

# **TRANSPORTATION ENGINEERING-II**

Subject Code: **A70143**

Regulations: **R15 - JNTUH**

Class : **IV Year B.Tech CE I Semester**



**Department of Civil Engineering**

**BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY**

Ibrahimpatnam - 501 510, Hyderabad

## **TRANSPORTATION ENGINEERING-II (A70143) COURSE PLANNER**

### **I. COURSE OVERVIEW:**

The course introduces various modes of transportation systems like railways, Airways, Seaports and harbours. It addresses the various requirements to be provided for effective functioning of

these systems. It also impart knowledge regarding various components like (i) Rails, sleepers, ballast, signals super elevations etc in railways, (ii) Runways, Taxiways, Aprons, Terminal building facilities, Airport considerations signage's etc (iii) jetties, ware houses, Break waters piers etc. It also helps in understanding how each system functions their importance and limitations. Standards framed by various bodies for the smooth and convenient functioning of various components, design and implementations The course also introduces to various advanced technologies used in transportation like ITS

## II. PREREQUISITE(S):

Level	Credits	Periods/Week	Prerequisites
UG	4	4	Transportation engineering II

## III. COURSE OBJECTIVES:

**The objective of the teacher is to impart knowledge and abilities to the students to:**

- I. **Introduce** different transportation systems and their importance and their role in development
- II. **Understand** standards and norms of National and International organisations which are framed for efficient functioning of existing transport systems
- III. **Impart** Knowledge regarding the functioning of various components like rails, sleepers, Tracks, Geometric curves, Runways, Taxiways Aprons Wear houses, Jetties etc
- IV. **Design** elements like horizontal curves, vertical curves, super elevation etc

## IV. COURSE OUTCOMES:

**After completing this course the student must demonstrate the knowledge and ability to:**

1. **Gain knowledge** regarding various specifications and standards set by organisations and official bodies.
2. **Differentiate** the working of various transport systems and their working in different scenarios
3. **Understanding** the functions of various components in Rail, Air, Water transport systems and their importance.
4. Capable of carrying out surveys needed to be done while constructing Railways Airports and seaports
5. Have a in depth knowledge on curve sections super elevations and many other design elements
6. **Explain** the working of various design elements used in different Transport systems
7. **Calculate** entities like maximum permissible loads on rails ,degree of curves, permissible speeds on various gauges etc
8. **Prepare** master plans for Airports, harbour site considering natural phenomenon and different harbour railway airport elements
9. **Exposure** to new technologies which are currently in use for safe and efficient travel
10. **Predict** the upcoming trends and changes which are likely to take place in transport and travel modes.
11. Introduce the recent advancements in the field of Sustainable Urban Development, Traffic Engineering and Management, Systems Dynamics Approach to Transport Planning
12. Participate and succeed in competitive examination like GATE, PSUs and IES etc

**V. HOW PROGRAM OUTCOMES ARE ASSESSED:**

<b>Program outcomes</b>		<b>Level</b>	<b>Proficiency assessed by</b>
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an	H	Assignments, Exams
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	H	Assignments, Exams
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	S	Assignments
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	S	Assignments
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	S	-
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	H	Exams
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	S	Exams, Assignments
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	S	Quizzes, Discussions
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	S	Lectures, Discussions
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	S	Lectures, Discussions
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	S	Possible Projects
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long	S	Discussions

	learning in the broadest context of technological change.		
--	---	--	--

#### VI. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program outcomes		Level	Proficiency assessed by
PSO 1	<b>ENGINEERING KNOWLEDGE:</b> Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication	H	Lectures, Assignments, Exams
PSO 2	<b>BROADNESS AND DIVERSITY:</b> Graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.	H	Lectures, Assignments, Exams
PSO 3	<b>SELF-LEARNING AND SERVICE:</b> Graduates will be motivated for continuous self-learning in engineering practice and/or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.	S	Guest Lectures, Possible Group Projects, Industrial Internship

#### VII. SYLLABUS:

##### UNIT – I:

**Introduction to Railway:** permanent way components-cross section of permanent way-functions of various components like Rails, sleepers and Ballast, Gauge-Creep of Rail-Theories related to creep-sleeper density

##### UNIT – II:

**Geometric Design of Railway Track:** Gradients-Grade Compensation-Cant and Negative Super elevation-Cant Deficiency-Degree of Curve, Points and Crossing, Rail joints & Welding of joints, Railway station& Yards, Signalizing & Interlocking.

