

**SRM VALLIAMMAI ENGINEERING COLLEGE**  
(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203.

**DEPARTMENT OF CIVIL ENGINEERING**

**QUESTION BANK**



**VI SEMESTER**

**1903603- RAILWAYS, AIRPORTS, DOCKS AND HARBOUR  
ENGINEERING**

**Regulation – 2019**

**Academic Year 2024 – 2025**

*Prepared by*

**Dr. E. Maheswari**

**ASSISTANT PROFESSOR (O.G)**

**DEPARTMENT OF AGRICULTURAL ENGINEERING**



# SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203.



## DEPARTMENT OF CIVIL ENGINEERING QUESTION BANK

**SUBJECT : RAILWAYS, AIRPORTS, DOCKS AND HARBOUR ENGINEERING**

**SEM / YEAR: VI/ III**

### **UNIT – I: RAILWAY PLANNING AND CONSTRUCTION**

Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods--Geometric design of railway, gradient, super elevation, widening of gauge on curves- Level Crossings

#### **PART – A**

Q.No	Questions	BT Level	Competence
1.	Define creep in sleepers.	BT-1	Remember
2.	What do you mean by level crossing?	BT-1	Remember
3.	Define super elevation in railways.	BT-1	Remember
4.	What do you mean by ballast?	BT-1	Remember
5.	What are the functions of sleepers?	BT-1	Remember
6.	Describe the requirements of an ideal sleeper.	BT-2	Understand
7.	List the functions of subgrade.	BT-1	Remember
8.	Discuss the types of spikes.	BT-2	Understand
9.	Explain sleeper density.	BT-2	Understand
10.	Discuss the irregularities in track.	BT-2	Understand
11.	Outline about pandrol clip in railways.	BT-2	Understand
12.	Outline the allowable super elevation in Broad Gauge & Metre Gauge tracks.	BT-2	Understand
13.	Develop the sketch of permanent way cross section.	BT-2	Understand
14.	Identify the cause of kinks in rails.	BT-1	Remember
15.	Build some points on uses of Fish plates.	BT-2	Understand
16.	Investigate on split head.	BT-2	Understand
17.	Outline the classification of level crossings.	BT-1	Remember
18.	Classify the different surveys required for railway projects.	BT-2	Understand
19.	Classify the types of gradient in railways.	BT-1	Remember
20.	Write the importance of widening of gauge in curves.	BT-1	Remember
21.	Conclude few points about grade compensation in curves.	BT-2	Understand
22.	Develop few points on coning of wheels.	BT-2	Understand
23.	Discuss the functions of ballast in railways.	BT-1	Remember
24.	Compose the types of gauges.	BT-1	Remember
25.	Invent special class level crossing.	BT-2	Understand

## PART – B

1.	i) List the advantages of railways. (6) ii) What to you understand by cant deficiency? (7)	BT-3	Application
2.	Discuss about the various geometric design parameters of a railway track.	BT-3	Application
3.	i) What are the requirements of an ideal rail joint? (6) ii) Explain the various rail joints used in railways with neat sketches. (7)	BT-4	Analyze
4.	i) List the different types of defect in rails. (6) ii) What are the different types of rails? Elaborate in detail. (7)	BT-3	Application
5.	i) Outline about super elevation and derive its expression in railways. (7) ii) Write notes on transistion curves. (6)	BT-4	Analyze
6.	Explain with neat sketches any four obligatory points controlling railway alignment.	BT-4	Analyze
7.	Illustrate the types of level crossings with neat sketches.	BT-3	Application
8.	i) Build up points on role of remote sensing and GIS technology in track alignment. (7) ii) Develop points on different types of stresses in railway track. (6)	BT-3	Application
9.	Develop points on functions and requirements of various elements of railway permanent way.	BT-3	Application
10.	i) Explain the selection of gauges in detail. (7) ii) Compare the various types of switches in railway track. (6)	BT-4	Analyze
11.	Expalin in detail about widening of gauges on curves and coning of wheels with neat sketches.	BT-4	Analyze
12.	Draw a neat sketch way and list the functions of different components of permanent way.	BT-4	Analyze
13.	Explain the route alignment surveys in detail.	BT-3	Application
14.	i) Elaborate in detail ballast materials used for railway track. (7) ii) Discuss on ballastless track. (6)	BT-4	Analyze
15.	Explain in detail the stresses generated on railway tracks.	BT-4	Analyze
16.	What are the functions of sleepers? Also, compare the different types of sleepers.	BT-3	Application
17.	Explain the different surveys involved in fixing the railway tracks.	BT-4	Analyze

