B.Tech. (Civil Engg.) 5th Semester (G-Scheme)

Examination, December-2024

HYDROLOGY AND WATER

RESOURCE ENGINEERING

Paper -PCC-CE-301-G

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

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

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

   (a) Precipitation

   (b) Hydrograph

   (c) Non-recording gauges

   (d) Catchment area

   (e) Classification of run-off

   (f) Actual evapotranspiration

3201-P-4-Q-9 (24)   [P.T.O.

Section-A

2. (a) What is the hydrological cycle? Give a brief description of different components of a hydrologic cycle.   8

    (b) Write the application of hydrology in the engineering purpose.   7

3. A catchment area has seven rain gauge stations. In a year the rainfall recorded by the gauges are as follows

Station	P	Q	R	S	T	U	V
Rainfall (cm)	130.0	142.0	118.0	108.0	165.0	102.0	147.0

For an error of 10% in the estimation of the mean rainfall, Calculate the minimum number of additional stations required to be established in the area.   15

Section-B

4. (a) Differentiate between the infiltration capacity and the infiltration index.   7.5

    (b) Explain evaporation and factors affecting the evaporation?   7.5

5. The mass curve of rainfall of duration 100 min. is given below. If the catchment had an initial loss of 0.6cm and a ϕ-index of 0.6cm/h, calculate the total surface runoff from the catchment.   15

Time from start of rainfall (min)	0	20	40	60	80	100
Cumulative rainfall (cm)	0	0.5	1.2	2.6	2.6	3.5

Section-C

6. (a) Explain procedure to derive S-curve hydrograph from a given unit hydrograph. Also describe the uses of S-curve hydrograph.   7

    (b) Explain rational method and empirical formula used for estimation of floods.   8

7. The peak of flood hydrograph due to 3-h duration isolated storm in a catchment is 270m²/s. the total depth of rainfall is 5.9cm. Assuming an average infiltration loss of 0.3cm/h and a constant base flow of 20m³/s. Estimate the peak of 3-h unit hydrograph. If the area of the catchment is 567km². Calculate base width of 3-h unit hydrograph by assuming it to be triangular in shape.   15

Section-D

8. (a) Explain functional requirements of water resource projects. 7.5

(b) What is the need for planning of water resource projects? Discuss briefly the various steps involved in planning of water resource projects. 7.5

9. (a) What is basin wise planning in water resource? 7.5

(b) What is system analysis in water planning? 7.5

B.Tech. (Civil Engg.) 5th Semester G-Scheme

Examination, December–2024

HIGHWAY ENGINEERING-I

Paper-PCC-CE-303-G

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

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

1. **Compulsory Question :**   15

    (i)   Classification of highway

    (ii)   How is design hourly volume determined ?

    (iii) What is the significance of CBR test?

    (iv)   Subgrade soil and its function

    (v)   PIEV theory

Unit-I

2. (a) What factors are considered in finalizing 20 years (1981-2001) plan?   7.5

   (b) What is the final location survey?   7.5

3202-P-3-Q-9(24)   [P.T.O.

3. (a) The area of a certain district in India is 13,400sq.km and there are 12 towns as power 1981 census. Determine the lengths of different categories of roads to be provided in this district by the year 2001. 7.5

(b) Compare the construction methods of Telford and Macadam; bring out the point of differences. 7.5

Unit-II

4. (a) If ruling gradient is 1 in 20. What will be the grade compensation and compensated gradient for a curve of radius 150 m. 7.5

(b) Calculate the stopping sight distance on a highway at a descending gradient of 3% for a design speed of 100 kmph. Assume other data as per IRC recommendation. 7.5

5. (a) Explain Super Elevation. What are the factors on which the design of super elevation depends? 7.5

(b) Define sight distance. State its different types and explain SSD. 7.5

Unit-III

6. (a) Explain the different Engineering properties of aggregate and suitable tests required to check those properties. 7.5

(b) Discuss various factors affecting on subgrade soil strength. 7.5

7. (a) List different types of cutback. When are these used? 7.5

(b) Explain CBR and the test procedure for laboratory and field test. 7.5

Unit-IV

8. Explain :

(i) Geographic Information Systems 7.5

(ii) Traffic Volume (q) & Traffic Density (k) 7.5

9. (a) What are the different techniques used in intelligent transportation system? Describe in details. 7.5

(b) Classify the Regulatory Signs, Warning Signs and Information signs and Mention the objectives with neat sketches. 7.5

3203

(Graph Paper)

B.Tech. (Civil Engg) 5th Semester G-scheme

Examination, December-2024

SOIL MECHANICS

Paper - PCC-CE-305-G

Time allowed : 3 hours]   [Maximum marks : 75

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

1.   (i)   Define degree of saturation and shrinkage ratio.

