1. Define Permanent way?
   The combination of rails, fitted on sleepers and resting on ballast and sub grade is called the Railway track or Permanent way.

2. Define Gauge?
   The ‘Gauge’ of a railway track is defined as the clear distance between inner or running faces of two track rails.

3. Define Rails?
   The rails on the track can be considered as steel girders for the purpose of carrying axle loads. They are made of high carbon steel to withstand wear and tear.

4. What are the different types of rail sections?
   1. Double headed rails (D.H.Rails)
   2. Bull headed rails (B.H.Rails)
   3. Flat footed rails (F.F.Rails)

5. What are the different types of rail joints?
   1. Supported rail joints.
   2. Suspended rail joints.
   3. Bridge joints.
   4. Base joints.
   5. Welded joints.

6. Define Creep?
   Creep is defined as the longitudinal movement of rails with respect to sleepers in a track.

7. Classify Sleepers?
   1. Wooden sleepers
   2. Metal sleepers
      a) Cast iron sleepers
      b) Steel sleepers
   3. Concrete sleepers
      a) Reinforced concrete sleepers
      b) Prestressed concrete sleepers
8. **What are the uses of Fish plates?**

   Fish plates are used in rail joints to maintain the continuity of the rails and to allow for any expansion or contraction of the rail caused by temperature variations. They maintain the correct alignment of the line both horizontally and vertically.

9. **What is the use of Spikes?**

   1. For holding the rails to the wooden sleepers.
   2. Spike should be strong enough to hold the rail in position.
   3. Spike should be as deep as possible, easy in fixing, removal, cheap in cost.

10. **What is the use of Keys?**

    Keys are small tapered pieces of timber on steel to fix rails to chairs on metal sleepers.

11. **What are the different materials used for Ballast?**

    Broken stone, Gravel. Ashes (or) Clinker, Sand, Moorum, Kanbar, Brick Ballast, Blast furnace slag, Selected earth.

12. **Define track alignment?**

    The direction and position given to the center line of the railway track on the ground is called the track alignment.

13. **Write the different surveys required for railway projects?**

    1. Traffic survey.
    2. Reconnaissance survey.
    3. Preliminary survey (or) survey for initial location.
    4. Detailed survey (or) survey for final location.

14. **Define super elevation?**

    When a train moves round a curve, it is subjected to centrifugal force acting horizontally at the center of gravity of each vehicle radially away from the center of the curve. This increases the weight on the outer rail. To counteract the effect of centrifugal force, the level of the outer rail is raised above the inner rail by a certain amount to introduce the centripetal force. This raised elevation of outer rail above the inner rail at a horizontal curve is ‘called super elevation’.

15. **What are the different types of curves?**

    1. Simple curve.
    2. Compound curve.
    3. Parabolic curve.
    4. Transitional curve.
UNIT – II
RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION

1. What are the necessities of points and crossings?
   Points and crossings provide flexibility of movement by connecting one line to another according to requirements.
   They also help for imposing restrictions over turnouts, which necessarily retard the movements.

2. What are the two types of Switches?
   1. Stub switch.
   2. Split switch.

3. Define Crossings?
   A ‘Crossing’ or a ‘Frog’ is a device, which provides two flange ways through which the wheels of the flanges may move, when two rails intersect each other at an angle.

4. Classify the Crossings?
   A) On the basis of shape of crossing.
      1) Acute angle crossing or “V” crossing or Fog.
      2) Obtuse angle crossing or Diamond crossing.
      3) Square crossing.
   B) On the basis of Assembly of crossing.
      1) Spring or movable wing crossing.
      2) Ramped crossing.

5. What you mean by Diamond crossing?
   When straight tracks or curved tracks of the same or different gauges cross each other at an angle less than 90 degree, a diamond shape is formed. So this crossing is called as diamond crossing.

6. Define cross-over in track junction?
   When two adjacent parallel or diverging tracks, which may be straight or curved, are connected by two sets of turnouts, with or without a straight length between them, the connecting line is known as cross-over.

