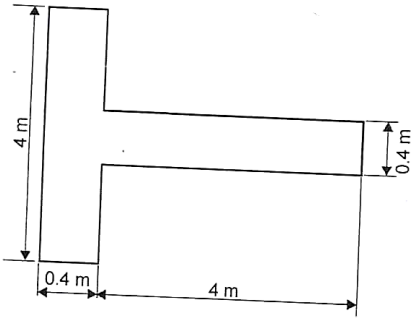
UNIT 4 AIRPORT DESIGN
TWO MARK QUESTIONS AND ANSWERS

Two mark question with answer

1.Landing direction indicator

It is in the form of Tee- Tetrahedron and it is placed at the center of segmented Circle marker. This enables the pilot to identify the direction of active runway of the Airports



2.What are beacons

Beacon is high luminous beam of light Which is used to demark any Geographical location. It is positioned above the Surrounding Ground rotated at a Specific Frequency

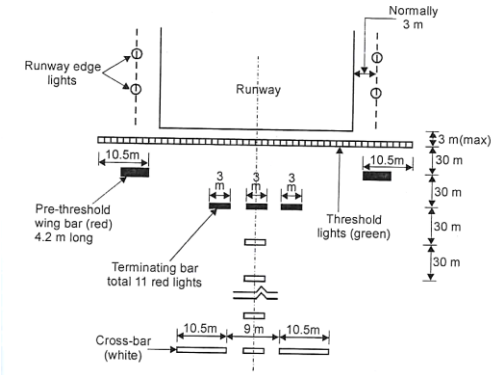
3. What is parallel runway marking

If there are two or more number of parallel runway they are marked as follows at the threshold

(a) Two parallel runways
(b) Three parallel runways
(c) four parallel runways

4.Why threshold lighting is needed

In order to decide about landing or not the identification of runway threshold is important for a pilot. For this reason ,the area near the runway threshold is given special lighting arrangements.



5.What is Airways communication?

Airways communication is usually informed through flight Service stations. The location of these Stations are at the airport and along the Airways. The function are Two-folds

1. To relay air traffic control messages between the control airways and enrooted Aircrafts
2. To give the Specific information to the pilot, Before and during the flight such that as weather changes, navigational aids. Airport out of uses.

6.List the various enrooted aids are provided in an air traffic controls

During the flight from the starting point to destination a pilot of an aircraft is guided by different route aid, or airways or airway aids. They are

1. Airway beacon
2. Air to ground communication
3. Direction finder
4. Marker beacon
5. Distance measuring equipment
6. Air route surveillance radar

7.list at least ten facilities to be provided in an Airport building

The facilities are

1.Enquiry counter
2.Baggage claim section
3.Toilet facilities
4.Waiting hall
5.Customs officer
6.General Stores
7.Control tower
8.Post office and bank

8.What are Blast fences

These are provided to deflect and dissipate the energy of the jet Exhaust. Based on the type of the protection needed. Accordingly particular type of jet is used. In general blast fences of about 2.563m height give better result at runways ends and other area are attacked by the take-off thrust

9.Why wind direction indicator is provided ?

A wind direction indicator is provided so as to indicate the pilot the direction of the wind. It is in the form of truncated cone made of fabric. White and orange colored indicator is generally used

10.What is an IFR?

IFR is the Instrumental flight Rule. IFR condition prevail when visibility is poor or the height of the cloud falls below the visual meteorological conditions. IFR is also described as “bad weather or blind flying”

11. What are the basic requirement of signaling

In order to identify and recognize various airport element by a pilot certain marking are made on the airport area in a simple manner. By this arrangement the pilot Should be distinctly identify the landing area and the wind- Direction

Marking only helps in good weather condition. During bad weather conditions and during night it is essential to provide the adequate lighting in the Airport. Such that the lighting Should convey similar information to the pilot during good visibility condition as the marking do in daytime. these are the basic need of signaling **(Lighting, Marking)**

12.How the runway numbering is done.

End of Each runway is marked with a numbering indicating the magnetic Azimuth. That is the East-end of an East-West runway would be marked 27 and the west end 7

13.Define the term Hanger?

In general these areas are usually flood it. However, the light Source is so mounted that there is no glare Experienced by the pilots, passengers and service personnel's.

It is recommended that the flood lights Should be mounted Above the Pavement

14.What is meant by Boundary lighting

The periphery of the entire landing area is provided with light at 90 m center to center with a height of about 75m from the ground. I fence is provided along the boundary the lights have to be provided 3m inside the fences

In order to indicate the Hazardous approaches the boundary lights are provided with the red marker lights

15.Draw a pattern of typical motor vehicle parking in an Airport

Aircraft can be Grouped adjacent to the terminal building in a variety of ways. These groupings are referred as to the aircraft parking System

(a) Frontal or Linear System

(b) Open Apron or Transporter System

(c) Finger or Pies System

(d) Satellite System

16 .What is the use of Airport Lighting

Marking only helps in good weather condition. During bad weather conditions and during night it is essential to provide the adequate lighting in the Airport. Such that the lighting Should convey similar information to the pilot during good visibility condition as the marking do in daytime

All the Airports Should not be Provide the Same type and intensity of Airport lighting

Types of lighting

1. Beacons
2. Boundary Lighting

3. Approach Lighting
4. Runway Lighting
5. Taxiway Lighting
6. Apron and Hanger Lighting
7. Lighting for wind and landing direction Indicator
8. Threshold lighting

16 MARK QUESTIONS AND ANSWERS

1. What is meant by layout. Explain the various types of layout with neat Sketch

The prime factor to be consider in the design of an aircraft is the selection of the runway configuration. Different types of configuration is to be discussed as follows

The combination of all Airport leads to a smooth functioning of traffic, Optimal distance of taxies and provides Shortest route for the passengers

Classifications involved in airport Layout

1. Balanced Airport Layout
2. Types of airport layout
3. Military Airport Layout

1. Balanced Airport Layout

A balanced Airport Layout Should possess the following characteristics

1.Runway length Should be safe
2.Space of loading apron Should be safe
3.Less cost of construction
4.Feasibility for future Expansion
5.landing, Take-off Should function independently
6.Approaches Should be safe
7.Economical maintenance Cost
8.Taxiway Distance fro loading apron to runway end be shortest

2. Types of airport layout

(a) Airport Layout- Single Runway
(b) Airport Layout- Two Parallel Runways
(c) Airport Layout- Three non-intersect Runways
(d) Airport Layout-Three intersection Runways

(a) Airport Layout- Single Runway

The position of hanger, Apron, Terminal Building And taxiways Along with the runway are shown as follows

