

DEPARTMENT OF CIVIL ENGINEERING

**CE 6604 - RAILWAYS AIRPORT AND HARBOUR ENGINEERING**

**QUESTION BANK**

**UNIT 1**

**RAILWAY PLANNING**

**PART A**

1.	Define Permanent way.	BT 1
2.	List out the elements of permanent way.	BT 1
3.	Define creep of rail and mention its causes.	BT 1
4.	Define fish plate. Why is it named so?	BT 1
5.	Define transition curve and list its types.	BT 1
6.	Define obligatory points	BT 1
7.	Distinguish between double headed and bull headed rail	BT 2
8.	Differentiate cant and negative cant.	BT 2
9.	Describe in short about pusher gradient.	BT 2
10.	Differentiate right hand and left hand turnout.	BT 2
11.	Classify the stresses produced in a railway track.	BT 3
12.	Classify the methods of survey that should be done for track alignment.	BT 3
13.	A B.G. railway track is designed for a ruling gradient of 1 in 200 on a curve of $2^\circ$ . Calculate its grade compensation.	BT 3
14.	Explain what is a turnout and why it is required.	BT 4
15.	Compare Creep and Kink in Rails.	BT 4
16.	Explain the basic requirements of an ideal rail joint.	BT 4
17.	Draw a neat sketch of a permanent way and mark its parts.	BT 5
18.	What is to be done if the resistance in gradient is exceeding beyond the allowable limit.	BT 5
19.	What are the factors to be considered in selecting the sleeper density?	BT 6
20.	Under what situation is points and crossings recommended.	BT 6

**PART B**

1. Describe in detail about the types of rail joints, rail fixtures and fastening used in a track BT 1
2. When and where the soil suitability analysis is carried out and explain BT 1
3. Define gradient and super elevation; List out its types and explain clearly. BT 1
4. Compare and contrast the different type of sleepers used in Indian railways. BT 2
5. Discuss in detail about points and crossings. BT 2

6.
  - i. A BG curved railway track has a  $4^\circ$  curvature and 12cm cant. BT 3  
Maximum Permissible speed on the curve is 85Km/hr. Calculate the length of the transition curve.
  - ii. An  $8^\circ$  curve track diverges from a main curve of  $5^\circ$  in an opposite direction in the layout of a B.G. yard. Calculate the super elevation and the speed on the branch line, if the maximum speed permitted on the main line is 45 Km/hr.
7.
  - i. Derive an expression to establish the relationship among gauge, speed, radius of curvature and super elevation (8 marks) BT 3
  - ii. Explain in detail the importance of Indian Railways in the National Development in terms of economic, social and political contributions. (8 marks) BT 4
8. Explain in detail about BT 4
  - (a) Ballast less Track (4 marks)
  - (b) Negative super elevation. (4 marks)
  - (c) Widening of gauge (4 marks)
  - (d) Grade Compensation (4 marks)
9. Design and draw a neat sketch of permanent way cross section and explain the functions of its components. BT 5
10. Compare the conventional and modern methods of surveying for route alignment and justify which one is the best. BT 6

## **UNIT 2**

### **RAILWAY CONSTRUCTION AND MAINTENANCE**

#### **PART A**

1.	List out the methods used for stabilization of tracks in poor soil.	BT 1
2.	Define formation.	BT 1
3.	List out the methods of tunneling construction	BT 1
4.	When is a branch line called as siding?	BT 1
5.	List out the materials required for laying of track.	BT 1
6.	Where is a marshaling yard provided?	BT 1
7.	Summarize the stages in construction of a railway track	BT 2
8.	Differentiate metro and mono railway system.	BT 2
9.	Estimate the number of rails required per Km of railway track.	BT 2
10.	Describe shortly about passenger platform	BT 2
11.	Classify the types of railway stations	BT 3
12.	Relate the importance of construction and maintenance of tracks.	BT 3
13.	Classify the methods of plate laying.	BT 3
14.	Explain why ventilation should be provided in tunneling.	BT 4
15.	Compare the pros and cons of daily maintenance and periodic maintenance.	BT 4
16.	Classify the types of marshaling yards.	BT 4

17.	What are all the factors is to be considered if a railway station is to be constructed.	BT 5
18.	Design and draw a neat sketch of a junction station.	BT 5
19.	Under what circumstances does a wayside station be selected	BT 6
20.	Summarize the operations to be carried out for drainage in tunnelling	BT 6