7. Define Ladder tracks?
   When a number of parallel tracks are branched off from the straight track in continuation of a turnout, it is called a gathering line or ladder track.

8. What are the different classifications of railway stations?
   A) Operational classification
      1) Block station.
      2) Non-Block station.
      3) Special class station.
   B) Functional classification
      1) Way side station.
      2) Junction station.
      3) Terminal station.
9. Define Platforms?
   A raised level surface, from where either passengers board and alight from trains or loading and unloading of goods is done, is known as a ‘Platform’.

10. Define station yards?
    A yard is defined as a system of tracks laid usually on a level within defined limits, for receiving, storing, making up new trains, dispatch of vehicles and for other purposes over which movements are not authorized by a time table. The various movements on a system of tracks are governed by prescribed rules, regulations and signals.

11. Define Buffer stop?
    The dead end of a siding or the end of any track of terminal station is not kept bare but a form of stop or barrier is provided at the end of the track, to prevent the vehicles, from running off the track. This stop or barrier provided at the end, across the track of a siding or at terminal station is known as “Buffer stop”.

12. What are the three stages of construction of new railway track?
    1) First stage. Earth work – formation and consolidation.
    2) Second stage. Plate Laying – laying of a railway track.
    3) Third stage. Laying of ballast on the track.

UNIT – 3
AIRPORT PLANNING AND DESIGN

1. List out the advantages and disadvantages of air transport.
   ADVANTAGES: Accessibility, Continuous journey, Emergency use Engineering use, Saving in time
   DISADVANTAGES: Flight rules, Operating expenses, Unsafe Weather conditions

2. What are the drawings should be prepared for construction of new airport?
   Drainage plan, Grading plan, Lighting plan, Master plan, Obstruction plan, Paving plan, Topographic plan

3. Define apron.
   It indicates a defined area of the airport to accommodate aircrafts for loading and unloading of cargo and passengers, parking, refueling, etc. It is usually paved and is located in front of the building or adjacent to hangers.

4. Define wind coverage.
   The percentage of time in a year during which the crosswind component remains within the limit of 25km p.h. is called the wind coverage of the runway.
5. **What are the four basic patterns of runway?**
   1. Single runway
   2. Parallel runways
   3. Intersecting runways
   4. Divergent or Open-V runways

6. **What are the different types of parking of aircraft?**
   1. Nose-in parking.
   2. Angled nose-in parking
   3. Nose-out parking
   4. Angled nose-out parking
   5. Parallel parking

7. **What is the main function of hangar?**
   The main function of a hangar is to provide an enclosure for housing and repairing of the aircraft. They are constructed of steel framework covered with the galvanized iron sheets.

8. **Define crosswind component.**
   It is not possible to get the direction of opposite wind parallel to the center-line of the runway length everyday or throughout the year. For some period of the year at least, the wind may blow making some angle $\theta$ with the direction of the center-line of the runway length. If $V$ km ph is the velocity of the inclined opposing wind, its component $V \sin \theta$, which is normal to the centerline of the runway length, is called the crosswind component.

9. **What are the factors should be consider for layout of taxiway?**
   1. Arrangement, Busy airports, crossing, Higher turn-off speeds, Route

10. **What do you mean by airport capacity?**
    The number of aircraft movement, which an airport can handle within a specified period of time.

11. **What are the phases of Master plan by FAA recommendation?**
    Phase I: Airport Requirements Phase II: Site selection
    Phase III: Airport plans Phase IV: Financial plans

12. **What are the advantages of head wind?**
    1. During landing, it provides a breaking effect and the aircraft comes to a stop in a short length of the runway.
    2. During take off, it provides greater lift on the wings of the aircraft.

13. **What are the corrections required for runway length?**
    1. Correction for elevation
    2. Correction for gradient
    3. Correction for temperature
14. **Define holding apron.**
   The portion of paved area which is provided adjacent to the ends of runway incase of busy airports is known as the holding apron.

