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B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Eighth Semester

Branch : Civil Engineering

CE 010 801—ADVANCED STRUCTURAL DESIGN (CE)

[New Scheme—2010 Admission onwards]

(Supplementary)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Explain IRC specification Bridges.

2. Discuss the structural behaviour of Folded Plates.

3. Discuss the action of wind on Steel Trusses.

4. Explain the applications of Gantry Girder.

5. Sketch the cross section of a Railway Plate Girder Bridge.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Explain the necessity of Bearings in Bridges.

7. Discuss the Structural characteristics of Plates ?

8. Explain the Design principles of Bridge Bearing.

9. Explain the criteria for design of Plate Girder.

10. Discuss the loads acting on Railway Plate Girder Bridges.

(5 × 5 = 25 marks)

Turn over

Part C

*Answer **all** questions.*

Each full question carries 12 marks.

11. A Box Culvert is to provided for a drain under a highway. The inside dimensions of the box culvert is 2.5 m × 2.5 m. The box culvert is expected to carry a superimposed dead load of 15kN/m^2 and a live load of 50 kN/m^2. Design th Box Culvert. Take r = 18.3kN/ m^3 and ø = 30° for the soil. Use M20 concrete and HYSD bars.

Or

12. Design the interior slab panel of a T-beam Slab Bridge, 5.5m wide between the two main T-beams and 4 m long between the cross Girders. Carriageway width is 7 m and kerbs of 700 mm wide are provided. Use IRC Class A loading. Adopt M20 concrete and Fe 415 steel bars. Sketch the reinforcement details.

13. Design a simply supported Cylindrical shell roof with the following details. Radius of the shell is 8m and span is 25m and the thickness of the shell is 60 mm. Take live load of 2kN/m^2. Use M20 concrete and Fe 415 steel. Sketch the details.

Or

14. Design a reinforced concrete shell with a circular directrix with the following dimensions. Distance between the traverse is 40 m, Radius of shell is 8 m, and thickness of shell is 40 mm and semi central angle is 60 degree. L. L is 200N/mm^2. Use M20 concrete and Fe 415 steel.

15. Design a pratt type roof truss for an industrial building given the following data. Overall length is 40 m, overall width is 20 m, width of c/c of roof columns is 18 m, height of column is 10 m, roofing material is GI sheets.

Or

16. The trusses for a factory building located spaced at 8 m c/c and the purlin are spaced at 1.5m c/c. The pitch of the truss is 28° and the span of the truss is 16 m. The roof consists of asbestos sheets with weight 15 kN/m^2. Design :

    (i)   Suitable I section purling : and

    (ii) Angle section purling and properly sketch the connections with ACC sheets to purling.

17. Design a 8 m gantry girder for a 156 kN E.O.T. crane with 3 m wheel base. The maximum load on each carriage wheel is 100 kN. Allow an impact of 30 percent. Assume the effect of lateral forces to be carried equally by all the wheels of crane Girders to one - seventh capacity of the crane treated as live load.

Or

18. A plate Girder of span 22 m has to carry a uniformly distributed load of 90 kN/m inclusive of its own weight. Design the maximum section of the Girder if the web depth is not to exceed 160 cm. Calculate the spacing of 22 mm diameter rivets connecting the flange angles and the flange plate near the ends. Assume permissible bending stress in the Girder as 165 M Pa. Provide a neat sketch.

19. The effective span of a through type plate Girder two lane bridge is 25 m. The reinforced concrete slab is 250 mm thick inclusive of wearing coat. The footpaths are provided on their sides of carriageway. The cross Girder are provided at 3 m center. The stringers are spaced at 2.45 m c/c the spacing between the main Girder is 9.80 m. Determine the maximum sections for the stringers if Bridge is to carry IRC class A standard loading.

Or

20. In a Plate Girder through type Bridge carrying a single broad guage track, the cross Girder are provided at 4 m centers. The stringers are spaced 2 m from c/c. Using the data given below, design the cross Girders.

    Spacing between the main Girder   = 4 m.

    EUDLL for 4 m for BM per track   = 592 kN.

    EUDLL for 4 m for shear per track = 788 kN

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Eighth Semester

Branch : Civil Engineering

CE 010 803—ENVIRONMENTAL ENGINEERING—II (CE)

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 marks.

1. What is partially combined system of sewerage ?

2. What is sewage farming ?

3. What are the objective of waste water treatment ?

4. Define sludge volume index. What is its significance ?

5. Why sludge digestion is necessary ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 marks.

6. What are the factors that affect quantity of dry weather flow ?

7. What is oxygen ? Sag curve in stream pollution ?

8. Explain theory of sewage sedimentation.

9. Explain the principle and theory of biological treatment.

10. What are the objective of sludge treatment ?

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each full question carries 12 marks.

11. What is BOD ? What is meant by first stage BOD ? Deduce a mathematical expression of first stage BOD.

Or

12. Determine the diameter of a circular sewer laid on a slope of 1 in 1000 and carrying a discharge of 0.312 m³/sec while flowing half full. Assume value of 'n' = 0.012.

13. (i) Explain self purification of streams and indicate how sunlight helps in self purification.

(6 marks)

(ii) How sewage pumps are different as compared to pumps for water supply ?

(6 marks)

Or

14. Mention the various sewer appurtenances used in a sewerage scheme and state the location and utility of each.

15. Explain with sketches different types of screens.

Or

16. Design a rectangular grit chamber for the following data :

Flow = 50 m/d

Grit of specific gravity = 2.65

Size = 0.2 mm to be removed.

Find (i) Settling velocity of 0.2 mm particle.

(ii) Critical horizontal velocity of flow.

(iii) Size of grit chamber.

17. Sketch and explain the types of aeration system in an activated sludge process.

Or

18. Determine the size of a high rate trickling filter for the following data :

(i) Flow = 4.8 m/d.

(ii) Recirculation ratio = 1.4.

(iii) BOD of raw sewage = 250 mg/lit.

(iv) BOD removal in primary tank = 25%.

(v) Final effluent BOD desired = 40 mg/lit.

Calculate also size of the standard rate trickling filter to accomplish the above requirement.

19. Distinguish between aerobic and anaerobic digestion with reference to

(i) Efficiency.

(ii) Product of sludge.

(iii) Energy content of the product.

Or

20. Describe construction and operation of an 1mhoff tank.

(5 × 12 = 60 marks)