**B.Tech. (Civil Engg.) 5th Semester (G-Scheme)
Examination, December–2025**

**HYDROLOGY & WATER RESOURCE
ENGINEERING**

Paper– PCC-CE-301-G

Time allowed : 3 hours]   *[Maximum marks : 75*

Note: *Attempt **five** questions in total. **Question No. 1 is
compulsory.** Attempt **one** question from each
section. All questions carry equal marks.*

1. (a) Enlist different recording type of rain gauges and
      explain any one of its type.

   (b) Discuss probability of occurrence and non-
      occurrence of a flood event.

   (c) What is a "Return Period"?

   (d) Why is base flow separated from total runoff?

   (e) Explain the concept of S hydrograph and under
      what circumstances you would advocate adoption
      of this hydrography.   5×3=15

Section- A

2. Define Unit Hydrograph. What are the assumptions
   underlying the Unit Hydrograph theory? Explain uses
   of Unit Hydrograph.   15

3. The rain gauge station X was in operative for a part of a month during storm occurred. The storm rainfall recorded at the three surrounding stations A, B and C was 75, 55 and 85 mm respectively. If the average annual rainfall of stations A, B, C and X are 780, 660, 850 and 700 mm respectively. Estimate the storm rainfall of station X. 15

Section-B

4. (a) Explain process of infiltration and factor affecting it. 7

   (b) What is Infiltration Indices? Explain different types of indices. 8

5. A catchment area of 30 sq. km has one recording gauge. During a storm, the following mass curve of rainfall was recorded. 15

Time from start of storm (Hour)	0	2	4	6	8	10	12	14
Accumulated rainfall (mm)	0	6	17	57	70	81	87	90

If the volume of runoff due to the storm measured is 1.2×10^5 m^3. Estimate the ϕ-index of catchment.

Section-C

6. The effective rainfall hyetograph of a storm has duration of 12 h, with rainfall intensity of 2.0, 0.75, and 4.0 cm/h respectively in successive 4 h periods. The ordinates of the corresponding direct runoff hydrograph read at 4 h intervals are: 15

   160,300,570,636,404,234, 105 and 48 m^3/s respectively. Determine the ordinates of the 4 h UHG using deconvolution method. 15

7. Define flood routing. What are the usual assumption made in routing a flood in a reservoir-? Explain the I.S.D. curves method of reservoir flood routing. What are the factors to be considered in choosing the routing period? 15

Section-D

8. Distinguish between: Confined and Unconfined Aquifer, Aquiclude and Aquitard, Specific yield and storage coefficient. 15

9. (a) What is meant by water harvesting? Describe in brief, the rain water harvesting designed for agricultural use, with advantages and disadvantages. 7

   (b) What are the causes of drought? What measures you will suggest for water conservation and augmentation? 8

B. Tech. 5th Semester, G-Scheme (Civil Engineering)
Examination, December-2025
HIGHWAY ENGINEERING - 1
Paper : PCC-CE-303-G

Time allowed : 3 Hours]   *[Maximum marks : 75*

Note : Attempt any **five** full question all question carry equal marks, Assume Suitable Data if not provided use of relevant code is allowed.

1. Write a short note on the following:

   (a)   Classification of highway.   2.5

   (b)   Length of transition curve   2.5

   (c)   Summit and valley curve   2.5

   (d)   What is the significance of CBR test?   2.5

   (e)   Subgrade soil and its function   2.5

   (f)   PIEV theory   2.5

Section-A

2. What is the scope of highway engineering? Explain different road development plans in India.

                                                           15

3. What are the various requirement of an idea highway alignment? Also explain factors effecting alignment.   15

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Section-B

4. Find the stopping sight distance for a design speed of 55 kmph. Assume suitable data. What are sight distance requirement at a gradient of 1 in 30? Assume suitable data.   15

5. Explain super elevation. What are the factors on which the design of super elevation depends?   15

Section-C

6. What are the different tests on aggregates? Describe any two in detail.   15

7. Explain CBR and the test procedure for laboratory and field test.   15

Section-D

8. Classify the different types of traffic signs and mention the objective of each type of sign with neat sketches.   15

9. What are the different techniques used in intelligent transportation system? Describe in detail.   15

**B.Tech. (Civil Engg.) 5th Semester (G-Scheme)
Examination, December–2025**

SOIL MECHANICS

Paper– PCC-CE-305-G

Time allowed : 3 hours]   *[Maximum marks : 75*

Note: *Attempt **five** questions in total. **Question No 1** is* *compulsory. Attempt **one** question from each section.* *All questions carry equal marks.*

1.   (i)   What are the Atterberg's limits? List its types.

