Seat No.

T.E. (Civil) (Part - II) (Semester - VI) Examination, May - 2018
ENGINEERING MANAGEMENT
Sub. Code : 66875

Day and Date : Tuesday, 08 - 05 - 2018   Total Marks : 100

Time : 02.30 p.m. to 05.30 p.m.

Instructions :
1) All questions are compulsory.
2) Use of Non programmable calculator is allowed.
3) Figures to the right indicate full marks.

SECTION - I

Q1) a) Explain in brief the principles of management given by Henry Fayol. [8]

    b) Enlist the types of organization. Explain any one in detail. [6]

    c) Explain the process of decision making. [6]

Q2) a) Write a note on sensitivity analysis. [5]

    b) Solve the following LPP by graphical method.

     Maximum $Z = 5X_1 + 9X_2$ with constraints

     Subjected to $3X_1 + 5X_2 < 90$

                $4X_1 + 3X_2 \leq 75$

     With X_1 and $X_2 \geq 0$ [5]

    c) Determine an IBFS to the following transportation problem using North-West corner method. [5]

|	D_1	D_2	D_3	D_4	Supply
S_1	5	3	1	4	14
S_2	7	8	2	5	16
S_3	4	3	6	2	5
Demand	6	10	15	5	35

P.T.O.

Q3) a) What are the functions of material management? **[8]**

b) A Construction company consumes 12,000 cement bags every year for its construction activities. It requires Rs. 250 to place order. Each bag cost Rs. 200. If inventory carrying cost is 12% of average inventory investment, find out EOQ. How many times the order be placed in a year. **[7]**

SECTION - II

Q4) a) Explain Importance of engineering economy in civil engineering field. **[5]**

b) The details are two construction machines are given below. Make a comparison if the rate of interest is 12% per year. Use EUAC method. **[10]**

	Machine A	Machine B
Initial cost (Rs.)	100000	170000
Annual O & M Cost (Rs.)	60000	50000
Salvage value (Rs.)	10000	20000
Service life (Year)	10	10

c) Define the following terms with neat sketch with reference to break even analysis. **[5]**

i) Fixed cost

ii) Variable cost

iii) Total cost

iv) Total sales

v) Breakeven point

Q5) a) Draw typical layout for multistoried building construction project. **[5]**

b) What are the factor consider while drawing site layout. **[5]**

c) Explain main provision of workmen's Compensation Act. **[5]**

Q6) a) Write short notes on Work Study. **[5]**

b) Explain concept of quality circle with related to civil engineering. **[5]**

c) What do you know about Value Engineering. **[5]**

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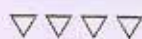
T.E. (Civil) (Part - I) (Semester - V) Examination, April - 2018
TRANSPORTATION ENGINEERING - I
Sub. Code : 66239

Day and Date : Saturday, 28 - 04 - 2018   Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions :   1)   Solve Any THREE questions from each section.
              2)   Figures to the right indicates full marks.
              3)   Make assumptions wherever necessary.

SECTION - I

Q1) a)   Explain Sight distance & factors affecting Sight distance.   **[8]**

      b)   State the objectives of Widening of Pavement on horizontal Curves. **[8]**

Q2) a)   Explain the terms--   **[8]**

           i)   MSRDC

           ii)   NHDP

           iii)   Asian Highways

      b)   Explain the Necessity of Highway Planning.   **[8]**

Q3) a)   Explain how Surface Drainage is made effective.   **[8]**

      b)   Enlist various Traffic Studies. Explain any one.   **[8]**

P.T.O.

Q4) SHORT NOTE (ANY THREE): [18]

    a)   SDBC ROAD.

    b)   Duties of Traffic Engineering.

    c)   Types of pavements, functions of pavement components.

    d)   Traffic Characteristics.

SECTION - II

Q5) a)   Define & Explain the type of Brakewaters. [8]

    b)   Define Fenders & explain any one with sketch. [8]

Q6) a)   Enlist the importance & types of Signals in Harbours. Explain any one.[8]

    b)   Explain the importance of Airport Planning. [8]

Q7) a)   Explain the importance of Ventilation & Dust Control in Tunnel. [8]

    b)   Enlist the methods of tunnelling in Hard Rock. Explain any. [8]

Q8) SHORT NOTE (ANY THREE): [18]

    a)   Runway Patterns.

    b)   Mucking & Muck Haulage.

    c)   Blast Fences.

    d)   Wind Rose Diagram.

T. E. (Civil) (Semester - V) Examination, April - 2018
DESIGN OF STEEL STRUCTURES (New)
Sub. Code : 66236

Day and Date : Wednesday, 25 - 04 - 2018   **Total Marks : 100**
Time : 10.00 a.m. to 01.00 p.m.

