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FACULTY OF ENGINEERING AND
TECHNOLOGY

Lecture-38

Man-made disaster-part 2



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Building fire

- Building fire refers to the fire involving the structural components of various types of residential, commercial or industrial buildings.
- The common causes of fires in buildings are cooking equipment, electrical equipment, heating and lighting equipment, smoking materials, and intentional fire setting.
- **Cooking equipment:** Because of high cooking temperatures, flammable oils and grease, gas leak, etc. lead to fire in commercial places. Cooking equipment is responsible for:
 - 65% of fires in healthcare facilities
 - 61% of fires in restaurants
 - 38% of fires in educational institutions
 - 29% of fires in office properties
 - 13% of fires in stores and mercantile properties



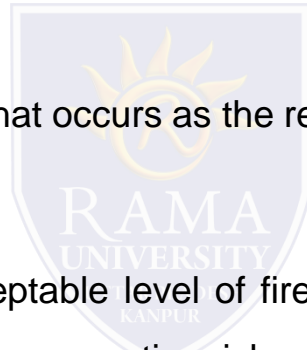
- **Heating and lighting Equipment:** Overheating of equipment used in buildings to maintain normal temperature and open flames used for lighting or heating purpose such as fireplace or candles sometimes lead to fire. Heating equipment is responsible for:
 - 14% of fires in industrial or manufacturing properties
 - 11% of fires in office properties
 - 9% of fires in restaurants
 - 5% of fires in healthcare facilities
- **Electrical equipment:** Old or defective wiring, overloaded circuits, loose connections, faulty fuses, imbalanced electrical loads, etc. lead to overheating or sparks that ignite a fire. Electrical problems are responsible for:
 - 12% of fires in office properties
 - 10% of fires in stores and mercantile properties
 - 9% of fires in restaurants
 - 5% of fires in healthcare facilities



- **Smoking Materials:** Lighted cigars, cigarettes, and other smoking materials can start fires if disposed of improperly. Smoking materials are responsible for:
 - 9% of fires in office properties
 - 7% of fires in restaurants
 - 5% of fires in healthcare facilities
- **Intentional:** An intentional fire is one that occurs as the result of the deliberate burning.

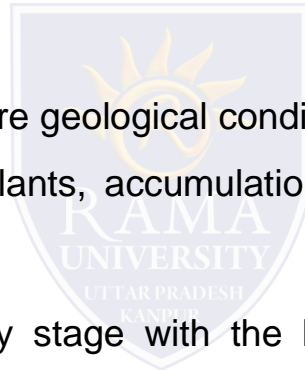
Prevention and control

Building should be designed to offer acceptable level of fire safety to minimize the risk. These safety measures include fire alarms, means of escape, extinguishment facility and rescue service to control fire and prevent loss of life.



Coal fire

- Coal is the primary sources of energy and a non-renewable resources.
- It is mined from the earth surface or below the surface and used to produce electricity or heat.
- Coal fire can occur in coal mines while coal extraction and in coal-fired power plant.
- Coal fire result in loss of life and coal resources. In addition, burning of coal add huge amount of toxic pollutants in the air.
- The major cause of coal fire in mines are geological conditions and high temperature that result in self-ignition of coal. In coal fired power plants, accumulation of coal dust during transportation of coal through conveyor belt.
- Detection of coal self-heating at early stage with the help of physical symptoms, and/or thermal devices or chemical methods can facilitates prevention of coal fire in mines. In coal fired power plant, preventing accumulation of coal dust can minimize the risk of coal fire.



Forest fire

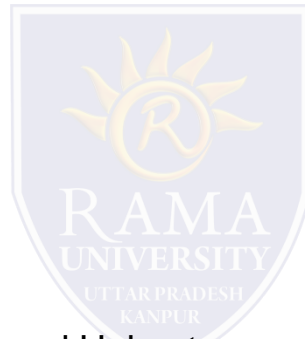
- A **wildfire or bushfire**, is an unplanned, unwanted, uncontrolled fire in an vegetation area.
- Wildfires can be characterized in terms of the cause of ignition, their physical properties, the combustible material present, and the effect of weather on the fire.
- Wildfire behavior and severity result from a combination of factors such as available fuels, physical setting, and weather.
- The most common direct human causes of wildfire ignition include arson, discarded cigarettes, power-lines arcs, and sparks from equipment.
- Wildfires can also be started in communities experiencing shifting cultivation, where land is cleared quickly and farmed until the soil loses fertility, and slash and burn clearing.
- Forested areas cleared by logging encourage the dominance of flammable grasses, and abandoned logging roads overgrown by vegetation may act as fire corridors.
- Wildfires can cause damage to property and human life, destroy vegetation, devastate wildlife habitat and shrink population of animals.
- Wildfire add large quantities of pollutant gases and particulate matter in air that deteriorate air quality and cause air pollution to long distance areas.