      (ii)   Differentiate between plasticity and consistency.

      (iii) State the assumptions in construction of flow net.

      (iv)   What is Quick sand condition? List the conditions
             for the occurrence of quick sand condition.

      (v)   Describe Triaxial shear test. What are its merits
             and demerits?

      (vi)   Explain the terms immediate settlement and
             co-efficient of volume compressibility.

                                                    6×2.5=15

3203-P-4-Q-9(24)   [P.T.O.

Section-A

2. (a) A partially saturated soil from an earth fill has a natural water content of 22% and a bulk unit weight of 19 kN/m³. Assuming the specific gravity of soil solids as 2.65, Compute the degree of saturation and void ratio. If subsequently the soil gets saturated, determine the dry density, buoyant unit weight and saturated unit weight.   10

   (b) Discuss about the grain size distribution of soil by (i) Sieve analysis, (ii) Sendimentation analysis.
       5

3. (a) Discuss Indian Standard classification system. 5

   (b) What are the factors affecting permeability of soil? The falling head permeability test was conducted on a soil sample of 4cm diameter and 18cm length. The head fell from 1.0m to 0.40m in 20 minutes. If the cross-sectional area of the stand pipe was 1cm², determine the coefficient of permeability.   10

Section-B

4. (a) What is quick sand condition? Calculate hydraulic gradient for this case.   7

   (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 upto 10.00m.   8

5. (a) Explain the factors affecting rate of compaction of a soil mass.   7

   (b) Draw the compaction curve and explain the procedure to determine OMC and Maximum Dry density.   8

Section-C

6. (a) Discuss in detail about the Boussineq's analysis to find vertical stress and horizontal shear stress for point load.   8

   (b) Explain Newmark's influence chart.   7

7. (a) Derive the equation for Terzaghi's theory of one dimensional consolidation with a neat sketch.   8

   (b) A 5m thick saturated soil stratum has a compression index of 0.25 and coefficient of permeability 3.2×10^{-3} mm/sec. If the void ratio is 1.9 m at vertical stress of 0.15 N/mm². Compute the void ratio when the vertical stress is increases to 0.2 N/mm², also Estimate the settlement due to above stress increase and time required for 50% consolidation and 90% consolidation.   7

Section-D

8. Explain briefly Vane shear test of soil. Explain the triaxial shear tests based on drainage and their applicability. Mention its merits and demerits.   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 Engineering) 5th Semester G-scheme

Examination, December-2024

WATER SUPPLY AND TREATMENT

Paper - PCC-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 notes on following :   6×2.5=15

    (i)   Turbidity

    (ii)   Water meter

    (iii)   Gutter

    (iv)   Putrefaction

    (v)   B.O.D.

    (vi)   R.M.O.

Section-A

2. What is Water Supply System? Explain the Planning and Objectives.   15

3. Explain the Population Forecasting, Water Demands and its Variations.   15

Section-B

4. Design of Slow and Rapid Sand Filtration.   15

5. What is a process for Membrane System? Explain Iron and Manganese Removal, DE fluoridation, Dissolved Solids Removal.   15

Section-C

6. Explain the Pipes and Conduits for Water-Pipe Materials, Laying, Jointing and Testing of Pipes.   15

7. Discuss in detail the utility of air lift pumps in water supply projects.   15

Section-D

8. What is Water Distribution? Explain the Type of Distribution System with example.   15

9. Explain the terms water pollution control and water management.   15

B.Tech. (Civil Engg.) 5th Semester (G-Scheme)

Examination, December-2024

DESIGN OF STEEL STRUCTURE

Paper -PCC-CE-309-G

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

Note : _Attempt any **five** questions in all, selecting **one**_
question from each unit. **Question No. 1** is
**compulsory**. All questions carry equal marks.

