Bus Rapid Transit Systems (BRTS)

Brief introduction:

- It has dedicated bus lanes, platform-level boarding, off-board fare collection, and enhanced stations
- which provide faster, more reliable, high-capacity transport, mimicking rail systems
- at lower cost
- through features like signal priority, modern buses, and integrated technology for better urban mobility.

Key Features: Description -

- **Dedicated Infrastructure:** Buses run in their own exclusive lanes (often central), separated from general traffic to avoid congestion.
- **Platform-Level Boarding:** Stations are built to match the bus floor height, allowing quick, easy access for all passengers, including those with mobility challenges.
- **Off-Board Fare Collection:** Passengers pay before boarding at the station, significantly speeding up boarding times.
- **High-Capacity Buses:** Often use larger, sometimes articulated, buses to carry more people.
- **Modern Stations:** Well-designed, identifiable stations with shelters, seating, real-time info, security, and amenities.
- **Intelligent Transit Systems:** Includes GPS tracking, passenger information systems (PIS), automated announcements, and traffic signal priority (TSP).

Benefits

- **Speed & Reliability:** Faster travel times due to dedicated lanes and signal priority, reducing delays.
- **Capacity:** Moves large numbers of people efficiently, similar to light rail but with more flexibility.
- **Cost-Effectiveness:** Lower capital cost than rail systems, making quality transit accessible to more cities.
- **Environmental:** Can reduce emissions and air pollution compared to conventional bus systems.
- **Urban Development:** Promotes sustainable growth and revitalizes areas along corridors.

Compass Surveying

Local attraction:

- It is the **deviation or deflection** of magnetic needle away from the magnetic north **due to permanent types of magnetic attraction** near the survey station.
- These permanent sources of attraction may include, iron fencing, electric poles, electric cables overhead or underground, iron ores in the ground, iron pipes in the ground etc.

- (The temporary sources of error like wrist watch, ranging rod, chain tape etc. are always removed away before taking readings with a magnetic compass. They are not considered as local attraction.)
- Due to local attraction at a station, the difference of Fore Bearing and Back Bearing of a line is not 180 degrees. Similarly, if the difference between F.B. and B.B. of a survey line is not 180 degrees, any of the two survey stations (end points of the survey line) may have local attraction.

Total Station

- Total station is a compact electronic surveying instrument having laser emission and laser sensors, digital panel and keypad and computer compatible software inbuilt in it.
- It is used with laser reflector prisms. It is having all features of magnetic compass, dumpy level, digital theodolite.
- We can measure bearing, distances, angles, reduced levels etc. with it. It has digital display panel and keypad with various functions.
- During survey and measurements, we directly get distances (horizontal, vertical and inclined), angles (horizontal and vertical) etc. in the form of digital display.
- During the survey all readings and data are recorded in memory.
- When connected through compatible software, the readings can be converted into digital maps, location of points, contour maps etc. in computer.

GPS – Global Positioning System

- GPS uses satellite signals to locate the GPS survey station.
- It gives precise coordinates of the GPS survey station by receiving and analysing signals from three or more satellites simultaneously.
- It has a base and a rover. After setting up base station, with help of rover and transmitting signals between base and rover exact positions of all the points, objects and details can be recorded and saved in memory.
- After connecting it to the computer using compatible software, maps can be generated automatically.
- It Is very much useful in thick forests, dense built-up areas where the Total Station is difficult to use due to obstructions in sighting the objects.

Difference between Load bearing structure and Framed structure

	Load bearing structure	**Framed structure**
1	In this, the masonry walls transfer the loads on the building to foundation.	In this, a frame of columns and beams transfer all the load to foundation.
2	The walls are thick.	The walls are just for separating the spaces and are in form of partition walls.
3	Walls occupy more area. So, usable space becomes less.	Columns occupy less area, so more usable space is available.
4	It is cheaper.	It is costlier due to use of steel bars, more use of cement and cost of formwork etc.
5	Modification in room sizes in future is difficult/impossible.	Modification in room sizes in future is easy and possible.

Difference between Cast-in-situ and Precast construction

Cast-in-situ concrete construction	Precast concrete construction
1. The fresh concrete is cast at the place of construction in the erected formwork.	1. The fresh concrete is cast at factory/another site.
2. The construction takes more time due to formwork erection, casting, curing period etc.	2. The construction takes less time due to fabrication of precast concrete members at the site.
3. The quality control is difficult.	3. Better quality control can be achieved.
4. The transportation of material is easy.	4. The transportation of precast members is difficult and require heavy equipment and care.
5. Do not require heavy handling equipment.	5. Require heavy handling equipment.

Solid Waste Management

Classification of Solid waste:

Anything containing or made of solid material and rejected as waste is called solid waste.
Different types of solid waste are:

- **Municipal solid waste** – includes – food waste, packaging waste, rubbish, plastics, waste from trees and plantation cuttings, demolition waste, dead animals
- **Industrial solid waste** – from different industries
- **Agricultural solid waste** – from farms and fields
- **Biomedical waste** – from hospitals
- **E-waste** – electronic waste
- **Hazardous waste** – explosives, flammables, radioactive, etc.

Solid Waste Management (SWM) system:

For a city of village SWM requires Planning, Design, Finance, Construction and Operation activities.
The infrastructure required for SWM includes –

- **Collection** by containers, vehicles, staff
- **Transportation** of collected solid waste from and to proper places
- **Processing** – like segregation, and converting into disposable form
- **Recycling** – Extracting recyclable waste and recycling it
- **Disposal** – Disposing of segregated/processed waste by appropriate methods like sanitary landfilling, incineration (burning), Composting or Pyrolysis of biodegradable waste, Dumping below land or sea-bed etc.

Linear measurement

Methods of linear measurement:

- **Direct methods**
    - Pacing – by counting steps and distance is determined by multiplying it by step length.

    - Passometer – It is fitted on leg. It gives the count of steps. From that distance is calculated.
    - Pedometer – It is also fitted on leg. It is adjusted to step length. It directly gives the distance.
    - Odometer – It is wheeled instrument which gives distance.
    - Speedometer – It is available in vehicles, which gives distance.
- **Optical methods** – In these methods telescope having lenses and diaphragm with cross wires are used and distance is indirectly determined.
- **Electronic methods** – In these, different sensors and electronics are used to give distance in digital value.

Instruments used in chaining:

- **Chain** – it is made up of steel bars and links. Normally metric chains are 30 m long.
- **Tape** – measure-tapes of different length made up of different materials are used.
- **Pegs** – Steel or wooden pegs are used to mark survey stations.
- **Ranging rods** – They are used for ranging and sighting.
- **Arrows** – they are used to marks ends of chains.