### **UNIT – III:**

**Airport Engineering:** Airport site selection-Runway Orientation-Basic Runway Length-Corrections for Elevation, Temperature-Airport Classification-Runway Geometric design-Factors Controlling Taxiway layout-Terminal Area-Hangar-Blast considerations, Typical Airport Layouts-Wind rose diagram-Runway Lightening system & Marking.

### **UNIT – IV:**

**Port and Harbour Engineering:** Requirements of port and Harbour, Classification of port& Harbour, Features of a Harbour, planning of Harbour, Breakwaters, Dry docks, jetties, Aprons, Transit shed and Warehouses, Navigational aids, Maintenance of port and Harbours, Inland Water Transport.

### **UNIT – V:**

**Intelligent Transport Systems:** ITS Definition, Benefits of ITS, user services, Detectors, Automatic Vehicle Location(AVL), Automatic Vehicle Identification(AVI), Introduction to ITS applications; Advanced Traffic Management systems(ATMS), Advanced public Transportation systems(APTS), ITS architecture components and standards, overview of ITS implementations in developed countries

### **SUGGESTED BOOKS:**

#### **Textbooks:**

1. Satish Chandra and Agarwal, M.M (2007) “Railway Engineering” Oxford Higher Education, University Press New Delhi.
2. Airport Planning and Design S. K khanna and M.G Arora, Nemchand Bros.
3. A Text book of transportation Engineering – S.P. Chandola S.Chand &Co.Ltd (2001)
4. Transportaion Engineering and Planning C.S Papacostas, P.D Prevedouros.

#### **REFERENCE BOOKS:**

1. A Text book of railway Engineering S.C Saxena and S.Arora, Dhanpatri and Sons, New Delhi.
2. Highway, Railway, Airport and Habour Engineering - K.P. Subramanian.
3. Harbour, Dock and Tunnel Engineering – R.Srinivasan.
4. Dock and Harbour Engineering - Hasmukh P Oza, Gutam H Oza.

#### **NPTEL WEB COURSE:**

<http://nptel.ac.in/courses/105107123/>

#### **NPTEL VIDEO COURSE:**

<http://nptel.ac.in/courses/105107123/#>

### **GATE SYLLABUS:**

**Introduction to Railway:** permanent way components-cross section of permanent way-functions of various components like Rails, sleepers and Ballast, Gauge-Creep of Rail-Theories related to creep-sleeper density.

**Geometric Design of Railway Track:** Gradients-Grade Compensation-Cant and Negative Super elevation-Cant Deficiency-Degree of Curve, Points and Crossing, Rail joints & Welding of joints, Railway station& Yards, Signalizing & Interlocking.

**Airport Engineering:** Airport site selection-Runway Orientation-Basic Runway Length-Corrections for Elevation, Temperature-Airport Classification-Runway Geometric design-Factors Controlling Taxiway layout-Terminal Area-Hangar-Blast considerations, Typical Airport Layouts-Wind rose diagram-Runway Lightening system & Marking.

**IES SYLLABUS:**

**Introduction to Railway:** permanent way components-cross section of permanent way-functions of various components like Rails, sleepers and Ballast, Gauge-Creep of Rail-Theories related to creep-sleeper density.

**Geometric Design of Railway Track:** Gradients-Grade Compensation-Cant and Negative Super elevation-Cant Deficiency-Degree of Curve, Points and Crossing, Rail joints & Welding of joints, Railway station& Yards, Signalizing & Interlocking.