1. (a) Define plastic hinge and plastic collapse.

 (b) Define load factor and shape factor.

 (c) What are the various factors affecting strength of
 tension member?

 (d) Differentiate between laced column and battened
 column.

 (e) Define throat thickness and gross diameter of rivet.

 (f) Describe various components of a Gantry girder.

 $6 \times 2.5 = 15$

3205-P-4-Q-9 (24)   [P.T.O.

Unit-I

2. A single riveted double cover butt joint in used to connect two plates 16mm thick with chain riveting. The rivets used are power driven 20mm in diameter at a pitch of 60mm. Find the safe load per pitch length and efficiency of the joint. 15

3. Define physical, mechanical and chemical properties of structural steel and also State the assumptions in the theory of riveted joints. 15

Unit-II

4. Design a suitable flat 10mm thick to act as a tie member in a roof truss and subjected to an axial pull to 140 kN. Use $\sigma_{at} = 150 N/mm^2$, $\tau_{vf} = 100 N/mm^2$, $\sigma_{pf} = 300 N/mm^2$ and diameter of rivets = 18mm. 15

5. Design a double angle discontinuous strut to carry a load of 90 kN. The length of the strut is 3m between intersections. The two angles are placed back to back (with long legs connected) and are tack riveted. 15

   (a) Angles are placed on opposite sides of 12 mm gusset plate.

   (b) Angles are placed on same side of 12 mm gusset plate.

Unit-III

6. Design a beam of 6.5m effective span carrying a uniform load 30 kN/m if the compression flange is laterally unsupported. Assuming $f_y = 250 N/mm^2$. 15

7. Two columns I.S.H.B. 350@ 661.2N/m and I.S.H.B. 400@ 759.3N/m are spaced 6m c/c. The Columns carry loads 1100 kN & 1800 kN respectively. Design a combined grillage foundation for the columns. Bearing pressure of the earth is 200 kN/m². 15

Unit-IV

8. Determine the collapse load for the continuous beam section as shown in figure. 15
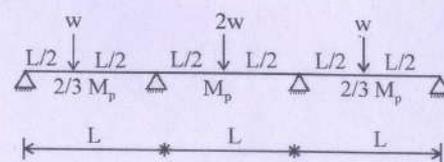
9. Design a gantry girder to be used in an industrial building
   carrying an electric overhead travelling crane, for the
   following data: 15

Crane capacity	200 kN
Self-weight of the crane girder excluding trolley	200 kN
Self-weight of the trolley, electric motor, hook, etc.	40 kN
Approximate minimum approach of the crane hook to the gantry girder	1.20 m
Wheel base	3.5 m
c/c distance between gantry rails	16 m
c/c distance between columns (span of gantry girder)	8 m
Self-weight of the rail section	300 N/m
Yield stress of steel	250 N/mm^2

B.Tech. (Civil Engg.) 5th Semester

(G-Scheme) Examination, December-2024

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 questions carry equal marks.*

1. Describe the following :   15

    (a) Sub division of Geology

    (b) Soil Profile

    (c) Volcanoes

    (d) Folds and Faults

    (e) NIRM

Section - A

2. Explain the causes of erosion of surface of earth and method of its prevention. 15

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

Section - B

4. (a) Explain different types of rocks.

 (b) What are the physical properties of mineral used for the identification? 15

5. What is metamorphic grades and also explain the agents and types of Metamorphism? 15

Section - C

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

 (b) Explain the importance of geological structure in civil engineering projects. 15

7. (a) Write an essay on Ground Water and Engineering Practice.

 (b) What is aquifers and also explain its types and functions. 15

Section - D

8. Explain the different types of rocks and unfavorable conditions in sedimentary rocks. 15

9. (a) Write the use of remote sensing technique for hydrological survey of the site.

 (b) Explain the uses of geological maps and interpretation of data. 15

B.Tech (Civil Engg.) 5th Semester (G-Scheme)
Examination, November-2023

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) Define rain gauge density. Discuss the IS norms
        for the rain gauge density.

    (b) Discuss various methods of reducing evaporation
        from a water body.

    (c) Differentiate between infiltration and percolation.

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

    (e) Write short note on : Depth area duration
        curve.   5×3=15

Section-A

2. (a) Explain "Hydrological cycle" with neat
        sketch.   5

3201-P-4-Q-9 (23)   [P. T. O.