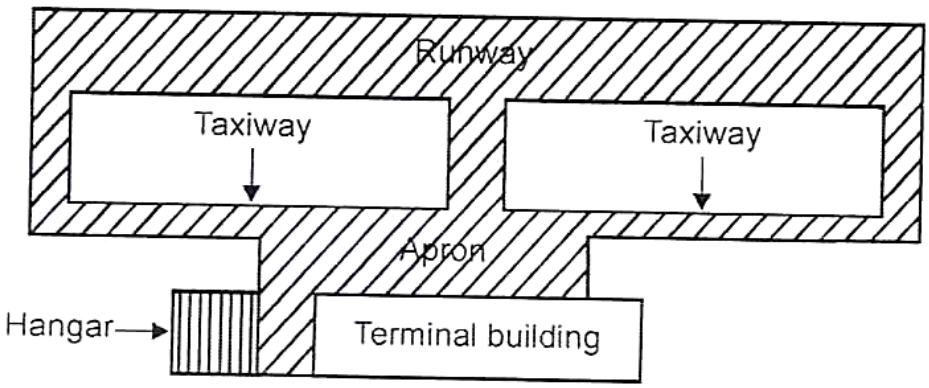


Figure 10.11 Airport layout - single runway

(b) Airport Layout- Two Parallel Runways

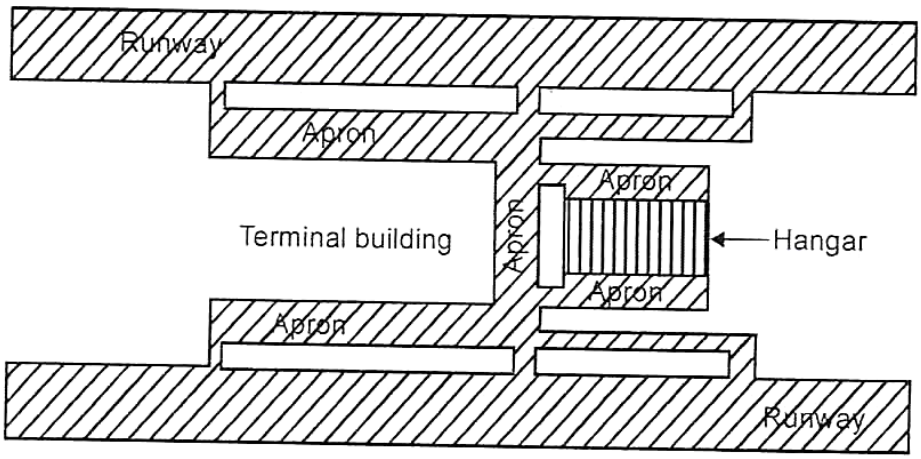
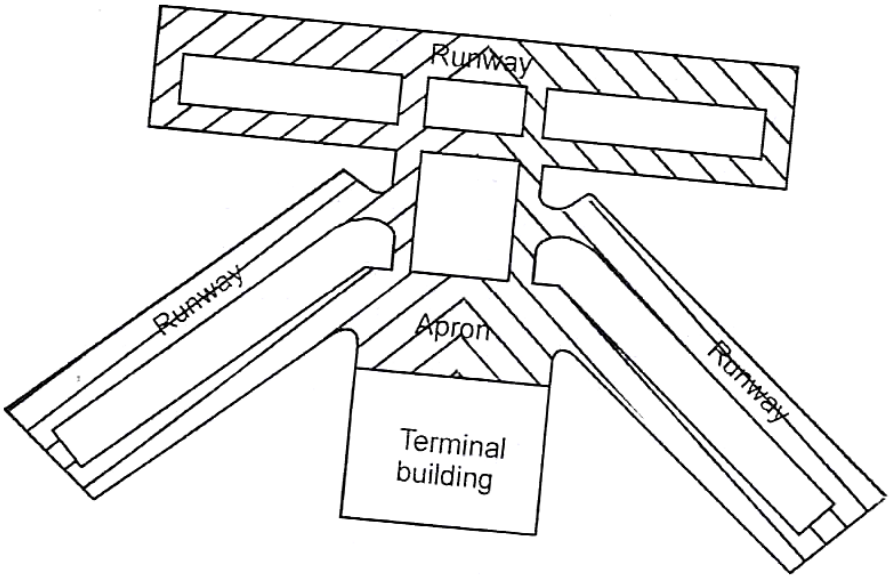