**Airport Engineering:** Airport site selection-Runway Orientation-Basic Runway Length-Corrections for Elevation, Temperature-Airport Classification-Runway Geometric design-Factors Controlling Taxiway layout-Terminal Area-Hangar-Blast considerations, Typical Airport Layouts-Wind rose diagram-Runway Lightening system & Marking.

**VIII. COURSE PLAN:**

Lecture No.	Week	Unit	Topics to be covered	Learning Objective	References
1.	1	1	Introduction to railway	Explain the importance of railways in connectivity and development. Understand how the railway functions are administered. Various subsidiaries that work in railways etc	T1: 1.1-6, 2.6-8
2.	1	1			
3.	1	1	Permanent way components	Explain rail gauge system in Indian railways, Feasibilities considerations and limitations Define Permanent way and introduce to its components and explain cross section of a permanent way	T1: 31.37 T1: 31.37
4.	1	1			
5.	2	1			
6.	2	1	Rails	Explain the function of Rails, Types of rail sections.Understanding Rail and wheel interaction, Arrangement of wheels in locomotives	T1:81-97
7.	2	1			
8.	2	1	Sleepers and ballast	Understand the importance of sleepers Explain Requirements of ideal sleepers, Types of sleepers etc Ballast and its considerations	T1: 97-106
9.	3	1			
10.	3	1	Creep in rails	Understanding Creep in rails Explain causes for creep, problems caused by creep	T1: 191-.193
11.	3	1			T1: 191-.193
12.	3	1	Theories related to creep.	Explain various theories of creep	T1: 191
13.	4	1	Sleeper density	Explain sleeper density, how it varies for	T1: 106

				different gauges. Factors that determine sleeper density etc	
14.	4	2	Gradients	Define Gradients, Objectives, types of gradients	T1: 197.-199
15.	4	2	Grade compensation and cant	Explain Grade compensation for different gauges, Various terminology Centrifugal force on a curved track	T1:200
16.	4	2			
17.	5	2	Cant deficiency and Negative super elevation	Derive safe speed of trains explain about negative super elevation	T1: 9.6-7
18.	5	2	<b>Degree of curve</b>	Explain about Horizontal curves and Degree of curvature vertical curves and Problems regarding them	T1: 201-233
19.	5	2			
20.	5	2			
21.	6	2	Points and crossings	Explain the terminology used in points and crossing, Types of crossings Understanding Turnouts	T1:254-273
22.	6	2			
23.	6	2			
24.	6	2	Railway stations and yards	Explain Track junction ,facilities of	T1: 451-
25.	7	2			
26.	7	2	Signalizing and interlocking	Understanding the importance of signals .Types of signals on various basis and different classifications	T1: 578-551
27.	7	2			
28.	7	2			
29.	8	2	Various signal systems and interlocking	Explain different terminology and its purpose and importance	T1:551-574
30.	8	3	Introduction to Airport Engineering and Airport site selection	Explain about types of airports, Importance of Air Transport, Factors affecting airport site selection	T2: 8.1.8-8
31.	8	3			
32.	8	3	Runway orientation	Define Runway, Aircraft characteristics which influence runway design Elements of runway	T2: 8.2.1.-8.6.3
33.	9	3	Basic Runway length	Explain different types of runways, Basic runway length,	T2: 8.3.1-8.6.10
34.	9	3	Corrections for Elevation, temperature	Explain the corrections done in runway design in detailed	T2: 8.6.12-8.6.13
35.	9	3	Taxi ways.	Explain the importance of taxiways location, criteria to be followed in taxiway layout	T2: 8.7.1-8.7.10
36.	9	3			
37.	10	3			
38.	10	3	Terminal area	Understand functions of Terminal Building, Explain components of passenger terminal system	T2: 9.6-7
39.	10	3	Apron and Hangar	Explain the importance and purposes of Apron and Hangar and their corresponding entities	T2: 9.6-7
40.	10	3	Airport layout	Explain about various airport layout with international case studies as example	T2:9.6-11