(b) Explain the concept of S hydrograph and under what circumstances you would advocate adoption of this hydrograph. Give a clear associated sketch.   10

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) Describe the method of obtaining infiltration capacity rate curve of an experimental plot using rainfall simulator.   7

    (b) The infiltration capacities of an area at different intervals of time are indicated below. Find an equation for the infiltration capacity in the exponential form.   8

Time (hrs)	0	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Infiltration capacity (cm/hr)	10.5	5.65	3.20	2.18	1.50	1.25	1.10	1.0	1.0

5. A storm during dry weather has rainfall intensities of g, 12, 40, 3g, 30, 26, 28, b, 16, 32,36, 24, 14 and 4 mm/h at an hour intervals. What is the runoff volume from a basin area of 600 km^2 if the initial abstractions are 10 mm and d index for the basin is 10 mm/h ? What is the per cent error in runoff estimate if the initial abstractions are neglected ?   15

Section-C

6. What is unit hydrograph ? What are the basic proposition of the unit hydrograph theory ? What are the limitations of the unit hydrograph theory ?   15

7. (a) Explain Gumbel's method for flood frequency analysis.   5

    (b) Estimated flood peaks for two return periods for a river is given below. Determine flood discharge in the river will have a return period of 1000 years.   10

Return period (years)	Peak flood (m^3/s)
100	430
50	390

Section-D

8. (a) Discuss briefly the various steps involved in planning of water resources projects.   7

    (b) Discuss the environmental impact of multi-purpose water resources projects.   8

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

3202

B.Tech. (Civil Engineering), 5th Semester (G-Scheme)
Examination, November-2023
HIGHWAY ENGINEERING-I
Paper -PCC-CE-303-G

Time allowed : 3 hours] [Maximum marks : 75

Note : *Question no. 1 is compulsory. Attempt total **five** questions, selecting **one** question from each unit. All questions carry equal marks.*

1. **Compulsory** question; 5 parts : 15

   (a) What are the objectives of CRI?

   (b) What is extra widening?

   (c) What is the significance of CBR test?

   (d) Subgrade soil and its function.

   (e) PIEV theory

   Unit-I

2. (a) Write any four recommendations of third year 20 plan. 7.5

   (b) What is the final Location survey? 7.5

3202-P-3-Q-9(23) [P.T.O.

3. (a) The area of a certain district in India is 13,400 sq. km and there are 12 towns as per 1981 census. Determine the lengths of different categories of roads to be provided in this district by the year 2001. 7.5

   (b) Compare the construction methods of Telford and Macadam; bring out the point of differences. 7.5

Unit-II

4. (a) If ruling gradient is 1 in 20. What will be the grade compensation and compensated gradient for a curve of radius 150 m. 7.5

   (b) Calculate the stopping sight distance of 70 kmph for two way traffic & one way traffic road. Take reaction time 2.5sec & co-efficient of friction = 0.35? 7.5

5. (a) Explain superelevation provided for pavement in curves. Explain the factors influencing it. 7.5

   (b) Define sight distance. State its different types and explain SSD. 7.5

Unit-III

6. (a) List and explain the various desirable properties of subgrade soil as highway material. 7.5

   (b) Discuss various factors affecting on subgrade soil strength. 7.5

7. (a) List different types of cutback. When are these used? 7.5

   (b) How do you find the CBR value in Laboratory? Explain the test procedure with a neat sketch. 7.5

Unit-IV

8. Explain:

   (i) Geographic Information Systems 7.5

   (ii) Traffic Volume(q) & Traffic Density(k) 7.5

9. (a) What are the different techniques used in an intelligent transportation system? Describe in details. 7.5

   (b) Classify the Regulatory Signs, Warning Signs and Informatory signs and mention the objectives with neat sketches. 7.5

B.Tech (Civil Engg) 5th Semester (G-Scheme)

Examination, November-2023

SOIL MECHANICS

Paper-PCC-CE-305-G

Time allowed : 3 hours]   [Maximum marks : 75

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

1. (a) Discuss Indian standard classification system.

    (b) Define Consistency Index.

    (c) Write the assumptions taken in Darcy's law.

    (d) Define coefficient of volume compressibility.

