1. **What are the functions of sleepers?**
   - To had the rails to correct gauge and alignment
   - To give a firm and even support to the rails
   - To act as an elastic medium between the rails and ballast to absorb vibrations and blows of moving
   - To maintain the alignment of the track

2. **List the different conventional methods of surveys for track alignment?**
   1. Traffic survey for justification of the project
   2. Map study for fixing provisional alignments
   3. Reconnaissance survey
   4. Preliminary survey and
   5. Detailed survey

3. **What is creep? How is it prevented?**
   - Rail creep is the longitudinal movement of rails in a track.
   - Creeps are prevented by
     - Pulling back rails
     - Provision of steel sleepers and anchors/anti creepers
     - Efficient and proper maintenance

4. **What is cant deficiency?**
   - Cant deficiency occurs when a train travels on a curve at a speed higher than equilibrium speed. It is the difference between theoretical cant required for such higher speed and actual cant provided.

5. **What is the effect of creep (or) state the effect of creep?**
   - Sleepers get out of square and consequently gauge alignment get distorted
   - Rail joints get opened out vaulting in failure of fishplate and bolts
   - The joints are continuously jammed
   - Points and signals fails

6. **What are the functions of rails?**
   - It act as a girders and transmit load to a large area of formation through sleepers and ballast
• Provide continuous smooth and level surface for the movement of train
• The head of the rail should have adequate depth to allow for vertical wear

7. **What are the advantages of concrete sleepers?**
   • Service life is about 50-60 years
   • Manufacturing and maintenance cost is cheaper
   • Track circulating is easy
   • No damage by white ants or corrosion
   • More suitable for high speed routes
   • Track elasticity is very high

8. **State any two factors which given the selection of gauge?**
   • Cost of construction of track
   • Traffic volume
   • Type of terrain
   • Speed of train

9. **What are the different materials used as ballast?**
   • Broken stone
   • Gravel
   • Ashes
   • Sand
   • Brickbats
   • Blast finance slag

10. **What is grade compensation?**
    • Reduction in ruling gradient in order to keep the combined resistance due to ruling gradient and curvature is termed as grade compensation
    • The grade compensation is expressed as a percentage per unit degree of curve for B.G:0.04%  Mg-0.03%  NG-0.02%

11. **What is mean by kinds in rails and what are the causes of formation of it?**
    • Kinds are formed when ends of adjoining rails move slightly out of position causes for formation of kinds are
    • Loose packing at joints
    • Defects in gauge and joints
    • UN even wears of rail head
12. Write the classification of gradients?
   - Ruling gradient
   - Momentum gradient
   - Pusher or helper gradient
   - Gradients at station yards.

13. Calculated the super elevation in a broad gauge track having a curvature of 5 degree and the equilibrium speed of the track in 60Kmph
   - Degree of curve= 5degree
   - Equilibrium speed= 60 Kmph
   Super elevation  \[ e = \frac{av^2}{127R} \]
   Radius of curvature \( R = \frac{1750}{50} = 350 \text{m} \)
   \( E = \frac{1750 \times 60^2}{127 \times 350} \)
   Super elevation = 141.73mm

14. Requirements of ideal fastening?
   - For connecting rail and sleepers
   - It should be capable of absorbing shocks and vibration
   - It should be cheap and durable
   - It should be easy to fix and to adjust

15. What is fish plate and why it is used in railways?
   - The rails due to be connected at their ends this is achieved by means of a pair of fish plates per rail the holes due provided through the plate and web of rails and then the fish bolt and nuts are provided in these holes by this continuous track is formed

16. List the different railways for urban railway transportation
   - Monorail,
   - Metro rail,
   - Rope car
PART-B
16 MARKS

• Briefly explain the modern methods of surveys for track alignment.*
  (a) Explain the widening of gauge on curves with the formula.
(b) Briefly explain about super-elevation, gradients.
  (i) Briefly explain the modern methods of surveys for track alignment.
  (ii) What are the objectives of providing transition curves in railways?
• (i) What are the requirements of an ideal permanent way? What are the factors that
govern the cross section and length of rails?
(ii) Explain super elevation giving the relationship of super elevation with gauge,
speed and radius of the curve.
  • Compare the different types of sleeper. Give all details.
  (i) What do understand by ‘cant deficiency’?
(ii) If a 8° curve track diverges from main curve of 5° in an opposite direction in the
layout of a BG yard. Calculate the super elevation and speed on branch line, if the
maximum speed permitted on the main line is 45Kmph.
  • (i) What is the necessity of geometric design of a railway track?
    Enumerate the significant features of design of a railway track.
(ii) What are the requirements of an ideal rail joint? Explain any two joints used in
Indian Railway lines with neat sketches.
UNIT - II
RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION
2 MARKS

