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10CV61

Sixth Semester B.E. Degree Examination, June/July 2016
Environmental Engineering – I

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.**
2. Draw sketches wherever necessary.
3. Assume any missing data suitably.

PART – A

- 1 a. Explain the need and importance for planned water supply scheme to town. (06 Marks)
 b. Define per capita demand and explain various factors that affect the per capita demand. (08 Marks)
 c. The population data of a town are given below:

Year	1990	2000	2010	2020	2030
Population	90,000	1,20,000	1,60,000	2,50,000	2,60,000

Estimate the expected population in the year 2050 by Geometric Increase Method. (06 Marks)

- 2 a. Enumerate the different surface and subsurface sources of water and compare the quality and quantity and suitability of various sources. (08 Marks)
 b. What is an intake structure? What are the factors governing the selection of site for locating an intake. (06 Marks)
 c. Explain with a neat sketch of a reservoir intake. (06 Marks)
- 3 a. Explain the different physical, chemical and bacteriological tests conducted on water. (08 Marks)
 b. Mention the max. permissible limits as per BIS of the following water quality parameters and write the problem caused if the limit is exceeded.
 (i) Hardness (ii) pH (iii) Fluoride (iv) Turbidity (06 Marks)
 c. Explain various waterborne diseases and their control. (06 Marks)
- 4 a. With the help of a flow diagram, explain briefly the complete sequence of a water treatment plant. (08 Marks)
 b. Explain with a sketch how the optimum coagulation dosage is determined in the laboratory. (06 Marks)
 c. Design a circular sedimentation tank to treat 10 MLD of water, given the following data:
 Depth of liquid = 3.5 m Detention time = 4 hr.
 Calculate, also over flow rate. (06 Marks)

PART – B

- 5 a. Explain the theory of filtration. (06 Marks)
 b. Compare slow sand filters with Rapid sand filters. (06 Marks)
 c. What is meant by disinfection in water treatment? Give the requirements of an ideal disinfectant. (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.

- 6 a. List the different forms of chlorination and explain any two of them. (08 Marks)
b. Write a note on fluoridation and defluoridation. (06 Marks)
c. Explain the zeolite methods of water softening. (06 Marks)
- 7 a. Explain the environmental significance of hardness in water. (08 Marks)
b. Explain methods of water softening to remove permanent hardness of water. (06 Marks)
c. Calculate the hardness of given water sample data:
Na²⁺ = 30 mg/L Cl⁻ = 54 mg/L
Ca²⁺ = 20 mg/L Sr⁻ = 04 mg/L
Mg²⁺ = 15 mg/L Turbidity = 50 mg/L
Comment on the result. (06 Marks)
- 8 Write short notes on the following (any four) :
a. Defluoridation
b. Pressure filters
c. Iron and Manganese removal
d. Removal of Taste & Odour
e. Activated Carbon treatment. (20 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2016
Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks: 100

- Note:** 1. Answer any TWO full questions from Part-A
 and ONE full question from Part-B.
 2. Use of IS456 2000, SP 16 is permitted.
 3. Assume any missing data suitably.

PART – A

- 1 Prepare a centre line drawing showing foundation trench layout for walls of the building and footing for columns as shown in Fig.Q1.
 All columns C1 230mm × 450mm in size
 Columns C2 300mm × 300mm in size.
 Size of footing for C1 columns = 1.2m × 1.5m.
 Size of footing for C2 columns = 1.0m × 1.0m.
 Concrete bed for footing 100 mm thick, projecting 75mm beyond the footing.
 Width of foundation trench for walls = 900 mm
 Width of trench for corridor basement = 750 mm
 Also prepare the slab and beam layout with suitable dimensions, notations and with appropriate grids. Use M20 grade concrete and Fe415 grade steel. (20 Marks)