## PART-C

1.	i) Explain the necessity of sleepers in railway track. What are the desirable qualities or requirements of good sleepers? (7) ii) Explain the basic methods followed for classification of level crossings. (5)	BT-3	Application
2.	Explain in detail about the various types of gradients used in railway track and grade compensation.	BT-3	Application

3.	Build up points on conventional method of surveying in track alignment.	BT-4	Analyze
4.	i) What is meant by track alignment? Give the basic requirements of good alignment. ii) Discuss in detail, the factors which control the alignment of a railway track.	BT-3	Application
5.	Describe with illustrations the types of rails and their defects	BT-4	Analyze

## UNIT – II: RAILWAY CONSTRUCTION AND MAINTENANCE

Earthwork – Stabilization of track on poor soil - Track drainage – Calculation of Materials required for track laying - Construction and maintenance of tracks – Railway Station and yards and passenger amenities- Signalling.

### PART - A

Q.No	Questions	BT Level	Competence
1.	Write the significance of earthwork in railway station.	BT-2	Understand
2.	Define point indicators.	BT-1	Remember
3.	List the components of a switch.	BT-1	Remember
4.	What are the different methods of plate laying?	BT-1	Remember
5.	What are the methods to improve the poor subgrade soil?	BT-2	Understand
6.	When is a branch line called as siding?	BT-2	Understand
7.	What is meant by chemical stabilization?	BT-1	Remember
8.	Classify the methods used for stabilization of tracks in poor soil.	BT-2	Understand
9.	Explain about marshaling yard.	BT-2	Understand
10.	Outline the use of 'formation in embankment' with neat sketch.	BT-2	Understand
11.	Summarize the materials required for laying of track.	BT-2	Understand
12.	Outline on surface drainage.	BT-2	Understand
13.	Build points on various platforms in railways.	BT-1	Remember
14.	Develop points on principle of measured shovel packing.	BT-2	Understand
15.	Give the classification of yards.	BT-1	Remember
16.	Differentiate embankment and cutting.	BT-2	Understand
17.	Differentiate between 'loop' and 'siding'.	BT-1	Remember
18.	Define halt station.	BT-1	Remember
19.	Distinguish 'gravity yard' and 'hump yard'.	BT-2	Understand
20.	Explain Cole's method.	BT-2	Understand
21.	Give the classification of Railway stations.	BT-1	Remember
22.	Build points on directed track maintenance.	BT-1	Remember
23.	Summarize the operations to be carried out for drainage in track.	BT-2	Understand
24.	Compose Signalling.	BT-1	Remember
25.	Compose block station.	BT-1	Remember

## PART – B

1.	Describe in detail about plate laying techniques.	BT-3	Application
2.	Explain relaying of track in detail.	BT-3	Application
3.	List out the type of railway stations and explain each one of them in detail.	BT-4	Analyze
4.	Write short notes on i). Track drainage (6) ii). Explain the advantages of track maintenance. (7)	BT-3	Application
5.	Discuss in detail about methods of track maintenance.	BT-3	Application
6.	Explain the sub formation soil stabilization methods in detail.	BT-3	Application
7.	Discuss in detail the materials required for track laying and also write factors considered in the construction of railway track.	BT-4	Analyze
8.	Classify the stages in construction of railway track and explain in detail.	BT-3	Application
9.	i) Calculate the quantity of all the materials required for track laying. (6) ii) Explain the factors governing track alignment. (7)	BT-3	Application
10.	i). Explain in detail about the passenger amenities to be provided in a railway station. (9) ii). Explain the purpose of different types of yards. (4)	BT-4	Analyze
11.	Explain in detail. i) Wayside Station. (3) ii) Branch line siding. (4) iii) Junction Station. (3) iv) Passenger Platform. (3)	BT-4	Analyze
12.	Explain in detail when a branch line called as siding and the circumstances wayside station to be selected.	BT-4	Analyze
13.	Design and draw a neat sketch of marshaling yard and explain detail.	BT-3	Application
14.	Compose the types of signals.	BT-3	Application
15.	Calculate the materials required to lay a 1 km length BG line with sleeper density of $M + 7$ and with rails weighing 52 kg per m.	BT-4	Analyze
16.	How are railway stations classified? Explain the features of each station.	BT-3	Application
17.	Illustrate self-explanatory diagrams of crossing station, junction station and terminal station.	BT-4	Analyze

## PART-C

1.	Summarize the working principle of Measured shovel packing and list the equipment's used for M.S.P.	BT-4	Analyze
2.	Develop points on maintenance of railway bridges.	BT-4	Analyze
3.	Explain in detail modern methods of track construction and maintenance.	BT-3	Application

4.	Elaborate the facilities to be provided for passengers at the station yard.	BT-3	Application
5.	Explain two methods of plate laying in detail with neat sketch.	BT-4	Analyze

### UNIT – III: AIRPORT PLANNING

Air transport characteristics -airport components - airport classification – ICAO – airport planning:  
Site selection typical Airport Layouts, Case Studies, parking and Circulation Area.