1. List the equipment needed for rolling stock?
   1. Locomotive
   2. Coaches
   3. Wagons

2. Define locomotives
   1. A locomotive is a machine which transfers the chemical energy of a fuel into the mechanical energy of motion
   2. The fuel used may be water or coal or fuel oil and now-a-day’s diesel and electric locomotives are more popular these are very expensive
   3. But, this diesel and electric locomotives gives excellent performance.

3. List the two type of switches
   • Stub switch
   • Split switch

4. Define turnout
   1. Turnout- means the brain diverted from straight track to curved track
   2. If the main diverted to the right hand turnout
   3. Side as should-It’s called right hand turnout
   4. Similarly train diverted from main track to left hand side-called left hand turnout
   5. And turnout is the simplest combination of points and crossing

6. List the type of signal based on the functional characteristics?
   • Audible signal
   • Visible signal
   • Visible signal again classified to two types
   • Fixed signal
   • Hand signal

7. Define interlocking
   • Interlocking is the one of the teaching and
   • The possibilities of confusion and danger of pulling wrong signals and thus prevents conflicting movement.
• Interlocking – its ensures that a particular lout for which the signal is given for the movement of a train properly set and held and at the same time all signals and points

8. Track circuiting
• Track circuit is an electrical circuit formed along running rails and connected to signal cabin and block instrument to indicate presence of a main on the track.

9. List the construction stages of a railway track
• Land acquisition
• Earth work and bridges
• Passenger’s amenities, stations and yards
• Laying railway track including ballasting of track the plate laying
• Opening of section for traffic

10. Direct track maintenance (DTM)
• Directed track maintenance, enables tracks to be maintained to better to clearance with lessees input of labor

11. Characteristics and classification of signal?

<table>
<thead>
<tr>
<th>characteristics</th>
<th>Basis of classification</th>
<th>examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation And Functional</td>
<td>Audible or usual communication</td>
<td>Detonators, Hand signals (or) Fined signal</td>
</tr>
<tr>
<td>Location</td>
<td>Location along a track</td>
<td>Outer, Home, Starter.</td>
</tr>
<tr>
<td>Special characteristics</td>
<td>Meant for special purpose</td>
<td>Calling on, Signals, Repeater, Signals.</td>
</tr>
</tbody>
</table>

12. Telescopic method of track laying:
• Rails, sleepers and other fitting are taken to base depot. Then track materials are taken is linked and packed.

The telescopic method has three main open
• Unloading and preparation of materials.
• Linking of track
• Packing of track
13. **Factors considered in the selection of a site for a railway station:**
   - Adequate land
   - Fairly level area
   - Sub grade with drainage characteristics
   - Location on a straight alignment
   - Availability of basic facilities and utilities

14. **Buffer stop:**
   - It is a barrier placed across a track to stop a vehicle.
   - It is structurally stronger to track the impact of rolling a vehicle.

15. **Sources of moisture in a railway track:**
   - Surface moisture due to rainwater.
   - Water from any source nears to the track

16. **Automated track maintenance?**
   - Indian railways increasingly adopt mechanized track maintenance of high-speed routes and it is take for shortest possible time
   - Mechanized track maintenance enables quicker restoration of track affect delaying
   - Sleeper is tamped from all sides with equal pressure even when it is perfectly square

17. **Directed track maintenance**
   - Directed track maintenance is carried out by manually and it’s divided to two parts
     
     *Daily maintenance*
     - Daily maintenance is carried out by “sectional gangs” the fuel time staff of railways

     *Periodic maintenance*
     - It’s carried out by internal of two to three years during periodic maintenance gauge leave alignment and points and crossing are thoroughly checked and its rectified