Figure 10.12 Airport layout - two parallel runways

(c) Airport Layout- Three non-intersect Runways



d) Airport Layout-Three intersection Runways

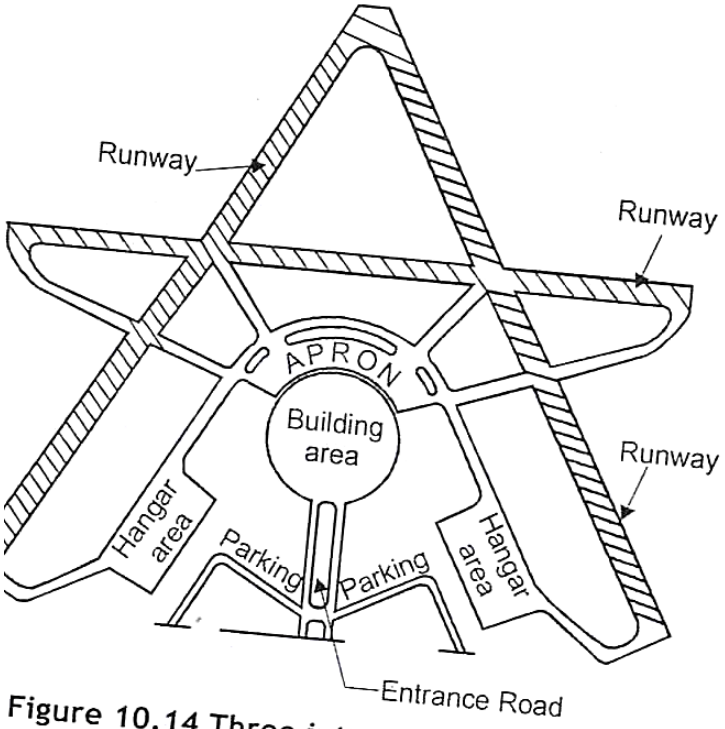


Figure 10.14 Three intersecting runways

Tangential airport layout

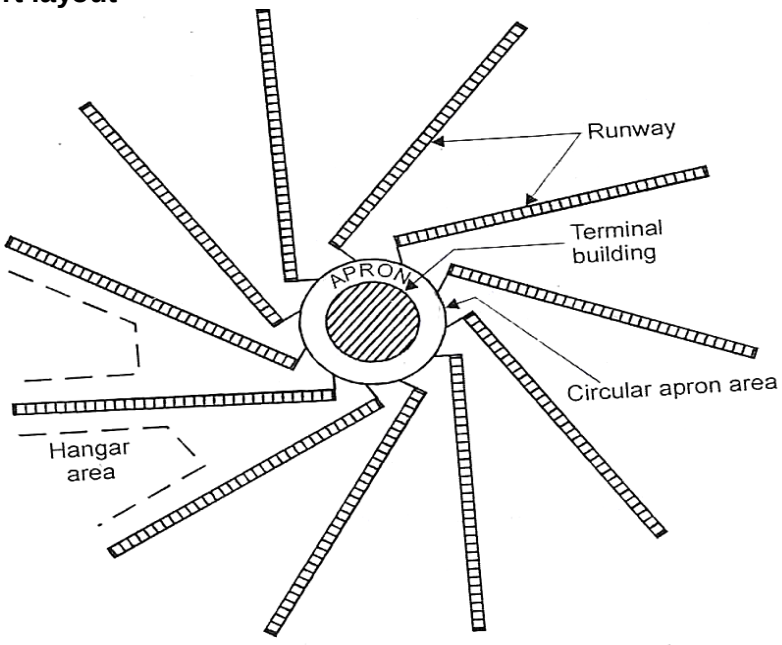


Figure 10.15 Tangential runway layout

3. Military Airport Layout

Military Airport Requirement have to be looked into an different way than that of a commercial Airport. Some of the important Airport Factors to be considered are as follows

1.Maxium number of trees have to be preserved
2.Surfece of a runway has to be Specially treated with the Specific color
3.Made as inconspicuous as possible
4. overall Layout may appear to be unusual and irregular
5. topography Should be suitable for underground installation
6. Storage Spaces for the Aircraft may be distribution widely and Scattered

2. Explain the various Aircraft parking Systems involved in Airport. Give all in detail

Aircraft can be Grouped adjacent to the terminal building in a variety of ways. These groupings are referred as to the aircraft parking System

1.Frontal or Linear System

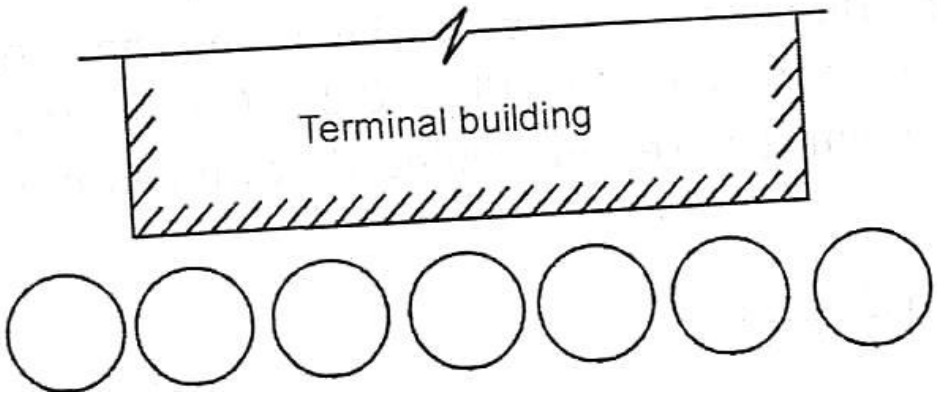
2.Open Apron or Transporter System

3.Finger or Pies System

4.Satellite System

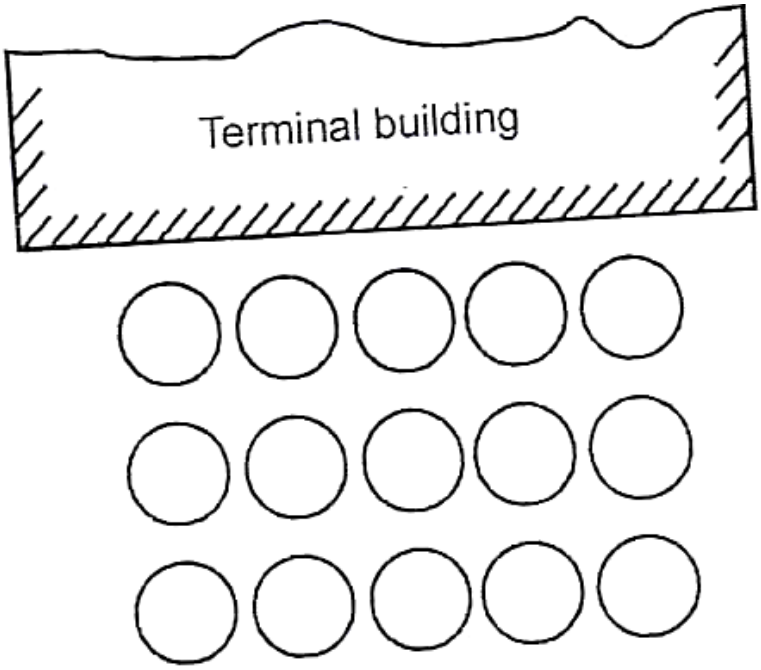
1.Frontal or Linear System

In the frontal or linear system the aircraft are parked along the face of the terminal Building. This is a simple system but adoptable to the airport with low airline activity



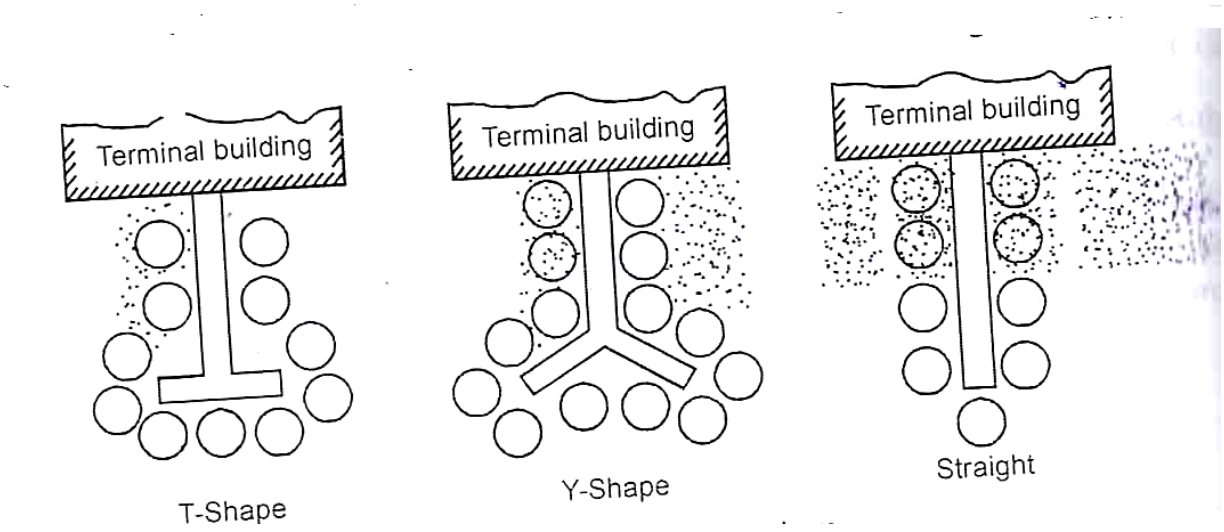
2. Open Apron or Transporter System

In this open Apron System the aircrafts are parked in rows. The passenger Have to walk a long distance in Exposed weather condition to reach the outmost Row. In order to protect the passenger from the adverse weather condition vehicular transport have to be provided for Enplaning and deplaning



