

## **Important terms and questions**

### **1. Gauge**

The clear minimum perpendicular distance between the inner faces of the two rails.

### **2. Broad Gauge**

The gauge of a track in which the distance between the running faces of two track rails is 1.676m.

### **3. Meter Gauge**

The gauge of a track in which distance between the running faces of two track rails is one meter .Width 1067mm, 1000mm and 915mm

### **4. COFMOW**

The Central organization for modernization of workshop.

### **5. Ballast**

Ballast is the granular material packed under and around the sleepers to transfer loads from sleepers to ballast.

### **6. Bull headed rails**

Bull headed rails are those in which head is made little thicker and stronger than lower part.ie, foot by adding more metal at the top.

### **7. Capacity of the track**

Capacity of the track is the number of trains that can run safely on a track per hour.

### **8. Coning of wheels**

The wheels are coned at a slope of 1 in 20 to prevent from rubbing the inside face of the rail head and to prevent lateral movement of the axle with its wheels. This is known as coning of wheels.

### **9. Check rails**

Check rails are provided on the opposite side of the crossing location for guiding one wheel of the vehicle and thus to check the tendency of another wheel to climb over the crossing.

### **10. Chairs**

C.I chairs are used to hold the bull headed and double headed rails. These chairs are fixed to sleepers by round spikes.

### **11. Creep of rails**

Creep is the longitudinal movement of rails in a track. It occurs due to several reasons. The effect of creep tends to drag the track if ballast is insufficient to hold the rails.

### **12. Double headed rails**

These are the rails which have double head. The bottom and top of the rails are of the same cross section.

### **13. Fish Plates**

These plates, resembling in shape to a fish, are used to provide the continuity between the two rails at the rail-joints.

They also provide the required gap for expansion and contraction of rails due to temperature variations.

### **14. Formation**

Formation is the prepared sub-grade ready to receive the ballast.

### **15. Gradient**

Any departure of the railway track from the level is known as grade or gradient.

### **16. Hogged rails**

Those rails which get battered due to impact action of wheels over the end of the rails are called hogged rails.

### **17. Keys**

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

### **18. Kinks**

The lateral movement of the ends of the rails out of its original position due to several causes such as loose joints, defective gauge etc., from shoulders, are called kinks.

### **19. Permanent way**

The combination of rails, fitted on sleepers and resting on ballast and sub-grade is called the railway track or permanent way.

### **20. Wear of rails**

Wear is one of the prominent defects of rails. When the axle loads are abnormally heavy and the train moves with very fast speed then the concentrated stresses exceed the elastic limit resulting in metal flow, on the gap or joint the ends are battered and at the curves the occurrence of skidding, slipping and the striking of wheel flanges with rails results in wear and tear of rails.

### **21. ADZING OF SLEEPERS:**

The sleepers are cut at the rail set to provide a slope of 1 in 20 to the rails. The process of cutting the wooden sleepers or casting of concrete sleepers accordingly is known as Adzing of sleepers.

### **22. ASH PITS:**

These are long masonry pits, constructed longitudinally inside and under the track to collect the ash discharge from steam locomotives.

### **23. BALLAST:**

It is the granular material used in packing under and around the sleepers for transferring the load to the formation.

### **24. CHECK RAILS:**

The rails provided on the inner sides of the main rails at crossings for guiding the wheel flanges to pass are known as Guard rails or check rails.

### **25. DROP PITS:**

These are deep pits constructed in the loco shed for tracking down wheels of the locomotive during repair.

#### **26. EXAMINATION PITS:**

These pits are constructed in the locomotive yards for examination of the engines from underneath. These pits are rectangular tanks larger than the ash pits and plastered inside.

#### **27. LEVEL CROSSING:**

It is the place when the road and the railway line cross line cross each other at the same level.

#### **28. ROLLING STOCK:**

Locomotives, goods wagons, passenger coaches, oil tanks, etc. which move on the permanent way are known as rolling stock.

#### **29. STOCK RAIL:**

This is the main rail at the switch where the tongue rail lifts against it.

#### **35. TONGUE RAIL:**

It is a tapered rail used in the switch.

#### **36. Cant or super elevation**

On curves, to counteract the effect of centrifugal force, the level of outer rails is raised above the inner rail by a certain amount. This raising of outer rail over the inner rail is called super elevation or cant.

#### **37. Ruling Gradient**

The ruling gradient on a section may be defined as the gradient which determines the maximum load that the engine can haul on the section.

