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Total No. of Pages : 4

Seat No. 30526

T.E. (Civil) (Part - I) (Semester - V) (Revised) Examination, May -2019

GEOTECHNICAL ENGINEERINE - I

Sub. Code : 66238

Day and Date : Monday, 6 - 05 - 2019 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) **Make assumptions wherever necessary.**
4) Use of non-programmable calculator is allowed.

SECTION - I

Q1) Answer the following.

a) Derive the relation for unit weight of partially saturated soil in terms of specific gravity of soil solids, void ratio, degree of saturation and unit weight of water. [6]

b) Explain Casagrande's laboratory method for determination of liquid limit. **[6]**

c) 50 gm of oven dried soil passing 75 micron sieve was taken in a hydrometer analysis. The corrected hydrometer reading in 1000 ml soil suspension at 2 minute elapsed interval ws 25. The effective depth corresponding to above hydrometer reading is 12.1 cm. Considering specific gravity and poisson's ratio as 2.7 and 0.01 poise Calculate particle size in mm and percent finer of the soil. **[6]**

OR

A soil has liquid limit 22%, plastic limit 15%, flow index 12% and natural water content as 20%. Determine the plasticity index, toughness index, liquidity index and the relative consistency. **[6]**

P.T.O.

Q2) Answer the following.

a) Explain laboratory method for determination of coefficient of permeability for coarse grained soil with equation and sketch. **[8]**

b) Calculate effective stress, pore water pressure and total stress at 6 m. below ground level where water table is 3 m below ground level. Properties of the soil as below, Dry unit weight of soil - 16.5 KN/ cu.m, moisture content of the soil above water table - 15% and specific gravity of soil - 2.7. **[8]**

OR

During a pumping out test observation wells and a test well were sunk through strata of dense soil 10 m deep overlying on impervious strata. Observation wells were drilled at 15 m and 6.75 m from the test well. Initially the water level was 2.5 m below the ground level. After pumping until steady condition had been achieved the water level in the observation wells had dropped 0.50 m and 1.95 m. If the steady discharge was 9 lit/ sec through test well. Determine the coefficient of permeability of soil. **[8]**

Q3) Answer the following.

a) Explain **[10]**

i) Proctor theory of compaction.

ii) Normally consolidated and Over consolidated soil.

OR

Explain laboratory method for determination of consolidation characteristics by fixed ring type consolidometer with sketch. **[10]**

b) The maximum dry density of a soil sample by the standard proctor compaction test is 1.78 gm/ cu.cm and optimum moisture content of 15%. Find porosity due to air and the degree of saturation if specific gravity is 2.67. What would be the corresponding value of zero air void dry density at optimum moisture content? **[6]**

SECTION - II

Q4) Answer the following.

a) State assumptions made in the Westergaards theory. [6]

OR

Explain Newmark's chart and its application. [6]

b) A concentrated load of 30 kN acts on the ground surface. Find the stress intensity at a depth of 8 m and at a horizontal distance of 6m. Use Boussinesq's equations. [6]

c) Determine the vertical stress intensity at a depth of 5 m below the center of a rectangular loaded base 3 m X 4 m, carrying a loading of 200 kN/m^2, using equivalent point load method. [6]

Q5) Answer the following.

a) What are the three standard triaxial shear test w.r.t. drainage conditions? Explain with reasons the situations for which test are to be performed. [6]

b) A consolidated undrained triaxial test was conducted on a normally consolidated clay yielding the following data: [10]

cell pressure = 250 kN/m^2 deviator stress = 275 kN/m^2

Determine

i) The angle of friction

ii) Angle which the failure plane makes with the major principal plane and

iii) Normal stress and shear stress on the failure plane.

OR

Two identical soil specimens were tested in a triaxial apparatus. First specimen failed at a deviator stress of 770 kN/m^2 when the cell pressure was 200 kN/m^2. Second specimen failed at a deviator stress of 1370 kN/m^2 when the cell pressure was 400 kN/m^2. Determine the shear strength parameters of the soil by analytical method. If the same sample is tested in a direct shear apparatus with a normal stress of 600 kN/m^2. Estimate the shear stress at failure. [10]

Q6) Answer the following.

a) What are the different types of earth pressure and state the assumptions made in the Rankine's earth pressure theory. **[8]**

b) Compute the intensities of active and passive earth pressure at a depth of 6 m in dry cohesionless sand with an angle of internal friction of 30° and unit weight of 18 kN/m^3. What will be the intensities of active and passive earth pressures if the water level rises to the ground level? Take saturated unit weight of sand as 22 kN/m^3. [8]

OR

A retaining wall of 6 m height supports earth with its face vertical. The earth is cohesionless with specific gravity 2.69, = 35° and porosity 40.5%. The earth surface is horizontal and level with the top of the wall. Determine the active earth thrust and its point of application on the wall if the earth is water logged to level 2.5 m below the top surface. Neglect wall friction. Draw the pressure diagrams. **[8]**

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Total No. of Pages : 2

Seat No.	

