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10CV61

Sixth Semester B.E. Degree Examination, June / July 2013
Environmental Engineering - I

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO question from each part.

PART - A

1. a. Discuss water pollution due to human activities. (06 Marks)
b. Make the list of population forecasting methods and explain in detail decreasing rate of growth method and comparative graphical method. (08 Marks)
c. Compute the population of the year 2000 and 2006 for a city whose population in the year 1930 was 25,000 and in the year 1970 was 47,000. Make use of geometric increase method. (06 Marks)
2. a. What are 'infiltration galleries' and 'infiltration wells'? Explain both with neat sketches. (06 Marks)
b. With a neat sketch, explain twin well type of a river intake. (08 Marks)
c. With a neat sketch, explain the working of a hand operated reciprocating pump. (06 Marks)
3. a. Write the desirable limits for the following parameters as per BIS : 10500 – 1991 :
i) Color ii) pH iii) Total hardness iv) Nitrate v) Total dissolved solids
vi) Iron vii) Fluoride viii) Chloride ix) Alkalinity x) Turbidity. (10 Marks)
b. Explain in brief grab sampling and composite sampling. (04 Marks)
c. In a water treatment plant the pH values of incoming and outgoing water are 7.2 and 8.4 respectively. Find average value of pH, assuming linear variation of pH with time. (06 Marks)
4. a. What is aeration? With neat sketches, explain slat tray aerator and trickling bed aerator. (08 Marks)
b. How you will determine the optimum coagulant dosage in Lab using Jar test apparatus? Discuss with sketch. (06 Marks)
c. Determine quantity of alum needed to treat 13 million litres of water per day in treatment plant. The dosage of alum 12mg/l. Also find amount of CO₂ released per liter of water treated. Assume molecular weight of Al = 26.97 , S = 32.066 , O = 16 , H = 1.008 , C = 12.01. (06 Marks)

PART - B

5. a. Give comparison between flow sand filter and rapid sand filter. (10 Marks)
b. Write a note on :
i) Cracking and Clogging of filter bed
ii) Formation of mud balls and
iii) Air binding. (10 Marks)
6. a. Write explanatory note on :
i) Ozone treatment ii) UV treatment iii) Chlorination iv) Electro – Katadyn process v) Treatment with KMnO₄. (10 Marks)
b. Write the comparison between soda lime process and Zeolite process of softening of water techniques. (10 Marks)

7 a. With a neat sketch, explain the radial system and dead end system used in distribution networks. (10 Marks)

b. With a sketch, explain :

- i) Ground level storage reservoir (GLSR)
- ii) Air valve
- iii) Pressure relief valve
- iv) Post fire hydrant.

(10 Marks)

8 Write short notes on any Four of the following :

- b. Systems of supply of water.
- c. House water connection.
- d. Water meter.
- e. Break point chlorination.
- f. Socket and Spigot joint.

(20 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2013
Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks:100

- Note: 1. Answer any TWO full questions from PART – A and ONE question from PART – B.**
2. Use of IS 456, IS 3370 and SP16 are permitted.

PART – A

- 1** A two way slab for a hall of internal dimensions 4.5 m × 5.5 m has the following detail:
- Thickness of slab = 120 mm
 - Wall thickness = 230 mm
 - Short span steel = 10 mm # @ 120 mm c/c
 - Long span steel = 8 mm # @ 140 mm c/c
 - Torsion steel = 10 mm # @ 170 mm c/c
 - Grade of concrete and steel = M20 and Fe 415.
- Draw to a suitable scale the following:
- Plan showing reinforcement details. (08 Marks)
 - C/Sⁿ of slab @ mid span along short span. (06 Marks)
 - C/Sⁿ of slab @ mid span along long span. (06 Marks)
- 2** Following are the details of a dog legged RCC stair case:
- Strain hall dimension = 5m × 3m.
 - Width of tread = 250 mm
 - Rise = 150 mm
 - Floor height = 3.6 m
 - Waist slab thickness = 180 mm
 - Width of stair = 1.3 mt
 - Number of steps in each flight = 12
 - Main reinforcement in waist slab = 9-12 mm #
 - Distribution steel = 8 mm # @ 250 mm c/c
 - Grade of concrete of steel = M20 and Fe 415
- Draw to a suitable scale the following:
- Plan of stair (06 Marks)
 - Sectional elevation along first flight (07 Marks)
 - Sectional elevation along second flight. (07 Marks)
- 3** An isolated RCC column and footing has the following details:
- Column dimension = 320 × 460 mm
 - Footing size = 2.2 × 2.8 m
 - Thickness of footing of face of column = 480 mm
 - Thickness of footing of the edges = 200 mm
 - Depth of foundation below GL = 1.2 m
 - Column reinforcement (main) = 8-20 mm #
 - Lateral ties in column = 8 mm # @ 180 c/c
 - Footing reinforcement along shorter direction = 10 mm # @ 90 c/c
 - Footing reinforcement along longer direction = 10 mm # @ 120 c/c
 - Grade of concrete and steel = M20 and Fe 415
- Draw to a suitable scale, the following:
- Sectional plan of column and footing. (05 Marks)
 - Sectional elevation of column and footing. (10 Marks)
- Prepare bar bending schedule. (05 Marks)