41.	11	<b>3</b>	Blast considerations	Define various pavements used in runways Explain various specifications	T2: 4.1
42.	11	<b>3</b>	Wind rose diagram	Explain wind rose diagram Understanding how a runway orientation affected by wind rose diagram Understanding how to read a win rose diagram	T8: 6.6 - 8.6.7
43.	11	<b>3</b>	Runway Lighting	Requirements for visual aids , Explain about Airport beacon Configurations	T2: 8.7.6-8.7.4
44.	11	<b>3</b>			
45.	12	<b>3</b>			
46.	12	<b>4</b>	Introduction to water Transportation Requirements of Port and Harbour	Explain about importance of water transportation Basic requirements of ports and harbours	T1: 7.1-3
47.	12	<b>4</b>	Classification of ports and harbours	Explain various classification of ports and harbours and their basis for classification with necessary examples	T1: 7.4-7
48.	12	<b>4</b>	Features of harbours and ports and planning	Discussion of master plan preparation for ports with an example and necessary features and explanation of various forces of winds, tides etc that act on ships and vessels and various marine structures	T3: 9.6-7
49.	13	<b>4</b>			
50.	13	<b>4</b>			
51.	13	<b>4</b>	Break waters	Importance of break waters, Types of break waters Design criteria etc	T3: 9.6-7
52.	13	<b>4</b>	Docks	Dry docks and docks purpose and differences	T3:9.6-11
53.	14	<b>4</b>	Jetties	Types of jetties and purpose of jetties, Wharves and Quays and their importance	T3: 9.6-7
54.	14	<b>4</b>	Transit sheds and ware houses	Explain Transit sheds and wear houses, requirements and purpose	T3: 9.6-7
55.	14	<b>4</b>	Navigational aids	Explain necessity of navigational aids, Light house and construction signals and types of signals	T3:9.6-17
56.	14	<b>4</b>			
57.	15	<b>4</b>	Maintenance of ports and harbours and inland water transport	Describe the impact of coastal zones and beach profiles. Justify the need for berth nourishment Describe the function of water houses and the methods to maintain them. Describe the features of protection	T3:9.6-67
58.	15	<b>5</b>	ITS, Benefits, User services	Explain about ITS, Benefits, Need for ITS, User services 1Travel and traffic management 2. Public transportation operations 3. Electronic payment .4. Commercial vehicle operations	T4: 12.1-3
59.	15	<b>5</b>			

				5. Advance vehicle control and safety systems 6. Emergency management	
60.	15	5	Detectors	Explain different types of sensors and detectors	T4: 12.4-11
61.	16	5	Automatic vehicle location and identification Advance traffic management systems	Traffic management Travel information systems Transit vehicle communication and signal priority Dynamic message signs	T4: 12.4-11
62.	16	5			
63.	16	5	ITS architecture components and standards	National ITS architecture Evaluation of ITS Logical and physical architectures	T4: 13.1-9
64.	16	5	Overview of ITS implementations in developed countries	Case studies regarding various ITS applications world wide	T4: 14.1-8

**IX. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Objectives					Program Outcomes					Program Specific Outcomes					
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
I	S	H										H		S	
II	H	S										H	S		
III			H			S						H	S		
IV										S		S	H		

**X. QUESTION BANK: (JNTUH)**

**UNIT-I**

**SHORT ANSWER QUESTIONS:**

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1.	Define gauge ?What are the different types of Rail gauges used in India	Remember	7, 8
2.	Define Track capacity?	Apply	9
3.	What is coning of wheels ?	Understand	5
4.	When and between which two stations the first railway service was started?	Remember	5
5.	Write about Whyte system and give an example ?	Understand	6, 9
6.	Write a short note on meter gauges and its classification?	Remember	7, 8
7.	Define permanent way?	Understand	9, 7
8.	What is ballast? Name different types of ballast?	Remember	6,7,9

9.	Define formation? And what are its functions?	Remember	7
10.	Define creep?	Understand	5
11.	What are the factors restricting the length of rails?	Remember	5

