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10CV61

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Environmental Engineering – I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain in detail the various types of water demands. **(06 Marks)**

b. With the help of a diagram, describe the hourly variation of water demand. **(06 Marks)**

c. The following data have been collected from the census department for a city. Calculate the probable population of the city in the year 2020 by using geometrical increase method:

Year	Population
1960	35,00,000
1970	46,60,000
1980	99,50,000
1990	1,56,00,000
2000	1,63,00,000
2010	1,84,00,000

(08 Marks)

2 a. What are intake structures? Describe with neat sketch a intake structure. **(08 Marks)**

b. Describe the working of a simple hand operated reciprocated pump. **(06 Marks)**

c. Estimate the size of supply conduct for a city with population of 5,00,000. Assume water consumption as 270 ℓ/c/d and flow velocity through the pipe as 1.2 m/sec. **(06 Marks)**

3 a. What is meant by turbidity of water? Explain how to determine the optimum coagulant dosage in the laboratory using Jar Test apparatus. **(10 Marks)**

b. Explain the significance of the following parameters of water, with their standards:
i) Hardness of water
ii) Chlorides
iii) Fluoride
iv) Turbidity
v) Nitrates **(10 Marks)**

4 a. Draw the water treatment flow chart indicating the impurities removed at each unit and discuss briefly of them. **(10 Marks)**

b. Design a sedimentation tank for a water works which supplies 1.5×10^6 liters/day. Velocity of flow is 15 cm/min and depth of water in tank is 3.5 m. Sedimentation period is 5 hours. Assume an allowance for sludge as 50 cm. **(10 Marks)**

PART – B

5 a. Explain the theory of filtration process for the treatment of water. **(10 Marks)**

b. Design a set of 8 rapid gravity filters for treating water at water works, which has to supply water to a town of population 3,00,000. Per capital demand if the town is 270 liters/day. The rate of filtration of the rapid gravity filter may be taken as 4500 litres/hour/sq.m. **(10 Marks)**

6 a. Explain lime soda process for removal of hardness. **(08 Marks)**

b. Discuss briefly on:

i) Pre and Post chlorination

ii) Super chlorination

iii) Dechlorination **(06 Marks)**

c. Write the requirements of a good disinfectants. **(06 Marks)**

7 a. Explain methods for removing fluoride from water. **(10 Marks)**

b. List the different layout of distribution system of water. Explain any two methods. **(10 Marks)**

8 a. Differentiate between port fire hydrant and flush fire hydrant. **(10 Marks)**

b. Write short notes on:

i) Back wash of RSF

ii) Break point chlorination **(10 Marks)**

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10CV62

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Design and Drawing of RC Structures

Time: 4 hrs. Max. Marks:100

Note: 1. ***Answer any TWO full questions from PART-A and any ONE question PART-B.***

2. Use of IS-456(2000) and SP-16 is permitted.

PART – A

1 A simply supported two way slab with clear dimensions 5.0m × 6.0m is supported on all sides by 230 mm thick wall. Following are the reinforcement details:

Short span : Positive steel = #12 mm @ 125 mm c/c
Negative steel = #12 mm @ 125 mm c/c
for a length of 1.5 m.

Longer span : Positive steel = #12 mm @ 140 mm c/c
Negative steel = #12 mm @ 140 mm c/c
for a length of 1.5 m.

Torsional reinforcements in the form of corner mat # 10 mm at 150 mm c/c is provided at top and bottom in all corners.
Edge strip reinforcement #8 @ 230 mm c/c
Thickness of slab 150 mm.

Draw to a suitable scale.

a. Plan showing reinforcement details. **(10 Marks)**
b. C/S at midspan along shorter span. **(05 Marks)**
c. C/S at midspan along longer span. **(05 Marks)**

2 A dog legged staircase is to be detailed with the following details:
Size of staircase room 2100 mm × 4500 mm
Width of flight = 1000 mm
Width of landing = 1000 mm
Number of treads in each flight = 10
Tread = 250 rise = 150 mm
Wall thickness = 230 mm
Waist slab thickness = 160 mm
Main steel 12 mm HYSD bars at 100 mm c/c and distribution steel for each flight = 8 mm @ 200 c/c. First flight starts from ground floor level and foundation 750 mm below GFL and second flight rests on wall.

Draw to a suitable scale:

a. Plan **(06 Marks)**
b. Sectional details of 1st and 2nd flight. **(14 Marks)**

3 A rectangular column of size 300 mm × 450 mm is provided with square isolated footing of size 2.60 m × 2.60 m. Height of column above GL = 3.6 m. Depth of foundation = 1.2 m below GL.

