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10CV61

**Sixth Semester B.E. Degree Examination, June/July 2015
Environmental Engineering - I**

Time: 3 hrs.

Max. Marks:100

**Note:1. Answer any FIVE full questions, selecting
atleast TWO questions from each part.
2. Assume suitable data wherever necessary.**

PART - A

- 1
 - a. Explain the various types of water demand. (08 Marks)
 - b. What is meant by per capita demand? Mention the factors that affect per capita demand. (06 Marks)
 - c. What is meant by design period? Discuss the factors affecting design period. (06 Marks)
- 2
 - a. Describe the incremental method of estimating the population of a locality. (06 Marks)
 - b. Mention the different sources of water supply. Give the factors governing the solution of a particular source of water. (06 Marks)
 - c. What is an intake? Explain the factors governing the location of an intake. (08 Marks)
- 3
 - a. Enumerate the various physical and chemical characteristics of testing of raw water supplies. (08 Marks)
 - b. Give the drinking water standards for the following parameters. Discuss their effect when they exceed their limits : i) Turbidity ii) Hardness iii) Chlorides iv) Fluoride. (08 Marks)
 - c. Explain the method of sampling of water. (04 Marks)
- 4
 - a. Briefly explain the complete treatment process of a water supply scheme with flow chart. (06 Marks)
 - b. What is Aeration? Explain the types of aerators. (06 Marks)
 - c. Describe briefly the various constituents of coagulation – sedimentation plant. (08 Marks)

PART - B

- 5
 - a. With the help of a neat sketch, explain the working of Rapid gravity filter. (10 Marks)
 - b. Design six slow sand filters beds from the following data :
Population to be served = 50000 persons ; Per capita demand = 150 lpcd ;
Rate of filtration = 180 litres/hr/sq.m ; Length of each bed = Twice the breadth.
Assume maximum demand as 1.8 times the average daily demand. Also assume that one unit, out of six, will be kept as stand by. (10 Marks)
- 6
 - a. Explain briefly the following processes : i) Break point chlorination ii) Super chlorination. (10 Marks)
 - b. Mention the methods of softening the water. Describe zeolite process of softening water in detail. (10 Marks)
- 7
 - a. Explain briefly : i) Defluoridation ii) Desalination. (10 Marks)
 - b. With sketches, explain briefly dead end system and grid iron system of distribution networks. (10 Marks)
- 8 Write short notes on :
 - a. Fire hydrants.
 - b. Pressure release valve.
 - c. Metering in distribution system.
 - d. Jar test. (20 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.

Sixth Semester B.E. Degree Examination, June/July 2015
Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks:100

Note: 1. Answer any TWO full questions from part – A and ONE from part - B.
2. Use of IS – 456 and SP – 16 is permitted.