### **PART B**

1.	Describe in detail about plate laying techniques.	BT 1
2.	When and where should a tunnel be provided and explain the methods of tunnel construction in soft ground.	BT 1
3.	List out the type of railway stations and explain each one of them in detail.	BT 1
4.	Discuss in detail about the modern methods of maintenance.	BT 2
5.	Summarize how poor soil is being stabilized and explain the methods in detail.	BT 2
6.	Classify the stages in construction of railway track and explain in detail.	BT 3
7.	i. Calculate the quantity of all the materials required for track laying. (8 marks) ii. Compare the advantages and disadvantages of conventional maintenance and modern maintenance techniques. (8 marks)	BT 3 BT 4
8.	i. Explain in detail about the passenger amenities to be provided in railway station (12) ii. Explain the purpose of different types of yards. (4)	BT 4
9.	Design and draw a neat sketch of marshaling yard and explain in detail.	BT 5
10.	i. On what situations will mono rails, metro rails be selected. Explain (4 marks) ii. Explain in detail about how ventilation and drainage should be provided in tunneling. (12 marks)	BT 6

## **UNIT 3**

### **AIRPORT PLANNING**

#### **PART A**

1.	List the components of an airport.	BT 1
2.	List the components of an aircraft.	BT 1
3.	Tell the advantages of air transport.	BT 1
4.	Write the objectives of airport master plan	BT 1
5.	Write the airport parking configuration	BT 1
6.	Describe the general classification of airport.	BT 1
7.	Distinguish terminal apron and cargo apron	BT 2

8.	Predict why regional planning is to be done.	BT 2
9.	Discuss the characteristics of airport layout.	BT 2
10.	Summarize the four groupings of Aircraft parking system?	BT 2
11.	Illustrate what is a hangar and mention its types.	BT 3
12.	Show the outline of ICAO master planning process	BT 3
13.	Classify airport codes based on aircraft wheel load.	BT 3
14.	Drawings for layout plan for an airport - explain	BT 4
15.	Comment on the sequence of passenger flow in an airport.	BT 4
16.	Analyze the importance of preplanning for an airport project.	BT 4
17.	Prepare a typical layout of airport for a single runway and two parallel runways	BT 5
18.	Prepare a list of data's to be collected before site selection.	BT 5
19.	Summarize how the size of gate position decided.	BT 6
20.	Recommend the criteria for site selection.	BT 6

### **PART B**

1.	(i) List the factors to be considered for the selection of site for a commercial airport (ii) Explain the importance of airport planning.	BT 1
2.	What is a master plan? Explain the recommendation by ICAO & FAA master plan in detail.	BT 1
3.	Describe the necessity, functions and types of hangers.	BT 1
4.	i) Summarize the surveys that is to be done for airport location. (8) ii) Summarize the planning consideration of a terminal building. (8)	BT 2
5.	Describe i) motor vehicle parking area & its patterns (6) ii) Aircraft parking system.(10)	BT 2
6.	Briefly explain how the size of apron decided.	BT 3
7.	(i) Describe briefly the salient features and functions of aprons in an airport. (8) (ii) What are the passenger facilities, required at an airport terminal? Explain using sketches. (8)	BT 3 BT 4
8.	Explain with neat sketch the typical layout of airport based on runway configuration.	BT 4
9.	Draw a typical layout of any international airport in India and explain its concept.	BT 5
10.	Discuss the advantage, disadvantage of air transportation and list the aircraft characteristics for airport planning.	BT 6

## **UNIT 4 .**

### **AIRPORT DESIGN**

#### **PART A**

1.	How orientation of runway is done? On what basis it is decided.	BT 1
2.	What is a wind rose diagram?	BT 1
3.	List the elements to be considered in the Geometric design of runways.	BT 1
4.	Describe bypass taxiway	BT 1
5.	Define clear zone.	BT 1
6.	Define turning zone	BT 1
7.	Differentiate runway and taxiway	BT 2
8.	Differentiate between VFR and IFR.	BT 2
9.	Discuss airport markings	BT 2
10.	Differentiate type I and type II wind rose diagram.	BT 2
11.	Illustrate the purpose of installing visual aids in a airport	BT 3
12.	Classify the cases that are to be considered in deciding the basic runway length.	BT 3
13.	Show the importance of various imaginary surfaces around the airport.	BT 3
14.	Explain the term cross wind components and wind coverage.	BT 4
15.	Classify the elements of airport lightings.	BT 4
16.	Air traffic control aids- explain	BT 4
17.	Integrate zoning laws	BT 5
18.	Prepare the list of factors affecting runway capacity	BT 5
19.	Turning radius in a taxiway is decided based on?	BT 6
20.	Explain the factors to be considered in locating exit taxiways.	BT 6