Details of Column:
Longitudinal steel = 10 numbers of 16 mm dia HYSD bars
Transverse steel = 8 mm dia ties at 200 mm c/c.
Details of footing:
Depth of footing at column face 600 mm and is tapered to 300 mm at the edge of footing.
Reinforcements = #12 mm HYSD bars at 150 mm c/c.

Draw to a suitable scale:

a. Plan of column and footing showing reinforcement. **(06 Marks)**
b. Sectional elevation. **(10 Marks)**
c. Bar bending schedule. **(04 Marks)**

PART – B

4 Two reinforce columns A = 350 mm × 350 mm and B = 400 mm × 400 mm in size carry axial service loads of 600 kN and 850 kN respectively. The columns are spaced at 3.6 m c/c. SBC of soil is 150 kN/m^2. The property line is 0.9 m from the centre of column A. Design the beam and slab type combined footing. **(40 Marks)**

Draw longitudinal section, plan and typical cross sections to a suitable scale. Use M20 grade of concrete and Fe 415 steel. **(20 Marks)**

5 Design a counter fort retaining wall with the following details.
Height of wall above GL = 6.0 m
Depth of hard soil level = 1.2 m
Angle of repose of the soil = 30°
SBC of the soil = 180 kN/m^2
Density of soil = 18 kN/m^3
Spacing between counterforts = 3.0 m c/c
Length of base slab = 4.5 m
Length of toe = 1.1 m
Coefficient of friction, $\mu = 0.55$
Materials: concrete M20 grade, Steel Fe415. **(40 Marks)**

Draw to a suitable scale:

a. Cross section through counterfort. **(10 Marks)**
b. Cross section mid way between counterforts. **(05 Marks)**
c. Sectional plan. **(05 Marks)**

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10CV63

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Transportation Engineering – II

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What are the factors considered for laying new railway line? **(06 Marks)**

b. With the aid of sketches briefly explain the types of rails. **(06 Marks)**

c. Define permanent way. What are the ideal requirements of permanent way? **(08 Marks)**

2 a. What are the advantages of welding of rails? **(06 Marks)**

b. With a neat sketch, explain
(i) Dog spike (ii) Screw spike **(06 Marks)**

c. Define sleeper density. For a rail of 12.80 metre length, calculate the quantity of materials required per km length of track. Assume sleeper density as $n+3$. **(08 Marks)**

3 a. Determine the maximum train load that can be handled by a locomotive having four pairs of driving wheels of an axle load of 28 tonnes each. On a straight track the train runs at a speed of 90 kmph. Also determine the reduction in speed of train when it is moving on upward gradient of 1 in 200. If the train moves on upward gradient with 4°curve, what would be the reduction of speed? **(08 Marks)**

b. What are the objects of providing transition curve? Explain briefly the essential requirement of ideal transition curve. **(06 Marks)**

c. A 6° curve branches off from 3° main curve in an opposite direction in the layout of B.G. yard. If the speed on the branch line is restricted to 35 kmph, determine the speed restricted on main line. Assume permissible deficiency in cant as 7.6 cm **(06 Marks)**

4 a. Draw a neat sketch of "Right hand turnout" and show the various parts on it. **(06 Marks)**

b. Find the lead and radius of curve for a B.G. turnout having d = 136 mm, $\theta = 1°34'27''$ and number of crossing as 1 in $8\frac{1}{2}$. **(04 Marks)**

c. Write a note on:
(i) Marshalling yards (ii) Locomotive yards. **(10 Marks)**

PART – B

5 a. List and explain the aircraft characteristics which affect planning and design of airports. **(10 Marks)**

b. What is wind rose diagram? Explain any one method of constructing wind rose diagram. **(10 Marks)**

6 a. With the aid of sketch explain the procedure of instrument landing system. **(06 Marks)**

b. Explain the various factors affecting on locations of exit taxiway. **(06 Marks)**

c. Determine the corrected length of runway for an airport site using the following data:
(i) Basic runway length = 2600 metres.
(ii) Airport elevation = 500 meters.
(iii) Airport reference temperature = 21°C
(iv) Runway effective gradient = 0.2% **(08 Marks)**

7 a. Explain the method of transfer of centre line into tunnel and providing grade. **(10 Marks)**
b. With the aid of sketch, explain he needle beam method of tunneling. **(06 Marks)**
c. What are the advantages of cement concrete lining? **(04 Marks)**

8 a. What are the factors to be considered for selection of harbor site? **(06 Marks)**
b. What is dry dock? Explain the construction and uses of dry dock. **(08 Marks)**
c. Compare with sketches, the wall type break water and mound type break water. **(06 Marks)**

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10CV64

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Geotechnical Engineering – II