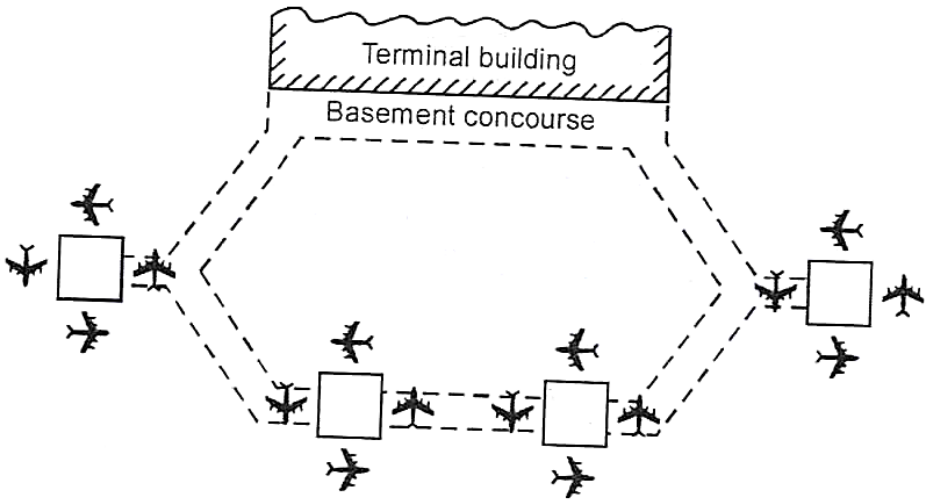
3. Finger or Pies System

In the finger or Pier System the connection to the Aircraft is Achieved through the pier Extending from the main terminal Area . It can be T-Shaped, Y- Shaped, or Straight. Each pier a row of Aircraft gate position on both sides. Aircraft are parked around the axis of the pier is noise-in of parallel parking arrangement



4. Satellite Parking

Satellite are Small buildings located on an Apron. In this types of System the aircraft are parked around the satellite . the satellite building is connected to the main terminal building by underground tunnels



3. What are the various Systems involved in Airport Marking. Explain in detail

In order to identify and recognize various airport element by a pilot certain marking are made on the airport area in a simple manner. By this arrangement the pilot Should be distinctly identify the landing area and the wind- Direction

Types of Airport Marking

1. Runway Marking
2. Taxiway Marking
3. Apron Marking
4. Wind direction indicator
5. landing direction indicator

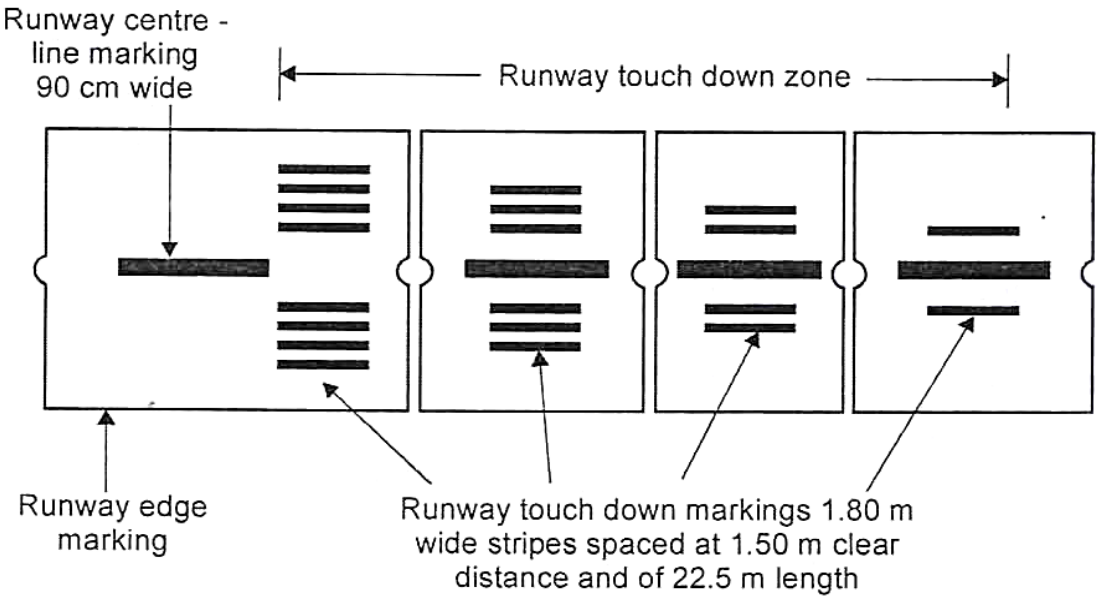
1.Runway Marking

Runway Marking Consist of

1. **Runway centerline Marking**
2. **Runway threshold Marking**
3. **Runway End-Strip Marking**
4. **Runway numbering**
5. **Parallel runway Marking**
6. **Runway Shoulder Marking**

1. Runway centerline Marking

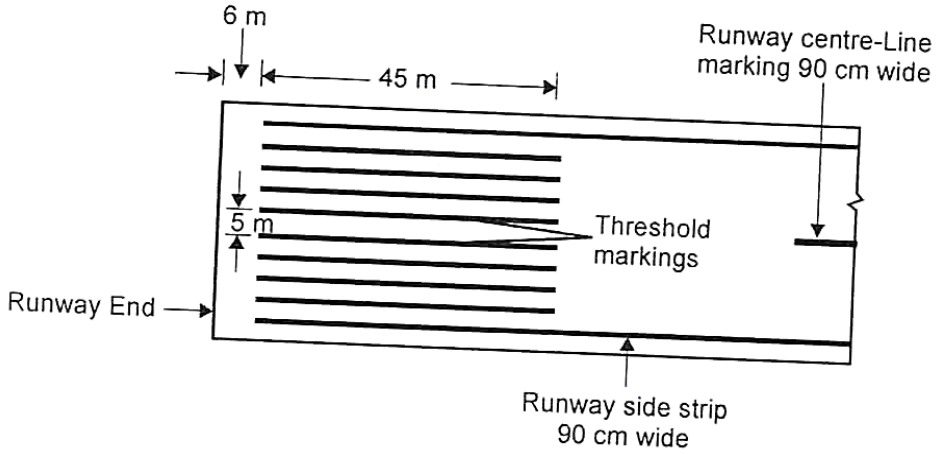
The runway center-line is represented by a broken Strip running along the full length of the runway. The width of the marking is 90cm