#### **PART B**

1.	What are the items to be considered in the geometric design of runway and explain it in detail.	BT 1
2.	Describe about the geometric design standards of taxiway and also explain Exit taxiway.	BT 1
3.	Explain what are different control surfaces at an airport? Explain the concepts of airport zoning with the help of sketches.	BT 1
4.	Discuss in detail about i) Various design factors to be considered in determining the thickness of pavement. (8) ii) Special consideration for pavement design. (8)	BT 2
5.	Distinguish between Type I and Type II wind rose diagrams. Explain how the optimum runway orientation is determined.	BT 2

6.	The typical wind data for an airport site is given in the following table. Determine the best orientation of the runway with the help of a wind rose diagram given in <b>table 1</b>	BT 3
7.	(i) The length of a runway at mean sea level, standard temperature and zero gradients is 1600m. The site has an elevation of 320m, with a reference temperature of 33.6°C. The runway has to be constructed with an effective gradient of 0.25%. Calculate the actual length of the runway at site (ii) The length of runway under standard conditions is 1620m. The airport site has an elevation of 270m. Its reference temperature is 32.90°C. If the runway is to be constructed with an effective gradient of 0.20%. Determine the corrected runway length	BT 3 BT 4
8.	Explain in brief: 1. Clear Zone. 2. Approach zone 3. Turning zone. 4. Buffer zone.	BT 4
9.	Describe the importance of runway lighting. Explain threshold lighting with the help of sketches.	BT 5
10	Explain the various runway and taxiway markings.	BT 6

**Table 1**

Wind Direction	Percentage of time		
	6.4 – 25 Kmph	25-50 Kmph	50-80 Kmph
N	4.7	1.50	0.1
NNE	3.5	0.75	0.0
NE	1.8	0.03	0.1
ENE	3.0	0.02	0.03
E	2.2	2.40	0.0
ESE	5.8	4.95	0.0
SE	7.0	1.40	0.0
SSE	8.0	0.02	0.0
S	4.8	1.40	0.10
SSW	2.6	0.75	0.0

SW	1.2	0.03	0.10
WSW	3.8	0.02	0.03
W	1.9	2.40	0.0
WNW	6.4	5.25	0.0
NW	6.3	1.40	0.0
NNW	7.2	5.20	0.30

## **UNIT 5**

### **HARBOUR ENGINEERING**

#### **PART A**

1.	How is breakwater classified?	BT 1
2.	Write in short about the features of port.	BT 1
3.	List source of the special types of break water.	BT 1
4.	What do you understand by littoral drift?	BT 1
5.	What is a graving dry dock.	BT 1
6.	Why a shore protection work is needed?	BT 1
7.	Differentiate Quay and Pier	BT 2
8.	Distinguish between diurnal and semi-diurnal tides	BT 2
9.	Describe wharf? Name the types	BT 2
10.	Distinguish between Dolphins & Jetties	BT 2
11.	Classify Harbour based on location.	BT 3
12.	Illustrate coastal shipping with an example	BT 3
13.	Mention any two erosion protection Methods in Coastal Zone?	BT 3
14.	Mention some of the features of a harbour	BT 4
15.	Explain Breakwater	BT 4
16.	How to design the entrance of a harbor?	BT 4
17.	Prepare the list of requirements that is to be considered during design of port.	BT 5
18.	How is Inland Water Transport different from sea transport?	BT 5
19.	Summarize about marine survey.	BT 6
20.	Summarize the requirements of good port?	BT 6

#### **PART B**

1.	Draw a neat sketch of a harbour layout & show the Various Components. Mention the objectives of each.	BT 1
2.	What is a fender. Explain in detail about its types and classification.	BT 1

3.	Define dredging? Explain the reasons for its adoptions. How dredged Materials are disposed off?	BT 1
4.	i. Discuss the factors to be considered while selecting a suitable site for the construction of a port? ii. Distinguish Between Pier Wharf. Explain their utility with the help of sketches?	BT 2
5.	i. What are the functions of wet Docks? Explain with Sketches, their working & main features. ii. Explain with sketch the features of a composite Breakwater	BT 2
6.	Classify harbours on broad basis and on the basis of utility and explain them.	BT 3
7.	(i).Classify different types of break water. Explain any one in brief.  (ii) Define a port and bring out the differences between a port and a harbor. What are the requirements of good port?	BT 3  BT 4
8.	Explain the facilities to be provided in a port.	BT 4
9.	Discuss the tides and wave effects and its action on coastal structures.	BT 5
10.	Explain clearly about the coastal regulation zone,2011.	BT 6