### LONG ANSWER QUESTIONS:

S.NO	Question	Blooms Taxonomy Level	Program me Out come
1	Write about the centrifugal force on a curved track with neat sketch? Explain about Equilibrium super elevation with necessary derivation?	Understand	1, 3, 7
2	What are different types of sleepers used in Railways? Using the sleeper density of $N + 5$ Determine the number of sleepers required for the construction of a 1800-m long BG Track?	Apply	2, 5, 1
3	Discuss the factors on which sleeper density depends? How sleeper density is expressed? Determine the number of sleepers required for the construction of 640m long BG Track ensuring sleeper density of $N + 7$	Apply	1,2,3
4	What are the factors governing the choice of gauge while construction of a railway line? Explain?	Remember	2.8,10
5	Discuss the ill effects of Multi gauge system	Understand	2,7,9
6	Write about the following with corresponding sketches I) Percussion theory II) Drag theory	Understand	2,6
7	(a)What are the requirements of ideal sleepers? (b) what do you understand by adzing of sleepers? Explain?	Apply	7
8	What are the requirements of an ideal permanent way?	Remember	8, 9
9	Discuss the causes of creep?	Understand	10
10	Explain wave theory of creep in rails with neat sketch?	Understand	1

### UNIT-II

#### SHORT ANSWER QUESTIONS:

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1	What are vertical curves? Name the types of vertical curves?	Remember	5
2	What is the function of vertical curve?	Understand	7
3	Define grade compensation? Write its values for BG, MG and NG	Remember	b, i
4	What is negative super elevation?	Remember Apply	8, 7
5	Define cant deficiency? What are its considerations?	Remember	4
6	What is the function of points and crossings?	Remember	4

7	Define crossing?	Remember	5
8	Write about trap indicator?	Remember	7, 12
9	What are sighting boards? Where to position them?	Understand	8.6
10	What Are The methods Of Welding Rail joints?	Remember	7,9

**LONG ANSWER QUESTIONS:**

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1.	Write about classification of signals based on various characteristics?	Analyze	6
2.	What are different types of gradients used in Indian Railways? Explain?	Understand	5
3.	Write a short note on following a) Switches b) Stock rails	Understand	4
4.	What are the components of monitoring system in electrical signaling?	Apply	5
5.	(a)What is semaphore signal? Explain its working principle? (b)Explain the modified lower quadrant semaphore signal system?	Understand	6
6.	(a) What are the types of colored light signals and write what each signal indicate? (b) Write about trap indicator?	Remember	9
7.	Write about classification of station yards?	Remember	3
8.	What are different types of rail joints? Explain with neat sketches?	Remember	5
9.	Explain various types of stop signals with reference to location on their station?	Remember	5
10.	Write about centrifugal force on a curved track and equilibrium super elevation with neat sketch?	Apply	7

**SHORT ANSWER QUESTIONS:**

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1.	What any four major problems faced by Airlines?	Understand	5
2.	Define Taxi ways?	Understand	7, 12
3.	Define calm period?	Understand	5
4.	Write a short note on Apron?	Understand	7, 11
5.	Define Hangar?	Remember	6,10
6.	What are visual Aids?	Remember	8, 7
7.	What are different types of airport markings?	Understand	9, 12
8	Give abbreviations VFR, ICAO?	Remember	9
9.	What are the different stresses induced in the flexible pavement?	Understand	5
10.	What are the factors affecting in flexible pavement?	Remember	5

**LONG ANSWER QUESTIONS:**

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1.	What is wind rose diagram? Explain it with a neat sketch?	Understand	3
2.	Monthly mean of average daily temperature for the hottest month of year at an airport site is 40 degree centigrade. Monthly mean maximum daily temperature for the same month of the year is 50 degree centigrade. calculate the airport reference temperature if the site is at mean sea level with a level ground. Determine the actual runway length provided?	Apply	4
3.	Write about classification of airports? Discuss them in detail?	Understand	1
4.	What are the major factors that influence site selection of an airport? Describe any three of them in detail?	Remember	2, 8, 11
5.	Write about Runway configurations?	Understand	2, 7, 6
6.	What are the objectives of civil aviation?	Remember	2, 8
7.	Explain Master plan for an airport?	Understand	3,4
8.	Write about passenger terminal system and its components?	Remember	7,8
9.	Write a short note on various corrections used in runway design of an airport?	Apply	7
10.	What is Airport reference code? Explain in detail?	Apply	1