#### **38. Speed of the train**

The speed of the train depends upon the strength of the track and the power the locomotive.

#### **39. Safe speed on curves**

Safe speed for all practical purposes means a speed which is safe from the danger of overturning and derailment with a certain margin of safety.

#### **40. Cant deficiency**

The cant deficiency is the difference between the equilibrium cant necessary for the maximum permissible speed on a curve and actual cant provided (on the basis of average speed of trains)

#### **41. Horizontal curves**

These are provided whenever there is change in the direction of the alignment of the track. They are usually circular with parabolic transition curves at either end.

#### **42. Vertical curves**

These are provided whenever there is change in the gradient alignment i.e either a rising gradient changes to a falling gradient. They are usually parabolic curves.

#### **43. Transition Curves**

Transition curve is defined as a curve of parabolic nature which is introduced between a straight and circular curve or between two branches of a compound curve.

#### **44. Negative Cant**

When the main line is on a curve and has a turnout of contrary flexure leading to a branch line, the super elevation necessary for the average speeds of trains running over the main line cannot be provided.

#### **45. Vertical Alignment:**

The vertical alignment of a transportation facility consists of tangent grades (straight lines in the vertical plane) and vertical curves. Vertical alignment is documented by the profile. To repeat what was said in Chapter 3, the profile is a graph that has elevation as its vertical axis and distance, measured in stations along the centerline or other horizontal reference line of the facility, as its horizontal axis.

#### **46. Points and Crossing**

The problem of diversion of trains from one track to another is solved arrangements known as points and crossings.

#### **47. Turnouts**

Turnout is the simplest combination of points and crossings which enables one track either a branch line or a sliding, to take off from another track. So the object of turnout is to provide facilities for safe movement of trains in either direction on both the tracks.

#### **48. Right hand Turnout**

If a train from main track is diverted to the right of the main route in the facing direction then this diversion is known as Right hand turnout.

#### **49. Left hand Turnout**

If a train from main track is directed to the left of the main route in the facing direction then this diversion is known as left hand turnout.

#### **50. Switches**

A switch consists of a stock rail and a tongue rail. A set of switches or points consists of a left hand switch and a right hand switch.

#### **51. Switch angle**

It is the angle between the running faces of the stock rail and tongue rail.

#### **52. Types of Switches**

- o Stub Switch
- o Split Switch

#### **53. Crossings**

A crossing or a frog is a device which provides two flangeways through which the wheels of the flanges may move, when two rails intersect each other at an angle.

#### **54. Types of Crossings**

- o Acute angle crossing
- o Obtuse angle crossing
- o Square crossing
- o Spring or movable wing crossing
- o Ramped crossing

#### **55. Station**

A railway station is the selected place on a railway line, where trains halt for one or more of the following purposes.

- For exchange of Passengers
- For Exchange of Goods
- For Control of train movements

#### **56. Terminal Station**

The station at which a railway line or one of its branches terminates or continuity of a line stops is known as terminal station or terminal junction.

#### **57. Platform**

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.

#### **58. Loops**

When a branch line from a main line again terminates at the same main line, it is called a loop.

#### **59. Sidings**

When a branch line from main line or a loop line terminates at a dead end with a buffer stop or sand hump, it is called a sidings.

#### **60. Station Yards**

A yard is defined as a system of tracks laid usually on a level within defined limits, for receiving, storing, sorting, making up new trains, dispatch of vehicles and for other purposes over which movements are not authorized by a time table.

#### **61. Types of yards**

- o Passenger's yard
- o Goods Yards
- o Marshalling yards
- o Locomotive yards

#### **62. Level Crossings**

When a railway line and a road cross each other at the same level, it is called a level crossing.

#### **63. Signaling**

Signaling consists of the systems, devices and means by which trains are operated efficiently and tracks are used to maximum extent, maintaining the safety of the passengers, the staff and the rolling stock.

#### **64. Track Circuiting**

A track circuit is an electrical circuit formed along with the running rails and connected to signal, cabin, block instruments etc., for the desired indications by lights or bell or siren etc.,

#### **65. Interlocking**

Interlocking is defined as the technique achieved through mechanical or electrical devices or agencies by which it can be ensured that before a signal is taken-off position, for the route, which the signal controls, is properly set and held, and at the same time all the signals and points, the operation of which may lead to conflicting movements, are locked against the feasibility of such conflicting movements.