Fig.Q1

- 2 A rectangular R.C. Beam of cross-section 300mm × 450mm is supported on four columns spaced at 4 m centre to centre. The beam reinforcement consists of 4 bars of 16 mm dia at midspan out of which two bars are curtailed near each support at bottom (+ve reinforcement). The reinforcement at all supports consists of 4 bars of 16 mm diameter –ve reinforcement. The beam has 2 Nos 16 mm diameter hanger bars at top. Shear reinforcement consists of 8mm diameter 2 legged vertical stirrups at 150 mm c/c at 1 m from face of supports and at 230 mm c/c in the remaining span. Use M20 concrete and Fe 415 grade steel. Draw to a suitable scale.
- Longitudinal section of continuous beam (07 Marks)
 - Cross section of beam at mid span. (04 Marks)
 - Cross section at support. (04 Marks)
 - Bar bending schedule for beam. (05 Marks)

- 3 An R.C.C column and footing has the following details:

Size of column = 300 mm × 450 mm

Size of footing = 1500 mm × 2250 mm

Thickness of footing near column face = 450 mm

Thickness of footing at edges = 200 mm

Depth of foundation below GL = 1 m

Height of column to be shown above GL = 1 m

Details of reinforcement:

Column longitudinal reinforcement = 8 Nos # 16 mm dia bars.

Lateral Ties = #8mm dia bars at 150 mm c/c

Footing reinforcement: #16mm @ 150 mm c/c along longer direction.

12mm @ 200 mm c/c along shorter direction.

Use M20 concrete and Fe 415 grade steel. Draw to a suitable scale.

(i) Sectional plan of column and footing.

(07 Marks)

(ii) Sectional elevation of column and footing.

(08 Marks)

(iii) Prepare bar bending schedule for footing steel and column steel upto 1 m above G.L.

(05 Marks)

PART – B

- 4 Design a cantilever retaining wall to retain an earthen embankment 5 m high above ground level. The backfill is horizontal. The following details are available.

Density of backfill = 18 kN/m³

Angle of internal friction $\phi = 30^\circ$

Co-efficient of friction between soil and base slab = 0.5.

SBC of soil = 200 kN/m²

Adopt M20 grade concrete and Fe415 grade steel.

(40 Marks)

Draw to a suitable scale.

(i) Cross section of retaining wall.

(10 Marks)

(ii) Longitudinal section of stem showing the curtailment of reinforcement.

(06 Marks)

(iii) Sectional plan showing the details of reinforcement in heel slab.

(04 Marks)

- 5 Design a combined footing for two R.C.C. columns A & B separated by a distance of 4 m c/c. Column A is 500 mm × 500 mm and carries a load of 1250 kN and column B is 600mm×600mm and carries a load of 1600 kN. Take SBC of soil is 200 kN/m² and use M20 concrete and Fe415 grade steel.

(40 Marks)

Draw to a suitable scale.

(i) Longitudinal sectional elevation.

(14 Marks)

(ii) C/s at Mid span locations to show details of reinforcement.

(06 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2016
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 economical advantages of railways? (06 Marks)
- b. Draw a neat sketch showing the details of 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 various components of railway track. (08 Marks)
- 2 a. What are the requirements of the good ballast? Mention the different types of ballast used in permanent way. (08 Marks)
- b. For rail of 11.89 m length, calculate the quantity of material per km length of track. Assume sleeper density to be equal to $[1.093n + 4]$. (06 Marks)
- c. A locomotive on MG track has three pair of driving wheels each carrying 20 tones. What maximum load can it pull on level track with curvature of 2° at 50 kmph? (06 Marks)
- 3 a. Explain the following: (i) Ruling gradient; (ii) Momentum gradient; (iii) Grade compensation on curve. (06 Marks)
- b. What is super elevation? List objects of providing super elevation on curves. (06 Marks)
- c. What would be the equilibrium cant on a M.G. curve of 5° for an average speed of 60 kmph? Also find the maximum permissible speed after allowing the maximum cant deficiency. (08 Marks)
- 4 a. Draw a neat, line diagram of a right hand turn out and show its various components. (06 Marks)
- b. With a neat sketch, explain the working of a semaphore signal. (08 Marks)
- c. Write short notes on: (i) Turn table, (ii) Water column. (06 Marks)