**UNIT-IV**

**SHORT ANSWER QUESTIONS:**

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1	Define inland water transport?	Remember	1
2	What do you understand by Tidal range?	Understand	5
3	Define break waters?	Understand	7
4	Define piers?	Remember	7,8,9
5	What are floating light stations?	Remember	1
6	Define spring Tides?	Remember	3
7	Define Neap Tides?	Remember	5
8	Define Wharves?	Understand	6 11
9	What are Quays?	Remember	7, 8
10	What are Jetties?	Remember	5, 8

**LONG ANSWER QUESTIONS:**

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1	Define Harbour? Explain classification of harbours?	Remember	8
2	What are the factors that influence the site selection of a harbour?	Remember	8
3	Define port? Explain classification of ports?	Understand	9
4	What are the factors to be considered while designing a port? Write the requirements of a good port?	Understand	7
5	What are break waters? Write about classification of break waters? Explain any one of them?	Understand	6,7
6	What are the different aspects to be considered in the design of break? Discuss them?	Remember	8
7	Write about Jetties?	Remember	1
8	Explain different types of fenders?	Remember	7
9	what are the qualities of good fenders?	Remember	I
10	Write a short note about light house and its construction?	Remember	2,5,9

**UNIT-V****SHORT ANSWER QUESTIONS:**

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1.	Define ITS?	Remember	5
2.	What do you understand by electronic payment?	Understand	10
3.	Write about lateral collision avoidance?	Understand	10
4.	Define Ramp metering?	Remember	2, 4

5.	What are dynamic message signs?	Apply	5
6.	What do you understand by status objects in ITS?	Understand	2
7.	Define smart car?	Remember	2 3
8	What is blind spot?	Remember	4, 5

### LONG ANSWER QUESTIONS:

S.NO	Question	Blooms Taxonomy Level	Programme Out come
1	Explain about ITS architecture?	understand	10
2	What are the benefits of ITS explain them in detail?	Remember	5
3	Write a short note on Travel demand management?	Understand	4
4	Explain the following (a) Pre trip information (b) En route driver information	Apply	5
5	Explain public transportation management?	Understand	6
6	Explain about commercial vehicle operations?	Remember	7,8
7	Write about advanced vehicle control and safety systems?	Remember	9
8	Define Emergency? What are the functions of Emergency management service?	Remember	1
9	What are the challenges faced in integrating ITS to Transport planning?	Remember	7
10	Explain the need for ITS standards?	Understand	1

### XI. OBJECTIVE QUESTIONS: JNTUH UNIT-I & II RAILWAY ENGINEERING

- For developing thinly populated areas, the correct choice of gauge is **c**  
a) Broad Gauge      b) Meter Gauge      c) Narrow Gauge      d) any of the above
- Due to battering action of wheels over the end of the rails, the rails get bent **b**  
down and are deflected at ends. These rails are called  
a) roaring rails      b) hogged rails      c) corrugated rails      d) buckled rails
- The slipping of driving wheels of locomotives on the rail surface causes **a**  
a) wheel burns      b) hogging of rails      c) scabbing of rails      d) corrugation of rails
- The width of foot for 90 R rail section is **c**  
a) 100 mm      b) 122.2 mm      c) 136.5 mm      d) 146.0mm
- The height of the rail for 52 kg rail section is **b**  
a) 143 mm      b) 156 mm      c) 172 mm      d) 129mm
- The formation width for a railway track depends on the **b**  
i) type of gauge      ii) number of tracks to be laid side by side      iii)  
slope of sides of embankment or cutting The correct answer is  
a) only (i)      b) both (i) and (ii)  
c) both (i) and (iii)      d) (i), (ii) and (iii)
- The formation width for a single line meter gauge track in embankment as **b**  
adopted on Indian Railways is  
a) 4.27 m      b) 4.88 m      c) 5.49 m      d) 6.10 m