      (ii)   A soil has void ratio of 0.65 and specific gravity 2.80. Determine unit weight of soil.

      (iii)   State Darcy's law.

      (iv)   Differentiate between discharge and seepage velocity.

      (v)   Explain about the assumptions made in Terzaghi's one dimensional consolidation theory?

      (vi)   List the assumptions made in Boussinesq's analysis of stress distribution. $6 \times 2.5 = 15$

Section-A

2.   (a)   A soil has bulk density of 20.1 kN/m3 and water content of 15%. Calculate the water content if the soil' partially dries to density of 19.4 kN/m3 and void ratio remains unchanged.   10

(b) Describe three Atterberg Limits of a soil in detail. Draw the diagram and mark the various soil phases.   5

3. (a) Explain the IS soil classification system for soil.   5

(b) What are the factors affecting permeability of soil?   5

(c) Describe in detail with neat sketches, the field determination of permeability   5

Section-B

4. (a) Derive the Laplace equation for two dimensional flow.   8

(b) Find the value of the effective stress at 2m, 4m, 6m, 8m and 10m is a soil mass having 'γs =21 KN/m3 . Water table is 2m below ground surface. Above water table there is capillary rise up to ground surface. Also draw total stress diagram up to 10.00 m.   7

5. (a) Explain the factors affecting rate of compaction of a soil mass.   8

(b) A clay layer of 10m thickness underlies a sand stratum of 10m and overlies a pervious layer. The sand layer carries a point load of 10 MN.

Assume e =0.7 and G = 2.72, L.L. = 60% and Cv= 25 x 10-4 cm2 /sec. the water table is located 5 m above the top of the clay layer. Find how long would the clay take to settle 4.7 cm.   7

Section-C

6. (a) A circular area of 7.5 m in diameter on the ground surface carries a uniformly distributed load of 300 kg/m2. Find the intensity of vertical pressure below the centre of the loaded area at a depth of 6m below the ground surface. Use boussinesq's analysis.   8

(b) What do you mean by pressure bulb? What is its significance in soil mechanics?   7

7. (a) Derive the equation for Terzaghi's theory of one dimensional consolidation with a neat sketch.   7

(b) Differentiate Modified and Standard compaction test.   8

Section-D

8. List various methods of finding out shear strength parameters. Explain any one method in detail with its advantages and limitations.   15

9. (a) How to calculate active earth pressure graphically when a line load is acting on the ground surface. 5

    (b) What is the effect of cohesion on active earth pressure and passive earth pressure? Explain with earth pressure distribution diagram   10

B. Tech. (Civil Engg.) 5th Semester (G-Scheme)
Examination, December–2025
WATER SUPPLY AND TREATMENT
Paper– CE-307-G

Time allowed : 3 hours]   *[Maximum marks : 75*

Note: *Attempt five questions in total. Question No. 1 is compulsory. Attempt one question from each section. All questions carry equal marks.*

1. Write short note on the following :   6×2.5 = 15

   (i) Turbidity

   (ii) Plain sedimentation

   (iii) Water meter

   (iv) Industrial waste

   (v) Sewer

   (vi) Soil waste

Section-A

2. What is meant by the term pure water? What are the impurities present 15 in water? Explain.   15

3. What is the importance of bacteriological tests? Discuss the two standard tests which are employed to examine water bacteriologically.   15

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Section-B

4. What is the Necessity of Water Treatment? Explain the Flow Diagram of Different Treatment Units.　15

5. What are processes for Water Softening, Desalination-R.O. Plant, Demineralization, Adsorption, Ion Exchange with diagram?　15

Section-C

6. Explain the Methods of Supply - Intermittent and Continuous.　15

7. Why is pumping of water required in water supply projects? What considerations govern the choice of a particular type of pump?　15

Section-D

8. Enumerate some of the appurtenances required for the pipes of water distribution system.　15

9. What are the Sources of Water Pollution? Explain it. 15

**B.Tech. (Civil Engg.) 5th Semester (G-Scheme)
Examination, December–2025**

DESIGN OF STEEL STRUCTURE

Paper– PCC-CE-309-G

Time allowed : 3 hours]   *[Maximum marks : 75*

Note: *Q. No. 1 is compulsory. Each question carries equal marks (20 marks). Students have to attempt five questions in total at least one question from each section.*

- Use of IS 800- 1984 or 2007 is allowed.