PART – B

- 5 a. Explain the factors which influence selection of sites for an airport. (08 Marks)
- b. Draw a neat sketch cross section of runway. (06 Marks)
- c. Mention the various assumptions made in the basic length of runway. (06 Marks)
- 6 a. Explain the various factors which affect the locations of exist taxiway. (08 Marks)
- b. Design an exist taxiway joining a runway and a parallel main taxiway. The total angle of turn is 30° and the turn off speed is 80 kmph. Draw a neat sketch and show there in all design elements. [Assume $R_1 = 73.1$ m for 80 kmph, speed] (12 Marks)
- 7 a. Explain various shape of tunnels with neat sketch. (06 Marks)
- b. Explain with neat sketch the operations involved in needle beam method of constructing a tunnel. (06 Marks)
- c. Write short notes on: (i) Tunnel lining; (ii) Tunnel drainage. (08 Marks)
- 8 a. What are 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 break water? Explain with a neat sketch wall breakwater. (08 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2016
Geotechnical Engineering – II

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions,
 selecting atleast two questions from each part.
 2. Assume missing data, if any, suitably.**

PART – A

- 1 a. Describe standard penetration test as per IS:2131 guidelines. How to apply corrections to observed SPT-values? **(10 Marks)**
 b. Estimate the grand water table, given the following data. Depth upto which water is boiled out 18 meters. Water rise on Ist day = 0.95m, II day = 0.86m and III day = 0.78m. Use Hvorselev's method. **(10 Marks)**

- 2 a. Explain equivalent point load method of determining σ_z – at any point with in loaded area. **(08 Marks)**
 b. Point loads 64kN, 15kN and 21kN, 1.5m apart in a straight line at the surface of soil mass. Calculate the resultant stress produced by these loads on a horizontal plane one meter below the surface at points vertically below the loads and also half way (mid point) between them.

The vertical pressure σ_z du to point load Q is given by Boussinesq's equation $\sigma_z = \frac{Q}{z^2} \cdot I_B$.

The value of I_B are as follows:

r/z	0	0.75	1.5	2.25	3.0
I_B	0.4775	0.1565	0.0251	0.053	0.0015

Sketch the curve showing distribution of these resultant stresses at that level. **(12 Marks)**

- 3 a. Explain with a neat sketch a method of locating the phreatic line in a homogeneous earth dam with horizontal filter. **(10 Marks)**
 b. List the applications of flow net. Discuss about the validate of Darcy's law in determining quantity of seepage. **(08 Marks)**
 c. An earthen dam is built on a impervious foundation with a horizontal filter under the downstream slope. The horizontal and vertical permeability of the soil material in the dam are respectively 4×10^{-5} m/sec and 1×10^{-5} m/sec. Full reservoir level is 20 meters above downstream filter. Flow net consists of 4 flow channels and 15 equipotential drops. Estimate seepage loss per meter length of the dam. **(02 Marks)**

- 4 a. Distinguish between Coulomb's earth pressure theory and Rankine's earth pressure theory. **(04 Marks)**
 b. Describe Rebhann's graphical method of finding active earth pressure on a retaining wall. **(16 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – B