PART – A

- 1** A simply supported two way slab is supported on all sides by 230 mm thick wall. The dimensions of two way slab is 3 mts × 4 mts (clear). Following are the reinforcement particulars :
- Along short span ϕ 10 mm @ 125 mm c/c
 - Along long span ϕ 10 mm @ 150 mm c/c
 - Negative steel for short span ϕ 10 mm @ 250 mm c/c
 - Negative steel for long span ϕ 10 mm @ 300 mm c/c
 - Alternative rods are cranked
 - Corner mats are ϕ 8 mm @ 150 mm c/c along short span and ϕ 8 mm @ 200 mm c/c along long span
 - Thickness of slab is 150 mm
- Draw to a suitable scale :
- Plan showing reinforcement particulars. (08 Marks)
 - Cross section at mid span along short span. (06 Marks)
 - Cross section at mid span along long span. (06 Marks)
- 2** A dog legged staircase is proposed for a building with the following data :
- Clear dimension of stair hall (2.5 m × 5 m)
 - Vertical distance between the floors 3.6 m
 - Thickness of waist slab is 150 mm
 - Wall thickness is 230 mm
 - Main reinforcement ϕ 12 mm @ 100 mm c/c
 - Distribution reinforcement ϕ 8 mm @ 150 mm c/c
 - Use M20 grade concrete and Fe415 grade Steel
- Draw to a suitable scale :
- Plan of staircase. (05 Marks)
 - Sectional elevation of first flight which starts from foundation showing reinforcement details. (10 Marks)
 - Sectional elevation of second flight. (05 Marks)
- 3** A rectangular RCC column and footing have the following details :
- Dimension of column – 230 mm × 450 mm
 - Size of footing – 1.2 m × 1.5 m
 - Depth of footing at the face of column 450 mm
 - Depth of footing at the edges 150 mm
 - Depth of foundation below ground level is 1.2 m
 - Details of reinforcement
 Column : ϕ 16 mm – 8 no's as main bars ϕ 8 mm @ 150 mm c/c as lateral ties
 - Footing : 10 mm ϕ @ 90 mm c/c – shorter direction 10 mm ϕ @ 120 mm c/c – longer direction
 - Use M20 grade concrete and Fe415 grade Steel
- Draw to a suitable scale :
- Sectional plan of column and footing. (05 Marks)
 - Sectional elevation of column and footing. (10 Marks)
 - Prepare the bar bending schedule for footing steel and column steel up to 3 m height above ground level. (05 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 slab type rectangular combined footing for supporting two columns $400 \text{ mm} \times 400 \text{ mm}$ in size to carry a load of 1000 kN each. Center to center distance between the columns is 3.5 m . The projection of footing on either side of the columns with respect to center of columns is 1 m . Safe bearing capacity of soil can be taken as 190 kN/m^2 . Use M20 grade concrete and Fe415 grade Steel. **(40 Marks)**
Draw to a suitable scale :
- a. Plan of footing. **(05 Marks)**
 - b. Longitudinal section of footing. **(10 Marks)**
 - c. Transverse section of footing. **(05 Marks)**
- 5 Design a single bay portal frame having an effective span of 7 m and an effective height of 4 m . The portal frames are spaced at 3.5 m c/c . Take live load as 1.6 kN/m^2 on the slab. Assume safe bearing capacity of soil as 120 kN/m^2 . Use M20 grade concrete and Fe415 Steel. Design the beam, column and footing. **(40 Marks)**
Draw to a suitable scale :
- a. Section elevation of half the portal frame. **(10 Marks)**
 - b. Cross – sectional details of column. **(05 Marks)**
 - c. Cross – sectional details of beam at support and midspan. **(05 Marks)**

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Sixth Semester B.E. Degree Examination, June/July 2015

Transportation Engineering – II

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. What are the requirements of rails? (06 Marks)
- b. Explain the following :
 - i) Theories and causes of creep (08 Marks)
 - ii) Types of rail joints. (06 Marks)
- c. Compare flat footed rails with DH and BH rails. (06 Marks)

- 2 a. What are the requirements of a good ballast material? Mention the different types of ballast used. (06 Marks)
- b. Determine the quantity of materials required to construct a 16 km long B.G rail way track. Assume a sleeper density of $m + 5$ and weight of rail section as 52 kg/m length. (06 Marks)
- c. Calculate the maximum permissible train load that can be pulled by a locomotive having 4 pairs of driving wheels, carrying an axle load of 22 tonnes each. The train has to run at a speed of 80 kmph on a straight level B.G track. Also calculate the reduction in speed if the train climbs a gradient of 1 in 150. If the train climbs the gradient with a 4° curve, then what should be the reduction in speed. Take $\mu = 0.166$. (08 Marks)

- 3 a. List the different types of curves used on railways. Explain the necessity of transition curves. (06 Marks)
- b. What is grade compensation on curves? If the ruling gradient is 1 in 150 on a particular section of B.G track and at the same time a curve of 4° is situate on this ruling gradient, what should be the allowable ruling gradient? (06 Marks)
- c. A 5° curve diverges from a 3° main curve in the layout of a B.G yard. If the speed of the branch line is restricted to 35 kmph, find out the maximum permissible speed on the main line. Allowable cant deficiency is 7.6 cm. (08 Marks)

- 4 a. Draw a neat sketch 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. List the types of yards in railways. Explain marshalling yards and the different types of marshalling yards. (08 Marks)

