# B.TECH. DEGREE EXAMINATION, MAY 2017

## Eighth Semester

### Branch : Civil Engineering

### CE 010 801—ADVANCED STRUCTURAL DESIGN (CE)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours                                                                Maximum : 100 Marks

## Part A

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

1. What do you mean by impact effect ?

2. What do you understand by membrane forces in shells ?

3. List the different types of beachings.

4. What is the function of a gantry girder ?

5. Classify railway bridges.

(5 × 3 = 15 marks)

## Part B

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

6. Write a note on IRC loadings and specifications for a T-beam bridge.

7. Explain membrane theory for cylindrical shells.

8. Write the stepwise procedure for puelin design.

9. With a neat sketch, explain gantry girders.

10. Enumerate the forces considered for the design of a railway bridge of plate girder type.

(5 × 5 = 25 marks)

## Part C

*Answer all questions.*
*Each full question carries 12 marks.*

11. A T-beam bridge has to be provided across a channel having the following data :

Design the bridge deck.

**Turn over**

Flood discharge : 30 m³/s ; Bed width = 12 m, ; Side slope = 1 : 1, Bed level = 50 m, HFL = 51.25 m., Maximum allowable afflux : 1.5 cm., GL = 52 m., hard rock available at 48 m., Road formation level = 54 m., Road : NH (2 lanes). Footpath = 1 m., wide on either side, Loading : IRC class AA. Use M40, Fe415 steel. No. of longitudinal girders = 3.

*Or*

12. Design a box culvert using the following data. Width of carriageway = 7.5 m., footpath on either side is 0.7 m., span = 4 m., height of the Vent = 2.5 m., Use M25 and Fe415 steel.

13. Given the distance between the traverse is 60 m., Radius of the shell is 8 m. and thickness of shell is 50 mm. and semi control angle is 60°. LL = 200 N/mm². Use M20 concrete and Fe415 steel to design a reinforced concrete shell.

*Or*

14. Design a simply supported cylindrical shell roof with the following details :

    Radius of the shell is 6 m. and span is 20 m. and thickness of shell is 60 mm. Take LL = 2 kN/m². Use M20 concrete and Fe 415 steel. Sketch the details.

15. Design a steel roof truss to suit the following data :—

    Span = 10 m., Type-fan type, Roof cover galvanized corrugated sheeting (GC), Materials : Rolled steel angles, spacing of roof trusses = 4.5 m., wind pressure $P_d$ = 1 kN/m². Draw the elevation of the roof truss and details of joints.

*Or*

16. Design a pratt-type roof truss for an industrial building given the following data. Overall length is 40 m., overall width is 12 m., roof column spacing is 14 m., height of column = 10 m. Bldg is in Agra.

17. The effective span of a deck type plate girder two lane highway bridge is 30 m. The reinforced concrete slab is 250 mm. thick inclusive of the wearing coat. The footpaths are provided on either side of the carriageway. Design the maximum section of plate girder, if the bridge is to carry IRC class A loading.

*Or*

18. Write a detailed note on the design procedure of a gantry girder.

19. Design a plate girder of 20 m. span, using the tension field action for the following factored forces. Mz = 6000 kNm., maximum shear force = 1100 kN. The girder is laterally restrained.

*Or*

20. A through type plate girder is provided for a single bread gauge track. Cross-girders are spaced 3 m. apart, the total span of main girder from c/c of bearings bring 30 m. The stringers are at 2 m. b/w centre lines 0.6 kN/m. stock rails and 0.4 kN/m. check rails are provided. Sleepers are spaced at 450 mm. c/c and are of size of 2.8 m. × 250 mm. × 250 m. Weight of timber = 7.5 kN/m³. Find maximum section of main girder if EUDLL for BM is 2800 kN per track total for BM, and EUDLL for shear 3023 kN per track total, impact factor of 30 m = 0.45. Main girder are provided at a spacing of 5 m. b/w centre lines.

(5 × 12 = 60 marks)

**G 5065** (Pages : 2) Reg. No.............................

Name...........................