2. Runway threshold Marking

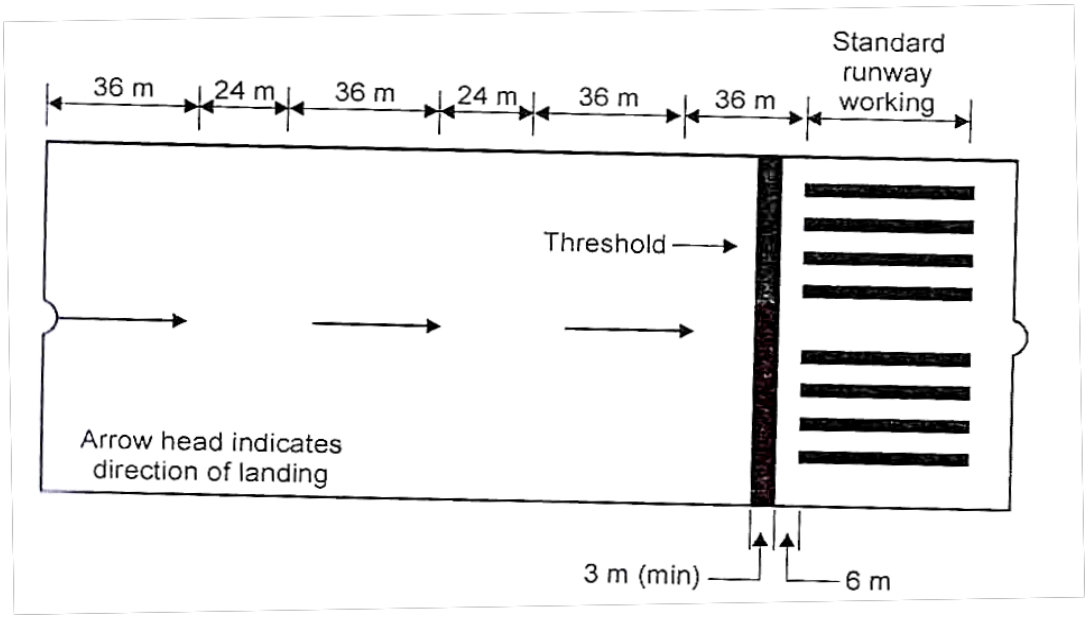
Runway threshold marking is indicated by a series of parallel lines commencing from a distance of 6m fro the runway-end.

The markings are in the from of strips 3.60m wide and with of the Spacing of 0.90m. The marking are placed Symmetrically on either side of the runway center-line



3. Runway End-Strip Marking

Edges of the runway are normally marked. Incase of with width Exceeding 45m, The Strips is made in the form of along continuous lines of 90cm width of marked near the edges



4. Runway numbering

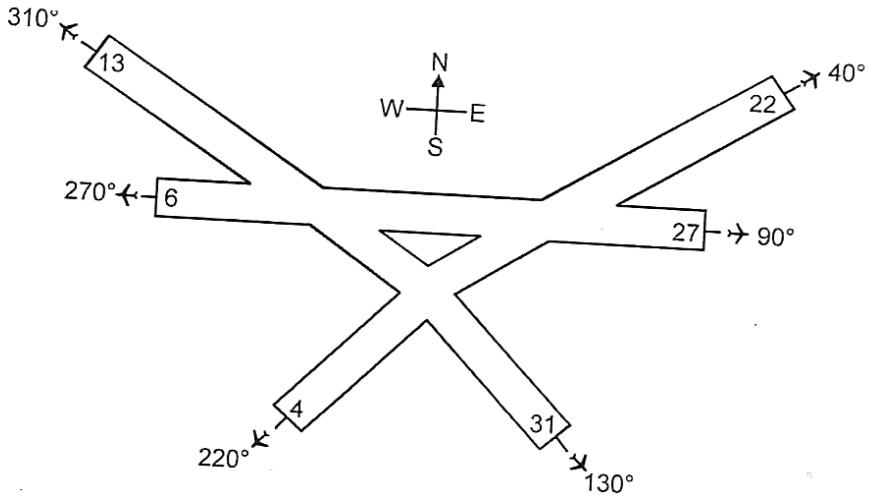
End of Each runway is marked with a numbering indicating the magnetic Azimuth. That is the East-end of an East-West runway would be marked 27 and the west end 7

5. Parallel runway Marking

If there are two or more number of parallel runways they are marked as follows at the threshold

(a) Two-Parallel Runways
(b) Three parallel Runways
(c) Four Parallel Runways

Considering the Azimuth of three intersecting, the numbering can be done as Shown as follows



6. Runway Shoulder Marking

The Shoulder on the edges of a runway and taxiway are paved. Although they appear Structurally Strong they are not Capable of withstanding the Aircraft loads.

Runway Shoulder marking is used as a supplement to runway side Strips. Shoulder marking are generally needed to guide the pilot to identify the runway from the Shoulder

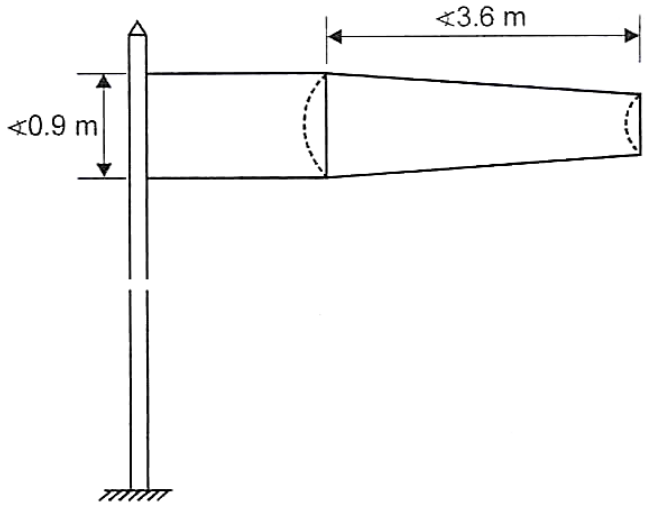
The color of runway Shoulder marking is yellow and are located between the runway side Strips and the pavement edges .