18. **Heel divergence**
   1. Distance b/w the running faces of the stock rail and gauge face of the tongue rail when measured at the heel of the switch
   2. Heel clearance (or) heel divergence
      - For B.G track -13.7cm -13.3cm
      - M.G track -12.1cm-11.7cm
      - N.G track -9.8cm
18. MSP;

MSP- Measured shovel packing

3. It is a method it’s used for many advanced countries for the purpose of maintenance of track
4. And this method is more economical and it’s reduce the launce cost and this method deformation of sleepers are loss
5. But its requires special sized stone chippings which may not be readily available

1. **What are the advantages at electric traction?**
   - Fuel consumption
   - Very high speed to compare the diesel traction

**PART B**

16 MARKS

1. **Briefly explain the modern methods of surveys for track alignment.**
2. (a) Explain the widening of gauge on curves with the formula.
   (b) Briefly explain about super- elevation, gradients.
3. (i) **Briefly explain the modern methods of surveys for track alignment.**
   (ii) What are the objectives of providing transition curves in railways?
4. (i) **What are the requirements of an ideal permanent way?** What are the factors that govern the cross section and length of rails?
   (ii) Explain super elevation giving the relationship of super elevation with gauge, speed and radius of the curve.
5. **Compare the different types of sleeper.** Give all details.
6. (i) **What do understand by ‘cant deficiency’?**
   (ii) If a 8° curve track diverges from main curve of 5° in an opposite direction in the layout of a BG yard. Calculate the super elevation and speed on branch line, if the maximum speed permitted on the main line is 45Kmph.
7. (i) **What is the necessity of geometric design of a railway track?** Enumerate the Significant features of design of a railway track.
   (ii) **What are the requirements of an ideal rail joint?** Explain any two joints used in Indian Railway lines with neat sketches.
UNIT – III
AIRPORT PLANNING AND DESIGN

1. Define cross wind component and wind coverage.*

V km ph. is the velocity of the inclined opposing wind, its component $V \sin \theta$ which is normal to the Centre line of the runway length is called cross wind component.

Wind coverage

The percentage of time in a year during which the cross wind component remains within the limit of 25km ph. Is called wind coverage of the runway.

2. What is need for clear zone?

The term clear zone is used to indicate the inner most portions of the approach zone and it is to be provided at the ends of the runway.

3. List the various imaginary surfaces around the airport?

- Approach surface
- Conical surface
- Horizontal surface
- Take off climb surface
- Transitional surface

4. Define wind rose diagram- and its Types

The diagram showing direction, duration & intensity of wind over a certain period in a specified region is known as wind rose. Its shape resembles a rose.

- Wind rose – Type I
- Wind Rose – Type II

5. Define airport capacity:

The number of aircraft movements which an airport can process or handle with a specified period of time, usually an hour is called the capacity.

6. What is master plan?

It is the usual practice to start an airport with minimum essential requirements & to go on developing the airport as the demand of air traffic increases.

The main purpose of the master plan is therefore to provide the specific details for the future development of an individual airport to satisfy the aviation requirement.
7. How ICAO classified the airport

Airport classified by to indicate the basic runway length, width of runway pavement &
maximum longitudinal grade.

To indicate the signal isolated wheel load and tyre pressure

8. What is an exit taxiway?

The function of exit taxiway is to minimize the runway occupancy by the landing aircraft the
location of exit taxiway

9. What are the factors affecting the exit taxiway?

Depends on following factor

- Air traffic control
- Exit speed
- Location of runways
- Pilot variability
- Number of exits
- Topographical features
- Types of aircraft
- Weather conditions

10. List the assumed conditions in deciding basic runway length

- No wind is blowing on the runway
- The aircraft is loaded to its full loading capacity
- The airport is situated at sea level
- The standard temperature is maintained along the way
- The standard temperature of 15degree exits at the airport

11. What is meant by zoning law?

The zoning is considered to be the most effective vehicle for achieving excellent results
from the functioning of the airport

The airport are involved in the two types of zoning

- Height zoning
- Land use zoning
12. What is meant by ponding in airport drainage?
   The term ponding is used to indicate simply a means of providing temporary storage of runoff prior to the entry into the underground drainage system.