Instructions: 1)   All questions compulsory.
               2)   Use of IS 800:2007, IS 875, Steel table, Non programmable
                     calculator permitted.
               3)   Figures to the right indicate full marks.
               4)   Draw sketches wherever necessary.
               5)   Assume suitable data if required.

SECTION - I

Q1) a)   What different loads acting over roof trusses? Explain how the wind load
         acting on the roof computed as per IS 875.   **[6]**

     b)   Two plates 200 mmx8mm are to be connected by 16mm dia. bolts in a
         lap joint. The factored load transmitted by the joint is 160 KN. Design
         the joint.   **[10]**

Q2) a)   Explain the terms   **[6]**
         i)   block shear failure.
         ii)   design strength due to rupture of section.

     b)   A tension member of a truss consist of two angles 75×75×6 which are
         provided on either side of a 10mm thick gusset plate. 20mm dia. Bolts
         are used in one row for connecting the member to the gusset plate.
         Determine design tensile strength of the member and also the number of
         bolts required to develop the design tensile strength.   **[12]**

                                     OR

     b)   Design a tension member of roof truss subjected to 190 KN working
         load. Use double angle section connected back to back on either side of
         gusset plate 8mm thick. Use bolted connection. Assume fy = 250N/mm²
         and fu = 410N/mm² for both member and bolts.   **[12]**

Q3) a)   Explain the terms with reference to compression members,   **[6]**
         i)   Buckling class of cross section,
         ii)   Effective length of struts.

                                                              P.T.O.

b) Design a double angle discontinues strut to carry a factored axial compression of 175 kN. The length of the strut between the centre of intersection is 3.0m. **[10]**

SECTION - II

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

b) Design a 8m long built up column to carry a factored axial load of 1250 KN. The column is restrained in position but not direction at each end. The column shall consist of two channels placed back to back at a suitable spacing. Provide suitable lacing system, connections are to be made with 16mm bolts. Take $f_y = 250$ N/mm². **[14]**

OR

b) An ISHB350 @ 710.2 N/m column carries a factored axial load of 2000 KN. Design a gusseted base with bolted connection for the column. Assume that the bearing strength of concrete and pedestal is 9 N/mm².**[14]**

Q5) a) Explain in brief the failure modes of beams. **[5]**

b) A simply supported beamof effective span 4m carries an UDL of 10KN/m on entire span inclusive of self weight. The compression flange of beam is laterally supported. Design the section to carry the load and check it for shear and deflection. Use grade of steel as Fe410. **[11]**

Q6) Compute the design forces and select the section for gantry girder with following data. **[16]**

a) Capacity of crane = 100 KN

b) Span between the crane rails = 20m

c) Weight of crane girder = 90 KN

d) Weight of crab, Electric motor hook = 20 KN

e) Minimum hook approach = 1.1m

f) Wheel base = 2.5m

g) Span of gantry girder = 5.5m

h) Weight of gantry girder = 8 KN

i) The crane is electrically operated.

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Seat
No.

T.E (Civil) (Semester - V) Examination, April - 2018
WATER RESOURCES ENGINEERING - 1 (Revised)
Sub. Code : 66235

Day and Date : Tuesday, 24 - 04 - 2018   Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

Instructions :   1)   Que. 1 and 5 are Compulsory. Attempt any two questions from re-
maining questions from both sections each.

2)   Assume any suitable data if necessary, wherever needed.

3)   Figures to the right indicate full marks.

SECTION - I

Q1) a)   Explain in brief the methods of computation of average rainfall over a
catchment.   **[6]**

b)   Explain the procedure to develop direct runoff hydrograph and unit
hydrograph from storm hydrograph.   **[6]**

c)   Explain the factors to be considered while selecting a site for rain gauge
station.   **[6]**

Q2) a)   Given below are the ordinates of observed flows from 4 hour storm on a
stream with drainage area 250 sq.km. Assuming constant base flow of
20 m³, derive and plot 4 hour unit hydrograph. Describe the procedure
in detail.   **[8]**

Time(hours)	0	4	8	12	16	20	24	28	32	36	40
Observed flow(m³)	20	116	230	160	115	90	65	50	40	28	20

b)   'What is unit hydrograph? Describe its limitations and assumptions. What
are its uses?   **[8]**

Q3) a)   Define evaporation process. Describe the factors affecting evaporation
in detail.   **[8]**

b)   Explain runoff and types of runoff. Explain the factors affecting runoff. **[8]**

