

Roll No.

3522

B. Tech. 7th Semester (Civil)

Examination – May - 2026

ADVANCED STEEL STRUCTURE

Paper : PCC-CE-403-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates 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 questions carry equal marks. IS 875 : 1983 is allowed.

1. Describe the following : 15
- (a) Welded frame connection
 - (b) Compression and bending elements
 - (c) Braces and stepped column
 - (d) Transmission line tower

3522-250-(P-4)(Q-9)(26)

P. T. O.

(e) Types of bracing of tower

(f) Wind pressure in steel stack

SECTION - A

2. Design a bolted end plate connection between an ISMB 400 beam and ISHB 200 @ 40kg/m column so as to transfer hogging factored bending moment of 150 KNm and a vertical factored shear of 150 KN. Use HSFG bolts of diameter 22mm. Assume 6 HSFG 8.8 grade bolt of 22mm diameter and 180×600 mm end plate. 15
3. Explain all light gauge section in detail. Draw different types of cold formed section. Write down the design steps for the design of compressive element according to Indian Standard. 15

SECTION - B

4. Design a roof truss for a factory building for a span of 20m and a pitch of 1/5. The height of truss at the eaves level is 10m. The spacing of truss is 4m. The factory building which is 75m long is situated at Delhi. Take $f_y = 250 \text{ N/mm}^2$. 15
5. Explain the analysis and design steps of Transmission Line Tower. 15

3522- (P-4)(Q-9)(26) (2)

SECTION - C

6. Design a rectangular steel overhead water tank to hold 150000 liters of water. The height is 2.2m and depth of water is 2m. Steel plates are available in 2m and 1.25m width and of any thickness. Design the bottom plate and bottom tee cover. 15
7. Design for Delhi a self-supporting steel stack of height 100m above the foundation. The diameter of cylindrical part of chimney is 4m. The foundation has to rest on the soil having a bearing capacity 185 KN/m^2 . The topography at the site is flat and location of terrain category is 2. Design any three sections along with foundation. 15

SECTION - D

8. A load out of plate of web is causing a bending moment of 8 KNm on the stiffeners. Design a web stiffener. The size of the plate is :

Top Plate : $290 \text{ mm} \times 22 \text{ mm}$

Bottom Plate : $215 \text{ mm} \times 22 \text{ mm}$

Web : $900 \text{ mm} \times 8 \text{ mm}$. 15

3522- (P-4)(Q-9)(26) (3) P. T. O.

9. (a) What are the points to be remembered while designing girder with corrugated webs. 7

(b) What are the longitudinal web stiffeners and how are they provided ? 8

Roll No.

3523

**B. Tech. 7th Semester (Civil)
Examination – May - 2026**

DESIGN OF HYDRAULIC STRUCTURES

Paper : PCC-CE-405-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates 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 questions carry equal marks.

1. Write a short note on the following : $2.5 \times 6 = 15$

- (a) Seepage line and its importance
- (b) Stilling basin and its type
- (c) Use of flood routing
- (d) Describe aqueduct and super passage in detail

3523-266-(P-3)(Q-9)(26)

P. T. O.

- (e) Energy dissipator and use of hydraulic jump as energy dissipator
- (f) Function of gallery in gravity dam

SECTION - A

2. Design and sketch a guide bank including launching apron from the following data : 15

Maximum discharge = 6000 cumecs

Highest flood level = 104 m

River bed level = 100m

Average diameter of river bed material = 0.1mm

3. What do you mean by flood routing? Explain the procedure of different methods of flood routing in detail. 15

SECTION - B

4. What are the factors which affects the selection of suitable type of cross drainage works. Explain the type of cross drainage work. 15
5. Distinguish between the barrage and weir. Also explain the design of the following components of weir. 15

SECTION - C

6. Design a suitable section for the overflow portion of a concrete gravity dam having the downstream face sloping at a slope of 0.7 H: 1 V. The design discharge for the spillway is 8000 cumecs. The height of the spillway crest is kept at RL 204 m. The average river bed level at the site is 100 m. The spillway length consists of 6 spans having a clear width of 10 m each. Thickness of each pier may be taken to be 2.5m. 15
7. Which are the main types of falls ? Briefly discuss about each fall with neat sketches where required. 15

SECTION - D

8. What do you mean by gravity dam ? Explain briefly with neat sketches the different forces that may act on gravity dam and also explain advantage and disadvantage of gravity dam. 15
9. What do you mean by earthen dam. Enumerate the types of earthen dams, and draw neat sketches and also write their advantage and disadvantage. 15

Roll No.

3526

B. Tech. 7th Semester (Civil Elective-III)

Examination – May - 2026

HYDRO POWER ENGINEERING

Paper : PEC-CEEI-411-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates 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 questions carry equal marks.

1. Describe the following : **2.5 × 6 = 15**

- (a) Explain why hydropower is considered a renewable energy source, but thermal power is not.
- (b) What is firm power and secondary power in hydropower stations ?