13. List the data to be collected for a regional planning
   - Air traffic
   - Existing airport
   - Population
   - Topographical feature

14. Mention any five factors to be considered for airport site selection
   - Atmospheric & meteorological conditions
   - Availability of land for expansion
   - Availability of utilities
   - Development of surrounding area
   - Economy of construction

15. List out the objectives of surface drainage in airport
   - It should be practicable to carry out the usual airport operations under the climate condition.
   - The removal of surface water for the storms having values greater than the design form should be such that minimum damage of the airfield facilities occurs.
   - The system should result in minimum maintenance & operational difficulties.

16. List the element to be considered in the geometric design of runways?
   - Length
   - Longitudinal & effective gradient.
   - Rate of change of longitudinal gradient.
   - Safety area
   - Sight distance
   - Transverse gradient

17. List the elements to be considered in the geometric design of taxiway?
   - Length of taxiway
   - Longitudinal gradient
   - Rate of change of longitudinal gradient.
- Sight distance.
- Transverse gradient.
- Turning radius.
- Width of taxiway.

18. What is an airport?
   An airport is an area which is used for landing & take of an aircraft. It may not be provided with facilities for convenience of passengers & shelters, repair & servicing of aircraft.

19. What are the cases to be considered for deciding basic runway length?
   - Normal landing
   - Normal takes off
   - Stopping in emergency

20. What are the imaginary surfaces?
    Imaginary surface are established surface in relation to the airport and to each runway above which no obstruction should project.
    The size of the imaginary surface will depend on the category of each runway and on the type of approach planned for that runway.

21. Define Wind direction indicator?
    The direction from which the wind blows is indicated at the airport at a wind cone. it is placed within a segmented circle together with landing direction indicator.

22. Define Calm period?
    The absence of appreciable wind generally considered as Km .ph. or less is called calm period. The knowledge of calm period of a particular place throughout the year places an important role in designing an airport.

23. What are the deciding factors of an aircraft size?
   - Demand upon large storage for passengers.
   - Demand upon the no. of passengers travelled in aircraft.
   - Aircraft organization which it is national aircraft or international aircraft.

24. Name of the airport organizations?
   1. FAA- federal aviation administration.
   2. ATCT-airport traffic control towers.
3. AAI – airport authority of India.
4. ARTCC – air route traffic control centers.
5. IAF – Indian air force
6. NAA – national airport authority.

25. List out the Assumption made in the design of airport sub grade drainage?
   - Function of sub-surface drainage.
   - Changes in moisture content.
   - Base course & subgrade drainage.
   - Intercepting drainage.
   - Drain ability of soils.
   - Surface of sub-surface drainage.

26. Classify airports based on functions and aircraft types?

   **Based on functions**
   - Civil (or) Commercial Airport
   - Military Airport

   **Airport Types**
   - Military airport.
   - Domestic airport.
   - International aircraft.

27. Differentiate between domestic airport and international airport citing examples of Indian airports

<table>
<thead>
<tr>
<th>S.NO</th>
<th>DOMESTIC</th>
<th>INTERNATIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To interconnect the state capital and important commercial cities in the country</td>
<td>To interconnect the country capital and important commercial cities for the various country</td>
</tr>
<tr>
<td>2</td>
<td>Airport and aircraft size is small to compare the international airport</td>
<td>Airport and aircraft size is big to compare the domestic airport</td>
</tr>
<tr>
<td>3</td>
<td>The owner of the domestic airport is available in the country</td>
<td>The owner of the international airport is available around the various country</td>
</tr>
</tbody>
</table>
28. What is Air Traffic Potential?

- It means the aircraft capacity
- To calculate the no of aircraft landing/takeoff in per day

29. Mention factors of Air Traffic Potential

- Weather conditions
- Signals
- To do repair work for runway
- Runway availability

30. What is the Airside part of an airport?

- Terminal building
- Vehicle parking
- Transport Facilities

PART – B
16 MARKS

1. (i) Draw a layout of any one international airport in India and explain the concept.*
   (ii) Explain the planning concept of airport buildings.*

2. (i) Explain the various runway and taxiway markings.
   (ii) Explain in detail about air traffic control.

3. (i) Describe briefly the salient features and functions of aprons in an airport.
   (ii) What are the passenger facilities, required at an airport terminal? Explain using Sketches.