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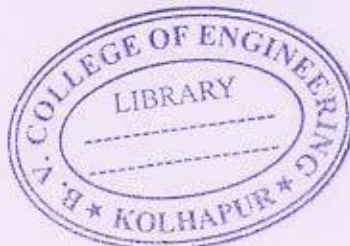
Q4) Write detailed notes on [4 × 4]

    a)   Applications of hydrology in civil engineering

    b)   Mass rainfall curve

    c)   Methods of separation of base flow

    d)   Infiltration indices

SECTION - II

Q5) a)   Distinguish with sketches in between confined and unconfined aquifer.[6]

    b)   Write a detailed note on percolation tank. [6]

    c)   Explain the factors to be considered for duty of irrigation water. [6]

Q6) a)   Define duty, delta and base period. Derive the relation between them.[8]

    b)   The culturable command area of a water course is 2000 Ha. Intensity of irrigation for the crops sugarcane and wheat is 25% and 35 % respectively. The duties for the two crops at the head of the water course are 650 Ha/cumec and 1600 Ha/cumec respectively. Determine the discharge required at the head of water course and design discharge at the outlet if time factor is 0.75 [8]

Q7) a)   Define hygroscopic soil moisture, capillary moisture and gravitational moisture. Describe their importance in crop growth. [8]

    b)   Describe in detail watershed management and its techniques for recharging ground water. [8]

Q8) Write detailed notes on [4×4]

    a)   Lift irrigation

    b)   Crop rotation

    c)   Assessment of irrigation water

    d)   Recuperation test

Q2) a) Give the design parameters of bar rack. [5]

b) Design an ASP for treating 10 MLD of sewage flow with influent BOD 500mg/l, Determine size of aeration tank and capacity of surface aerators. F/M ratio=0.3, ML VSS=3000 mg/L. [8]

c) Give the modifications of ASP and explain any one in detail. [5]

OR

c) Explain the biological process in tricking filter. [5]

Q3) a) Explain the necessity of sludge treatment and disposed. [5]

b) Give the constructional features and design parameters of oxidation ditch. [5]

c) Design an aerated lagoon for treating 5 MLD flow with influent BOD = 350 mg/L. [6]

OR

c) Design an oxidation pond to treat 2 MLD flow. Influent BOD = −300mg/L. [6]

SECTION - II

Q4) a) What are the zones of self purification of a stream? Write the actions involved in it. [5]

b) Draw a neat sketch of DO sag curve and give the equations for each curve. [6]

c) Give the CPCB effluent standards for stream and land disposal. [6]

OR

c) Explain the procedure for EIA study. [6]

Q5) Write short notes on any three: [15]

a) Characteristics of municipal solid waste.

b) Aerobic Composting.

c) Incineration.

d) Hazardous waste management.

Q6) Answer any three: [18]

a) Give the classification and sources of air pollutants.

b) Explain the importance of atmospheric stability and mixing height in the dispersion of air pollutants.

c) Explain with neat sketch the principle and working of cyclone separator.

d) Explain the causes and effects of Ozone depletion.

Seat
No.

T.E. (Civil) (Semester - VI) (Revised) Examination, May - 2018
ENVIRONMENTAL ENGINEERING - II
Sub. Code : 66877

Day and Date : Tuesday, 15 - 05 - 2018   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) a)   Compare with graphical representation the hourly fluctuation in municipal
         waste water flow with fluctuation in water demand and state the causes
         of fluctuation in waste water flow.   [5]

    b)   Explain the layout patterns of sewerage system with neat sketches.   [5]

    c)   The 2-day BOD of waste water sample incubated at 20°c is 200 mg/L.
         Determine the time required to have BOD value of 300mg/L at same
         temperature.

         BOD rate constant 'k' is 0.18 per day base 'e' at 20°c.   [6]

                                    OR

    c)   Estimate the quantity of storm water generated from following data by
         rational method.   [6]

         Area of drainage district 50 Ha. Intensity of rainfall = 20mm/hr.

Area	%Area	Runoff Coefficient
Densely built up portion	10	0.9
Area with adjoining houses	20	0.7
Area with detached houses	30	0.5
Area with few Buildings	40	0.2

P.T.O.