#### PART - A

Q.No	Questions	BT Level	Competence
1.	List the components of an airport.	BT-1	Remember
2.	List the components of an aircraft.	BT-1	Remember
3.	Tell the advantages of air transport.	BT-1	Remember
4.	Write the objectives of airport master plan.	BT-1	Remember
5.	Write the airport parking configuration.	BT-1	Remember
6.	Describe the general classification of airport.	BT-1	Remember
7.	Distinguish terminal apron and cargo apron.	BT-2	Understand
8.	Predict why regional planning is to be done.	BT-2	Understand
9.	Discuss the characteristics of airport layout.	BT-2	Understand
10.	Summarize the four groupings of Aircraft parking system.	BT-2	Understand
11.	Illustrate what is a hangar and mention its types.	BT-1	Remember
12.	Show the outline of ICAO master planning process.	BT-1	Remember
13.	Classify airport codes based on aircraft wheel load.	BT-2	Understand
14.	Drawings for layout plan for an airport – explain.	BT-2	Understand
15.	Comment on the sequence of passenger flow in an airport.	BT-2	Understand
16.	Analyze the importance of preplanning for an airport project.	BT-2	Understand
17.	Prepare a typical layout of airport for a single runway and two parallel runways.	BT-2	Understand
18.	Prepare a list of data's to be collected before site selection.	BT-1	Remember
19.	Summarize how the size of gate position decided.	BT-1	Remember
20.	Recommend the criteria for site selection.	BT-1	Remember
21.	Write the difference between cross wind component and wind coverage.	BT-1	Remember
22.	What is transitional surface in airport design?	BT-1	Remember
23.	What are the factors influencing runway length?	BT-2	Understand
24.	State the primary functions of an airport drainage system.	BT-2	Understand
25.	What is clear zone?	BT-2	Understand

#### PART – B

1.	i) List the factors to be considered for the selection of site for a commercial airport. (6)	BT-3	Application
----	---	------	-------------



	ii) Explain the importance of airport planning. (7)		
2.	What is a master plan? Explain the recommendation by ICAO & FAA master plan in detail.	BT-4	Analyze
3.	i) List out the classification of airport. (7) ii) Examine the socio-economic characteristics of catchment area. (6)	BT-3	Application
4.	Describe the necessity, functions and types of hangers.	BT-3	Application
5.	i) Summarize the survey that is to be done for airport location (6) ii) Summarize the planning consideration of a terminal building. (7)	BT-4	Analyze
6.	Briefly explain how the size of apron decided.	BT-4	Analyze
7.	i) Describe briefly the salient features and functions of aprons in an airport. (6) ii) Classify the different flying activity. (7)	BT-3	Application
8.	i) What are the passenger facilities, required at an airport terminal? Explain using sketches. (6) ii) Analyze the relationship between aircrafts and airports. (7)	BT-4	Analyze
9.	Analyze how the aircraft characteristics importance in designing of airport.	BT-4	Analyze
10.	Describe about i) Motor vehicle parking area & its patterns. (6) ii) Aircraft parking system. (7)	BT-3	Application
11.	Briefly explain how the size of apron decided.	BT-3	Application
12.	Explain with neat sketch the typical layout of airport based on runway configuration.	BT-4	Analyze
13.	Draw a typical layout of any international airport in India and explain its concept.	BT-4	Analyze
14.	Discuss the advantage, disadvantage of air transportation and list the aircraft characteristics for airport planning.	BT-3	Application
15.	Discuss with neat sketch the four factors you would keep in mind to select the site for airport.	BT-3	Application
16.	Explain the facilities to be provided in the international and domestic terminal at an airport.	BT-4	Analyze
17.	Explain in detail the parking patterns and systems at airport along with the runway configuration	BT-3	Application

### PART-C

1.	What is an airport master plan? Briefly describe the steps in its formulation.	BT-3	Application
2.	Write about a Case study of any one Typical airport layout.	BT-3	Application
3.	i) Describe the points to be considered for the site selection of airports. (6) ii) Summarize briefly the various geometrics of the runway as recommended by the ICAO. (9)	BT-4	Analyze
4.	Bring out the purpose of airport imaginary surfaces.	BT-4	Analyze
5.	Explain in detail the vital factors to be kept in mind as an Airport Planner of International airport.	BT-3	Application

## UNIT – IV: AIRPORT DESIGN

Runway Design: Orientation, Wind Rose Diagram, Problems on basic and Actual Length, Geometric Design – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings.