4. (i) Discuss the importance of air traffic control and list the various equipments needed for en-route air traffic control.
   (ii) Describe the importance of runway lighting. Explain threshold lighting with the help of sketches.

5. Describe the different systems of aircraft parking.

6. Write notes on the following with neat diagrams:
   (i) Terminal facilities
(ii) Airport markings

7. Briefly explain the Night-time aids provided at Airports.

8. What are flight rules? Discuss the advantages and disadvantages of each system.

9. Explain the characteristics of commercial airport layout and military airport layout.

10. Draw a typical layout of airport for a single runway and two parallel runways.
UNIT - IV

AIRPORT LAYOUT, VISUAL AIDS & AIR TRAFFIC CONTROL

1) How the runway numbering is done?

The end of each runway is marked with a number which indicates the magnetic azimuth i.e., the angle measured in a clockwise direction from the north of the runway in the direction of landing.

East end of an east-west runway would be marked 27 (for 270 degree) & the west end 9 (for 90 degree).

2) Draw a typical pattern of motor vehicle parking in an airport?

3) List the factors affecting the locations of exit taxiway?

* Air traffic control.
* Exit speed.
* Location of runway.
* Number of exits.
* Pilot variability.
* Topographical features.
* Type of aircraft.
* Weather conditions.

4) Define the term gate position?

The space allotted to an aircraft parking at a loading apron is known as gate position.

(or)

The term gate is used to denote an aircraft parking space adjacent to a terminal building & used by a single aircraft for loading & unloading of the passengers, baggage & cargo.
5) How do you select the site for terminal buildings?

   It should be centrally located with respect to the runway.

   The site should be easy facility of natural drainage.

   It should have enough provision for future expansion.

6) Why is airport zoning is important?

   * During landing & take off operation aircraft lose or gain altitude @ very low space.

   * It requires large clearance on both sides of the landing part.

7) What is terminal area & what are its functions?

   The portion of the airport other than the landing area is known as terminal area.

   It includes terminal building, aircraft apron, cargo storage buildings, hangars, automobile parking area, etc....

   Functions:

   * The loading & unloading of aircraft is carried out in the terminal area.

   * The aircraft is parked & service will be done.

8) What are the planning concepts of a terminal buildings?

   * Centralized system.

   * Decentralized system.

9) What are the design aspects of a terminal buildings?

   * Airline objectives.

   * Airport management objectives.

   * Community objectives.
Passenger’s objectives.

10) Mention the facilities provided by the terminal or operational building?

The facilities required for terminal buildings are as follows;

* banks with foreign exchange desks & sometimes open for 24 hours.

* bath or shower where the tired passengers can clean up & get refreshed.

* general information desks & tourist offices for giving guidance to the passengers.

11) List the sequence of activities of passenger flow in terminal building?

* Arrival.

* Check-in.

* Waiting.

* Security screening.

* Departure.

* Deplaning.

12) What are the four groupings of aircraft parking system?

* Frontal or linear system.

* Open-apron or transporter system.

* Pier or finger system.

* Satellite system.

13) What are the categories of ATC aids?

* En route aids or airway aids.

* Landing aids or terminal aids.
14) What are the different landing aids (Terminal aids)?

* Air service detection equipment.
* Airport surveillance radar.
* Approach lights.
* Instrument landing system.
* Precision approach radar

15) What are the different route aids (Airway aids)?

* Air route surveillance radar.
* Air to ground communication.
* Airway beacon.
* Direction finder.
* Distance measuring equipment.
* Low/medium frequency radio range.
* Marker beacon.
* Tactical air navigation.
* Very high frequency omni-directional range

16) List the types of parking for motor vehicles?

* Short-term.
* Long-term.
* Remote.

17. What is hanger & mention its type?
Hanger:
The large shed erected at the airport for the purpose of housing, servicing & repairing of aircraft is known as hanger.

Types:

- Nose hanger.
- T – Hanger.

18. **What are the methods to control soil erosion due to jet exhaust?**

   Methods for erosion control are:
   - Bituminous surfacing.
   - Stone pitching.
   - Turfing.
   - Stabilization with cohesive binder.