SECTION - II

Q4) Attempt any two of the following.

a) What do you mean by Reservoir Induced Seismicity? Discuss in detail the theories of RIS. **[9]**

b) Discuss in detail the role geological conditions that influence the design, cost & stability of tunnel. **[9]**

c) With the help of neat sketches describe the different types of dams. Explain the forces acting on the dam. **[9]**

Q5) Attempt any two of the following.

a) What are the various types of landslides? Describe in detail the prevent measures of landslides. **[8]**

b) Data obtained from a drill hole at foundation site is as follows, **[8]**

   i) Bore hole started at Top R.L: 375m.

   ii) Bore hole ends at R.L: 325m.

   iii) Length of each piece of core recorded between 369 m to 366m is as follows, 12,14,22,13,16,18,15,8,9,17,15,20,14,22,16,18,20,17. All piece lengths are in cm.

   Find out: 1) Total length of core recovered

   2) Core recovery

   3) Core loss

   4) RQD

c) What are the various sources of ground water? Explain in detail the zones of ground water? **[ ]**

Q6) Write short notes on. **[16]**

a) Seismograph

b) Reqirements of good building stones

c) Observations during drilling

d) Dams on folded strata

Scale 1cm=100
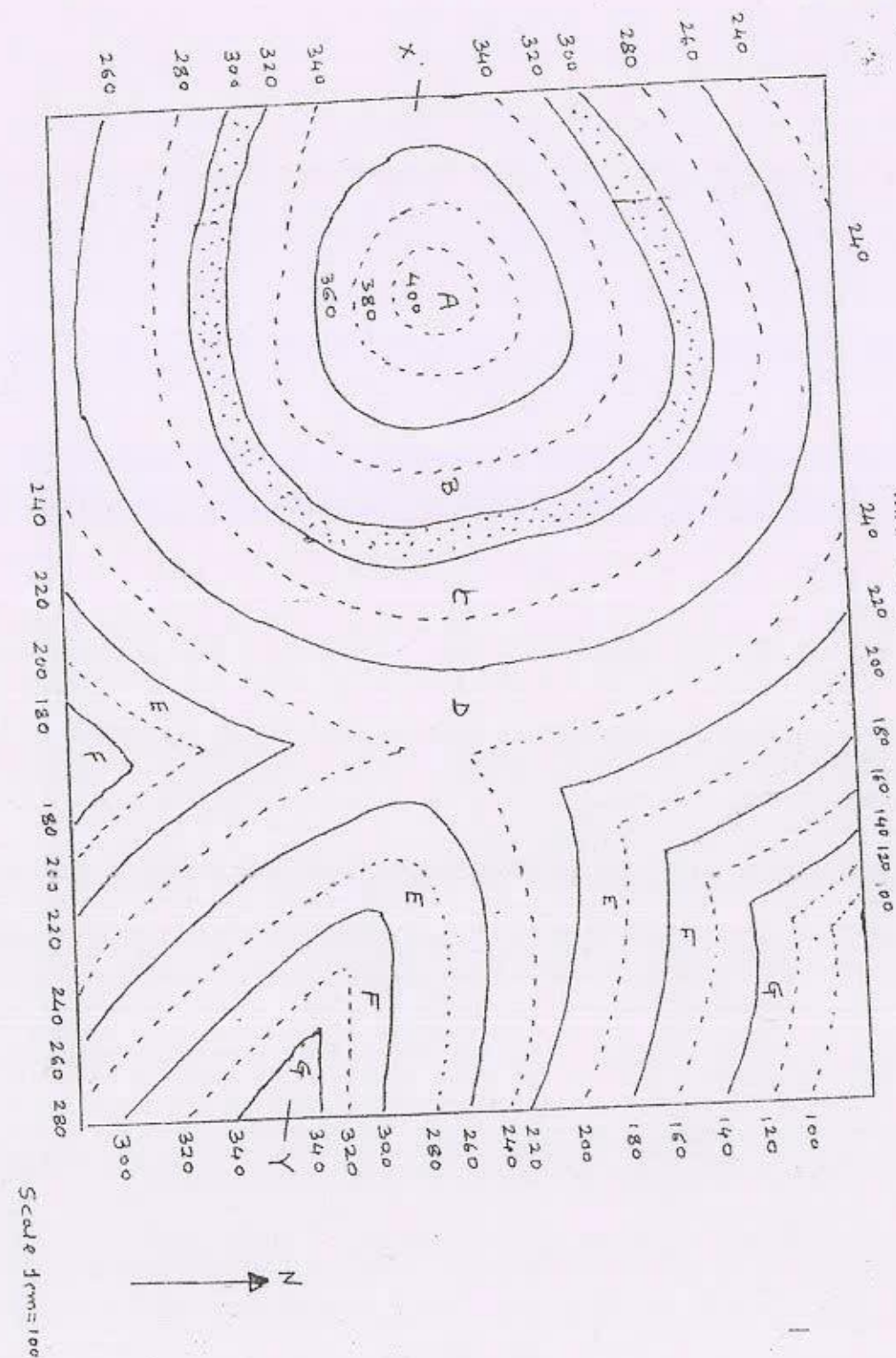
Seat
No.