These marking consist of Strips 1m width and Spaces 30m Apart. The Strips are marked Slander at an angle of 45 degree to the center and Start at the Runway mid-Point

4.Explain in detail about the function of Wind direction indicator and landing indicator

Wind –direction indicator is in the form of a truncated cone made of fabric. It Should be of 3.6 m length and 0.9 m diameter at the larger end. It should be Constructed in Such a way that it gives a clear indicating of the wind Speed. The color combination adopted Should be such that the indicator is clearly visible and understanding for the pilot from a height of 300m.

Generally, A Single color pre White or orange is used



An Airport must be Equipped with at least one wind direction indicator. The location of the wind direction indicator Should be at Such a position so as to be Visible Fro the aircraft in flight of on movement area

Provision Should be made to illuminate at least one wind direction indicator

Wind direction indicator is usually placed at the center of the segmented circle marker. This arrangement helps the pilot in locating the airport and the wind direction indicator

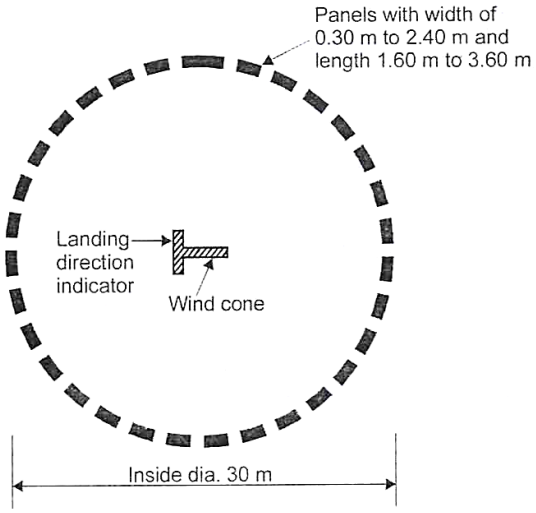
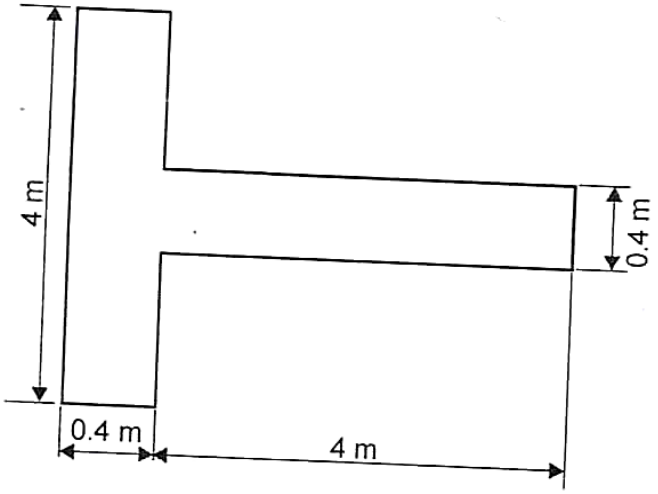


Figure 11.12 Segmented circle marker

The panel forming the segmented Circle markers are Gabble-roof Shaped with a pitch of atleat1 to 1. This Enables the pilot to have a better visibility from a considerable Distance. Generally panels are painted in White. As per the ICAO the inside Diameter of Segmented circle Should be 80m and the panel width varying from 0.90 to 2.40 m

LANDING DIRACTION INDICATOR

It is in the form Tee or Tetrahedron and is Placed at the center of t5he segmented Circle



This Enables the pilot to identify the direction of the Active runway of the Airport. This dimension of a typical Landing direction indicator is Shown in the above **figure**

5. Explain the various types of lightings involved in Airport. Give all in detail

Marking only helps in good weather condition. During bad weather conditions and during night it is essential to provide the adequate lighting in the Airport. Such that the lighting Should convey similar information to the pilot during good visibility condition as the marking do in daytime

All the Airports Should not be Provide the Same type and intensity of Airport lighting

Types of lighting

1. Beacons
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1. Beacons

Beacon is high luminous beam of light Which is used to demark any Geographical location. It is positioned above the Surrounding Ground rotated at a Specific Frequency

2. Boundary Lighting

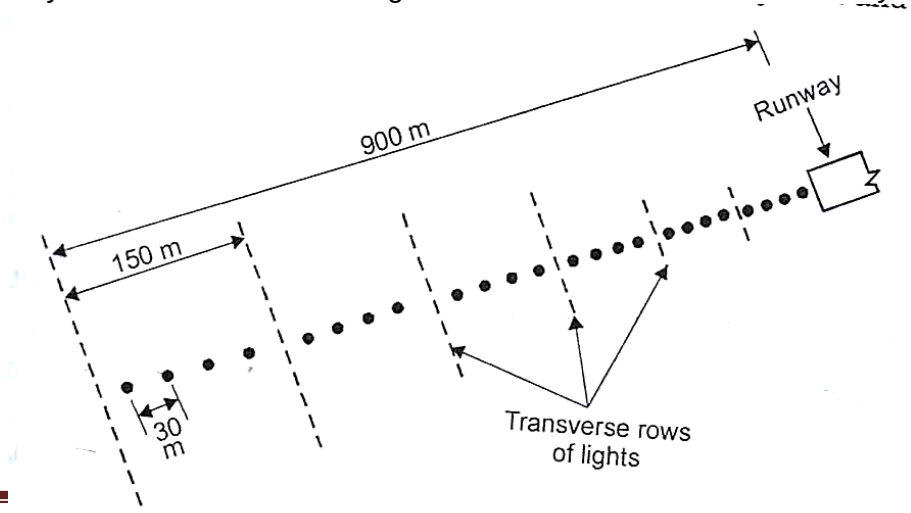
The periphery of the entire landing area is provided with light at 90 m center to center with a height of about 75m from the ground. I fence is provided along the boundary the lights have to be provided 3m inside the fences

In order to indicate the Hazardous approaches the boundary lights are provided with the red marker lights

3. Approach Lighting

For a pilot While Approaching a runway of landing, the approaches lights are the only element of guidance .Actually before the Starting point of the Runway, A Sequence of High-Intensity lighting arrangement for a length of 900m provided

This form a basic guidance for the pilot to center the aircraft centrally. These lighting then give way to the touchdown Zone lights From the threshold of the Runway