8. The side slope of embankments for a railway track is generally taken as c  
 a) 1:01 b) 1.5:1 c) 2:01 d) 1:02
9. The formation width for a double line Broad Gauge track in cutting (excluding c  
 drains) as adopted on Indian Railways is  
 a) 6.10 m b) 8.84 m c) 10.21m d) 10.82 m
10. The total gap on both sides between the inside edges of wheel flanges and d  
 gauge faces of the rail is kept as  
 a) 10mm b) 13mm c) 16mm d) 19 mm

### UNIT-III AIRPORT ENGINEERING

1. The threshold markings are d  
 a) 4 m wide and 45 m in length b) 1 m clear space between adjacent  
 c) placed symmetrically on either side of the runway centre line d) all the above.
2. An airport has 4 gates. If the weighted average gate occupancy time is 30 c  
 minutes and gate utilisation factor is 0.5, then the capacity of the gate will be  
 a) 1 aircraft per hour b) 2 aircrafts per hour  
 c) 4 aircrafts per hour d) 16 aircrafts per hour
3. The capacity of parallel runway pattern depends upon d  
 a) weather conditions and navigational aids available  
 b) lateral spacing between two runways and weather conditions  
 c) lateral spacing between two runways and navigational aids available  
 d) lateral spacing between two runways, weather conditions and navigational aids available.
4. The engine failure case for determining the basic runway length may require d  
 a) only clearway b) only stop way  
 c) either a clearway or a stopway d) either a clearway or a stopway or bot
5. The minimum width of clearway is c  
 a) 50 m b) 100 m c) 150 m d) 250 m
6. If the monthly mean of average daily temperature for the hottest month of the c  
 year is  $25^{\circ}\text{C}$  and the monthly mean of the maximum daily temperature of the  
 same month of the year is  $46^{\circ}\text{C}$ , the airport reference temperature is  
 a)  $32^{\circ}\text{C}$  b)  $35.5^{\circ}\text{C}$  c)  $48^{\circ}\text{C}$  d)  $25^{\circ}\text{C}$
7. Consider the following statements regarding ICAO recommendation for a  
 correction to basic runway length
1. The basic runway length should be increased at the rate of 7 percent per 300 m rise in elevation above the mean sea level.
  2. The basic runway length after having been corrected for elevation should be further increased at the rate of 1 percent for every  $1^{\circ}\text{C}$  rise in airport reference temperature above the standard atmospheric temperature at that elevation.
  3. The runway length after having been corrected for elevation and temperature should be further increased at the rate of 20% for every 1 percent of effective gradient.
- Of these statements
- a) 1 and 2 are correct b) 2 and 3 are correct
  - c) 1 and 3 are correct d) 1,2 and 3 are correct
8. The total length of a runway is 1000 m. The elevation at distance 0,200 m, 400 m, 600 m,

800 m and 1000 m are 100.0 m, 99.2 m, 101.0 m, 101.8 m, 101.4 m and 101.0 m respectively. The effective gradient of runway will be. b

- a) 0.10 %    b) 0.26 %    c) 0.43%    d) 0.65 %

9. The length of runway under standard conditions is 2000 m. The elevation of airport site is 300 m. Its reference temperature is 33.05°C. If the runway is to be constructed with an effective gradient of 0.25 percent, the corrected runway length will be

- a) 2500 m    b) 2600 m    c) 2700 m    d) 2800 m

10. As per ICAO, the minimum basic runway length for A and E type of airport will be d

- a) 1500 m and 600 m    b) 2100 m and 750 m  
c) 1500 m and 750 m    d) 2100 m and 600 m

#### UNIT-IV DOCKS AND HARBOUR ENGINEERING

1. Which of the following are repair docks? c

- a) marine railways, dry docks, floating docks, wet docks  
b) dry docks, wet docks, floating docks, lift docks  
c) wet docks, floating docks, lift docks, marine railways  
d) wet docks, lift docks, marine railways, dry docks