### PART – A

Q. No	Questions	BT Level	Competence
1.	How orientation of runway is done? On what basis it is decided?	BT-1	Remember
2.	What is a wind rose diagram?	BT-1	Remember
3.	List the elements to be considered in the Geometric design of runways.	BT-1	Remember
4.	Describe bypass taxiway.	BT-1	Remember
5.	Define clear zone.	BT-1	Remember
6.	Define turning zone.	BT-1	Remember
7.	Differentiate runway and taxiway.	BT-2	Understand
8.	Differentiate between VFR and IFR.	BT-2	Understand
9.	Discuss airport markings.	BT-2	Understand
10.	Differentiate type I and type II wind rose diagram.	BT-2	Understand
11.	Illustrate the purpose of installing visual aids in a airport.	BT-1	Remember
12.	Classify the cases that are to be considered in deciding the basic runway length.	BT-1	Remember
13.	Show the importance of various imaginary surfaces around the airport.	BT-2	Understand
14.	Explain the term cross wind components and wind coverage.	BT-2	Understand
15.	Classify the elements of airport lightings.	BT-1	Remember
16.	Air traffic control aids- explain.	BT-1	Remember
17.	Integrate zoning laws.	BT-2	Understand
18.	Prepare the list of factors affecting runway capacity.	BT-1	Remember
19.	Turning radius in a taxiway is decided based on what?	BT-2	Understand
20.	Explain the factors to be considered in locating exit taxiways.	BT-2	Understand
21.	How do you select the site for terminal building?	BT-1	Remember
22.	Define exit taxiway.	BT-1	Remember
23.	Define ‘number of gate position’	BT-1	Remember
24.	Define calm period.	BT-1	Remember
25.	What is clear zone?	BT-2	Remember

### PART B

1.	What are the items to be considered in the geometric design of runway and explain it in detail.	BT-3	Application
2.	Describe about the geometric design standards of taxiway and also explain Exit taxiway.	BT-3	Application



3.	i) List out the design consideration in taxiway lighting. (6) ii) Tabulate the different elements of airport lighting and explain any two. (7)	BT-4	Analyze
4.	Explain what are different control surfaces at an airport? Explain the concepts of airport zoning with the help of sketches.	BT-3	Application
5.	Discuss in detail about i) Various design factors to be considered in determining the thickness of pavement. (6) ii) Special consideration for pavement design. (7)	BT-4	Analyze
6.	Summarize and explain the services and facilities to be provided for the passengers in an airport.	BT-3	Application
7.	Distinguish between Type I and Type II wind rose diagrams. Explain how the optimum runway orientation is determined?	BT-4	Analyze
8.	Describe briefly about taxiway markings and lightings.	BT-3	Application
9.	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. (6) ii) The runway length required for landing at sea level in standard atmospheric condition is 3000m. Runway length required for take-off at a level site at sea level in standard atmospheric condition is 2500m. Aerodrome reference temperature is 25°C & that of standard atmosphere at aerodrome elevation of 150m is 14.025°C. If the effective gradient is 0.5%, determine the required runway length. (7)	BT-3	Application
10.	Explain in brief: i) Clear Zone. (3) ii) Approach zone (3) iii) Turning zone (3) iv) Buffer zone. (4)	BT-4	Analyze
11.	Analyze the different methods for designing flexible pavements and explain any two in detail.	BT-4	Analyze
12.	i) 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. (6) ii) Analyze the cases usually considered in determining the basic runway length. (7)	BT-3	Application
13.	Describe the importance of runway lighting. Explain threshold lighting with the help of sketches.	BT-4	Analyze
14.	Explain the various runway and taxiway markings.	BT-4	Analyze
15.	Explain in detail about the design elements to be considered for the taxiway of International airport.	BT-3	Application
16.	Illustrate and explain about airport zoning and airport lighting.	BT-4	Analyze
17.	Describe in detail about the runway geometric recommended by ICAO.	BT-3	Application

### PART – C

1.	i) What are the facilities to be provided in the terminal of international airport. (8) ii) Describe the importance of runway lighting. Explain about threshold lighting with neat sketch. (7)	BT-3	Application
2.	Explain briefly about the Geometric design of runways.	BT-4	Analyze
3.	Write about the Elements of Taxiway Design.	BT-4	Analyze
4.	What are the different types of terminals? Explain its concepts with neat sketch.	BT-3	Application
5.	Draw the layout of Chennai airport and explain the salient features and facilities provided.	BT-3	Application

### UNIT – V: HARBOUR ENGINEERING

Definition of Basic Terms: Harbour, Port, Satellite Port, Docks, Waves and Tides – Planning and Design of Harbours: Harbour Layout and Terminal Facilities – Coastal Structures: Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage – Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works – Coastal Regulation Zone, 2011.

