

Code No: RR 410103

Set No.

1

IV B.Tech. I Semester Regular Examinations, November-2005

STRUCTURAL ENGINEERING DESIGN AND DRAWING-III

(Civil Engineering)

Time: 3 hours

Max Marks: 80

PART-A

Answer any ONE question from PART-A [32Marks]

1. Design a solid slab bridge including Kerb for class A loading for the following data.

Clear span = 4.5 m

Clear width of road ways = 7 m

Average thickness of wearing coat = 80 mm

Grade of concrete = M 20

Allowable stress in steel = 125 MPa

Width of the kerb = 0.5 m

Draw the following to a suitable scale.

- a) Longitudinal Section showing top and bottom reinforcements
- b) Cross-section showing details of reinforcement in slab and kerb portion.

[24+8]

2. Design the central section of a deck type plate girder railway bridge for single track Broad Gauge (B.G) main line loading for the following data.

Effective span = 24.1 m

Spacing of plate girders = 1.9 m center to center

Weight of stock rails = 450 N/m

Weight of guard rails = 250 N/m

Weight of fastenings = 280 N/m of track

Timber sleepers = 250 mm X 150 mm X 2.8 m @ 0.4 m center to center

Density of Timber = 7.4 kN/m³

Take permissible stresses in accordance with railway steel bridge code provisions. Stiffeners and bracings need not be designed.

Draw to a suitable scale, the following:

- a) Plate girder section at mid-span
- b) Part elevation
- c) Assuming suitable section for bracings, draw top plan.

[24+8]

Contd...2

PART-B

Answer any THREE questions from PART-B [3 x 16 = 48 Marks]

- 3.a) Discuss the important factors while selecting type of bridge and derive the condition for economic span length of a bridge.
- b) Discuss about the various IRC loadings for road bridges. [10+6]
- 4.a) Explain in which situations the T-beam bridge is preferred over simple slab bridge.
- b) Explain how the live load is distributed on the longitudinal girders of a T-beam bridge and discuss the important assumptions made there on. [4+12]
5. The following particulars are available for a foot bridge:
Type of girder = N-type truss
Span of girders = 18.0 m
Spacing of cross girders = 2.25 m center to center
Clear walking width between main girders = 3 m
Live load = 4.0 kN/m^2
Flooring = Timber planks on cross girders
Design the following
(a) Timber planks
(b) Cross Girders and rakers. [16]
- 6.a) With the help of neat sketches, explain different types of R.C. Stairs.
- b) Explain how the dead weight of waist slab is calculated in the design of stairs [10+6]
7. Design the top dome and top ring beam of an Intze type water tank with a capacity of 900,000 litres. The height of the staging is 16 m up to the bottom of tank. Assume the intensity of wind pressure as 1500 N/m^2 . Use M20 concrete and HYSD steel bars with an allowable stress of 230 MPa. [16]

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STRUCTURAL ENGINEERING DESIGN AND DRAWING-III
(Civil Engineering)

Time: 3 hours

Max Marks: 80

PART-A

Answer any ONE question from PART-A [32Marks]

1. Design a solid deck slab bridge including Kerb for class A loading for the following data.
Clear span = 5 m
Clear width of road ways = 4.5 m
Average thickness of wearing coat = 75 mm
Grade of concrete = M 20
Allowable stress in steel = 130 MPa
Width of the kerb = 0.5 m
Draw the following to a suitable scale.
 - a) Longitudinal Section showing top and bottom reinforcements
 - b) Cross-section showing details of reinforcement in slab and kerb portion.

[24+8]
2. Data pertaining to a through type plate girder railway bridge for single track Broad Gauge (B.G) main line loading is given below.
Effective span = 24 m
Spacing of main girders = 5 m center to center
Spacing of cross beams = 3 m center to center
Spacing of stringers = 2 m center to center
Weight of stock rails = 450 N/m
Weight of guard rails = 250 N/m
Weight of fastenings = 280 N/m of track
Timber sleepers = 250 mm X 150 mm X 2.8 m @ 0.4 m center to center
Density of Timber = 7.4 kN/m³
Design the following for the above data.
 - i) Stringers and cross-beams
 - ii) Mid-span section of the Plate GirderTake permissible stresses in accordance with railway steel bridge code provisions. Stiffeners and bracings need not be designed.

Contd...2

Draw to a suitable scale, the following

- a) Plate girder section at mid-span
- b) Part elevation
- c) Assuming suitable section for bracings, draw top plan. [24+8]

PART-B

Answer any THREE questions from PART-B [3 x 16 = 48 Marks]

- 3.a) Explain the guide lines of I.R.C. for considering impact effect on bridges.
 - b) What are the longitudinal and lateral forces to be considered in design of bridges [8+8]
- 4.a) Differentiate between 'Slab Bridge' and 'T-beam bridge'.
 - b) Explain the distribution of live loads on intermediate transverse floor beams in a T-beam bridge. [4+12]
- 5. The following particulars are available for a foot bridge.
Type of girder = N-type truss
Span of girders = 18.0 m
Spacing of cross girders = 2.25 m center to center
Clear walking width between main girders = 3 m
Live load = 4.0 kN/m^2
Flooring = Timber planks on cross girders
Design the following
 - a) Central top chord members
 - b) Central bottom chord members. [16]
- 6. Explain in detail the various design considerations for the design of R.C. Stairs. [16]
- 7. An Intze type water tank has to store 950,000 litres of water. The height of the staging is 15 m up to the bottom of tank. Assume the intensity of wind pressure as 1600 N/m^2 . Work out suitable dimensions for the tank. Design the top dome and cylindrical wall. Use M20 concrete and HYSD steel bars with an allowable stress of 230 MPa. [16]

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IV B.Tech. I Semester Regular Examinations, November-2005

STRUCTURAL ENGINEERING DESIGN AND DRAWING-III

(Civil Engineering)

Time: 3 hours

Max Marks: 80

PART-A

Answer any ONE question from PART-A [32Marks]

1. Design a solid slab bridge including Kerb for class AA loading for the following data.
Clear span = 4.4 m
Clear width of road ways = 7.5 m
Average thickness of wearing coat = 70 mm
Grade of concrete = M 25
Allowable stress in steel = 130 MPa
Assume suitable width for the Kerb
Draw the following to a suitable scale.
 - a) Longitudinal Section showing top and bottom reinforcements
 - b) Cross-section showing details of reinforcement in slab and kerb portion.