PART – B

- 4 Design a cantilever retaining wall to retain the backfill material consisting of sand and gravel mixture 3.8 m above the GL. The backfill surface is horizontal. Following details are available:

Density of backfill = 18.9 kN/m^3

Angle of internal friction = 30°

Coefficient of friction between soil and base slab = 0.5

SBC of soil = 160 kN/m^2

Grade of concrete and steel = M20 and M 415.

(40 Marks)

Draw the following to suitable scale:

- Cross section of retaining wall. **(10 Marks)**
 - Longitudinal section of stem showing the curtailment. **(06 Marks)**
 - Sectional plan showing the details of reinforcement in heel slab. **(04 Marks)**
- 5 A single bay RCC portal frame having an effective span of 7m and an effective height of 4m. Portal frames are spaced at 3.5 m c/c. LL on the slab is 1.6 kN/m^2 . SBC of soil at site is 120 kN/m^2 . Design the beam, column and footing using M20 grade concrete and Fe 415 grade steel. **(40 Marks)**
- Draw to a suitable scale the sectional elevation of half the portal frame showing details of reinforcements in beam, column and footing. **(20 Marks)**

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10CV63

Sixth Semester B.E. Degree Examination, June/July 2013
Transportation Engineering – II

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. Missing data can be suitably assumed.

PART – A

1.
 - a. What are the political, social and economic advantages of railways? (06 Marks)
 - b. Draw a neat sketch showing the details of a double line B.G. track with electrical traction. (06 Marks)
 - c. Draw a typical cross-section of a permanent way. Discuss in brief the basic functions of the various components of a railway track. (08 Marks)

2.
 - a. What are the requirements of a good ballast material? Mention the types of ballast used in station yard. (06 Marks)
 - b. For a rail of 11.89m length, calculate the quantity of material per KM length of track. Assume sleeper density to be equal to $(1.0936n + 4)$. (06 Marks)
 - c. Calculate the maximum permissible train load that can be pulled by a locomotive having four pairs of driving wheel, carrying an axle load of 24 tones each. The train has to run at a speed of 75 kmph on a straight level B.G track. Also calculate the reduction in speed, if the train climbs gradient of 1 in 150. If the train climbs gradient with a 3° curve, then what should be the reduction in speed? Take $\mu = 0.166$. (08 Marks)

3.
 - a. Explain the following:
 - i) Ruling gradient
 - ii) Momentum gradient
 - iii) Grade compensation on curve. (06 Marks)
 - b. With a usual notation, derive the expression for superelevation for B.G., M.G. and N.G. track. (06 Marks)
 - c. A 5° curve diverges from a 3° main curve in the layout of B.G. yard. If the speed of the branch line is restricted to 30 kmph find out the speed on the main line. Allowable cant deficiency may be assumed as 76mm. (08 Marks)

4.
 - a. Draw a neat line diagram of a right hand turnout and show its various components. (06 Marks)
 - b. With a neat sketch explain the working of a semaphore signal. (06 Marks)
 - c. On a straight B.G. track, a turnout takes off at an angle of $6^\circ 42' 35''$. Design the turnout when the angle of switch is $1^\circ 34' 27''$, length of switch rail is 4.73m, heel divergence = 11.43cm and straight arm = 0.85m. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. $42+8=50$, will be treated as malpractice.

PART – B

- 5 a. Explain the factors which influences selection of site for an airport. (06 Marks)
b. Define the following:
i) Wind rose diagram
ii) Calm period
iii) Wind coverage
iv) Cross wind component. (06 Marks)
c. The basic runway length required under standard condition is 1600m and airport site of elevation 280m at an reference temperature of 32°C. The effective gradient is 0.15%. Determine the corrected runway length. (08 Marks)
- 6 a. Explain the various factors which affect the location of exit taxiway. (06 Marks)
b. Draw the cross-section of ILS runway. (06 Marks)
c. Design an exit taxiway joining a runway of 45m width and parallel main taxiway of 22.50m width. The total angle of turn is 30° and the turnoff speed is 80 kmph. Check the stopping distance if the separation clearance is 198.70m. (08 Marks)
- 7 a. Explain various shapes of tunnel with neat sketches. (06 Marks)
b. Explain with neat sketch the operations involved in needle beam method of constructing a tunnel. (06 Marks)
c. Write a short note on: i) Tunnel lining; ii) Tunnel drainage. (08 Marks)
- 8 a. What are the factors to be considered while selecting a site for a harbour? (06 Marks)
b. What is dry dock? Explain the construction and use of dry dock. (06 Marks)
c. What is breakwater? Explain with a neat sketch wall breakwater. (08 Marks)

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10CV64

Sixth Semester B.E. Degree Examination, June / July 2013
Geotechnical Engineering - II

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO question from each part.