### **AIRPORT PLANNING AND DESIGN**

#### **1. Airport Planning**

Airport planning requires more intensive study and fore thought as compared to planning of other modes of transport.

#### **2. Airport Master Plan**

Airport master plan refers the planner's idealized concept of the form and structure of the ultimate development of the airport.

#### **3. Air Cargo**

The air cargo is relatively younger industry and its past performance may not be a true representation of the future.

#### **4. Approach Zone**

During landing, the glide path of an aircraft varies from a steep to flat slope. But during take off, the rate of climb of aircraft is limited by its wing loading and engine power. As such wide clearance areas, known as approach zones are required on either side of runway along the direction of landing and take off of aircraft.

#### **5. Turning zone**

If during the take off, the engine fails or the pilot selects to land for any reason, the aircraft will have to take a turn and come in line with runway before landing. The area of airport other than the approach area, which is used for turning operations of aircraft is called turning zone.

#### **6. Clear Zone**

The inner most portion of approach zone which is the most critical portion from obstruction view point, is known as clear zone.

#### **7. Wind Rose**

The wind data, direction, duration and intensity are graphically represented by a diagram called wind rose.

#### **8. Apron**

A defined area which is used to accommodate aircrafts for loading and unloading of passengers and cargo, parking refueling etc., It is usually paved and planned adjacent to terminal building.

#### **9. Cargo**

Freight, other than passengers, baggage and mail, which is carried by a transport aircraft.

### 10. Heliport

Area for landing and take off of helicopter.

### 11. Taxiway

A defined path on land aerodrome over which an aero plane may taxi to and fro the runway and loading apron.

### 12. Terminal Building

A focal point in the terminal area. It provides space for air line operations, facilities for convenience of passengers, office for the airport management and other non aeronautical functions.

### 13. Airport capacity

The number of aircraft movements which an aircraft can process within a specified period time, with an average delay to the departing aircraft within the acceptable time limit is defined as airport capacity.

### 14. Gate capacity

The ability of a specified number of gates to accommodate aircraft loading and unloading operations under conditions of continuous demand.

1. What is meant by Gauge?
2. What is meant by Broad Gauge and Meter Gauge?
3. What is term Ballast means?
4. What is meant by double headed rails and bull headed rails?
5. How do define the term rails?
6. What is the capacity of Track?
7. What is Coning of Wheels?
8. What is meant by Chairs, Creep of Rails?
9. What is Creep of Rails?
10. What is the term Gradient means?
11. What is meant by Hogged Rails?
12. How do you define keys?
13. What is meant by Kins?
14. How do define Permanent Way?
15. What is meant by Wear of Rails?
16. What is meant by Tongue Rails, Stock Rails?
17. What is meant by Rolling Stock?
18. What is meant by Ash Pits?
19. How do you define Check Rails?
20. What is meant by Points and Crossing?
21. What is meant by Right hand Turnout?
22. What do you meant by Left hand Turnout?
23. Explain about Switches?
24. What is Switch angle?
25. What are the Types of Switches?
26. What are Crossings ?
27. What are the Types of Crossings?
28. What is meant by Station?
29. What is known as Terminal Station?
30. What is meant by Platform?
31. What are known as Loops?

32. What is meant by Sidings?
33. What are Station Yards?
34. What are the Types of yards?
35. What is meant by Level Crossings?
36. What is meant by Signalling?
37. What is meant by Track Circuiting?
38. What is Interlocking?
39. What are the purpose of signalling?
40. What is meant by Airport Planning?
41. What is meant by Airport Master Plan?
42. What is meant by Air Cargo?
43. What is meant by Approach Zone?
44. What is meant by Turning zone?
45. What is meant by Clear Zone?
46. What is meant by Wind Rose Diagram?
47. Differentiate air transport with other modes of transportation.
48. What are the different types of aircraft propulsion?
49. Draw a neat sketch of an aero plane with various component parts.
50. What is a wind rose diagram?
51. Define runway.
52. What is meant by Hangar?
53. What factors govern the size of a passenger landing apron?
54. List the various types of requirements to be provided for in an international type of airport for giving necessary services and amenities to the passengers.
55. State the requirements on which runway directions are fixed on meteorological considerations.
56. What is meant by air traffic control?
57. What are the geometric design corrections?
58. What is meant by buffer zone?
59. Define cross wind component.
60. Define Cant or super elevation.
61. What is meant by Ruling Gradient?
62. Define Speed of the train.
63. Define Safe speed on curves.
64. What is meant by Cant deficiency?
65. Define Horizontal curves.
66. Define Vertical curves.
67. What is meant by Transition Curves?
68. Define Negative Can't.
69. What are the classifications of curves.
70. Define grade compensation.
71. What is meant by widening of gauges?
72. Write down the formula for superelevation.
73. What are the classifications of horizontal curves?
74. How the vertical curves are classified?
75. How the transition curves are classified?
76. How to calculate the widening of gauge on curves?
77. How to compensate the grade?
78. What is meant by gradient?
79. Define rising gradient.
80. What is meant by Apron?
81. What is meant by Cargo?
82. What is meant by Heliport?
83. What is meant by Taxiway?
84. What is meant by Terminal Building?
85. What is meant by Airport capacity?