19. **What are the characteristic of a balanced airport layout?**

   - It has adequate space for the loading aprons.
   - It has sufficient terminal building facilities.
   - The cost of construction is minimum.
   - It provides excellent control tower visibility.

20. **What are the characteristic of a helicopter?**

   - Flight characteristics – depends on flight speed & altitude.
   - Physical characteristic – usage of engines & rotor.

21. **What are the factors to be considered for heliport site selection?**

   - It should be so located that the potential traffic is served in the best possible manner.
   - The cost of acquisition & development of land should be minimum.
   - The obstruction in the approach & departure area should be minimum.

22. **What are the lighting requirements in a heliport?**

   - Obstruction lighting – red colour lights.
   - Perimeter lighting – yellow colour & hemispherical light in touchdown area.

23. **What is mean by a control tower?**

   - The airport Traffic Control Tower (ATCT) is located in the terminal area & it supervises, directs & monitors the traffic at the airport.
   - The tower is responsible for all arriving & departure aircraft.
   - For providing the pilots with information such as temperature, wind direction, operating condition of airport etc.
24. **What are the marking required for an airport?**
   - Apron marking.
   - Landing direction indicator.
   - Runway marking.
   - Taxiway marking.
   - Shoulder marking.
   - Wind direction indicator.

25. **What is the information provided for proper landing?**
   - Alignment guidance.
   - Height information.
   - Visual parameters.

26. **Mention the elements of efficient airport lighting?**
   - Airport beacon.
   - Approach lighting.
   - Apron & hanger lighting.
   - Boundary lighting.
   - Lighting of landing direction indicator.
   - Lighting of wind direction indicator.
   - Runway lighting.
   - Taxiway lighting.
   - Threshold lighting.

27. **List the purpose of aircraft control?**
   - Avoid possibility of occurrence of accident in air.
   - It grants the economic & efficient utilization of aircraft & airport.
   - It guides the aircraft to their destination safely & speedily.

28. **What are the types of flight rules for ATC?**
   - Instrument flight rule (IFR)
   - Visual flight rules (VFR).

29. **Different between VFR & IFR?**
   **VFR:**
   - VFR conditions are said to prevail in good weather.
   - Pilots have responsible for the safe separation between aircraft.
   **IFR:**
   - IFR conditions are said to prevail in bad weather.
Air traffic control personnel has responsible for safe separation between aircraft.

30. Mention the three parts of ATC Network?
   - Control centers.
   - Control towers.
   - Flight service station.

16-MARKS

1. (i) Draw a layout of any one international airport in India and explain the concept.*
   (ii) Explain the planning concept of airport buildings.*
2. (i) Explain the various runway and taxiway markings.
   (ii) Explain in detail about air traffic control.
3. (i) Describe briefly the salient features and functions of aprons in an airport.
   (ii) What are the passenger facilities, required at an airport terminal? Explain using sketches.
4. (i) Discuss the importance of air traffic control and list the various equipments needed for en-route air traffic control.
   (ii) Describe the importance of runway lighting. Explain threshold lighting with the help of sketches.
5. Describe the different systems of aircraft parking.
6. Write notes on the following with neat diagrams:
   (i) Terminal facilities
   (ii) Airport markings
7. Briefly explain the Night- time aids provided at Airports.
8. What are flight rules? Discuss the advantages and disadvantages of each system.
9. Explain the characteristics of commercial airport layout and military airport layout.
10. Draw a typical layout of airport for a single runway and two parallel runways.
1. HOW THE POSITIONS OF LIGHT HOUSES ARE DECIDED?

- Light house is a massive structure, normally built of masonry (or) reinforced concrete. It is a tall tower or high pedestal. In an ideal planning of harbor, the light house should be in an alignment with the central line of entrance channel.

2. WRITE A BRIEF NOTE ON INTER-MODEL TRANSFER FACILITIES?

- Inter-model transport services are other models of transport such as roadways & railways.
- It does not provide door to door services.
- Other model transports are needed for passengers and cargo to reach or to leave harbors.

3. DIFFERENTIATE Quay and pier;

Quay:

- Quay is artificial structures where vessels can land. Normally, quays are parallel to west and they are made up of monolithic structures. It is constructed in water.