PART - A

- 1
 - a. What is subsurface exploration? What are the objectives of soil exploration? (06 Marks)
 - b. Explain briefly stabilization of bore holes. (06 Marks)
 - c. Estimate the position of the ground water table from the following data obtained from the field. Depth upto which water is boiled out is 30m. Raise in water levels : on first day 2.2m, second day 1.8m and third day 1.5m. (08 Marks)

- 2
 - a. Distinguish between Boussinesq's and Westergaard's theory of stress distribution. (06 Marks)
 - b. Explain construction and uses of Newmarks chart. (08 Marks)
 - c. A water tank is supported by a ring foundation having outer diameter of 10m and inner diameter of 7.5m. The ring foundation transmits uniform load intensity of 160kN/m^2 . Compute the vertical stress induced at a depth of 4m below the centre of ring foundation using Boussinesq analysis. (06 Marks)

- 3
 - a. What is flownet? What are the uses of flow net? (04 Marks)
 - b. Describe the Casa Grande's method to locate the phreatic line in a homogenous earth dam with a horizontal filter at its toe. (08 Marks)
 - c. A soil stratum with permeability $K = 5 \times 10^{-5}$ m/sec overlies an impermeable stratum. The impermeable stratum lies at a depth of 18m below the ground surface. A sheet pile wall penetrates 8m into the permeable soil stratum. Water stands to a height of 9m on upstream side and 1.5m on down stream side, above the surface of soil stratum. Sketch the flow net and determine quantity of seepage. (08 Marks)

- 4
 - a. Derive the equations for the earth pressure coefficients K_a and K_p considering back fill with horizontal surface. (08 Marks)
 - b. A retaining wall of height 10m supports cohesionless soil with following properties : $G = 2.65$, $e = 0.65$, $\phi = 30^\circ$. Water table lies at 3m depth. Surface of backfill is horizontal and carries surcharge of intensity 14kN/m^2 . Draw lateral active earth pressure distribution diagram. Determine total active earth pressure and its point of application. (12 Marks)

PART - B

- 5
 - a. Explain the causes for a slope failure and list the types of slope failures. (06 Marks)
 - b. Explain Swedish method of slices of stability analysis of slopes. (06 Marks)
 - c. A 5m deep canal has side slopes of 1:1. The properties of soil are $C_u = 20\text{kN/m}^2$, $\phi_u = 10^\circ$, $e = 0.8$ and $G = 2.8$. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when the canal runs full. Also find the factor of safety in case of sudden draw down, if the Taylor's stability number for this condition is 0.137. (08 Marks)

- 6
 - a. Define : i) Ultimate bearing capacity ii) Safe bearing capacity. (04 Marks)
 - b. Discuss effect of water table on bearing capacity of soil. (06 Marks)

- c. A square footing placed at a depth of 1m is required to carry a load of 1000kN. Find the required size of footing given the following data : $C = 10\text{kN/m}^2$, $\phi = 38^\circ$, $\gamma = 19\text{kN/m}^3$. For $\phi = 38^\circ$. Terzaghi's bearing capacity factors are $N_c = 61.35$, $N_2 = 48.93$, $N_\gamma = 74.03$. Assume water table is at base of footing. **(10 Marks)**
- 7 a. Explain the terms : i) Immediate settlement ii) Consolidation settlement iii) Secondary settlement iv) Differential settlement. **(08 Marks)**
- b. A circular footing 2m diameter resting on the ground surface transfers a contact pressure of 150kPa. Sub soil consists of fine sand of 6m deep underlain by 4m thick clay. The ground water table is 1m below ground level. Unit weight of fine sand above and below watch table are 17.6kN/m^3 and 20kN/m^3 respectively. The properties of clay are natural water content = 40%, liquid limit = 45% , $G = 2.72$. Calculate consolidation settlement. **(12 Marks)**
- 8 a. With the help of required figure, 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 3000kN including the weight of the pile cap at a site where the soil is uniform clay to a depth of 20m, underlain by rock. Average unconfined compressive strength of the clay is 70 kN/m^2 . The clay may be assumed to be of normal sensitivity and normally loaded 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, June/July 2013
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs.

