

GUJARAT TECHNOLOGICAL UNIVERSITY

3rd Semester Civil Engineering – PDDC

Subject Code & Name : X30602 - Railway, Bridges and Tunnels

Sr. No.	Course content
Part A - Railway	
1.	Introduction: History, Indian Railways, recent developments.
2.	Gauge : Definition, types-Broad gauge, meter gauge, narrow gauge, loading gauge, construction gauge .Problems of change of gauge.
3.	Alignment : Definition, importance, factors, requirements of an ideal alignment.
4.	Permanent way : Definition, requirements.
5.	Rails : Functions, types, flat footed rail, coning of wheels, creep, causes of creep, Effects of creep, Measures to reduce creep.
6.	Sleeper : Functions, requirements, types-concrete, wooden, C.I, Steel, spacing, sleeper density, examples.
7.	Ballast : Function, specifications.
8.	Track fittings : Fittings and fastening
9.	Geometric design : Necessity & parameters of geometric design, gradient-definition, purpose, types ruling, pusher helper, momentum gradient, gradient in station & yards, grade compensation, examples curves-necessity, degree of curve (radius of curve), relationship-versine of a curve & radius, maximum permissible speed on fully transitioned curve, super elevation(Cant), cant deficiency, examples.
10.	Resistance to Traction : Resistance to-friction, wave action, speed, track irregularity, wind, gradient, curvature, starting and accelerating. Stress in rails, sleepers, ballast and formation,
11.	Points and crossings : Functions, various terms, track layouts and sketches of turn out, diamond crossing, gauntleted track, triangle, double junction, cross over-between two parallel tracks with intermediate straight, scissors cross over, single slip, double slip, gatherings line, examples
12.	Stations and yards : Purpose, facilities required at railway stations. Requirements of station yard, classification as per function, wayside (crossing) station layout. Types of yards - definition, layout, functions, principles followed, various types, marshal yard. Layout of wayside stations, junctions and terminals, marshalling yards
13.	Signalling and Interlocking : Objects, classification, electronic signalling. System,
Part B - Bridge	
1.	General : Site investigation, waterway calculations, scours depth, afflux, economic Span.
2.	Classification : Classification of superstructures with respect to structural behaviour and material used, types of substructures, flooring joints, bridge bearings, movable bridges, temporary bridges.
3.	Construction methods : Methods of erection of various types of bridges, Superstructures and substructures.
4.	Maintenance : Testing and strengthening of bridges.

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Subject Code & Name : X30602 - Railway, Bridges and Tunnels

Sr. No.	Course content
Part C – Tunnel	
1.	General : Definition, advantages and disadvantages of tunnel, uses of tunnel, survey, various shape, size and sketches of tunnel for roads and railways, selection of route. Tunnel lining.
2.	Tunnelling in soft ground: Methods of fore-poling and needle beam, shield and use of shield plenum process, transferring centreline.
3.	Tunnelling in hard rock: Methods of tunnelling, tunnel Boring Machine, drilling.
4.	Lighting and Ventilation: Dust control, control of water, safety measures.
<p>Term Work : Term work shall be based on the above mentioned course content.</p> <p>Field Visit : Field visits based on course content are suggested.</p> <p>References Books:</p> <ol style="list-style-type: none">1. Railway Engineering by Saxena S.C. and Arora S. P.2. Principles and practice of bridge engineering by Bindra S. P.3. Tunnel engineering by Saxena S.C.4. Railway Engineering by Satish Chandra and Agrawal M.M.	