[24+8]
2. Design the mid-span section and the end stiffeners of a deck type plate girder railway bridge for broad gauge single track main line loading.
Span = 20 m (center to center of bearings)
Spacing of plate girders = 2 m (center to center)
Timber sleepers = 254 mm X 254 mm X 2.745 m @ 0.35 m center to center
Self load of track with timber ties = 7500 N/m
Use Fuller's formula for computing dead load.
Draw to a suitable scale, the following:
 - a) Plate girder section at mid-span
 - b) Part elevation
 - c) Details of end stiffeners.

[24+8]

Contd...2

PART-B**Answer any THREE questions from PART-B [3 x 16 = 48 Marks]**

3. A slab bridge has a clear span of 3.55 m and clear width of road way as 4.55 m. Compute maximum bending moment due to single lane of IRC class A loading using effective width method of analysis. [16]
- 4.a) Explain how the effective width of the slab is calculated to function as compression flange in T-beams of a girder bridge.
b) Discuss various design requirements of a T-beam bridge. [6+10=16]
5. The following particulars are available for a foot bridge.
Type of girder = N-type truss
Span of girders = 16 m
Spacing of cross girders = 2.0 m center to center
Clear walking width between main girders = 3 m
Live load = 3.0 kN/m^2
Flooring = Timber planks on cross girders
Design the following:
a) Central top chord members
b) Central bottom chord members. [16]
6. A straight stair in a residential building is supported on wall on one side and stringer beam on the other side. The risers are 150 mm and the treads are 250 mm and the horizontal span of the stairs may be taken as 1.2 m. The live load on the stairs may be taken as 3.0 kN/m^2 . Design a suitable staircase. Use M 20 grade of concrete and HYSD bars with an allowable stress of 230 MPa. Draw a rough sketch showing arrangement of stairs. [16]
7. An Intze type water tank has to store 850,000 litres of water. The height of the staging is 15.5 m up to the bottom of tank. Assume the intensity of wind pressure as 1500 N/m^2 . Work out suitable dimensions for the tank. Design the conical dome and cylindrical wall. Use M20 concrete and HYSD steel bars with an allowable stress of 230 MPa. [16]

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IV B.Tech. I Semester Regular Examinations, November-2005

STRUCTURAL ENGINEERING DESIGN AND DRAWING-III
(Civil Engineering)

Time: 3 hours

Max Marks: 80

PART-A

Answer any ONE question from PART-A [32Marks]

1. Design a solid deck slab bridge including Kerb for class AA loading for the following data.
Clear span = 5 m
Clear width of road ways = 7.5 m
Average thickness of wearing coat = 100 mm
Grade of concrete = M 30
Allowable stress in steel = 140 MPa
Width of the kerb = 0.5 m
Draw the following to a suitable scale.
 - a) Longitudinal Section showing top and bottom reinforcements
 - b) Cross-section showing details of reinforcement in slab and kerb portion.

[24+8]
2. Design the mid-span section and the end stiffeners of a deck type plate girder railway bridge for broad gauge single track main line loading.
Span = 21 m (center to center of bearings)
Spacing of plate girders = 1.95 m (center to center)
Timber sleepers = 254 mm X 254 mm X 2.745 m @ 0.37 m center to center
Self load of track with timber ties = 7600 N/m
Use Fuller's formula for computing dead load.
Draw to a suitable scale, the following:
 - a) Plate girder section at mid-span
 - b) Part elevation
 - c) Details of end stiffeners.

[24+8]

Contd...2

PART-B

Answer any THREE questions from PART-B [3 x 16 = 48 Marks]

3. A slab bridge has a clear span of 3.54 m and clear width of road way as 4.5 m. Compute maximum shear force due to single lane of IRC class A loading using effective width method of analysis. [16]
4. Explain in detail Pigeaud's theory for computation of bending moments in slabs supported on four edges with suitable examples. [16]
5. The following particulars are available for a foot bridge.
Type of girder = Pratt-type truss
Span of girders = 16.8 m
Spacing of cross girders = 2.1 m center to center
Clear walking width between main girders = 3 m
Live load = 3.5 kN/m^2
Flooring = Timber planks on cross girders
Design the following:
a) Central top chord members
b) Central bottom chord members. [16]
6. A straight stair in a residential building is supported on wall on one side and stringer beam on the other side. The risers are 150 mm and the treads are 250 mm and the horizontal span of the stairs may be taken as 1.3 m. The live load on the stairs may be taken as 3.5 kN/m^2 . Design a suitable staircase. Use M20 grade of concrete and HYSD bars with an allowable stress of 230 MPa. Draw a rough sketch showing reinforcement particulars. [16]
7. The capacity of an Intze type water tank is 800,000 litres. The height of the staging is 15.75 m up to the bottom of tank. Assume the intensity of wind pressure as 1500 N/m^2 . Work out suitable dimensions for the tank. Design the conical dome and bottom done. Use M20 concrete and HYSD steel bars with an allowable stress of 230 MPa. [16]