T.E.(Civil Engineering) (Semester - V) (Revised) Examination, May - 2019
TRANSPORTATION ENGINEERING-I
Sub. Code : 66239

Day and Date : Wednesday, 08- 05 - 2019. **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Use of non-programmable calculator is permitted.**

SECTION-I

Q1) a) Explain the classification of roads as per Lucknow Road Plan. **[8]**

b) Define 'Highway Alignment'. What are the requirements of an ideal highway alignment. **[8]**

OR

Explain the necessity of Superelevation on the horizontal curves. Calculate the superelevation required on a road curve of radius 280 m for a permissible speed of 75 kmph. The coefficient of friction is 0.12 **[9]**

Q2) a) What is the significance of 'Softening Point Test' on bitumen? Explain the test with sketch. **[8]**

b) Explain components of a flexible pavement with sketch. **[8]**

OR

Explain 'CBR Test' with sketch. **[9]**

Q3) a) Enlist various traffic studies. Explain any ONE in detail. **[8]**

b) Explain step-by-step construction of B.B.M. **[8]**

OR

Explain the importance of 'Highway Drainage'. Explain various methods with sketches. **[8]**

P.T.O.

SECTION-II

Q4) a) Explain the components of an aircraft with a sketch. [8]

b) Explain various Airport Surveys. [8]

OR

Determine the length of runway required for the following data, [9]

Basic runway length under standard conditions = 1200 m

Site elevation above M.S.L. = 900 m

Airport reference temperature = 16° C

Effective gradient = 0.5%

Q5) a) Explain with sketches : [8]

i) Littoral Drift

ii) Wave action on a sea wall

b) Explain ' Dry Dock' with sketches. [8]

OR

Explain various elements of a harbor with the help of neat layout. [8]

Q6) a) What is the necessity of ventilation in tunnels? How it is achieved? [8]

b) Explain 'Heading and Bench' method of tunneling in hard rock. [8]

OR

Explain ' shield Method' of tunneling in soft ground with sketch. [9]

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Total No. of Pages : 2

Seat No.	

T.E. (Civil) (Part - II) (Semester - VI) (Revised) Examination, May - 2019

ENVIRONMENTAL ENGINEERING - II

Sub. Code : 66877

Day and Date : Thursday, 23 - 05 - 2019 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Assume suitable data wherever necessary and mention it.**

SECTION - I

Q1) a) Explain the Rational method for estimation of storm runoff. **[5]**

b) Explain with neat sketch variation in flow and strength of municipal wastewater. **[5]**

c) Determine the diameter of combined circular sewer for a township having area 50 hectare, population density 500/Ha., water supply 170 LPCD, rainfall intensity = 25mm/hr. average ground slope = 1 in 500, runoff coefficient = 0.6,Mannings coefficient = 0.02, peak factor=2.5. **[6]**

OR

Draw a neat sketch of sewage pumping station and give the function of its components. **[6]**

Q2) a) Give the significance of COD and BOD in waste water treatment. **[5]**

b) Distinguish between Modified aeration and Extended aeration activated sludge process. **[5]**

c) Explain the operation and mechanism of trickling filter. **[6]**

OR

Write the design procedure for activated sludge process for determination of **[6]**

i) Volume of aeration tank,

ii) BOD loading, and

iii) Oxygen requirement and capacity of aerators.

P.T.O.

Q3) a) Write the methods of sludge treatment and mention their purpose. [6]

b) Explain the concept of anaerobic sludge digestion. Which factors control the working of this process? [6]

c) Give the types, advantages and limitations of stabilization ponds. [6]

OR

Design an aerated lagoon for treating 10 MLD of sewage flow. Influent BOD = 300 mg/L, Effluent BOD=30 mg/L, System rate constant at 20° C = 0.25. [6]

SECTION - II

Q4) a) Explain the self purification process of stream. [5]

b) Write the streeter pheVp's equation and give the meanings of each term in it. [5]

c) Give the various methods of disposal of waste water. Explain any ONE in detail. [6]

OR

What do you mean by Environmental Impact Assessment. [6]

Q5) a) Explain the factors affecting composting. [5]

b) Give the various methods of collection of solid waste [5]

c) Explain the sources and characteristics of Municipal solid waste. [6]

OR

d) Distinguish between Aerobic and Anaerobic composting [6]

Q6) Write a short note on any THREE. [3×6=18]

a) Effect of air pollution on vegetation.

b) Cyclone separators.

c) Ozone depletion.

d) Ambient air quality standard.