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER- III EXAMINATION – SUMMER 2014

Subject Code: X30602**Date: 20-06-2014****Subject Name: Railway, Bridges and tunnels****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Compare Railway transportation with Road transportation on atleast seven points. **07**
(b) Define permanent way with sketch. List out the requirements of ideal permanent way. **07**
- Q.2** (a) Describe the advantages of Uniformity of gauges. **07**
(b) Explain rail failures with neat sketches. **07**
- OR**
- (b) Describe in detail various types of rail joints. **07**
- Q.3** (a) What are the functions of rail sleepers? Enumerate characteristics of Good sleepers. **07**
(b) What is railway crossing? Describe with sketches the types of crossings. **07**
- OR**
- Q.3** (a) Explain with sketches: 1. Chairs, 2. Keys **07**
(b) What is economic span? Derive the formula for economic span **07**
- Q.4** (a) Classify the bridges in detail. **07**
(b) Describe (1) Suspension bridges, (2) Bascule Bridges **07**
- OR**
- Q.4** (a) Enumerate Characteristics of ideal bridge site. **07**
(b) Explain Bridge bearings. What are the functions of bearings in bridges? **07**
- Q.5** (a) Define tunnel. Explain in detail necessity and advantages of tunnel. **07**
(b) How center line transferred to the inside of the tunnel? Explain. **07**
- OR**
- Q.5** (a) Discuss the shapes of tunnel with neat sketches. **07**
(b) Explain forepoling method of tunneling in soft ground. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-III • EXAMINATION – WINTER 2013

Subject Code: X 30602**Date: 20-12-2013****Subject Name: Railway, Bridges and Tunnels****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Give comparison (any seven points) between railway transportation and road transportation. **07**
(b) Enumerate advantages of uniformity of gauges. **07**
- Q.2** (a) Explain in brief permanent way with neat sketch. **07**
(b) What is creep? How will you measure the creep? Explain. **07**
- OR**
- (b) Describe various failures of rails with neat sketches. **07**
- Q.3** (a) Derive the equation of super elevation for the railway track. **07**
(b) Explain various factors affecting selection of a bridge site. **07**
- OR**
- Q.3** (a) How will you calculate economic Span of a bridge? Explain. **07**
(b) Explain concept of coning of wheels with neat sketch. **07**
- Q.4** (a) Give detailed classification of bridges. **07**
(b) What are the data required for bridge design? **07**
- OR**
- Q.4** (a) Explain the followings in brief with neat sketch **07**
(i) Arch Bridge
(ii) Suspension Bridge
(b) Explain the functions of bearings. **07**
- Q.5** (a) Define tunnel. Give the classification of tunnel **07**
(b) Explain needle beam method for tunneling in soft ground. **07**
- OR**
- Q.5** (a) What are the objects of tunnel lining? Explain. **07**
(b) Explain full face method for tunneling in hard rock. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC - SEMESTER-III • EXAMINATION – SUMMER 2013****Subject Code: X 30602****Date: 13-05-2013****Subject Name: Railway, Bridges and Tunnels****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Draw neat sketches of c/s of permanent way, bull headed & flat footed rails. **07**

(b) What are the advantages of uniformity of gauges in railway tracks? Explain in detail. **07**

Q.2 (a) Explain “coning of wheels” with neat sketch. **07**

(b) Explain various rail failures with neat sketches. **07**

OR

(b) What is super elevation? What is necessity of provision of super elevation on the curves of railway track? **07**

Q.3 (a) Discuss various factors which should be considered while selecting a site for a bridge. **07**

(b) Give classification of bridges. Draw neat sketches of arch bridge and suspension bridge. **07**

OR

Q.3 (a) What are the data required for bridge design? **07**

(b) Explain: (1) Afflux, (2) Scour depth, (3) Design flood **07**

Q.4 (a) Derive the formula for economic span of a bridge. **07**

(b) Why artificial ventilation is necessary in tunnels? Explain mechanical ventilation of tunnels. **07**

OR

Q.4 (a) Differentiate between (a) ‘Cut out bridge’ Vs ‘flying bridge’, (b) ‘Lift bridge’ Vs ‘swing bridge’ **07**

(b) Explain dust controlling methods in tunnel. **07**

Q.5 (a) Explain objects of tunnel lining. **07**

(b) Give classification of tunnels. **07**

OR

Q.5 (a) Enlist different methods of tunneling in soft ground. Also explain any one method in detail. **07**