T.E. (Civil) (Semester - VI) (New) Examination, May - 2018
ENGINEERING GEOLOGY
Sub. Code : 66876

Day and Date : Saturday, 12 - 5 - 2018   Total Marks :100
Time : 2.30 p.m. to 5.30 p.m.

Instructions :   1)   All questions are compulsory.
2)   Answer to the two sections must be written in one and same answer book.
3)   Figures to the right indicate full marks.

SECTION - I

Q1) Attempt any two of the following.
   a)   Describe various processes involved in the geological work of river with respect to erosion.   **[9]**
   b)   What is metamorphism? What are types of metamorphism? Describe in detail the thermal metamorphism.   **[9]**
   c)   Define fold. Describe with the help of neat sketches Limb, Crest and Trough, Hinge line and Axial plane of the fold. Give in brief Civil Engineering significance of fold.   **[9]**

Q2) Answer any two of the following.
   a)   What do you understand by the term Igneous rock? State with the neat sketches the meaning of the term of Plutonic, hypabyssal & Volcanic Rocks. Give suitable examples.   **[8]**
   b)   Explain in brief various processes of chemical weathering.   **[8]**
   c)   Write a brief account of   **[8]**
       i)   Topography of a given geological map
       ii)   Residual deposits

Q3) Write short notes on: **[16]**
   a)   Scope of Engineering Geology
   b)   Products of volcanoes.
   c)   Stratification
   d)   Structures of Igneous Rocks

P.T.O.

**23)** Analyze the continuous beam ABCD, simply supported at A, B, C and D, with span AB = 4m (2EI), BC = 3m (1.5EI) and CD = 3m (EI). Span AB is subjected to udl of 4kN/m throughout, span BC to a central anti-clockwise couple of 15kNm and span CD supports a central point load of 10kN. Draw SFD and BMD for the beam. Also determine the maximum positive bending moment anywhere in the beam. [17]

SECTION - II

24) Analysis the continuous beam shown in fig. If the supports B and C sinks by 3 mm and 5 mm respectively for the beam. Take $I = 4 \times 10^7$ mm^4 and $E = 200$ KN/mm^2. Draw BMD. [17]
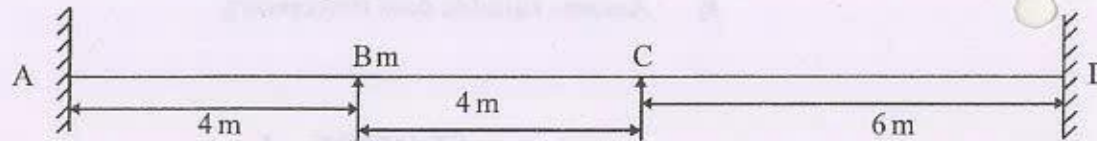
25) A continuous beam ABCD 20 m long is S.S. at its ends and is propped at the same level as shown in fig. If support B is sinks by 10 mm. Analysis the beam by moment distribution method and sketch the BMD. Take $E = 2.1 \times 10^5$ N/mm^2 and $I = 85 \times 10^5$ mm^4. [17]
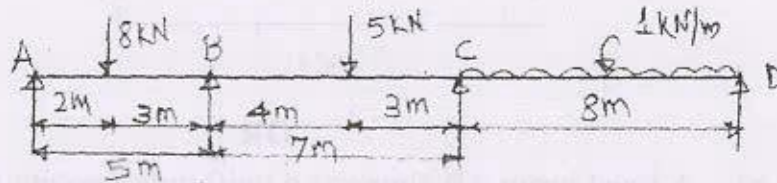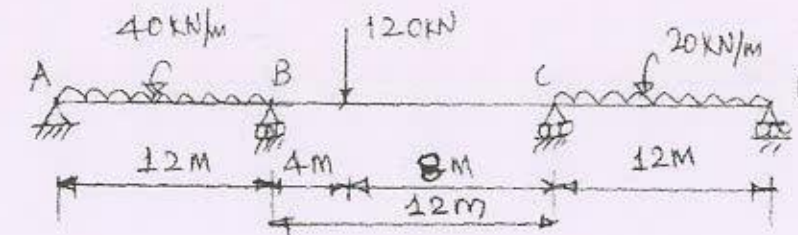

26) Analysis the (Knee bent) as shown in fig. by stiffness matrix method. Draw BMD. [16]
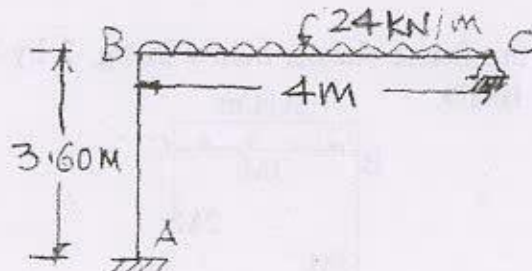
OR

Analysis the continuous beam as shown in fig. by flexibility matrix method. Take EI constant throughout.