15. **What is the necessity of surveying in construction of new airport?**
   1. To ascertain the characteristics of soil.
   2. To workout the detailed estimate of the project.
   3. To prepare suitable drawings
   4. To make provision for future extension of the airport
   5. To give an idea of the meteorological conditions prevailing at the proposed site

16. **What is wind rose diagram?**
   The diagram showing direction, duration and intensity of wind over a certain period in a specified region is known as wind rose diagram.

17. **What are the aims of Airport drainage?**
   1. It grants longevity to the pavements.
   2. It increases the efficiency of the airport.
   3. It is essential for proper and safe functioning of the aircraft.
   4. It reduces the maintenances of an airport.

18. **Define clear zone.**
   The term clear zone is used to indicate the innermost portion of the approach zone and it is to be provided at the ends of runways.

19. **What are the types of zoning?**
   1. Approach Zone
   2. Clear zone
   3. Turning zone

20. **Define Turning zone.**
   The turning zone is the area of airport other than the approach area and it is intended for turning operations of the aircraft incase of emergencies like failure of engine or trouble in smooth working of aircraft experienced at the start of the takeoff.

**UNIT -4**

**AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL**

1. **Mention the purposes of installing visual aids at the airport?**
   1. To avoid accidents during landing of the aircraft.
   2. To maintain an orderly flow of aircraft without any congestion.
   3. To satisfy the visual requirements for takeoff and taxiing.
   4. To grant safety to the persons and properties
5. To direct the pilot to make the landing of the aircraft in the landing area only.

2. **What are the airport markings?**
   1. Apron marking
   2. Landing direction indicator
   3. Runway marking
   4. Shoulder marking
   5. Taxiway marking
   6. Wind direction indicator

3. **Define Hangar.**
   The large shed erected at the airport for the purpose of housing, servicing, and repairing of aircrafts is known as hangar.

4. **What are the guidance and information required by the pilots during landing operation?**
   1. Alignment guidance
   2. Height information
   3. Visual parameters

5. **What are the factors, which affect the type and intensity of airport lighting?**
   1. Airport classification
   2. Amount of traffic
   3. Availability of power
   4. Nature of airport using the airport
   5. Type of night operations planned
   6. Type of the landing surfaces provided
   7. Weather conditions

6. **Give the elements of airport lightings.**
   1. Airport beacon
   2. Approach lighting
   3. Apron and hanger lighting
   4. Boundary lighting
   5. Lighting of land direction indicator
   6. Lighting of wind direction indicator
   7. Runway lighting
   8. Taxiway lighting
   9. Threshold lighting

7. **Define heliport.**
   The area for landing and taking off helicopter is known as heliport.
8. **What are the three factors which affect the size of an apron?**
   1. Gate position
   2. Number of gates
   3. Systems of aircraft parking

9. **Define terminal building.**
   The building or buildings which are meant for providing facilities to all passengers, for serving as office for airport management and for carrying out other non-aeronautical functions are known as terminal buildings. They act as the focal points of the terminal area.

10. **What are the markings made on the runways?**
    1. Runway centerline marking
    2. Runway edge stripes
    3. Runway numbering
    4. Touch down or landing zone
    5. Threshold marking
    6. Two or more parallel runways

11. **What are the two arrangements adopted for approach lighting?**
    1. Calvert system
    2. ICAO system

12. **Define the term visibility.**
    The term visibility is defined differently for day and night in the meteorology. During the day, it is the distance that a black circular target subtended by a visual age of 1° can be seen. At night, it is the distance from which a human can see a 25 candela light.

13. **Define ceiling.**
    The meteorological visibility is also generally associated with the height of the underside of a dense cloud above the airport surface. The height is referred to as the ceiling.

14. **What are the broad principles that are to be observed in the design of a terminal building?**
    1. Arrival and departure areas
    2. Baggage delivery
    3. Information
    4. Movement

15. **What are the systems of aircraft parking?**
    1. Frontal or linear system
    2. Open-apron or transporter system
    3. Pier or finger system
    4. Satellite system
16. **What are the importances of air traffic control?**
   It avoids the possibility of occurrence of the accidents in the air.
   It grants the economic and efficient utilization of the aircraft and the airports.