(b) Enumerate advantages and disadvantages of tunnel compared to open cut. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: X 30602**Date: 28/12/2012****Subject Name: Railway, Bridges and Tunnels****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What are the requirements of an ideal bridge site? **07**
(b) Classify the bridges in different ways. **07**
- Q.2** (a) Define: 1) Afflux. 2) Scour depth. 3) Effective span. **07**
(b) Define a bearing and mention the purpose of providing bearing in a bridge. **07**
- OR**
- (b) How will you calculate Economic Span of a bridge. **07**
- Q.3** (a) What are the advantages and disadvantages of tunnel? **07**
(b) How will you transfer the centre the centre line of proposed tunnel from ground surface to the tunnel interior? **07**
- OR**
- Q.3** (a) Describe the ways of providing effective drainage during and after the construction of a tunnel. **07**
(b) State the object of providing proper ventilation to the tunnel interior. **07**
- OR**
- Q.4** (a) Compare railway transportation with road transportation. **07**
(b) What are the factors affecting the choice of a gauge? **07**
- OR**
- Q.4** (a) Describe Coning of wheels and creep of rails. **07**
Q.4 (b) What are the facility requirements of a railway station? **07**
- OR**
- Q.5** (a) Write short note on Marshalling yards. **07**
(b) Write short note on suspension bridge. **07**
- OR**
- Q.5** (a) Discuss any one method of tunneling in hard rock. **07**
(b) Explain the functions of ballast and state the requirements of a good ballast. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC SEM-III Examination May 2012****Subject code: X30602****Subject Name: Railway, Bridges & Tunnels****Date: 15/05/2012****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Give classification of Indian railways based on importance of route. **07**
(b) Draw the neat sketch of cross section of broad gauge railway track fully dimensioned. **07**

- Q.2** (a) What are the functions of rails in railway track? Draw the sketch of flat footed rail. **07**
(b) What are the advantages of uniformity of gauges in railway tracks? Explain in detail. **07**

OR

- (b) Explain in detail types of gradient and also grade compensation. **07**

- Q.3** (a) Explain by drawing sketch “coning of wheels” **07**
(b) Enlist the different tractive resistances occurring in railway tracks **07**

OR

- Q.3** (a) Draw the sketch of left hand turnout showing all components. **07**
(b) Give the classification of railway stations. Explain junction stations. **07**

- Q.4** (a) Describe the characteristics of an ideal bridge. **07**
(b) Define the terms :- **07**
(i) waterway (ii) afflux (iii) economic span
(iv) substructure (v) superstructure (vi) movable bridge (vii) scour depth.

OR

- Q.4** (a) Draw the sketch of an arch bridge showing all components. **07**
(b) What is the function of bridge bearings? Explain the roller bearing. **07**

- Q.5** (a) Draw the sketch of typical two way highway tunnel. **07**
(b) Describe the procedure of tunnel driving in soft ground. **07**

OR

- Q.5** (a) Explain the purposes of tunnel lining. Draw sketch of timber lining. **07**
(b) Why the artificial ventilation is necessary in tunnels? Explain mechanical ventilation of tunnels **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC SEM-III Examination-Dec-2011****Subject code: X30602****Date: 15/12/2011****Subject Name: Railway Bridge and Tunnels****Time: 2.30 pm -5.00 pm****Total marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) State and discuss briefly the factors that control the alignment of a railway track **07**

(b) Explain various types of rails with neat sketch. **07**

Q.2 (a) What is ballast? Why is it used in the railway track? Briefly describe the various types of ballasts used. **07**

(b) What is super elevation? Why is it necessary to provide super elevation on the curves of a railway track? **07**

OR

(b) Explain various types of crossings with neat sketch. **07**

Q.3 (a) Explain the followings: **07**

(i) Flag station and Block station

(ii) Junction and Terminal

(b) What are the marshalling yards? Where are they located? Explain types of marshalling yards. **07**