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Seat
No.

T.E. (Civil) (Semester - VI) (Revised)
Examination, May - 2018
THEORY OF STRUCTURES
### Sub. Code: 66873

Day and Date : Thursday, 03 - 05 - 2018   **Total Marks : 80**
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) Use of non-programmable calculator is allowed.
4) Assume suitable data if necessary.

SECTION - I

Q1) a) Explain in brief 'Kinematic Indeterminacy' of structures.   **[5]**

b) Analyze the beam ABC fixed at A and C with hinge at B as shown in the fig. 1 below by consistent deformation method. Draw SFD and BMD. **[12]**

(FIG.1)
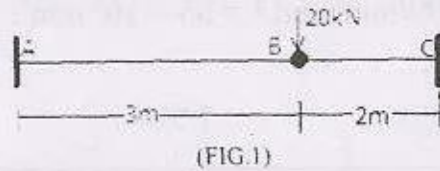
OR

b) A fixed beam AB supports a uniformly varying load with intensity of 5kN/m at center and zero at ends A and B which are 5m apart. Draw SFD and BMD for the beam.

Q2) Analyze the frame shown below in fig. 2 by Castigliono's theorem. Draw SFD and BMD.   **[16]**

(FIG. 2)

P.T.O.
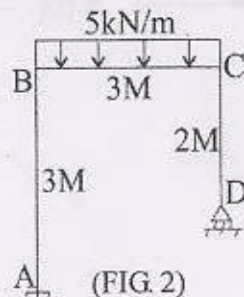
Q3) a) Write notes on (Any two): [8]

    i)   Calculation of consolidation settlement.

    ii)   Floating foundation.

    iii) Minimum depth of footing.

    iv) Tilt and angular distortion.

b) A combined trapezoidal footing has two columns 0.5×0.5 m each carrying loads of 2000 kN and 1500 kN. The c/c spacing of columns is of 6.0 m. Heavy column is on property line. Calculate dimensions of the combined trapezoidal footing by taking allowable soil pressure as 200 kN/m². [8]

SECTION-II

Q4) a) A group of 16 piles is arranged in square pattern with pile diameter as 45 cm and c/c distance of piles as 1.5 m. The soil has cohesion of 50 kN/m². Length of each pile is 10 m. Neglecting end bearing and taking adhesion factor as 0.7, [9]

    i)   Calculate group efficiency

    ii)   Mention whether the group would fail by individual or by block action

b) Explain pile load test with sketch. [9]

OR

b) Explain under reamed piles and it's construction. [9]

Q5) a) Explain with neat sketch, different shapes of well foundation and its suitability. [8]

b) Write short note on: (Any two) [8]

    i)   Common types of cofferdams

    ii)   Pneumatic cassions

    iii) Remedial measures for tilt and shift

    iv) Soil pressure distribution for sheet pile wall

Q6) a) Discuss vibrofloation technique for ground improvement in detail. [8]

b) Data from method of slices for a slope of soil with c = 4 t/m², ϕ = 25° and γ = 1.9 t/m³ is given below. Determine factor of safety. Take angle subtended at centre of curvature by arc of failure as 104° and radius of curvature R = 10 m. [8]

Slice no.	1	2	3	4	5	6	7	8
Area (m²)	0.55	3.0	4.65	5.8	6.15	6.35	3.3	0.2
α (degree)	-24	-12	-1	11	23	36	52	68

OR

b) A 7 m deep slope of 1:1 is to be made in a cohesive soil. The soil has a cohesion of 25 kN/m², the angle is friction is 25° and bulk unit weight is 18 kN/m³. [8]

    i)   Find factor of safety w.r.t. cohesion

    ii)   What will be critical height of slope?

Take S_n = 0.083 for 1:1 slope and ϕ = 45°.

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Seat No.

T.E. (Civil Engineering) (Part-III) (Semester - VI) (New) Examination, May - 2018
GEOTECHNICAL ENGINEERING - II
Sub. Code : 66874

Day and Date : Saturday, 05 - 05 - 2018   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)   Use of non-programmable calculator.
                   4)   Assume suitable data wherever necessary and state it clearly.