17. **What are the three components of an air traffic control network?**
   1. control centers  
   2. control towers  
   3. Flight service stations.

18. **What are the types of air traffic control aids?**
   1. En route aids or airway aids  
   2. Landing aids or terminal aids.

19. **Define passenger flow.**
   The design of the terminal building should be such that an uninterrupted flow route is formed for the passengers to follow on or off an aircraft without offending or disturbing each other.

20. **What are the basic requirements to be kept in mind while deciding the site for a terminal building?**
   1. It should be centrally located with respect to the runways.  
   2. It should have convenient and easy access to the highway.  
   3. The site should have easy facility of natural drainage.  
   4. There should be adequate space available for the parking of the vehicles.

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**UNIT V**

**HARBOUR ENGINEERING & OTHER MODES OF TRANSPORT**

1. **Advantages of water transport**
   Cheapest mode of transport  
   High load carrying capacity  
   Powerful defense of national security  
   To encourage consumption of foreign goods.

2. **Disadvantages of water transport**
   Slow Operation  
   Use only when water is available  
   Accidents due to ocean storms.  
   Water level fluctuations will affect the transport.

3. **Define Harbour**
   Harbour can be defined as a basin of navigable waters will protected naturally (or) artificially from action of wind and waves, and it is situated along the sea - shore (or) river.

4. **Classify Harbour**
   (i) Based on protection needed:
      (a) Natural  
      (b) Semi – Natural  
      (c) Artificial
(ii) Based on the Utility:
(a) Harbour of refuge  (b) Commercial  (c) Fishery
(d) Military  (e) Marina

(iii) Based on Location:
(a) Canal  (b) Lake
(c) River  (d) Sea

5. **Define Port:**
The term port is used to indicate a harbour where terminal facilities such as stores, loading of passengers and cargo etc.

6. **Classification Ports:**
(i) Based on Location
(a) Canal Port  (b) River Port  (c) Sea Port

(ii) Based on Size
(a) Major  (b) Intermediate  (c) Minor

7. **Define Sea water waves:**
The periodic rise and fall of sea water surface is termed as sea water waves.

8. **Define Littoral Drifts:**
The process of carrying and depositing materials by waves on the shore line. Such process of movement and deposition of sand is called Littoral Drifts.

9. **Define Clapotis:**
When tidal wave is reflected back by solid wall of marine structure, the reflected water may fall on the incoming tidal wave, increasing height of water surface, which looks like a wall of water, such a wall of water is called as clapotis.

10. **What is tidal range ?**
The difference in water level of high tide and low tide levels.

11. **Define Break water:**
The protective barrier constructed to enclose harbours and to keep the harbour waters undisturbed by the effect of waves and winds is called breakwater.

12. **Different Layout of ports**
(i) Square layout
(ii) Rectangular layout
(iii) Machicolated layout
(iv) Tridentine layout
(v) Digital layout
13. **Classify Docks**  
   (i) Wet docks  
   (ii) Dry docks

14. **Define quays**  
   It is a solid structure constructed along the shore for Loading & Unloading facilities.

15. **Define Piers:**  
   It is a solid structure perpendicular (or) oblique from shore for loading & unloading facilities.

16. **Define Pier heads:**  
   A pierhead is a structure constructed at a tip of breakwater near the harbor entrance.

17. **Define - Dolphins:**  
   The construction in the form of a cluster of closely spaced piles is known as dolphins. It is used for tying up ships and also for transferring cargo from one ship to another when moored along both of their sides.

18. **Differentiate between wharf and Jetty.**  
   The Wharf is a berth parallel to the share, and wharf has berth on one side only as it has a backfill of earth.  
   A Jetty is perpendicular to shore or breakwater and it may have berths on two faces.

19. **Define dredging:**  
   It is defined as excavation of bed below water.

20. **What are the types of dredging?**  
   (i) Dipper dredging  
   (ii) Grapple dredging  
   (iii) Ladder dredging  
   (iv) Hydraulic (or) Suction dredging