Max. Marks:100

Note: 1. Answer any TWO questions from Part-A and any ONE question from Part-B.

2. Any missing data may suitably be assumed.

PART – A

- 1 a. i) Explain the different storage zones of a reservoir.
 ii) Define the terms trap efficiency and density currents. (08 Marks)
- b. The monthly yield of water from a catchment is given below. Determine the minimum capacity of the reservoir by mass curve method if the flow is drawn at a uniform rate. Values are given in million cubic meters:

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Inflow volume million (m ³)	1.4	2.1	2.8	8.4	11.9	11.9	7.7	2.8	2.52	2.24	1.96	1.68

(07 Marks)

- 2 a. Explain various forces that act on gravity dam. (07 Marks)
- b. Following data were obtained from the stability analysis of a concrete gravity dam:
- Total overturning moment above toe = 1×10^5 t-m.
 - Total resisting moment above toe = 2×10^5 t-m.
 - Total vertical force above base = 5000t.
 - Base width of the dam = 50m.
 - Slope of the down stream face = 0.8H:1V.

Calculate the maximum vertical stress to which the foundation will be subjected to? What is the maximum principal stress at toe? Assume there is no tail water. (08 Marks)

- 3 a. Explain the design criteria for earthen dams. (07 Marks)
- b. Explain the causes for failure of earthen dams. (08 Marks)

PART – B

- 4 Design a tank surplus weir for a major tank connected with tank in series.

1) Field data:

Combined catchment area of group of tanks	: 29.5 km ²
Intercepted catchment area	: 22.8 km ²
General ground level at proposed site	: 15.8m
Level at which good foundation soil is available	: 14.0m
Slope at the proposed surplus works	
from its centerline reaches 14.8m in a distance of	: 10m

II) Construction details:

Full tank level	: 17.5m
Maximum water level	: 18.3m
Tank bund level	: 19.5m
Top width of bund	: 2.2m
Side slopes	: 2:1

(25 Marks)

III) Other details:

Make provision to store water up to MWL. Proper abutments, wing walls and returns are to be designed. Assume a hydraulic gradient of 1 in 5 and Ryves coefficient = 9.

Draw to a suitable scale.

- Half plan at top and half plan at foundation.
- Half elevation and half sectional elevation.
- Cross section across the weir.

(20 Marks)

(15 Marks)

(10 Marks)

5 Design a canal drop (notch type) for following data:

(25 Marks)

Particulars	U/S canal	D/S canal
Full supply discharge	10.0 m ³ /s	10.0m ³ /s
Bed level	+20.00	+18.00
Full supply level	+21.50	+19.50
Bed width	8.0	8.0
Top level of embankment	+22.50	+20.50m
Top width of embankment	2.0m	2.0m
Side slopes	1:1 (cut)	1.5:1 (fill)
Average ground level	20.50	12.50
Hand soil available @	18.50m	

Draw to a suitable scale:

- Half plan @ top and half of foundation.
- Half elevation and half longitudinal section.
- Cross section along the canal.

(20 Marks)

(15 Marks)

(10 Marks)

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10CV666

Sixth Semester B.E. Degree Examination, June/July 2013
Rural Water Supply and Sanitation

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Explain the necessity of a protected water supply. (06 Marks)
b. List the water borne diseases. Explain their controlling measures. (06 Marks)
c. List and explain drinking water quality standards. (08 Marks)
- 2 a. List and explain water supply systems in rural water supply scheme? (08 Marks)
b. Explain Nalgonda Technique used for water treatment in rural areas. (06 Marks)
c. Explain sources of ground water contaminants and their control. (06 Marks)
- 3 a. Explain the concept of ECO-sanitation. (04 Marks)
b. Explain the following : (10 Marks)
i) Composting method ii) Soak pit
c. Explain working of a septic tank with a neat sketch. (06 Marks)
- 4 a. Explain the disposal of storm water and sullage disposal in rural areas. (10 Marks)
b. Discuss objectives and methods of rain water harvesting. (10 Marks)

PART – B

- 5 a. Explain the classification of communicable diseases. (08 Marks)
b. Explain general methods of control of communicable disease. (12 Marks)
- 6 a. List and explain refuse disposal methods. (12 Marks)
b. Explain with a neat sketch, working of a biogas plant. (08 Marks)
- 7 a. Explain tests for milk quality determination. (06 Marks)
b. Explain the following: (14 Marks)
i) Pasteurization ii) Cattle borne diseases.
- 8 a. Explain the life cycle of a mosquito. (08 Marks)
b. Discuss the diseases transmitted by house fly and mosquito and their control measures. (12 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.