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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

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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.

   6×2.5=15

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.

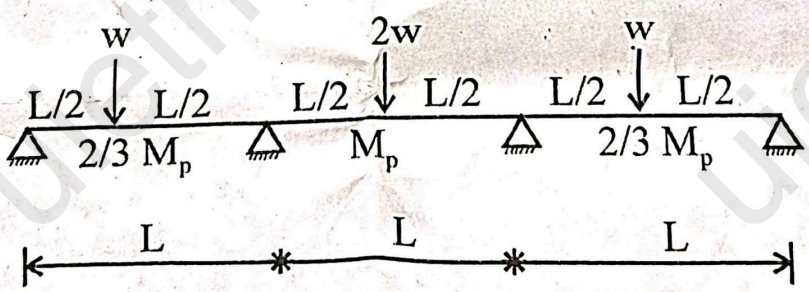
Unit-III

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/m^2. 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

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(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

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/m^3. 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/mm^2. Compute the void ratio when the vertical stress is increases to 0.2 N/mm^2, 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

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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

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 270m^2/s. the total depth of rainfall is 5.9cm. Assuming an average infiltration loss of 0.3cm/h and a constant base flow of 20m^3/s. Estimate the peak of 3-h unit hydrograph. If the area of the catchment is 567km^2. 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

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. (Common for all Branches)1st Semester (G-Scheme) Examination, December-2024

BASIC ELECTRICAL ENGINEERING

Paper -ESC-EE-101G

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

Note : *Attempt **five** questions in all. **Question number 1 is compulsory.** Attempt **four** more questions from the **Section A, B, C** and **D** by selecting at least **one** question from each section.*

1. (a) State and explain KCL.

   (b) Define Linear Networks.

   (c) What is the need of Power factor improvement?

   (d) Draw the phasor diagram of Ideal Transformer.

   (e) Define Voltage regulation of transformer.

   (f) Define slip in an Induction motor.

   (g) What is the function of armature winding in DC machines?

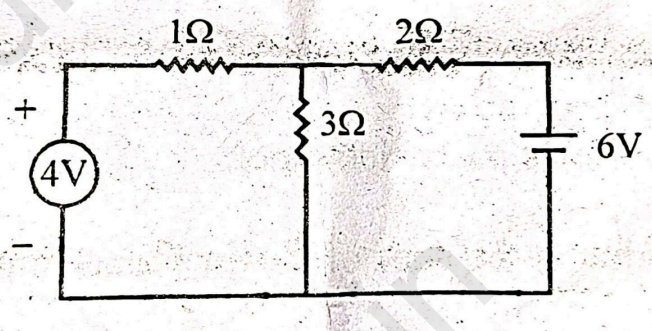
   (h) What is deflecting torque in measuring instruments?

(i) State and explain Faradays law of electromagnetic induction.

(j) Discuss the Eddy current losses in Electrical Machines in brief. 10×2.5=25

Section-A

2. State and Explain Thevenin's theorem. Solve the given circuit to find the value of current flowing through 2 ohm resistor by using Nortons theorem. 12.5



3. Outline the step-by-step procedure for applying the Mesh analysis to find the voltage across a specific resistor in any given Electrical network. 12.5

Section-B

4. Discuss the B.H. Characteristics curve in detail. 12.5

5. Draw and explain the phasor diagram of single phase transformer on capacitive load. 12.5

Section-C

6. Explain how the revolving field is produced in stator of 3 phase induction motor? 12.5

7. Explain the construction and working principle of Synchronous motor. 12.5

Section-D

8. Explain the construction and working principle of watt meter in detail. 12.5

9. What do you mean by earthing? Discuss the working of ELCB in detail. 12.5

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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

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