OR

Q.3 (a) Briefly describe the absolute block system of controlling the movement of trains for single and double lines. **07**

(b) Explain briefly the functions of the followings: **07**

(i) Fish plate

(ii) Hook bolt

(iii) Screw spike

Q.4 (a) Explain the terms :- **07**

Linear water way, Afflux, Depth of Scour, Economic span

(b) Explain the followings with neat sketch **07**

(i) Arch Bridge

(ii) Suspension Bridge

OR

Q.4 (a) Describe the different types of bridge piers with neat sketch. **07**

(b) Explain the functions of bearings. **07**

Q.5 (a) Explain Drift method of tunneling with neat sketch. **07**

(b) State the objects in providing lining to tunnel interior. **07**

OR

Q.5 (a) Explain Forepoling method of tunneling with neat sketch **07**

(b) Explain dust controlling methods in tunnel. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY

P.D.D.C Sem-III Examination May 2011

Subject code: X30602**Subject Name: Railway, Bridges and Tunnels****Date: 20/05/2011****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 Derive the formula for economic span of a bridge. **14**

Q.2 (a) Discuss the various factors which should be considered while selecting a site for a bridge. **07**

(b) Define and explain: **07**

- 1) Afflux
- 2) Scour depth
- 3) Design flood

OR

(b) How the maximum flood discharge of a stream is estimated for a bridge site? **07**

Q.3 (a) Enlist and explain the resistances required to be overcome by a moving train. **07**

(b) Define and explain: **07**

- 1) Junction station
- 2) Buckling of rails

OR

Q.3 (a) Explain in brief the basic functions of various components of railway track. **07**

(b) What are the factors influencing the choice of gauge? Enlist the benefits of uniform gauge. **07**

Q.4 (a) What is coning of wheels? With sketch enlist the Advantages and Disadvantages of it. **07**

(b) What is super elevation? Derive the formula for it. **07**

OR

Q.4 Enlist different methods of tunneling in soft ground and explain any one in detail. **14**

Q.5 (a) What are the advantages and disadvantages of tunnel compared to open cut? **07**

(b) What are the data required for bridge design? **07**

OR

Q.5 (a) Give classification of tunnels. **07**

(b) Write short note on railway yards. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY

P.D.D.C. Sem- III Examination December 2010

Subject code: X30602**Subject Name: Railway, Bridge and Tunnels****Date: 13 /12 / 2010****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is loading gauge? Describe in brief. **05**
(b) Write a short note on 'Coning of wheels' and 'Requirements of good rail sleeper'. **09**
- Q.2** (a) Explain the working principle of the turn out with neat sketch. **07**
(b) What do you understand by the 'Momentum' and 'Pusher' gradients? Explain at what places these are provided? **07**
- OR**
- (b) What are the different types of marshalling yards? Explain **07**
- Q.3** (a) What do you understand by 'alignment'? What point should be kept in mind while aligning a railway line? **07**
(b) What are the various signaling systems? Describe the working of the Absolute block system **07**
- OR**
- Q.3** (a) At what places 'Fish plates' are used? What are their main functions? Draw a neat sketch of fish plates fixed in position in rails. **07**
(b) Draw neat sketches of Bull headed and Flat footed rails. Discuss the relative merits and demerits of both types of rails. **07**
- Q.4** (a) Define a bearing and mention the purposes of providing bearing in a bridge. **07**
(b) Write a short note on 'Suspension bridges' with neat sketches. **07**
- OR**
- Q.4** (a) Describe the different types of bridge pier with neat sketch. **07**
(b) Differentiate between (i) 'Cut boat bridge and flying bridge' and (ii) 'Lift bridge and swing bridge'. **07**
- Q.5** (a) Give a detailed description of the fore poling method of tunneling **07**
(b) State and briefly explain the methods adopted for controlling dust inhalation. **07**
- OR**
- Q.5** (a) Explain Full face method of tunneling in hard rock. **07**
(b) What are the objects of tunnel lining? Explain. **07**
