well as allergens. They are skin sensitizer Epichlorohydrin and other constituent of epoxy resins are classed into carcinogens. chemicals such as bisphenol-A in it known to affect reproduction in both male and female Skin contact might lead to burns due to polyamine. They also might lead to asthma and breathing difficulties if inhaled.

Less toxic epoxy chemicals can be used as substitute.

Use of proper clothing and PPE's will reduce the exposure risks at workplace.

10. b. Comment on the roles and responsibilit of workers and managers in safety programs. 10M.

- He should identify potential areas of hazard which require intervention
- He should train subordinates for safety.
- He should have preventive educatio to ensure the understanding of policies and regulations.
- He should set an example for others by using PPE's at site.
- He a should acknowledge the safety practice of others.
- He should record the incidents happening on site and make sure they do not happen in future.
- He should cooperate and coordinate with agencies to develop better safety programs.

*Workers responsibility

- comply with OSH standards.
- Report the workplace hazards
- Report to the supervisor about illness, injuries or property damage
- follow safety and use PPE's.