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Total No. of Pages : 3

Seat No.	

T.E. (Civil Engineering) (Part - I) (Semester - V)
(New) Examination, April -2019
DESIGN OF STEEL STRUCTURES
Sub. Code : 66236

Day and Date : Saturday, 27 - 04 - 2019 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Attempt all questions from section I and II.**
2) **Figures to the right indicates full marks.**
3) **Assume any suitable data wherever necessary.**
4) **Use of non-programmable calculator and relevant I.S. 800:2007 and steel table is allowed.**

SECTION - I

Q1) a) Write the advantages and disadvantages of the steel structures. **[4]**

b) Write in short High Strength Friction Grip bolt. **[4]**

c) Design the lap joint between plates of sizes 100×16mm thick and 100×10mm thick so as to transmit a factored load of 100kN using single row of bolts of grade 4.6 and grade 410 plate. Assume e = 30mm, p = 40mm and area of bolt, A_{nb} = 157 mm^2. **[8]**

Q2) a) Explain the term **[6]**

i) Block Shear failure

ii) Gross Section Yielding

b) Find out design tensile strength of angle ISA 100×100×10mm in tension connected to gusset plate 10mm thick through 100mm leg using M20 bolt of class 4.6 in a single line. The yield and ultimate strength of steel are 250MPa and 410MPa. **[12]**

OR

P.T.O.

b) Design a single angle section for a tension member of a roof truss to carry a factored tensile force of 225kN. The member is subjected to possible reversal of stresses due to action of wind. The effective length of member is 3m. Use 20mmϕ shop bolts of grade 4.6 for the connection. Assume steel of grade Fe410 and $f_y = 250$ N/mm^2. **[12]**

Q3) a) Explain the following term with reference to compression member **[4]**

i) Buckling class of cross section

ii) Effective length of struts.

b) Design a double angle discontinuous strut to carry a load of 160kN. The length of strut between centre to centre of intersection is 2.6m. Assume the angle is connected by two bolts. Take steel of grade Fe410 and $f_y = 250$N/mm^2. **[12]**

SECTION - II

Q4) a) Write step by step procedure for design of built up column. **[4]**

b) Design a built up column composed of two channels placed back to back carrying an axial factored load of 1345kN. The effective length of column is 5.95m. Assume steel of grade Fe410,4.6 grade bolts and $f_y = 250$ N/mm^2. Design single lacing system also. **[14]**

OR

b) Design a gusseted base for a column ISHB 350 @ 710N/m with two plates 450mm×20mm carrying a factored load of 3600.kN. The column is to be supported on concrete pedestal to be built with M20 concrete. **[14]**

Q5) a) Explain web buckling & web crippling with neat sketch. **[4]**

b) A simply supported beam 5m span carries uniformly distributed load of 40kN/m. In addition, the beam carries a central point load of 50kN. The beam is laterally supported. Design the section and check the section for shear and deflection. **[12]**

Q6) Determine the design forces in the gantry girder carrying manually operating travelling crane for the following data, **[16]**

Crane Capacity - 200kN

Self-weight of crane girder excluding trolley - 250kN

Self-weight of trolley - 50kN

Minimum hook approach - 1.2m

Wheel base - 3.5m

Centre to centre distance between gantry rails (span of crane girder) - 16m

Centre to centre distance between column (span of gantry) - 6.5m

Diameter of crane wheel - 150mm

Self - weight of rails - 0.3kN/m

Self-weight of girder - 1.5kN/m

Steel of grade Fe410, fy = 250kN/mm^2, $f_u = 410$N/mm^2.

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Total No. of Pages : 3

Seat No.	

T.E. (Civil Engineering) (Part - I) (Semester - V) (New) Examination, April - 2019

WATER RESOURCES ENGINEERING - I

Sub. Code: 66235

Day and Date : Thursday, 25 - 04 - 2019 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Draw neat sketches wherever necessary.**
4) **Use of non-programmable calculator is allowed.**
5) **Assume any other suitable data, if required.**

SECTION - I

Q1) a) Hydrology is an interdisciplinary science. Justify this statement. Also enlist various Civil Engineering projects where hydrological studies are important. **[4]**

b) Enlist different types of rain gauges. Explain the working of any one type of rain gauge with a neat sketch. **[6]**

c) Briefly explain the process of evaporation. Explain various factors that affect rate of evaporation. **[8]**

Q2) a) Explain the two infiltration indices often used in hydrology. Explain their importance. **[4]**

b) A 6-hr. storm produced rainfall intensities of 7, 18, 25, 12, 10 and 3 mm/hr., in successive 1 hr. intervals over a basin of 800 km^2. The resulting runoff is observed to be 2640 ha-m. Determine $\varnothing$-index for the basin. Draw an explanatory sketch showing hectograph and the index. **[6]**

c) What is runoff? Explain the various factors that affect runoff. **[6]**

P.T.O.

