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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Eighth Semester

Branch: Civil Engineering

ADVANCED STRUCTURAL DESIGN (C)

(Old Scheme-Supplementary/Mercy Chance)

[Prior to 2010 admissions]

Time: Four Hours

Maximum: 100 Marks

Answer all questions.

Relevant IS codes may be permitted.

Any missing data may suitably be assumed.

- . 1. A reinforced concrete simply supported slab is required for the deck of a road bridge the following details:
 - 1 Clear span

= 6.0 m

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7.5 m

- 3 Foot path on either side
- = 600 mm wide
- 4 Asphaltec concrete weaving cost 75 mm thick
- 5 Width of bearing 500 mm
- 6 Loading IRC class A train of vehicle
- 7 Use M 25 grade concrete and Fe 415 steel.

Design the slab and show the details of reinforcement.

(20 marks)

Or

- 2. A box culvert having the following data:
 - 1 Inside dimension

 $= 3 m \times 3 m$

2 Wall thickness

= 250 mm

3 Dead load

 $= 12 \text{ kN/m}^2$

4 Live load

 $= 50 \text{ kN/m}^2$

Turn over

Angle of repose of soil

300

6 Unit weight of soil

18 kN/m³

7 Loading - IRC class AA tracked vehicle

Determine the design Bending moment and direct force.

3. (a) Design a simply supported cylindrical shell with radius ≈ 5 m, span = 18 m, thickness of shell = 60 mm central rise = 1.4 m super imposed load = 1.0 kN/m². Use M20 concrete and

(13 marks)

(b) Explain the different types of folded plate with neat figure.

(7 marks)

- 4. (a) Explain the principles for membrane theory for symmetrical with UDL.
 - (b) Explain the structural behaviour of folded plates.
- 5. (a) Explain common types of trusses used in industrial building along with neat sketches.

Or

(b) A factory building is to be provided with fink truss. Span = 20 m and pitch = 1/5 the height of truss at eves level is 10 m. The spacing of the trusses is $4.5~\mathrm{m}$ the factory building is $36~\mathrm{m}$ long, is situated at Delhi, Design the channel purlins. Take $f_y = 250 \text{ N/mm}^2$.

6. Design and detail a simple FAN roof truss with the following data:

Spacing of truss

4 m

Spam

= 10 m

Wind

= Consider the place Mumbai

Assume the wind load acts normal to root surface

Pitch of the root 1 m to 5 m

7. Design a gantry girder to carry an electrically operated overhead crane for the following data:

10 m

Crane capacity

350 kN

Distance between centres of gantry girder

18 m

Weight of crab

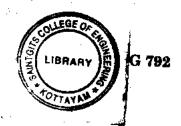
80 kN

Min approach distance at crane hook

1.2 m

Weight of crane girder

190 kN



Wheel base = 4m

Height of rail = 80 mm

Mass of rail section = 30 kg/m

Use Mg 250

Or

- 8. A welded plate girder simply supported over a span of 22 m carries a live load of 80 kN/m longer than the span and dead load of 40 kN/m. Design the girder completely.
- 9. Design a deck type plate girder for mid span section section with the following data:
 - 1 Loading = Single track BG main line
 2 Effective span = 24 m
 3 Spacing of plane girders = 2 m c/c
 4 Weight of stock rails = 440 N/m
 5 Weight of guard rails= 260 N/m
 6 Weight of fastening = 200 N/m
 - 7 Timber sleeper = 250 × 150 × 2800 mm @ 0.4 m c/c
 - 8 Density of timber = 7.5 kN/m³

Take permissible stresses as per railway steel bridge code.

- 10. Design a through type place girder bridge for single track BG mainline loading with the following data:
 - 1 Effective span = 24 m
 - 2 Spacing of main girders = 5 m c/c
 - 3 Spacing of cross girders = 3 m c/c
 - 4 Spacing of stringers = 2 m c/c
 - 5 Timber sleepers 250 × 150 × 2800 mm @ 0.4 m c/c
 - 6 Density of timber = 7.5 kN/m^3
 - 7 Weight of stock rail = 440 N/m
 - 8 Weight of guard rail = 260 N/m
 - 9 Weight of fastening = 280 N/m of track.

 $(5 \times 20 = 100 \text{ marks})$