### PART – A

Q. No	Questions	BT Level	Competence
1.	How is breakwater classified?	BT-1	Remember
2.	Write in short about the features of port.	BT-1	Remember
3.	List source of the special types of break water.	BT-1	Remember
4.	What do you understand by littoral drift?	BT-1	Remember
5.	What is a graving dry dock?	BT-1	Remember
6.	Why a shore protection work is needed?	BT-1	Remember
7.	How are waves classified?	BT-1	Remember
8.	Define marine survey.	BT-1	Remember
9.	Define free port.	BT-1	Remember
10.	Differentiate Quay and Pier.	BT-2	Understand
11.	Distinguish between diurnal and semi-diurnal tides.	BT-2	Understand
12.	Describe wharf. Name the types.	BT-2	Understand
13.	Difference between jetty and wharf.	BT-2	Understand
14.	Distinguish between the natural and artificial Harbour.	BT-2	Understand
15.	Distinguish between Dolphins & Jetties.	BT-2	Understand
16.	Classify Harbour based on location.	BT-1	Remember
17.	Illustrate coastal shipping with an example.	BT-1	Remember
18.	Mention any two erosion protection Methods in Coastal Zone.	BT-1	Remember
19.	Mention some of the features of a harbour.	BT-2	Understand
20.	Explain Breakwater.	BT-2	Understand
21.	How to design the entrance of a harbor?	BT-2	Understand
22.	Prepare the list of requirements that is to be considered during	BT-1	Remember

	design of port.		
23.	How is Inland Water Transport different from sea transport?	BT-2	Understand
24.	Summarize about marine survey.	BT-1	Remember
25.	Summarize the requirements of good port.	BT-1	Remember

### PART-B

1.	Draw a neat sketch of a harbour layout & show the Various Components. Mention the objectives of each.	BT-3	Application
2.	What is a fender. Explain in detail about its types and classification.	BT-3	Application
3.	Write in detail about Inland water transports and coastal protection works.	BT-4	Analyze
4.	Define dredging? Explain the reasons for its adoptions. How dredged Materials are disposed off?	BT-4	Analyze
5.	i) Discuss the factors to be considered while selecting a suitable site for the construction of a port. (6) ii) Distinguish Between Pier Wharf. Explain their utility with the help of sketches. (7)	BT-3	Application
6.	Discuss in detail about the environmental concern required for port operation.	BT-3	Application
7.	i) What are the functions of wet Docks? Explain with Sketches, their working & main features. (8) ii) Explain with sketch the features of a composite Breakwater. (5)	BT-4	Analyze
8.	Classify harbours on broad basis and on the basis of utility and explain them.	BT-3	Application
9.	i) Classify different types of break water. Explain any one in brief. (6) ii) Define a port and bring out the differences between a port and a harbor. What are the requirements of good port? (7)	BT-3	Application
10.	Explain the facilities to be provided in a port.	BT-4	Analyze
11.	Explain in brief: i) Littoral drift (3) ii) Wharves and Jetties (4) iii) Fenders (3) iv) Mooring accessories (3)	BT-4	Analyze
12.	Explain different types of break waters with neat sketches.	BT-4	Analyze
13.	Discuss the tides and wave effects and its action on coastal structures.	BT-3	Application
14.	Explain clearly about the coastal regulation zone, 2011.	BT-3	Application
15.	Explain in detail the classification of harbours.	BT-4	Analyze
16.	Explain the different components of port with neat sketch.	BT-4	Analyze
17.	Explain the salient features of coastal regulation zone notification 2011.	BT-4	Analyze

## PART – C

1.	Describe briefly the functions of fixed and floating signals with necessary sketches.	BT-3	Application
2.	Explain the different types of wind rose diagram for determining the harbour entrance.	BT-3	Application
3.	Briefly explain the various types of dredging.	BT-4	Analyze
4.	Explain about the wave action on Coastal Structures and Coastal Protection Works.	BT-4	Analyze
5.	Explain in detail about piers, quays and docks along with their salient features and application.	BT-3	Application