- 5 a. Obtain an expression for factor against sliding in $C-\phi$ soil by the method of slices. Explain determination of factor of safety by method of slices method. (14 Marks)
- b. An embankment is inclined at an angle 38° and its height is 20 meters. The angle of shearing resistance is 15° and the cohesion intercept is 50 kN/m^2 . The unit weight of soil is 16.5 kN/m^3 . Find the factor of safety with respect to cohesion. Consider Taylor's stability number = 0.08. (06 Marks)
- 6 a. List the assumptions of Terzaghi's bearing capacity equation. (08 Marks)
- b. Calculate the ultimate bearing capacity of a 2 meter wide square footing resting on a ground surface of a sand deposit with the following properties: i) Unit weight is 18.6 kN/m^3 ; ii) Angle of internal friction = 38° . Also calculate ultimate bearing capacity of same footing when the footing is placed at depth of 1m below the ground surface. Take $N_q = 41.4$, $N_r = 42.2$ for $\phi = 38^\circ$. Adopt Terzaghi's equation. Also calculate percentage increase in bearing capacity with increase in depth from surface to 1 meter from natural ground level. (12 Marks)
- 7 a. Discuss about the components of settlement. (08 Marks)
- b. The soft normally consolidated clay layer is 18 meter thick. The natural water content is 45%. The saturated unit weight is 18 kN/m^3 . The grain specific gravity is 2.70 and the liquid limit = 63%. The vertical stress increment at the centre of the layer due to the foundation load is 9 kN/m^2 . The ground water level is at the surface of the clay layer. Determine the consolidation settlement of the foundation. (12 Marks)
- 8 a. List and explain the classification of pile foundation base on function and material. (14 Marks)
- b. Discuss about the factors governing minimum depth of foundation as per IS:1904 guidelines. (06 Marks)

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10CV65

Sixth Semester B.E. Degree Examination, June/July 2016
Hydraulic Structures and Irrigation Design - Drawing

Time: 4 hrs.

Max. Marks: 100

- Note: 1. Answer any TWO full questions, from Part – A
 and any ONE question from Part - B.
 2. Assume missing data suitably.**

PART – A

- 1** a. Explain the graphical method for the determination of the required storage capacity of a reservoir when the demand is i) Uniform ii) Non - uniform. **(07 Marks)**
 b. Write short notes on any two of the following : **(04 Marks)**
 i) Flood control reservoir ii) Distribution reservoir iii) Multipurpose reservoir.
 c. The construction costs for certain possible heights of a dam at a given site have been estimated and the storage capacity for all these dam heights are tabulated in the table below:

Sl.No	Height of the dam in meter	Construction cost in million rupees	Storage in million cubic meters
1	10	04	50
2	20	08	100
3	30	12	180
4	40	18	250
5	50	27	350
6	60	39	500
7	64	50	600

Determine the most economical height of the dam.

(04 Marks)

- 2** a. Define Gravity dam. Explain with neat sketch the drainage galleries in gravity dam. **(06 Marks)**
 b. Following data were obtained from the stability analysis of a concrete gravity dam : **(09 Marks)**
 i) Total overturning moment about toe = 1.1×10^6 kN-m.
 ii) Total resisting moment about toe = 2.1×10^6 kN-m.
 iii) Total vertical force about base = 54,000 kN.
 iv) Base width of the dam = 50m.
 v) Slope of the D/S face = 0.8H : 1V.

Calculate the maximum and minimum vertical stress to which the foundation will be subjected to, what is the maximum principal stress at toe? Assume there is no tail water.

- 3** a. Explain the two different methods which are adopted for constructing earthen dams. Which of these methods would you prefer and why? **(06 Marks)**
 b. What precautions and remedial measures would you undertake to control the seepage through, i) Earthen dam body ii) The dam foundation. **(09 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – B

- 4 Design a surplus weir for the following data : Combined catchment area = 51km^2 ;
 Intercepted catchment area = 46km^2 ; Top bund level (TBL) = 100.00m ;
 Maximum water level (MWL) = 98.50m ; Full tank level (FTL) = 97.5m ;
 Average ground level at proposed site = 96.5m ; Top width of tank bund = 2m ;
 Side slopes of bund on either side = 2:1 ; Level of hard strata for foundation = 95.00m ;
 The ground level below the weir (D/S of weir) slopes to a level of 95.50m in a distance of about 6m .

Ryve's co-efficient $C = 8$; Modified Ryve's coefficient $C = 2.5$.