)3) a) Define a unit Hydrography? Explain the two important assumptions of unit hydrograph theory. [4]

b) Draw the neat sketch of a storm hydrograph resulting from an isolated storm. Name its various components. Explain any two methods used for separation of base flow and direct runoff in a storm hydrograph. [6]

c) Given below are the ordinates of a 6-hr unit hydrograph for a catchment. Calculate the `ordinates of the direct runoff hydrograph due to a rainfall excess of 3.5 cm. Occurring in 6 hours. Draw an explanatory sketch showing both unit hydrograph and direct runoff hydrograph. [6]

Time (h)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	66
UH Ordinate (m^3/s)	0	25	50	85	125	160	185	160	110	60	36	25	16		0

)4) a) Explain briefly various types of floats used to measure flow velocity in stream. [4]

a) Explain in detail the area velocity method used to measure the stream discharge. [6]

c) Explain the following terms: [6]

i) Design flood

ii) Standard project flood.

iii) Maximum probable flood.

SECTION - II

)5) a) Derive a relation to find discharge from a well penetrating a confined aquifer under steady state condition. [8]

b) Explain the terms: [8]

i) Artificial recharge.

ii) Recupation test.

)6) a) What are different types of irrigation systems? Discuss each of these briefly. [8]

b) The base period, intensity of irrigation and duty of various crops under a canal system are given below. Find reservoir capacity if the canal losses are 18% and reservoir losses are 10%. [8]

Crop	Base Period Days	Duty at the Field Hectors / cumec	Area under crop hectors
Wheat	120	1800	5000
Sugarcane	360	800	6000
Cotton	200	1400	2500
Rice	120	900	3000
Vegetable	120	700	1500

c) What are effects and causes of water logging. [8]

)7) a) Write a note on percolation tank, with reference to following points. [8]

i) Site selection.

ii) Construction details.

iii) Advantages and disadvantages. Draw neat sketch.

b) What do you understand by water harvesting? Explain a typical rainwater harvesting scheme on roofs and terraces. [8]

)8) Write short notes on any three. [18]

a) Darcy's Law and its validity.

b) Lift irrigation.

c) Blane-Criddle method of estimation of Evapo-transpiration.

d) Constructional features of tube well.

e) K.T. Weir.

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Part-III) (Semester - V)(Revised) Examination, May - 2019

ENVIRONMENTAL ENGINEERING-I

Sub. Code : 66237

Day and Date :Friday, 03 - 05 - 2019. **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary and mention it.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) Answer any three of following . **[3×6=18]**

a) Explain the basis on which water source is selected for water supply?

b) Write note on population forecasting.

c) Discuss the fluctuation in water demand with respect to graph for.

i) Daily consumption

ii) Monthly consumption

iii) Seasonal consumption

d) Mention the breakup of domestic water utilisation in liters in Indian condition and also comment on effect of various factors on consumption of water.

e) Explain the factors to be considered while selecting suitable site for intake works.

Q2) a) Find the dimensions of rectangular sedimentation basin for the following data. **[8]**

Volume of treated water -3 MLD

Detention time -4 hrs

Velocity of flow - 10cm/min

P.T.O.

b) Explain the process of tube and plate settler. [8]

OR

Explain the theory of coagulation and flocculation. [8]

Q3) a) Explain the need of water softening. Explain any one water softening method in detail. [8]

b) Explain the operation and head loss development for flow through rapid sand filter. [8]

OR

Explain forms of chlorination. [8]

SECTION - II

Q4) a) Explain the mass curve method of the determination of capacity of service reservoir. [6]

b) Mention the various pipes used for transmission of water, and explain the factors to be considered for the selection of suitable pipe material for water supply scheme. [6]

c) Explain the necessity and design considerations of thrust block. [5]

OR

Explain the methods of corrosion control. [5]

Q5) a) Explain with neat sketches the methods of water distribution. [6]

b) Determine the diameter of an equivalent pipe of 1000 m length using Hazen-williams formula for pipe network given below. [6]

Pipe	Length(m)	Diameter(mm)
AB	450	350
BC	350	300
CD	400	250

c) Explain the Hardy-Cross method of network analysis. [6]

OR

Explain any two soft wares used for network analysis. [6]

Q6) Write short notes on any three. [15]

a) Air relief and Non return valve

b) Methods of leak detection

c) Service connection

d) Green building materials.