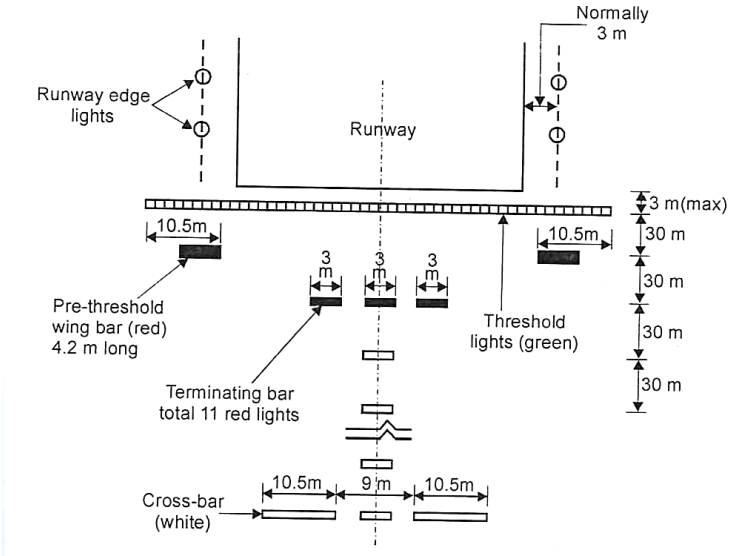
There are the Two Approaches lighting System, Viz.., Calvert System And ICAO System

Calvert System of approach lighting is shown in Fig.11.15. It is developed by Mr.E.S. Calvert of Great Britain. It is Widely used in Europe and other countries

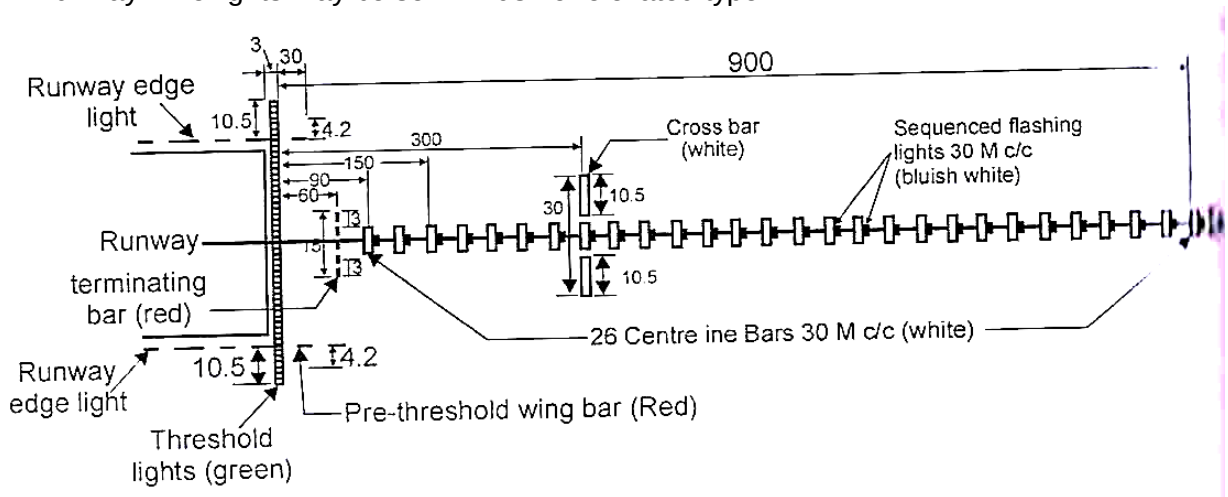
The ICAO system of approach lighting is show in Fig.11.16. This system is known as the centerline configuration system. The system is standardized by ICAO and used in USA.

4.Threshold lighting

In order to decide about landing or not the identification of runway threshold is important for a pilot. For this reason ,the area near the runway threshold is given special lighting arrangements.



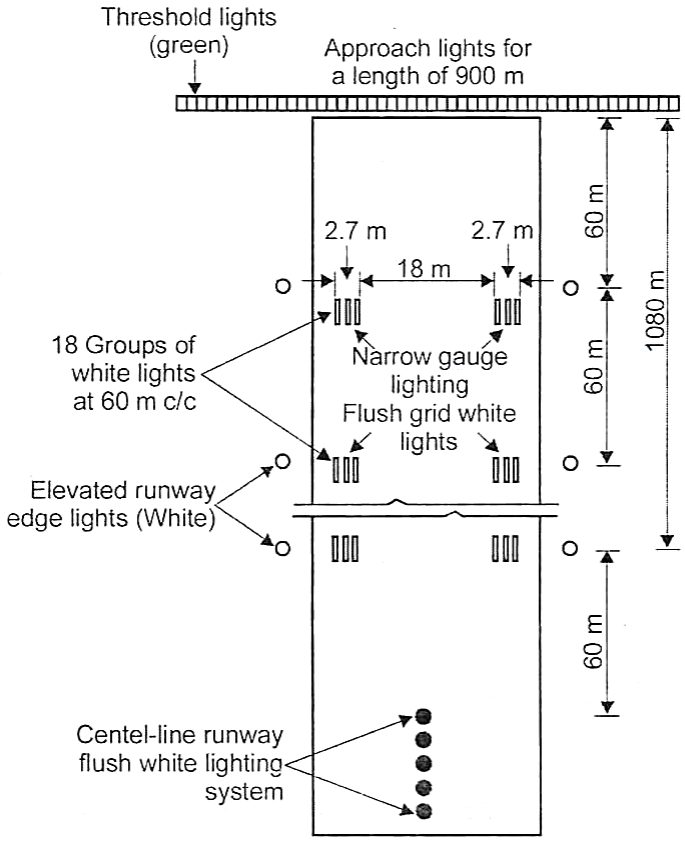
The end of approach lighting is denoted by terminal bar of red lights (Fig 11.16). The threshold is lighted fully with a continuous line of green light extending the full width of runway. The lights may be semi –flush or elevated type.



5.Runway lighting

After crossing the threshold the pilot has to complete a touch down and then roll the aircraft on the runway. The runway lighting has to be so planned and arranged such that it provides sufficient guidelines to the pilot (1) alignment (2)

Literal displacement (3) roll and (4) height of distance and thereby he /she is able to judge correctly his /her position in the space.