Pier:

- It may be considered similar to jetties; they are also built out from a shore into sea. Vessels are berthed either at the head or alongside. Pier is British nomenclature. It refers to iron cylindrical structures.

4. List the various mooring accessories;

- Mooring are devices for providing anchoring arrangement where area is limited. Harbors where berthing facilities are available ships have to take their turn wait for a period which may vary from few hours to few days.
- The mooring are two types; fixed and flouting
- Lender fixed moorings bollards rings and posts

5. What do you understand by littoral drift?

- Drift means movement
- Littoral means nearer to coast
- Littoral drift refers to the movement along a coast
when the direction of prevailing wind is not at right angles to the shore the tangential component at coined produces littoral current

Transport at material from one point to another along a sea coast is termed as drift.

6. What is necessity of docks?

- Docks are enclosed area for berthing of vessels to facilitate loading and unloading of cargo and for repairs renovations fuelling oiling painting and watering of vessels the docks may be of wet or dry type.

7. What are coastal structures?

- Similar to jetties
- To build out from a shore into sea
- They exist at sea side resorts for us of visitors and for landing and embarkation of passenger’s. these are known as coastal structures

8. What is break water? And its types;

- The most prominent feature in connection with artificially sheltered harbor
- To break up and disperse heavy seas
- It prevents waves from entering their destructive influence within enclosed area of the harbor types;
- Wall masonry (or) concrete blocks
- Moons rubble stone
- Subsidiary classes of breakwaters

9. What is a wharf and types?

- Wide stone walls built along edge (or) out into sea (or) river
- Berthing purpose
- Solid masonry or concrete
- To provide with adjacent space for receiving and loading of cargo

10. Difference between diurnal and semi-dicer tides?

Diurnal:-
- semi-diurnal:-

- It is defined as the tide which occurs twice each lomer day

Diurnal ties:-

- The high tides which occur only one time day

11. How to design the entrance of a harbor?
To facilitate easy entry and exit of vessels in to and out harbor

12. What is dredging?

Dredging is the excavation under water. It is an important aspect in harbor engineering it makes the harbor region up enough and cleans enough from slurry or suspended deleterious materials to make navigation suitable inside the harbor

13. What are the construction methods for mounds?

- Out of the many types the following two types of construction are widely adopted

Type: 1 construction:

- This type consists of three layers the core the intermediate and the top layer the core material (classic) of quarry waste or dredging or a combination of both

Type :2 construction

- This is the most common type adopted the breakwater consist of three portions

Core segment

- Intermediate (or) filter layer
- Top (or) armor layer

14. Sounding? Name the equipment used for sounding?

- It is a technique to measure depth of sea
- Depth of sea beds are important parameters for harbor planning

Equipment’s:

- Radar

15. Hydro graphic surveying

- This made to determine the depth of water and should extend over an area somewhat larger than the proposed channel and harbor in addition it should locate the shore line at low and high water and large rocks

16. Mention some points of harbors:-

- A harbor in primary sense is a place of refuge or rest
- It is place where safety hospitality is to be found
- Harbors after protection to vessel from violent seas
• It refers to sheltered sheet of water where vessels are anchored

17. What are advantages of breakwater?

• It is cost of construction will be cheaper
• It is very efficiency
• It is not properly constructed needs no maintenance

PART - B

16-MARKS

1. Explain about the different types of break waters with the sketches.
2. (i) Write descriptive notes on mooring and mooring accessories.*
   (ii) What are the different components of a harbor? And explain them with the layout.
3. (i) Discuss the tides and wave effects and its action on coastal structures.
   (ii) Distinguish between wet docks and dry docks. Explain with sketch the features and functioning of a dry dock.
4. (i) List the common types of break waters in use and bring out the advantages of each of them.
   (ii) Discuss briefly container transportation.
5. Write a detailed note on break waters. Explain all essential aspects.
6. (i) What are the types of Navigational Aids?
   (ii) Discuss the fixed navigation structures and floating navigation aids.
7. Classify harbours on broad basis and on the basis of utility and explain them.
8. (i) Define a port and bring out the differences between a port and a harbor. What are the requirements of good port?
   (ii) Classify different types of break water. Explain any one in brief.
9. Explain the different natural phenomena to be studied before the design of harbours.
10. What is littoral drift? How it affects the location of a harbour?