3526-150-(P-4)(Q-9)(26)

P. T. O.

- (c) List types of pump storage plants.
- (d) How do anchor blocks prevent penstock failures logically ?
- (e) What are the main components of a hydropower powerhouse ?
- (f) Why is the location of an intake upstream of a reservoir critical for hydropower operation ?

SECTION - A

2. Discuss the various sources of energy, highlighting the advantages and disadvantages of each. How does hydropower compare to other renewable sources in terms of efficiency and environmental impact ? 15
3. (a) Describe the methods used to predict electrical loads for hydropower stations. What factors must be considered to ensure accurate load forecasting ? 10
- (b) The load on a hydal plant varies from a minimum of 10,000 kW to a maximum of 35,000 kW. Two turbo generators of capacities 22,000 kW each have been installed. Calculate : 5
 - (i) Total installed capacity of the plant
 - (ii) Plant factor
 - (iii) Maximum demand

(iv) Load factor

(v) Utilisation factor

SECTION - B

4. (a) Explain the general layout of run-of-river and valley dam plants. 5
- (b) Classify hydropower stations based on their operational characteristics. Provide a detailed explanation of each type, including their advantages and limitations. 10
5. Explain the working principle of pump storage plants. How do they function to balance supply and demand in the power grid ? 15

SECTION - C

6. Explain the components of intake structures. How does each component contribute to the efficient operation of the plant ? 15
7. Discuss the role of anchor blocks in penstock design. How do they contribute to the structural integrity of the system ? 15

SECTION - D

8. (a) Discuss the phenomenon of cavitation in turbines.
What causes it, and how can it be prevented ? 8
- (b) Describe the design considerations for draft tubes.
How do they affect turbine efficiency and overall
plant performance ? 7
9. Explain the general layout and arrangement of hydro-
power units in a powerhouse. How does the design
impact the efficiency and maintenance of the plant ? 15

Roll No.

3529

**B. Tech. 7th Semester (Civil)
(Elective - IV)
Examination – May, 2026**

RIVER ENGINEERING

Paper : PEC-CEEI-417-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates 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 Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Define Sediment transport in rivers. $6 \times 2.5 = 15$
(b) What is meant by river morphology ?
(c) Differentiate between braided and meandering rivers.
(d) Explain anti-dune regime.
(e) What are bio-engineering techniques in river restoration ?
(f) Define guide bank and state its purpose.

3529-100-(P-3)(Q-9)(26)

P. T. O.

UNIT – I

2. (a) Explain the classification of streams with neat sketches. 7.5 × 2 = 15
(b) Discuss sediment transport and sediment budget in rivers.
3. Explain various river morphology classification schemes. 15

UNIT – II

4. Explain the characteristics and causes of meandering rivers. 15
5. What are braided rivers ? Explain their formation and characteristics. 15

UNIT – III

6. Discuss socio-cultural influences and ethics in stream restoration. 15
7. Describe bio-engineering techniques used in river restoration. 15

UNIT – IV

8. Explain the classification of river training works. 15
9. Explain the design and functions of guide banks. 15
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Roll No.

3530

B. Tech. 7th Semester (Civil Elective-V)

Examination – May - 2026

RAILWAY AND AIRPORT ENGINEERING

Paper : PEC-CEEL-419-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates 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 questions carry equal marks.

- 1. Answer the following questions :** **2.5 × 6 = 15**
- (a) Compare rail transport with road transport, listing advantages and disadvantages of both.
 - (b) What are the requirements of sleepers used in a railway track ?
 - (c) Name the various methods of tunnelling in hard and soft rocks.

3530-100-(P-4)(Q-9)(26)

P. T. O.

- (d) What are the essential features of an underground railway ?
- (e) State the purpose of an airport layout plan.
- (f) What are the standard turnouts prescribed on Indian Railways ?

SECTION - A

- 2. List out the various gauges prevailing in India with their gauge widths. What factors govern the selection of a suitable gauge ? Discuss. 15
- 3. (a) Calculate the superelevation, maximum permissible speed, and transition length for a 3° curve on a high-speed BG section with a maximum sanctioned speed of 110 km/h. Assume the equilibrium speed to be 80 km/h and the booked speed of the goods train to be 50 km/h. 10
- (b) Explain the objective of providing transition curves on either side of a circular curve. 5

SECTION - B

- 4. What are the various types of stresses induced in a rail section ? Explain briefly how these are evaluated ? 15
- 5. (a) Name the different types of marshalling yards. With the help of a neat sketch explain how goods train arriving at such a yard from different directions could be rearranged into their proper order. 10
- (b) What are the minimum signal requirements in each direction for a two aspect signalling system in class A, B, and C stations ? 5

SECTION - C

- 6. (a) Describe the drainage systems required for the following areas in detail : 8
 - (i) Drainage in station yards
 - (ii) Drainage of station platforms
- (b) Briefly discuss the problem of transport in Delhi. Give the salient details of the MRTS scheme of Delhi. 7

7. Why is a tunnel necessary ? Describe the advantages and disadvantages of constructing a tunnel. 15

SECTION - D

8. With neat diagrams, explain the components of a typical airport layout plan. 15
9. Write an elaborate note on airport markings and lighting systems with suitable sketches. 15