# B.TECH. DEGREE EXAMINATION, MAY 2017

### Eighth Semester

Branch : Civil Engineering

## CE 010 802—BUILDING TECHNOLOGY AND MANAGEMENT (CE)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

### Part A

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

1. Define High performance concrete.

2. What are the requirement of good framework.

3. What is ferrocement ?

4. What is construction schedule ?

5. Define durability of concrete.

(5 × 3 = 15 marks)

### Part B

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

6. What is inventory control ? Explain its objectives.

7. Discuss briefly post tension and pre-tension construction technique.

8. State and explain different types of contract.

9. Explain matrix organisation and task free organisation.

10. Discuss merit and demerit of CPM and PERT.

(5 × 5 = 25 marks)

### Part C

*Answer* **all** *questions.*
*Each full question carries 12 marks.*

11. What are the significance of the following term in building contract :

    (a) Earnest money deposit.        (b) Security deposit.

    (c) Retention money.              (d) Mobilisation of fund.

*Or*

**Turn over**

12. Explain safety legislation and standard for construction industry.

13. Explain step-by-step procedure of IS 10262 code method of mix design for normal concrete mix.

Or

14. Explain step-by-step procedure of ACI 211.4R for high strength concrete mix design method.

15. Discuss the various materials for form work construction that are in use around the world.

Or

16. What are the various design consideration for design of form work explain ?

17. What is Breach of contract ? What are the grounds on which a contractor can terminate a contract with the owner ? Discuss.

Or

18. Discuss transfer of contractual rights and obligations.

19. What is material management ? Explain the scope of material management.

Or

20. Explain various stages of quality control and acceptance criteria.

(5 × 12 = 60 marks)

G 5078

(Pages : 2)

# B.TECH. DEGREE EXAMINATION, MAY 2017

## Eighth Semester

Branch : Civil Engineering

CE 010 803—ENVIRONMENTAL ENGINEERING–II (CE)

(New Scheme–2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

## Part A

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

1. Define population equivalent and Relative Stability.

2. Reciprocating pumps are not recommended for the pumping of Sewage. Why ?

3. What is the use of Comminutors in Sewage treatment.

4. Explain the process of purification of Sewage by trickling filter.

5. Write a note on UASB.

(5 × 3 = 15 marks)

## Part B

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

6. Explain clearly the relation between design rainfall intensity and time of Concentration.

7. Explain Sewage loading.

8. What are the design consideration for a grit chamber ?

9. Discuss Unsuitability of activated sludge unit for a very small town.

10. Explain physical characteristics of sludge.

(5 × 5 = 25 marks)

## Part C

*Answer* **all** *questions.*
*Each full question carries 12 marks.*

11. (i) What are the hydraulic elements of circular sewers of flowing full.

(7 marks)

(ii) Mention any five sewer design flow formulae.

(5 marks)

*Or*

**Turn over**

12. (i) Discuss the comparative merit and demerits of the separate system and combined system.

(6 marks)

(ii) Describe the laying of a Sewer line in a trench.

(6 marks)

13. Design an inverted siphon of length 60 metre, which is to carry a maximum discharge of 0.75 m³/sec, an average flow of 0.3m³/sec and minimum discharge of 0.065m³/sec velocity of flow is to be maintained 1m/sec.

(12 marks)

Or

14. Describe the following with neat sketches :

   (i) Manhole.

   (ii) Grease and oil traps.

   (iii) Catch basins.

(12 marks)

15. Design a primary sedimentation tank for a population of 100,000 persons.
      (Assume any missing data)

(12 marks)

Or

16. Define and describe the component of :

   (i) Primary treatment.

   (ii) Secondary treatment and

   (iii) Tertiary treatment.

(12 marks)

17. (i) What are the advantages and disadvantages of an oxidation pond.

(6 marks)

   (ii) Describe a rotating Biological contactor reactor.

(6 marks)

Or

18. Describe the constructional details with neat sketches of a trickling filter.

(12 marks)

19. (i) Discuss the effect of pH and temperature on sludge digestion.

(6 marks)

   (ii) Explain the various methods of sludge treatment.

(6 marks)

Or

20. Design an imhoff tank for the following data. Population = 5000 Percapita rate = 120 l/d/head

      Detention Period = 2 hrs,

      Sludge space = 0.05m³/head and

      Surface loading = 30,000 l/d/m².

      (Assume suitable data necessary)

(12 marks)

[5 × 12 = 60 marks]

G 5099 (Pages : 2) Reg. No...........................

Name............................