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What are the objectives of soil exploration? With a neat sketch, explain any one method. **(06 Marks)**

b. What are the objectives of dewatering? With a neat sketch, explain any one method. **(06 Marks)**

c. A sampling tube has inner diameter of 70 mm and cutting edge diameter of 68 mm. Their outside diameters are 72 mm and 74 mm respectively. Determine the area ratio, inside clearance and outside clearance of the samples. This tube is pushed to the bottom of the bore hole to a distance of 550 mm with a length of sample recorded being 530 mm. Find the recovery ratio. **(08 Marks)**

2 a. Distinguish between Boussinesq's and Westergaard's theory of stress distribution. **(06 Marks)**

b. Explain construction and uses of Newmark's chart. **(08 Marks)**

c. A water tank is supported by a ring foundation having outer diameter of 10 m and inner diameter of 7.5 m. The ring foundation transmits a load intensity of 160 kN/m^2. Compute the vertical stress induces at a depth of 4 m below the centre of ring foundation using Boussinesq's analysis. **(06 Marks)**

3 a. List the characteristics and uses of flow net. **(06 Marks)**

b. Explain the graphical method of determining phreatic line in homogenous earth dam with horizontal filter. **(08 Marks)**

c. For an earth dam of homogenous section with horizontal filter. The coefficients of permeability in x and y directions are 8×10^{-7} cm/s and 3.6×10^{-7} cm/s respectively. The flow nets constructed include 4 flow channels and 18 potential drops. Determine the discharge through the dam in m^3/day if the treat during seepage was 14 m. **(06 Marks)**

4 a. Distinguish between the active and passive earth pressure. **(04 Marks)**

b. With a neat sketch explain the procedure to determine the lateral earth pressure by Culmann's graphical method. **(08 Marks)**

c. A retaining wall of 8 m height retains sandy material. The properties of sand are e = 0.6, $\phi = 30^\circ$ and G = 2.65. The water table is at a depth of 2.5 m from the ground surface. Draw the earth pressure diagram and determine the magnitude of total active earth pressure. **(08 Marks)**

PART – B

5 a. With neat sketch, explain different types of slope failures. **(06 Marks)**

b. Explain Swedish slip circle method for cohesive soils. **(06 Marks)**

c. A 5m deep canal has side slopes of 1:1. The properties of soil are C_u = 20 kN/m^2, $\phi_u = 10^\circ$, e = 0.8 and G = 2.8. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when canal runs full. Also find the same in case of draw down if Taylor's stability number for this condition is 0.137. **(08 Marks)**

6 a. Define ultimate bearing capacity, safe bearing capacity and allowable bearing capacity. **(06 Marks)**

b. With a neat sketch, explain plate load test. **(06 Marks)**

c. Determine the safe bearing capacity of a square footing with 2.1 m width placed at a depth of 1.5 m in a soil with moist unit weight of 17 kN/m^3, C = 15 kN/m^2 and $\phi = 20^\circ$. Take $N_C = 11.8$, $N_q = 3.9$ and $N_r = 1.7$, what is the change in bearing capacity if the water table raises to 0.5 m above the base of footing? Assume factor of safety as 3. **(08 Marks)**

7 a. Explain the terms:
i) Immediate settlement
ii) Primary consolidation settlement
iii) Secondary consolidation settlement
iv) Differential settlement **(08 Marks)**

b. Estimate the immediate settlement of a footing size (2 × 3) m resting at a depth of 2m in a sandy soil. The compression modulus of soil is 10 N/mm^2. The footing is expected to transmit a unit pressure of 160 kN/m^2. Assume $\mu = 0.28$ and $I_f = 1.06$. **(06 Marks)**

c. A square footing of width 1.2 m rests on a saturated clay layer of 4 m deep liquid limit of clay is 30%, unit weight is 17.8 kN/m^2, moisture content is 28% and specific gravity is 2.68. Determine the settlement if the footing carries a load of 300 kN. **(06 Marks)**

8 a. Explain the factors influencing the selection of depth of foundation. **(06 Marks)**

b. Discuss the proportioning of combined footings. **(06 Marks)**

c. Design a friction pile group to carry a load of 3000 kN including the weight of pile cap at a site where the soil is uniform clay to a depth of 20 m underlain by rock. Average unconfined compressive strength of clay is 70 kN/m^2. With liquid limit 60%. A factor of safety of 3 is required against shear failure. **(08 Marks)**

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10CV65

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs. Max. Marks:100

Note: 1. *Answer any TWO full questions form PART A and ONE question from PART B*
2. *Draw neat diagram wherever necessary*
3. *Missing data may suitably be assumed.*

PART – A

1 a. Define: i) Yield, ii) Trap efficiency iii) Density currents. **(03 Marks)**

b. The construction cost for certain possible heights of dam at a given site have been estimated and are given in table, along with storage capacity at these heights. Determine the most economical height of dam :