SECTION-I

Q1) a)   Explain necessity of site exploration and give the criteria for deciding depth and number of bore holes.   [8]

       b)   Explain Wash boring with a neat sketch.   [8]

OR

       b)   Explain modes of failures of rock with examples.   [8]

Q2) a)   The following data was obtained from a plate load test carried out on a 60 cm square plate at a depth of 2 m below GL on a sandy soil which extands upto large depth. Determine the settlement of foundation 3.0m×3.0 m carrying a load of 110 t and located at a depth of 2 m from GL.   [9]

Load (t/m^2)	5	10	15	20	25	30	35	40
Settlement (mm)	2.0	4.0	7.5	11.0	16.3	23.5	34.0	45.0

       b)   Explain standard penetration test.   [9]

OR

       b)   Write IS code method equation for calculating bearing capacity. Explain each term involved in it. Also explain how eccentricity of loading is considered.   [9]

P.T.O.

Seat
No.

T.E. (Civil) (Semester - V) (Revised) Examination, April - 2018
ENVIRONMENTAL ENGINEERING - I
Sub. Code : 66237

Day and Date : Thursday, 26 - 4 - 2018   **Total Marks : 100**
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) All questions are compulsory.
              2) Assume and mention data if necessary.

SECTION-I

Q1) Answer ANY THREE of following: **[3×6=18]**

a) Explain considerations while designing of Intake well?

b) Explain daily fluctuation in water demand with respect to graphical analysis.

c) Mention various authorities at international and national level for water quality standards. Explain any five quality parameters in Indian situation.

d) Explain importance of jack well and rising main in water supply?

e) What is importance of population forecasting in water supply scheme?

Q2) a) State and explain with sketch the advantages of clariflocculator as water treatment unit.   **[6]**

b) Design a vertical flow sedimentation tank for flow of 300m³/hr.   **[6]**

OR

Design a rapid mixer for the flow of 300 m³/hr.   **[6]**

c) State and explain types of settling.   **[4]**

P.T.O.

Q3) a) What is demineralization? Explain any one process in detail.   **[6]**

b) Explain detailed operation of filtration process in rapid sand filter with diagram.   **[6]**

OR

Explain the need of water softening. Explain any one water softening in detail.   **[6]**

c) Explain forms of chlorination.   **[4]**

SECTION-II

Q4) Answer ANY THREE of following: **[3×6=18]**

a) Why and where thrust block is required. How it is useful for safety of pipe?

b) Explain the control measures taken for pipe corrosion.

c) Explain details of steel pipes with respect to strength, durability, leakage, laying, transportation, availability and advantages.

d) Explain the capacity determination of reservoir by graphical method.

e) Mention necessity and types of reservoirs in detail.

Q5) a) What are the various layout patterns of water distribution system?   **[5]**

b) Determine distribution of flow in pipe network. The flow is turbulent and pipes are rough. Details are mentioned in the diagram. Use hardy cross method.   **[8]**
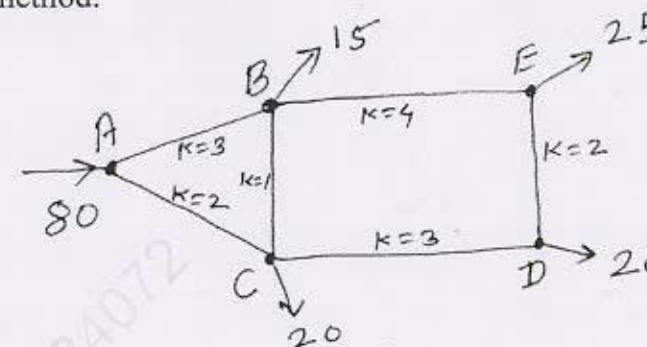
c) Why software is necessary in water distribution network analysis?   **[3]**

Q6) a) Explain details and working of gate valve and fire hydrants. **[6]**

b) Explain the maintenance of water distribution system. **[6]**

OR

Explain material options regarding construction of green buildings. **[6]**
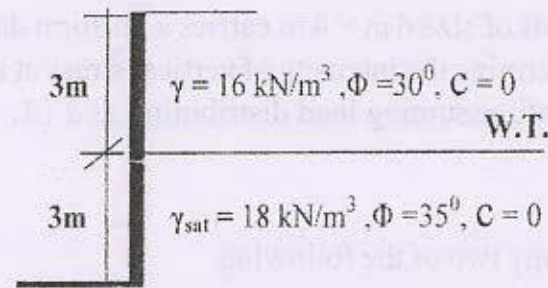
c) Explain water meter in detail. **[4]**

✈ ✈ ✈

Q6) Answer any two of the following: [16]

a) Explain Coulomb's Wedge theory for determination of earth pressure.

b) For the retaining wall as shown in fig., determine the force per unit length of wall for Rankine's active state. Also find the location of the resultant. W. T. is at 3 m from top of retaining wall.