## B.TECH. DEGREE EXAMINATION, MAY 2017

### Eighth Semester

Branch : Civil Engineering

CE 010 804 L02—ENVIRONMENTAL GEOTECHNICS—(Elective III) [CE]

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours                                                    Maximum : 100 Marks

### Part A

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

1. Explain formation of clay.

2. Define permeability.

3. Define contaminants.

4. Discuss reuse of waste.

5. Distinguish between waste management and waste disposal.

(5 × 3 = 15 marks)

### Part B

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

6. Explain kaolinite minerals.

7. Define hydraulic conductivity of soil.

8. Explain transport mechanism of waste.

9. Discuss recycling process to reduce waste.

10. Distinguish between rigid and flexible liners.

(5 × 5 = 25 marks)

Turn over

## Part C

*Answer all questions.*
*Each question carries 12 marks.*

11. Explain basic structural units of minerals.

*Or*

12. (a) Discuss electric charges on clay minerals.

    (b) Explain base exchange capacity of clay minerals.

13. Discuss the importance of mineralogical composition in soil expansion.

*Or*

14. State and explain Darcy's law. Explain its validity.

15. Explain characteristics and classification of hazardous wastes.

*Or*

16. Discuss the potential problems in agricultural soil due to contaminants.

17. Discuss hydrological aspects of selection of disposal site.

*Or*

18. Explain a waste disposal system for hospitals.

19. Discuss ground modification system for waste management.

*Or*

20. Discuss hydraulic modification for waste management. Explain the merits and demerits of this method.

(5 × 12 = 60 marks)

# B.TECH. DEGREE EXAMINATION, MAY 2017

## Eighth Semester

Branch : Civil Engineering

CE 010 804 L05—HIGHWAY AND AIRFIELD PAVEMENTS (Elective III) [CE]

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours                                                    Maximum : 100 Marks

## Part A

*Answer all questions.*

*Each question carries 3 marks.*

1. What are the different types of pavements ?

2. What are the disadvantages of CBR method of pavement design ?

3. Which are the critical load positions in rigid pavements ?

4. Explain the function of dowel bars and tie bars.

5. Describe pavement instrumentation.

(5 × 3 = 15 marks)

## Part B

*Answer all questions.*

*Each question carries 5 marks.*

6. How will you compute equivalent load factors.

7. Which are the different approaches in flexible pavement design ? Explain with examples.

8. Briefly describe the general design considerations in the design of rigid pavement.

9. What does combination of stresses imply ?

10. How are waves and corrugations formed in flexible pavement ?

(5 × 5 = 25 marks)

## Part C

*Answer all questions.*

*Each question carries 12 marks.*

11. Explain the about the pavement components. How are they evaluated ?

*Or*

12. Discuss the effects of climatic variations on pavements. Mention some remedial measures.

**Turn over**

13. Design a pavement section for 4100 kg. wheel load with tyre pressure of 6 kg./cm². The plate bearing test produced a result of 1.25 kg./cm² and 4.0 kg./cm² pressure at 0.5 cm. deflection when conducted using 30 cm. plate diameter on soil subgrade and over 18 cm. base course. Apply Burmister's approach. Allowable deflection = 0.5 cm.

*Or*

14. Explain IRC recommendations for the design of flexible pavements using an example.

15. Determine the warping stresses at interior, edge and corner regions in a 28 cm. thick concrete pavement with transverse joints at 9 m. intervals and longitudinal joints at 3.6 m. intervals K value is 4 kg./cm³. Assume radius of loaded area as 15 cm. for computing warping stress at the corner. Assume necessary data, temperature differential = 06°C/cm.

*Or*

16. A cc slab of 25 cm. is constructed over a subbase having modulus of subgrade reaction 12 kg./cm³. Temperature differential between bottom and top of the slab is 13° C. The spacing between contraction joints is 4.5 m. and that between longitudinal joints is 3.5 m. The design wheel load is 4200 kg., radius of contact area them, using IRC charts, find the worst combination of stresses. Assume any necessary data suitably.

17. Calculate the stresses at interior, edge and corner regions of a cc pavement using Westergaard's equations. Use, wheel load of 4200 kg., E = 3,0 × 10⁵ kg./cm², pavement thickness of 25 cm., Modulus of subgrade reaction = 12 kg./cm.³ Assume necessary data suitably.

*Or*

18. Discuss the Bradley's stress coefficients.

19. Explain in detail about the effect of environment on pavement surfaces.

*Or*

20. Give a detailed description about the various methods used for pavement maintenance.

(5 × 12 = 60 marks)

# G 5140

Reg. No....................................