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Total No. of Pages : 3

Seat No.	

T. E. (Civil) (Part - III) (Semester - VI)
Examination, May - 2019
THEORY OF STRUCTURES
Sub. Code: 66873

Day and Date : Monday, 13- 05 - 2019 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are cumpolsary.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculators is allowed.**
4) **Assume any suitable data if required and missing, and state it clearly.**

Q1) a) Compare the force methods with displacement methods for the analysis of indeterminate structures. **[4]**

b) Find all the reactions for a propped cantilever beam, total leangth 5 metres and the prop provided at one end. The beam is loaded with a point load of 20 kN at 2 metres from the fixed end and also carries an uniformly distributed load of 10 kN/m from this position upto the prop-end. The prop is 20 mm below the beam level at the unloaded stage of the beam. Adopt E = 200 Gpa and I = 345 cm^4. Adopt method of consistent deformation for the study. **[12]**

OR

A fixed beam AB of span 5m is subjected to uniformly varying load with intensity zero at left and A and 20 kN/m at the right end B. Determine the fixed moments at supports. Also draw SFD and BMD for the beam showing their maximum values.

Q2) a) State and Explain the law of reciprocal theorem. **[5]**

b) Determine the expressions for the end rotations of a simply supported beam subjected to a single point load P at offsets 'a' and 'b' from the ends. Adopt Castigliano's theorems for the calculation of either one or both rotations. **[12]**

OR

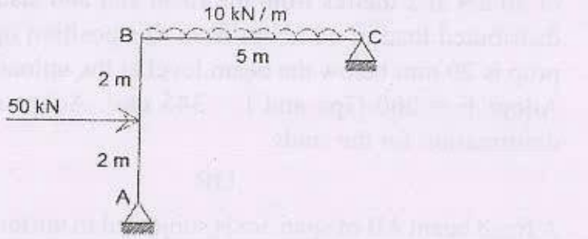
P.T.O.

A propped cantilever of span 'L' and prop at the right end is subjected to through udl of intensity 'w' kN/m. Determine the fixing moment at the left end support by applying Castigliano's theorem.

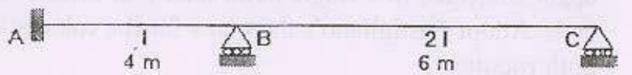
3) a) State the relationship between the moments at three points A, B and C of a continuous beam ABC having distinct moment of inertias for region AB and region BC and located at different levels (Most General from of Clapeyrone's Theorem). Explain the symbols involved in the equation. **[5]**

b) A 2 span continuous beam ABC is hinged at A and roller supported at B and C. It is loaded by an uniformly distributed load of 60 kN/ m over the entire beam ABC. Both the spans AB and BC are of equal length 4 m. Analyse the beam by three moment method, draw SFD and BMD and locate points of contraflexures. **[12]**

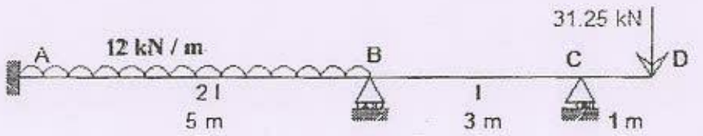
4) Analyse the portal bent shown besides by the Slope Deflection Method. Hence draw BMD and locate the points of contraflexures in each span. **[16]**



5) The continuous beam ABC as shown in figure is observed to undergo an settlement of 4 mm and 10 mm at the joints B and C respectively, even in the unloaded condition. Analyse the beam and sketch the SFD and BMD for the beam using moment distribution method. Also locate the point of contraflexure. Adopt EI = 20000 kN-m^2. **[17]**

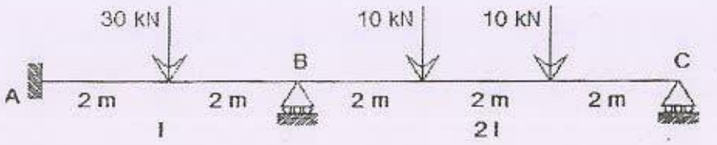


6) Analyse the continious beam loaded and supported as shown in figure by the flexibility matrix method. Draw BMD for the beam. **[17]**



OR

Analyse the continious beam loaded and supported as shown in figure by the stiffness matrix method. Draw BMD for the beam. **[17]**



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