- Use of Steel Table is allowed.

- Assume suitable data.

1. Explain the following:

  (a)   Write the use of Lug Angle in tension members.

  (b)   List the various forces acting on a Gantry Girder.

  (c)   Write any six features of structural steel

  (d)   Define Lap joint and Butt Joint.

  (e)   Distinguish between laterally restrained and unrestrained beams.

  (f)   What are the advantages of HSFG bolts?

           $6×2.5=15$

Section-A

2. (a) What are the methods employed for the design of the steel framework? What are the assumptions made in simple design? 7.5

   (b) What are the types of load to be account for steel design? 7.5

3. (a) Design a lap joint between the two plates of width 150 mm, if the thickness of one plate is 12 mm and the other is 10 mm. The joint has to transfer a working load of 100 kN. The plates are of Fe 410 grade. Use bearing type bolts. 7.5

   (b) Define weld. Write about the advantages of welding. List the various types of welded joints. 7.5

Section-B

4. Design a tension member to carry a load of 300 kN. The two angles placed back to back with long leg outstanding are desirable. The length of the member is 2.9 m. 15

5. Design a built-up column with two channel sections. The column is of 6.4 m effective length and supports a load of 1000 kN. 15

Section-C

6. A beam is simply supported over a span of 6 m. It supports one Iron 15 beam at mid span exerting 90 KN . Design the beam with ISWB section with flange plates. Assume the beam is not supported laterally. 15

7. A column 5 m long is to support a load 3500 kN. The ends of the column are effectively held in position and direction. Design the column if rolled steel beams and 16 mm plates are only available. 15

Section-D

8. A portal frame is shown in figure. Find the value of W at collapse. 15
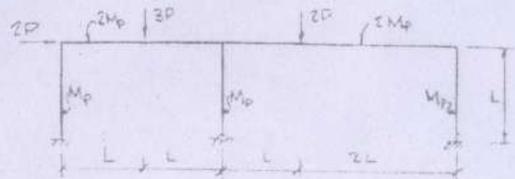
9. A Gantry crane exerts a load of 100 kN on each of its wheels, excluding impact and other loads, the wheel distance is 3 m. The span of the gantry is 6 m. Design the girder assuming lateral support. 15

B.Tech. (Civil Engg.) 5th Semester (G-Scheme)
Examination, December–2025
ENGINEERING GEOLOGY
Paper– PCC-CE-311-G

Time allowed : 3 hours]   *[Maximum marks : 75*

Before answering the questions, candidate should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note: *Attempt **five** questions in all, selecting **one** question from each section. **Question no. 1 is compulsory.** All question carries equal marks.*

1. Describe the following: 5×3=15

   (a) Interior of Earth

   (b) Soil Profile

   (c) Earthquake

   (d) Folds and Faults

   (e) Mineralogical composition

Section-A

2. Explain the importance of engineering geology in civil engineering projects.   15

3. Explain the internal and external forces causing changes in the formation of structure.   15

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Section-B

4. (a) Explain mineral, rocks and ore. 7.5

   (b) What are the physical properties of mineral used for the identification? 7.5

5. (a) Explain the mineralogy composition. 7.5

   (b) Explain the volcanic phenomenon. 7.5

Section-C

6. (a) Explain the various parts of faults. 7.5

   (b) Explain the folds in detail. 7.5

7. Define stress deformation of rocks and measurement of velocity of sound in rock. 15

Section-D

8. (a) What do you mean by failure of reservoir, and write the causes of failure? 7.5

   (b) Give a broad account of geological conditions that influence the dam site. 7.5

9. What do you mean by seismic waves, and also explain the seismic zones of India? 15