Provisions may be made to make Kutcha regulating arrangements to store water upto MWL in terms of necessity. **(25 Marks)**

Draw to a suitable scale the following views of the above designed surplus weir.

- Cross section of weir. **(10 Marks)**
 - Draw half longitudinal section and half longitudinal elevation. **(15 Marks)**
 - Draw half plan at foundation and half plan at ground level. **(20 Marks)**
- 5 Design a canal regulator –cum – road bridge with the following particulars :
 Hydraulic particulars of canal upstream : Full supply discharge = $20\text{m}^3/\text{sec}$;
 Bed width = 15m ; Bed level = 20.0m ; Full supply depth = 2.0m ;
 Full supply level = $+22.0\text{m}$; Top level of bank = $+23.0\text{m}$.
 The right bank is 5m wide and left bank is 2m wide.
 Hydraulic particulars of canal downstream : Full supply discharge = $16\text{m}^3/\text{sec}$;
 Bed width = 15m ; Bed level = $+20.0\text{m}$; Full supply depth = 1.75m ;
 Full supply level = $+21.75\text{m}$; Top level of bank = $+22.75\text{m}$. **(25 Marks)**
 Top width of banks are the same as those on the upstream side. The regulator carries a road way single lane designed for I.R.C loading class 'A'. Provide clear freeboard of one meter above F.S.L for road bridge. Good foundation soil is available at $+19.00$. Assume the ground level site as $+22.00$. The co-efficient of drawing ratio for 80% is 1.645, 85% is 1.58 and 90% is 1.358.
 Draw :
- Cross section showing half elevation and half section. **(10 Marks)**
 - Longitudinal section. **(15 Marks)**
 - Half plan at foundation and half pan at ground level. **(20 Marks)**

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10CV666

Sixth Semester B.E. Degree Examination, June/July 2016
Rural Water Supply and Sanitation

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- 1 a. Discuss the need for protected water supply. (08 Marks)
b. Explain the various factors that govern the selection of a particular source of water in formulating a town or city water supply scheme. (06 Marks)
c. Explain water borne diseases. What are the precautionary measures to be taken for control of the communicable diseases? (06 Marks)
- 2 a. What are the advantages and disadvantages of centrifugal pumps and reciprocating pumps? (06 Marks)
b. Explain the following : i) Plain chlorination ii) Break point chlorination iii) Super chlorination. (06 Marks)
c. Distinguish between fluoridation and defluoridation. Explain any one method of defluoridation in detail. (08 Marks)
- 3 a. Briefly explain the following methods of soil disposal with neat sketches : i) Aqua privy ii) Two – pit latrine. (08 Marks)
b. Explain the Septic Tank with neat sketch. Also Highlight advantages and disadvantages. (07 Marks)
c. With neat sketch, explain soak pit. (05 Marks)
- 4 a. Explain : i) Concept of Eco – sanitation ii) Sources of ground water pollution. (10 Marks)
b. What is Rain water harvesting? Explain suitable methods of rain water harvesting in rural areas. (10 Marks)

PART – B

- 5 a. Define the following as referred to communicable diseases : i) Epidemic ii) Endemic iii) Vehicle of Infection iv) Vaccination v) Isolation. (10 Marks)
b. Discuss the general methods of communication of communicable diseases. (10 Marks)
- 6 a. Describe the following methods of disposal with advantages and disadvantages : i) Dumping ii) Incineration iii) Salvaging. (10 Marks)
b. Explain with a neat sketch Bio plant in detail. (10 Marks)
- 7 a. Explain all the essentials necessary to obtain the objectives of milk sanitation. (08 Marks)
b. Define Pasteurization. Explain any one method of pasteurization, with a sketch. (12 Marks)
- 8 a. Discuss the different diseases transmitted by the mosquito. (10 Marks)
b. Briefly explain control of nuisance mosquitoes. (10 Marks)