    (e) Describe Triaxial shear test. What are its merits and demerits ? $5 \times 3 = 15$

Section–A

2. (a) An undisturbed specimen of clay was tested in a laboratory and the following results were obtained. Weight $= 2.1$ N, Oven dry weight $= 1.75$ N, Specific Gravity of soil solids $= 2.7$. What was the total volume of original undisturbed specimen assuming that the specimen was 50% saturated ?   10

(b) Derive a relationship between discharge velocity and seepage velocity.   5

3. (a) Discuss Indian standard classification system. 7

    (b) What are the factors affecting permeability of soil ?   8

Section–B

4. (a) What is quick sand condition ? Calculate hydraulic gradient for this case.   5

    (b) In a soil deposit layer is 10m thick having water table at 5m below the ground surface. There is a capillary zone of 1.5m with degree of saturation 80%. Void ratio is 0.6 and specific gravity s 2.65. Assume soil above the capillary zone to be dry. Draw total, effective and pore pressure distribution diagram.   10

5. (a) Explain the factors affecting rate of compaction of a soil mass.   7

    (b) Differentiate between standard and modified compaction text method.   8

Section–C

6. (a) Draw and explain vertical stress distribution diagram below a loaded circular area.   7

    (b) Explain Newmark's influence chart.   8

7. A clay soil, tested in a consolidometer, showed a decrease in void ratio from 1.20 to 1.10 when the pressure was increased from 50 to 100 kPa. If the coefficient of consolidation determined in the test for the given stress increment was 10 m²/yr, Calculate the coefficient of compressibility and the coefficient of permeability. If the sample tested in the lab was taken from a 2.8m thick clay layer, Determine the consolidation settlement corresponding to the given stress increment.   15

Section–D

8. (a) Explain briefly Vane shear test of soil.   5

    (b) An unconfined compression test was conducted on an undisturbed clay sample. The sample had a diameter of 32 mm. and length 66 mm the load at failure was 30 N and axial compression of the sample was 10 mm. Determine the undrained shear strength parameters if the failure plane makes an angle 46° with horizontal.   10

9. Draw Mohr–Coulomb failure envelopes of CU, CD and UU tests for sandy soil and comments on the shear strength parameters.   15

B.Tech (Civil Engg) 5th Semester (G-Scheme)

Examination, November-2023

WATER SUPPLY AND TREATMENT

Paper-PCC-CE-307-G

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

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

1. (a) Define impurities in water.

   (b) List out the standards for water quality.

   (c) List out advantages of slow sand filter.

   (d) Mention the advantages of chlorine, as disinfectant.

   (e) Define Zeolite process.

   (f) Name the types of intake according to their position.

   (g) Write any two appurtenances in water conveyance system.

   (h) List any four effects of hardness in water.

   (i) What are the methods of distribution of water ?

   (j) What is a surface reservoir ? $10 \times 1.5 = 15$

[P. T. O.

Section–A

2. The population census of a city is as shown in the following table. Estimate the expected population of the city by 2031 and 2041 using arithmetical increase method and geometrical increase method.   15

Year	1971	1981	1991	2001	2011
Population in lakhs	1.50	1.85	2.18	2.50	2.85

3. Explain all the physical test needed for testing quality of natural river water flowing over an alluvial bed. 15

Section–B

4. (a) Discuss the design aspects of sedimentation tanks in detail.   7

    (b) Describe Chlorination and its types. Explain the various process or methods.   8

5. Show the mechanism of sand filtration. Draw a neat sketch of filter units and explain its working principle.   15

Section–C

6. (a) Explain the factors to be considered in selection of intake structures.   7

    (b) Enumerate different types of :   8

    (i) Pipe appurtenances

    (ii) Pipe materials

7. (a) Explain briefly the steps involved in water supply pipe line installation.   7

    (b) Write brief notes on testing of pipelines.   8

Section–D

8. Explain about the analysis of distribution networks in water distribution and supply to buildings.   15

9. (a) Summarize few lines about leak detection and explain its methods. How to maintain the drinking water pipeline system ?   10

    (b) What do you mean by economic diameter of a rising main ?   5

B.Tech (Civil Engg.) 5th Semester (G-Scheme)

Examination, November-2023

DESIGN OF STEEL STRUCTURE

Paper-PCC-CE-309-G

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

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

1.   (a)   Define the properties of steel.   6×2.5=15

   (b)   Define various types of column bases.