Name..........................................

## B.TECH. DEGREE EXAMINATION, MAY 2017

### Eighth Semester

Branch : Civil Engineering

CE 010 805 G02—ENVIRONMENTAL POLLUTION CONTROL TECHNIQUES (Elective-IV) [CE]

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

## Part A

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

1. Which are the major air pollutants listed as criteria air pollutants by USEPA ?

2. Explain skimming as a wastewater treatment method.

3. What is equalization in industrial waste treatment ?

4. List the major sources of Municipal Solid Waste (MSW).

5. Which are the different zones specified in the 'Noise Pollution Rules 2000' based on the permissible noise levels ?

(5 × 3 = 15 marks)

## Part B

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

6. Explain using sketch, the working of a cyclone separator.

7. Explain the mechanism of treatment in oxidation ponds.

8. Explain neutralization as a pretreatment option for industrial waste.

9. Explain the factors influencing per capita generation of solid waste.

10. Explain engineering control of noise pollution using examples.

(5 × 5 = 25 marks)

**Turn over**

## Part C

*Answer all questions.*
*Each question carries 12 marks*

11. Briefly explain the sources and environmental impacts of the following pollutants in air :

    (i) CO.

    (iii) Hg.

    (ii) $NO_2$.

    (iv) $O_3$.

Or

12. (a) Explain the working principle of electro static precipitators.

    (6 marks)

    (b) What are acid gases ? Why are they called so ? What are its impacts on environment ?

    (6 marks)

13. Describe the various stages in anaerobic degradation process. Explain the importance of pH, alkalinity and temperature in anaerobic degradation.

Or

14. Using sketches explain Activated Sludge process (ASP) for wastewater treatment. Also, explain any two process modificators of ASP indicating the advantages of the modifications.

15. Explain with the help of a schematic, up-flow anaerobic sludge blanket reactor. What factors make it more efficient than conventional anaerobic treatment method ?

Or

16. Explain the theory behind (i) Floatation ; (ii) Coagulation. Explain the application of these techniques in the treatment of industrial effluents.

17. (a) Draw and explain the different components of a sanitary landfill.

    (8 marks)

    (b) What is the significance of C/N ratio in composting ?

    (4 marks)

Or

18. (a) Explain the different stages of aerobic composting process showing the temperature profile of the compost pile.

    (6 marks)

    (b) Explain, using sketches, the processing of commingled municipal solid waste.    (6 marks)

19. What are the duties of the 'State Pollution Control Board" and 'Central Pollution Control Board' as per the *Water/(Prevention and Control of Pollution) Act, 1974* ?

Or

20. What are the powers of central government as given in *Environment Protection Act 1986* ?

    (5 × 12 = 60 marks)

**G 5143**                     (Pages : 2)                 Reg. No............................

Name............................

# B.TECH. DEGREE EXAMINATION, MAY 2017

## Eighth Semester

Branch : Civil Engineering

CE 010 805 G06—REMOTE SENSING AND GIS APPLICATIONS (Elective IV) [CE]

(New Scheme—2010 Admission onwards—Supplementary)

Time : Three Hours                                                     Maximum : 100 Marks

### Part A

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

1. State Planck's law.

2. Define reflectance.

3. Explain radio meter radar.

4. Define hardware. Explain hard ware components for GIS.

5. Explain image filtering techniques.

(5 × 3 = 15 marks)

### Part B

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

6. Explain Stefan Boltsman law.

7. Explain atmospheric windows.

8. Explain earth resources satellites.

9. Explain digitizer.

10. Draw the wave model.

(5 × 5 = 25 marks)

Turn over

## Part C

*Answer all questions.*
*Each question carries 12 marks.*

11. Define remote sensing. Explain components of remote sensing.

Or

12. Explain electromagnetic radiation spectrum.

13. Define spectral signature. Explain spectral signature curve.

Or

14. Explain EMR interaction with earth surface materials.

15. Explain satellites. Discuss the classification of based on orbits.

Or

16. Discuss the principle and application of thermal remote sensing.

17. Define projection. Discuss different types of projection.

Or

18. Explain the principle and working of printers and plotters.

19. Discuss the interpretation of satellite images.

Or

20. Discuss the application of remote sensing and GIS in water resources.

(5 × 12 = 60 marks)