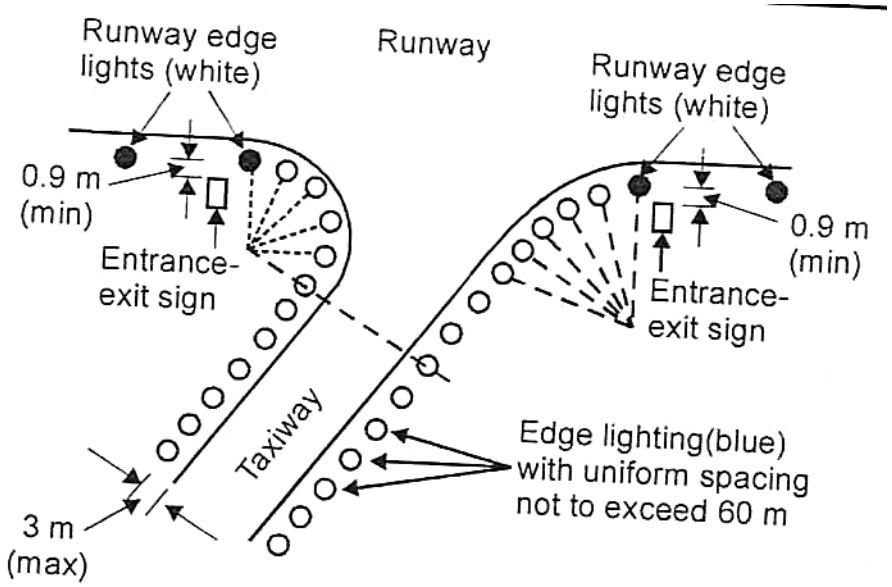


In olden days practice is to flood light the entire landing area. But nowadays it is resorted to indicate the preferred direction of landing

6.Taxiway Lighting

It is necessary to provide the adequate lighting aids for taxing at nights and in day time When the visibility is very poor

Taxiways has to be clearly identified and no confusion Exist between Runway and Taxiway. As provided in runway there Should be adequate guidance along taxiways also



Whenever Crossing of taxiways and Runway occur they Should be clearly identified. Exist taxiway Should be properly identified Such that the pilot is able to locate along taxiway

7.Apron and Hangar lighting

In general these areas are usually flood it. However, the light Source is so mounted that there is no glare Experienced by the pilots, passengers and service personnel's.

It is recommended that the flood lights Should be mounted Above the Pavement

8. Lighting for wind and landing direction Indicator

The illumination of wind direction indicator is done by four 200 watts angle reflector placed 1.8 m above the top of the cone. This arrangement will be provide continuous uniform lighting at any position of the cone

The landing direction indicator Also Should be Provided With Properly lighted For all time use as done for wind direction indicator

7.Explain the need of Air traffic control . Enumerate the various features involved in air traffic control network System

AIR TRAFFIC CONTROL

Air traffic control network mainly involves two aspects

1. To Safeguard life and property
2. To expedite the traffic movement

PURPOSE OF AIR TRAFFIC CONTROL

The main purpose of air traffic control are Safety, Efficiency and economy

1.Safety

The prime purpose of air traffic control is safety. Following two aspects Should be looked into

(a) Providing adequate guidance to the pilot whose vision may be obstructed during the time of landing and take-off

(b) Vision may be classified into three categories that are given as follows

Category 1:

weather condition which provides a forward visibility of at least 800m.

Category 2:

Forward visibility of 400m

Category 3:

Zero visibility condition

2.Efficiency

This has to ensure

1. Quick and efficient movement of traffic
2. Maintaining of scheduling of flights within reasonable limits and avoiding delays, misconnecting and discomfort to passengers
3. Avoiding waste of time causing hardship to business and effective use of Space in airways

3.Economy

In general a delay in air traffic causes loss. Any Excess time Spend in air attributes to monetary loss of fuel, wear and tear and other expenses.

Not using full airports capacity, Airways not carrying full passenger capacity and planes idling all contributes for wasted investments

AIR TRFFIC CONTROL NETWORK SYSTEMS

Air traffic control network system comprises of three parts of the followings

1. Control within terminal area
2. Control over Airways
3. Airways communication

Control within terminal area

A control tower is located in the terminal area which is the nerve center of an Airport. The entire control made by a control tower Which forms the part of the network

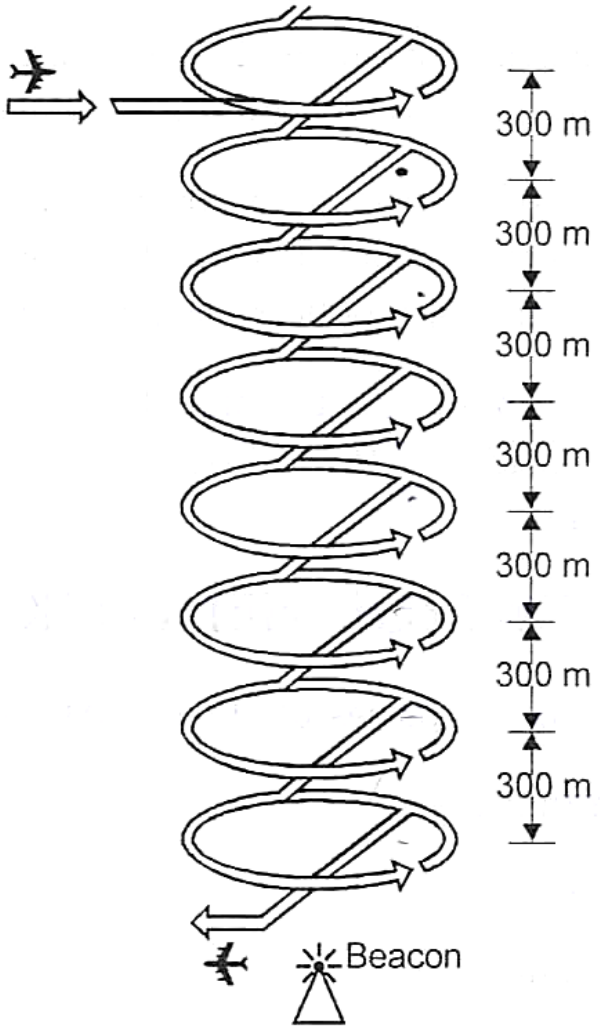
A control tower of an terminal area, Supervisors, Directs, And monitors the traffic at the Airport. The tower is responsible for issuing clearance to all arriving and departing aircrafts. IT

also gives the information needed foe a pilot such as temperature, wind direction, barometer , Operating condition of the Airport

The control tower is needed in a commanding position Such that a complete clear view of the Airport is Obtained. In general control towers are constructed at the top of the Administrative buildings

The control tower having the control facilities directs the Aircrafts to the Airport through a number of Specific points. These points are located within the radius of about 40km from the control tower.

If the traffic is heavy the Aircrafts are obtained at this point are known as Holding fix. At this point the heavy aircraft are required to keep moving with the vertical separation of 300m.s



2.Control over Airways

The control is provided by a number of air route traffic control centers. Each center has command over a Specific geographical area and by this arrangement the entire area of the country is covered.

Thus the function of these centers, are separated from the Airport operation. In order to reduce the additional communication facilities they are located at the airport

The control facility is primarily concerned with the Aircraft operating under the IFR centers Changes in the flight plan enrooted are permitted only with the approval of the control centers

3.Airways communication

Airways communication is usually informed through flight Service stations. The location of these Stations are at the airport and along the Airways. The function are Two-folds

1. To relay air traffic control messages between the control airways and enrooted Aircrafts

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