   (c)   What is the purpose for providing anchors bolt in base plate ?

   (d)   What is slenderness ratio ?

   (e)   Define diagonal buckling.

   (f)   Define Lap joint and Butt Joint.

Unit-I

2.   Two plates 10 mm and 18 mm thick are to be joined by a double cover butt joint. Assuming cover plates of 6 mm thickness. Evaluate the joint strength and calculate its efficiency. Using M20 boots of grade 4.6
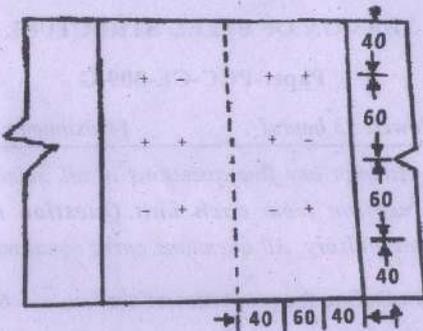
and Fe 410 plates. Assume a pitch of 60 mm and edge
distance of 40 mm.   15

3. Define weld. Write about the advantages of welding.
List the various types of welded joints.   15

Unit-II

4. A diagonal member of a roof carries a maximum axial
pull of 350 KN. Design the section and the connection
with a 14 mm gusset plate. The length on the gusset
plate available for making the connection is 320 mm.
Design the lug angle also if required. The steel is of
yield stress of 250 N/mm².   15

5. A discontinuous strut of 3 m length between the
intersections consists of two angles 110 × 110 × 8 mm.
The angles are placed back to back on the opposite

side of the gusset plate and are tack riveted. Calculate
the percentage change in the load carrying capacity if
the two angles are placed on the same side of the gusset
plate.   15

Unit-III

6. A roof of hall measuring 5 × 12 m consists of 120 mm
thick RCC slab supported on steel I-section spaced at
3.0 m c/c. Take live load 4.5 KN/m² and finishes
2.0 KN/m². Bearing of wall 400 mm. The beam is
laterally restrained. Design one of the interior beams
supporting the roof. Check for shear, moment capacity
and deflection.

15

7. A built-up column consists of ISHB 400 @ 77.4 kg/m
with one 300 mm × 12 mm flange plate on each side.
The column carries an axial load of 2400 KN. Design
a gusseted base, if the column is supported on concrete
pedestal with a bearing capacity of 4 N/mm².   15

Unit-IV

8. A beam of uniform cross-section and span L is built-in
at one end and simply supported at the other. It carries
a concentrated load at a distance X from the built-in
end. Show that the collapse load has the value

$\dfrac{2L - X}{X(L - X)} M_p$, where M_p is the fully plastic moment. If both the ends have been built-in, show that the load at collapse would have increased in the ratio $\dfrac{2L}{2L - X}$. 15
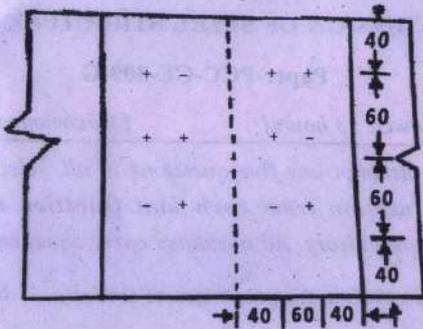
9. Design a gantry girder to be used in an industrial building carrying an electric overhead travelling crane, for the following data : 15

Crane capacity	250 KN
Self-weight of the crane girder excluding trolley	200 KN
Self-weight of the trolley, electric motor, hook, etc.	30 KN
Approximate minimum approach of the crane hook to the gantry girder	1.30 m
Wheel base	3.5 m
c/c distance between gantry rails	18 m
c/c distance between columns (span of gantry girder)	8 m
Self-weight of the rail section	400 N/m
Yield stress of steel	250 N/mm²

and Fe 410 plates. Assume a pitch of 60 mm and edge
distance of 40 mm.   15

3. Define weld. Write about the advantages of welding.
    List the various types of welded joints.   15

Unit-II

4. A diagonal member of a roof carries a maximum axial
    pull of 350 KN. Design the section and the connection
    with a 14 mm gusset plate. The length on the gusset
    plate available for making the connection is 320 mm.
    Design the lug angle also if required. The steel is of
    yield stress of 250 N/mm^2.   15