3m | $\gamma = 16$ kN/m^3, $\Phi = 30^0$, C = 0
W.T.

3m | $\gamma_{sat} = 18$ kN/m^3, $\Phi = 35^0$, C = 0

c) A smooth rigid retaining wall 6 m high carries a uniform surcharge load of 12 kN/m^2. The backfill is clayey sand with properties :- $\gamma = 16$ kN/m^3, $\phi = 25^\circ$, c = 6.5 kN/m^2. Determine the passive earth pressure and draw the pressure diagram.

✈ ✈ ✈

Seat No.

T.E. (Civil) (Part-I) (Semester - V) (Revised)
Examination, April - 2018
GEOTECHNICAL ENGINEERING - I
Sub. Code : 66238

Day and Date : Friday, 27 - 4 - 2018   Total Marks : 100
Time : 10.00 a.m. to 1.00 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 any three of the following: [18]

a) Explain Casagrande's plasticity chart used for soil classification.

b) List and explain field identification tests for soil classification.

c) A partially saturated soil sample from a borrow pit has a natural moisture content of 15% and bulk density of 1.90 gm/cc. The Sp. Gravity of soil solids is 2.70. Determine the degree of saturation, void ratio. Find bulk density of the soil on saturation.

d) The following are the results of the water content by pycnometer method,

Mass of pycnometer - 652 gm

Mass of pycnometer and moist soil - 891 gm

Mass of pycnometer, moist soil and water - 1608 gm

Mass of pycnometer and water - 1470 gm

The Sp Gravity of soil solids is - 2.66

Determine the water content of the soil.

P.T.O.

22) Answer any two of the following: **[16]**

a) List and explain factors affecting permeability of the soil.

b) Explain average coefficient of permeability parallel and perpendicular to bedding planes for stratified soil deposits with sketches.

c) The water table in a certain area is at a depth of 4.0 m below the ground surface. At a depth of 12.0 m the soil consists of soil having an average void ratio of 0.70 and Sp. Gravity 2.65. Above the water table the soil has an average degree of saturation of 50%. Calculate the effective pressure on a horizontal plane at a depth of 10.0 m below the ground surface. What will be the increase in the effective pressure if the soil gets saturated by capillary action up to a height of 1.0 m above the water table?

23) Answer any two of the following: **[16]**

a) List field compaction control methods. Explain any one with neat sketch.

b) Explain the following terms with sketch and equations as per necessity,

i) Coefficient of volume compressibility

ii) Compression Index

iii) Optimum Moisture Content

c) A clay layer 8 m thick is subjected to a pressure of 70 kN/m². If the layer has a double drainage and undergoes 50% consolidation in one year. Determine the coefficient of consolidation. If the coefficient of permeability is 0.40 m/year, determine the settlement in one year. Unit weight of water is 9.81 kN/m³.

SECTION-II

24) Answer any three of the following: **[18]**

a) State the formula for stress in a soil mass due to a point load at a point below ground level as given by Boussinesq's and gives the meaning of all the terms in it.

b) With a neat sketch, explain the use of Newmark's influence chart to find stress at a given point under a loaded area.

c) A concentrated load of 30 kN acts on the surface of a homogeneous soil mass of large extend. Find the stress intensity at a depth of 8 m and

i) directly under the load

ii) at a horizontal distance of 6 m. Use Boussinesq's equation

d) A raft of size 6 m × 4 m carries a uniform distributed load of 160 kN/m². Determine the intensity of vertical stress at a depth of 2 m below the base of raft, assuming load distribution as 2 : 1.

25) Answer any two of the following: **[16]**

a) What are the three standard triaxial shear tests with respect to drainage conditions? Explain with reasons the situations for which test is to be performed.

b) What is the shear strength of soil along a horizontal plane at a depth of 4 m in a deposit of sand having the following properties:

Angle of internal friction, $\phi = 35°$;

Dry unit weight = 17 kN/m³ and G = 2.7.

Assume the ground water table is at a depth of 2.5 m from the ground surface.

c) A cylindrical sample of soil having cohesion of 80 kN/m² and an angle of internal friction of 20° is subjected to a cell pressure of 100 kN/m².

Determine:

i) The maximum deviator stress at which the sample will fail and

ii) The angle made by the failure plane with the axis of the sample.