Height (m)	10	20	30	40	50	60	65
Construction cost (million Rs.)	4	8	12	18	27	39	50
Storage (million cum)	50	110	180	250	350	500	600

(05 Marks)

c. Explain briefly environmental effects of construction of a reservoir. **(07 Marks)**

2 a. What are the modes of failure of gravity dam? Explain. **(07 Marks)**

b. Design the practical profile of a gravity dam of stone masonry, given the following data :

RL of base of dam = 1250.00m
RL of FRL = 1280.00m
Height of wave = 1.5m
Safe compressive strength = 1200kN/m^2
Specific gravity = 2.4
Sketch the profile. **(08 Marks)**

3 a. List the design criteria for earth dams. **(07 Marks)**

b. Explain the steps in fixing the preliminary dimensions of an earth dam. **(08 Marks)**

PART – B

4 Design a surplus weir with stepped apron of a tank with the following details :

Catchment area = 20km^2
Maximum water level = 124.000m
Full tank level = 123.000m
Ground level at weir site = 122.000m
GL below proposed weir upto a reach of 5m = 121.000m
Tank bund level = 125.500m
Top width of tank bund = 2.0m
Side slopes of bund on either side = 2H:1V
Hard foundation available at 120.000m
Ryve's coefficient = 9
Hydraulic gradient = 1:5

(25 Marks)

Draw to a suitable scale :

a. Half plan at top and half plan at foundation. **(20 Marks)**

b. Half elevation and half sectional elevation. **(15 Marks)**

c. Cross section across the weir. **(10 Marks)**

5 Design details of a canal regulator is as follows :

Particulars	u/s	d/s
Full supply discharge	$16m^3/s$	$13m^3/s$
Bed width	10m	10m
Full supply level	12.000m	11.500m
Top level of Bank	13.000m	12.500m
Canal bed level	10.000m	10.000m
Top width of bank	2m	2m
Canal side slopes	2H:1V	2H:1V

Bligh's coefficient = 10

General GL at the site = 12.00m

Good soil for foundation is at 9.000m

Design Ventway, Gates, Apron, and Protection works. **(25 Marks)**

Draw to a suitable scale:

a. Half plan at top and half plan at foundation. **(20 Marks)**

b. Half elevation and half sectional elevation. **(15 Marks)**

c. Sectional elevation through regulator vent. **(10 Marks)**

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10CV667

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Traffic Engineering

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What are the objects and scope of traffic engineering? Explain briefly. **(10 Marks)**

b. Briefly explain different vehicular characteristics which affect the road design. **(10 Marks)**

2 a. List and explain the various resistances, which acts against the motion of vehicle. **(10 Marks)**

b. Enumerate the different method of carrying out traffic volume studies. Indicate the principle of each. **(10 Marks)**

3 a. With usual notations. Explain the power performance of vehicle. **(10 Marks)**

b. Explain the different forms of presentation of traffic volume data. **(10 Marks)**

4 a. What are the uses of origin and destination survey? How the results are presented. **(10 Marks)**

b. A vehicle of weight 2 tonnes skids through a distance equal to 40m before colliding with another parked vehicle of weight 1 tonne. After collision both the vehicle skids through a distance equal to 12m before stopping.
Calculate the initial speed of moving vehicle. Assume coefficient of friction as 0.5. **(10 Marks)**

PART – B

5 a. Show the linear relationship between speed and concentration. **(10 Marks)**

b. The speed and concentration of vehicles in a traffic stream were observed and the following data were obtained:

Concentration (veh/km)	5	10	15	20	25	30	35	40	45	50
Speed (kmph)	72	68	61	52	47	39	32	27	20	13

Find the regression equation for determining the speed from concentration. **(10 Marks)**

6 a. A toll booth at the entrance to a bridge can handle 120 Veh/hour, the time to process a vehicle being exponentially distributed. The flow is 90 Veh/hour with a Poisson arrival pattern. Determine :
i) The average number of vehicle in the system.
ii) The length of the queue
iii) The average time spent by the vehicle in the system
iv) The average time spent by the vehicle in the queue. **(10 Marks)**

b. Briefly explain the steps involved in simulation model. **(10 Marks)**

7 a. The average normal flow of traffic on cross roads A and B during a design period are 400 and 250 per/hr the saturation of flow values on these roads are estimated as 1250 and 1000 per/hr respectively. The all red time required for pedestrian crossing is 12 seconds. Design two phase traffic signal by Webster's method. **(10 Marks)**

b. What are the advantages and disadvantages of traffic signals? **(10 Marks)**

8 Write a note on :
a. Traffic rotary elements b. Street lighting
c. Road side furniture d. Intelligent Transport system. **(20 Marks)**

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