5. A discontinuous strut of 3 m length between the
    intersections consists of two angles $110 \times 110 \times 8$ mm.
    The angles are placed back to back on the opposite

side of the gusset plate and are tack riveted. Calculate
the percentage change in the load carrying capacity if
the two angles are placed on the same side of the gusset
plate.   15

Unit-III

6. A roof of hall measuring 5×12 m consists of 120 mm
    thick RCC slab supported on steel I-section spaced at
    3.0 m c/c. Take live load 4.5 KN/m^2 and finishes
    2.0 KN/m^2. Bearing of wall 400 mm. The beam is
    laterally restrained. Design one of the interior beams
    supporting the roof. Check for shear, moment capacity
    and deflection.
                                                     15

7. A built-up column consists of ISHB 400 @ 77.4 kg/m
    with one 300 mm $\times$ 12 mm flange plate on each side.
    The column carries an axial load of 2400 KN. Design
    a gusseted base, if the column is supported on concrete
    pedestal with a bearing capacity of 4 N/mm^2.   15

Unit-IV

8. A beam of uniform cross-section and span L is built-in
    at one end and simply supported at the other. It carries
    a concentrated load at a distance X from the built-in
    end. Show that the collapse load has the value

$\dfrac{2L - X}{X(L - X)}$ M$_p$, where M$_p$ is the fully plastic moment. If both the ends have been built-in, show that the load at collapse would have increased in the ratio $\dfrac{2L}{2L - X}$.   15

9. Design a gantry girder to be used in an industrial building carrying an electric overhead travelling crane, for the following data :   15

Crane capacity	250 KN
Self-weight of the crane girder excluding trolley	200 KN
Self-weight of the trolley, electric motor, hook, etc.	30 KN
Approximate minimum approach of the crane hook to the gantry girder	1.30 m
Wheel base	3.5 m
c/c distance between gantry rails	18 m
c/c distance between columns (span of gantry girder)	8 m
Self-weight of the rail section	400 N/m
Yield stress of steel	250 N/mm^2

B.Tech (Civil Engg.) 5th Semester (G-Scheme)

Examination, November-2023

ENGINEERING GEOLOGY

Paper-PCC-CE-311-G

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

Note : (i)   ***Question no. 1 is compulsory****. Attempt **one** question from each section.*

     (ii)   *All questions carry equal marks.*

     (iii)   *Assume missing data, if any, suitably.*

1. Describe the following :   15

   (a)   Use of geological maps

   (b)   Weathering

   (c)   Rock formation of sedimentary rocks

   (d)   Dip and strike

   (e)   Metamorphic grades

   (f)   Measurement of velocity of sound in rocks

   (g)   Preventive measures to control slides.

Section-A

2. (a) Define engineering geology with its subdivisions. Explain the importance of geology in the planning and execution of civil engineering projects. 7

(b) Describe in brief the crust, the mantle and core of the earth. 8

3. (a) Explain the external and internal geological forces causing erosion of surface of the earth. 7

(b) Describe the following terms : 8

(i) River meandering

(ii) Loess and mudflows

Section-B

4. (a) What is the mineral and list the physical properties of the minerals with brief description ? 7

(b) Define mineral and rocks. Explain the classification of important rock forming minerals. 8

5. (a) Explain in detail the texture and origin of different types of rocks. 7

(b) What do you mean by volcanoes ? Explain the types of volcanic eruptions and resulting features. 8

Section-C

6. (a) What is structural geology ? Describe in brief the different types of faults with neat diagram. 7

(b) What are the different structures of rocks ? Describe the stresses and strains developed in rocks. 8

7. (a) What are the engineering characteristics of rocks ? Describe the factors affecting the rock properties and its behaviour. 7

(b) What are the different laboratory and field tests on rocks ? Describe briefly. 8

Section-D

8. (a) What are the objectives of a dam ? Describe geological considerations in the selection of a dam site. 7

(b) Describe the concept of sliding. Write down the internal and external causes of landslides.   8

9. (a) Describe the slope reinforcement by rock bolting and rock anchoring.   7

(b) Define magnitude and intensity of earthquake. Also explain the seismic zones in India.   8