2. Which of the following structures protects the shore by trapping of littoral drift?

- a) groynes    b) sea walls    c) revetments    d) moles

3. Which of the following conditions of loading imposes the greatest load on the foundation in case of dry docks? c

- a) when the dock is empty    b) when the dock is empty with the ship of maximum tonnage  
c) when the dock is full of water    d) when the dock is dry and is under construction

4. For designing the dock, the proportion of ship load assumed to be borne by keel blocks is a

- a) 05-Aug    b) 03-Aug    c) Mar-16    d) 5/16

5. A ship strikes the berth generally at an angle d

- a) 90° with the face of the dock    b) 45° with the face of the dock    c) 30° with the face of the dock  
d) 10° with the face of the dock

6. Consider the following statements. d

(i) Fender is the cushion provided on the face of the jetty for ships to come in contact,  
(ii) Slip is the space of water area between two adjacent piers where ships are berthed,  
(iii) Pier head is a structure constructed near the tip of break water near the harbor entrance. Of the statements

- a) (i) and (ii) are correct    b) (ii) and (iii) are correct  
c) (i) and (iii) are correct    d) (i), (ii) and (iii) are correct

7. A ship is berthed in a chamber and lifted by principles of buoyancy. Such a chamber is called. c

- a) Dry dock    b) Wet dock    c) Floating dock    d) Refuge dock

8. Assertion A: Depth and width required at the entrance to a harbour are more than those required in the channel. a

Reason R: The entrance to a harbour is usually more exposed to waves as compared to the harbour itself.

Select your answer based on the coding system given below:

- a) Both A and R are true and R is the correct explanation of A.  
b) Both A and R are true but R is not the correct explanation of A.

- c) A is true but R is false. d) A is false but R is true.
9. When a ship floats at its designed water line, the vertical distance from water line to the bottom of the ship is known as  
 a) beam b) depth c) freeboard d) draft
10. The maximum harbour depth below lowest low water is generally equal to  
 (i) loaded draft + 1.2 m when bottom is rock (ii) loaded draft + 1.8 m when bottom is soft  
 (iii) loaded draft + 1.2 m when bottom is soft (iv) loaded draft + 1.8 m when bottom is rock  
 Of these statements  
 a) (i) and (ii) are correct b) (i) and (iii) are correct  
 c) (ii) and (iv) are correct d) (iii) and (iv) are correct

#### UNIT-V

1. Benefits of ITS\_\_\_\_\_
2. Automatic Vehicle Identification is used to test\_\_\_\_\_
3. What is meant by APTS\_\_\_\_\_
4. Applications Of ITS\_\_\_\_\_

#### XII. GATE QUESTIONS:

NA

#### XIII. WEBSITES:

1. <http://www.asce.org>
2. <http://www.civilengineer.com>
3. <http://www.railwayengg.in>
4. <http://www.trafficengg.com>
5. <http://www.airportengineering.com>

#### XIV. EXPERT DETAILS:

1. Prof. S.K. Bhattacharyya, Department of Civil Engineering, IIT Kharagpur.
2. Dr. Satish C Sharma (IITR)
3. LS Ramachandra & SK Barai (IITKGP)

#### XV. JOURNALS:

1. Indian Journal of Transport Management (IJTM), ISSN 0970-4736
2. Journal of Transportation of the Institute of Transportation Engineers
3. Journal of Transportation Engineering  
 Editor in Chief: Chris T. Hendrickson, Ph.D., Hon.M.ASCE, Carnegie Mellon University
4. Journal of Urban Planning and Development  
 Editor: Gang-Len Chang, Ph.D., M.ASCE, University of Maryland

**XVI. LIST OF TOPICS FOR STUDENT SEMINARS:**

1. Railway Components and Functions
2. Railway Geometric Design
3. Airport Engineering Studies
4. Port & Harbours Design Aspects
5. ITS and Application

**XVII. CASE STUDIES / SMALL PROJECTS:**

1. Railway Components and Functions
2. Railway Geometric Design
3. Airport Engineering Studies
4. Port & Harbours Design Aspects
5. ITS and Application