Oil fire

- **Oil fires** include oil or gas wells that have caught on fire and burn. Human activities like accident or arson result in burning of oil wells or oil deposit areas.
- They can exist on a small scale, such as an oil field spill catching fire, or on a huge scale, as in geyser-like jets of flames from ignited high pressure wells.
- A frequent cause of a well fire is a high-pressure blowout during drilling operations.
- Oil well fires are more difficult to extinguish than regular fires due to availability of enormous fuel . In fighting a fire at a wellhead, typically high explosives, are used to create a shockwave that pushes the burning fuel and local atmospheric oxygen away from a well. The flame is removed and the fuel can continue to spill out without catching fire.
- After blowing out the fire, the wellhead must be capped to stop the flow of oil. Capping material include brass tools, bronze tools, or paraffin wax-coated tools to prevent oil catching fire again.
- Oil well fires cause the loss of millions of barrels of crude oil per day.
- Large amounts of smoke and unburnt petroleum that contains many chemicals, such as sulfur dioxide, carbon monoxide, soot, benzopyrene, poly aromatic hydrocarbons, and dioxins can cause severe environmental pollution.

Road accidents

- Road accident is most unwanted thing to happen to a person travelling through road, though they happen quite often.
- Carelessness and human errors are major cause of road accidents and crashes.
- Some of the common reasons that results in road accident are:
 1. Over speeding
 2. Drunken driving
 3. Distractions to driver
 4. Red light jumping
 5. Avoiding Safety Gears like Seat belts and Helmets
 6. Non-adherence to lane driving and overtaking in a wrong manner
- Other factors such as bad weather, potholes, illiteracy, damaged road, etc. also result in road accidents.
- Road accidents often leads to fatality, injury and property loss
- Road accidents can be prevented by enhancing education and awareness about road safety, enforcing law, developing more better road infrastructure.



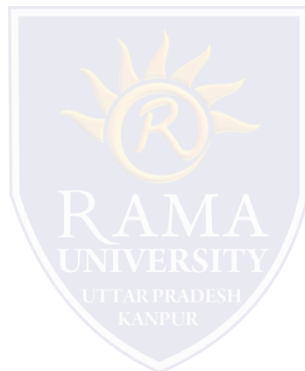
Rail accidents

- A rail accident is the train accident that can be a devastating incident resulting in serious injury or even death to the victims involved.
- Train accident may include derailment, collision, train marooned, fire or explosion in train, collapse of tunnel, railroad crossing accident, terrorist activity, etc.
- A major train accident leading to serious casualties, long duration interruption to traffic, and economic losses



Air accidents

- Air accident or aviation accident is an air event that result in damage to aircraft clamming life of passengers.
- Though the probability of air accidents are lower than any other transport accidents but the chances of passengers survival are least.
- Major reason for air accidents are
 - Pilot's error
 - Fuel tank explosion
 - Aircraft structural failure
 - Mid-air collision
 - Airstrip accident
 - Uncontrolled decompression
 - Intentional crashing
 - Explosion in aircraft
 - Crashing of aircraft may be due to bad weather
 - Shooting down aircraft during war or other reasons by missiles



Sea accidents

- Sea accident include accident of oil tankers, cargo ships, fishing trawlers, cruise and ferry ships carrying passenger.
- The major cause of sea accidents are:
 - Collision between two ships
 - Collision between ship and rocks, ice bergs, or coral reefs.
 - Maritime error
 - Technical or structural failure
 - Atmospheric storms
 - Pirates attack
- Effects of sea accident
 - Accident of passenger carrying ships, cruise or ferry cause loss of life
 - Accident of oil tankers cause oil spill that result in marine pollution damaging life of aquatic and avian species and deteriorating marine water habitat.
 - Accident of cargo ships and oil tankers cause loss of resources or materials resulting in economic loss.