86. What is meant by Gate capacity?
87. What are the points to be consider while selecting the airport?
88. What is meant by apron?
89. Define Hanger.
90. Mention the airport building.
91. Draw the runway markings.
92. Draw the taxiway markings.
93. What are the wind direction indicators?
94. Define Helipads.
95. What are the service equipments available?
96. What is the purpose of air traffic control network?
97. What are the functions of airport buildings?
98. Define passenger flow.
99. What are the visual aids in airport?

## PART B

1. Explain about Airport Planning
2. Describe about Runway and Taxiway Marking
3. Explain about Airport Lighting and Signage
4. Describe about Approach Lighting
5. Explain about Runway End Identifier Lights
6. Describe about Airfield Signage
7. Explain the principles involved in runway orientation and how they are implemented in practice.
8. The table given the percentages of time, the wind blows in specified speed ranges from 16 points of the compass. Determine the preferred directions of runways.

Wind direction	Percentage of winds			Total
	4 to 15 mph.	15 to 30 mph	Over 30 mph.	
N	4.7	0.5	-	5.2
NNE	6.0	2.6	0.2	8.8
NE	1.1	0.4	-	1.5
ENE	1.6	0.4	-	2.0
E	8.9	4.4	0.3	13.6
ESE	6.4	1.6	0.1	8.1
SE	1.2	0.7	0.1	2.0
SSE	1.3	0.5	-	1.8
S	7.1	0.9	-	8.0
SSW	4.6	3.0	-	7.6
SW	2.3	2.0	-	4.3
WSW	1.3	1.7	0.2	3.2
W	14.4	3.9	0.3	18.6
WNW	2.0	2.7	0.2	4.9
NW	2.4	0.2	0.1	2.7
NNW	2.2	0.3	-	2.5
Calms				5.2
Total	67.5	25.8	1.5	100

9. Explain the concept if visual aids.
10. Explain the runway & taxiway markings with neat sketches.
11. Explain about advantages of Airport.
12. 2.Explain about Disadvantages of Airport
13. Describe about Airport Components.
14. Explain about Runway classification of Airport.
15. Explain about Airport Planning
16. Describe about Airport Site Selection
17. Explain about Cost Analysis
18. Explain about Runway Configuration
19. Explain about Wind Rose diagram.
20. Describe about Taxiway separation requirements.

21. Write the history of Railways briefly.
22. Define Permanent Way, its components and functions.
23. Explain about the surveying for Railway Alignment.
24. Explain the types of Rail sections.
25. What is meant by creep and Explain in detail?
26. What is Sleeper and its types?
27. What is meant by Ballast less Track Explain?
28. Explain briefly Coning of Wheels.
29. What is meant by Kins of rails and explain it?
30. Explain about Ballast and its Causes in detail.
31. Define Gradient and explain the types of gradient.
32. What is meant by Curves? And explain its types.
33. Define Transition Curves and explain its Types.
34. Derive the formula for Super elevation.
35. Define Super elevation and explain the concept of super elevation.
36. Widening of Gauges- Explain.
37. Explain the cant deficiency.
38. Explain the negative cant.
39. How to compensate the grade.
40. Explain the ruling gradient.
41. Explain Points and Crossings
42. What is meant by Turnout and its parts?
43. Explain the working principle of Turnout.
44. What is meant by Points and Switches? Explain them.
45. Explain Switches according to their Shape.
46. Explain Crossings and their types.
47. Describe about Track Junction briefly.
48. What is meant by Signals and their types.
49. Explain some of the Signals used in India.
50. Explain Interlocking briefly with their Principles.
51. Explain Track Circuiting briefly.
52. Describe Rolling Stock and their types.