PART – B

- 5 a. Explain the characteristics of an aircraft which affects the planning and design of airports. (06 Marks)
- b. Explain the factors that influence the site selection for an airport. (06 Marks)
- c. Draw a neat sketch of an airport with single runway and explain the functions of the component parts. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 6 a. Explain the various factors which affect the location of exit taxiways. (06 Marks)
- b. A taxiway is to be designed for operating Boeing 707-320, which has the following characteristics. Determine the turning radius of the taxiway.
Wheel base = 17.7 m
Tread of main loading gear = 6.62 m
Turning speed = 40 kmph
Coefficient of friction between tyre and pavement surface = 0.13. (06 Marks)
- c. The length of runway under standard conditions is 1700 m. The airport site is at an elevation of 260 m. Its reference temperature is 32°C. If the runway is to be constructed with an effective gradient of 0.20 percent, determine the corrected runway length. (08 Marks)
- 7 a. Write short notes on :
i) Tunnel lining
ii) Tunnel drainage. (08 Marks)
- b. Explain with a neat sketch, the operation involved in needle beam method of tunneling in soil. (06 Marks)
- c. What is the necessity for ventilation in tunnels? Explain the methods of tunnel ventilation. (06 Marks)
- 8 a. Define the term harbour. Explain various classifications of harbours. (06 Marks)
- b. What are the factors to be considered while selecting a site for a harbour? (06 Marks)
- c. What is a breakwater? Explain the mound type of breakwater with a neat sketch. (08 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2015
Geotechnical Engineering - II

Time: 3 hrs.

Max. Marks:100

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

PART - A

- 1
 - a. Explain the wash boring method, with the help of a neat sketch. (08 Marks)
 - b. With a neat sketch, explain the seismic refraction method. (06 Marks)
 - c. Establish the location of ground water in a clayey strata, water in bore was bailed out to a depth of 10.67m below ground surface and rise of water recorded at 24 hour interval. $h_1 = 64.0\text{cm}$, $h_2 = 57.9\text{cm}$ and $h_3 = 51.8\text{cm}$. (06 Marks)
- 2
 - a. Derive an expression for vertical pressure under a uniformly loaded circular area along vertical symmetrical axis. (10 Marks)
 - b. Define isobar. Construct an isobar for a vertical stress of 40kN/m^2 when ground surface is subjected to a concentrated load of 1000kN. (10 Marks)
- 3
 - a. What are the assumptions made in deriving Laplace equation? (04 Marks)
 - b. Describe the Casagrande's method to locate the phreatic line in a homogeneous earth dam with a horizontal filter at its toe. (10 Marks)
 - c. A 3m thick soil stratum has coefficient of permeability of $3 \times 10^{-7}\text{m/sec}$. A separate test gave porosity of 40% and bulk unit weight of 21kN/m^3 at a water content of 31%. Determine the head at which upward seepage will cause quick sand condition. What is the flow required to maintain critical condition? (06 Marks)
- 4
 - a. Compare Rankine's and Coulomb's theory of earth pressure. (04 Marks)
 - b. Explain how do you determine Active Earth pressure by Rebhann's method. (10 Marks)
 - c. A retaining wall, 6m high, retains dry sand with an angle of friction of 30° and unit weight of 16.2kN/m^3 . Determine the earth pressure at rest. If the water table rises to the top of the wall, determine the increase in the thrust on the wall. Assume the submerged unit weight of sand is 10kN/m^3 . (06 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 same in case of sudden drawdown, if Taylor's stability number for this condition is 0.137. (08 Marks)
- 6
 - a. List the assumptions made in Terzaghi analysis. (04 Marks)
 - b. Discuss the effect of ground water table on bearing capacity of soils. (06 Marks)
 - c. A strip footing 2m wide carries a load intensity of 400kN/m^2 at a depth of 1.2m in sand. The r_{sat} of sand is 19.5kN/m^3 and unit weight above water table is 16.8kN/m^3 , $\phi = 35^\circ$, using Targahi's analysis determine Factor of safety with respect to shear failure for the following locations of water table. Take $N_q = 41.4$, $N_r = 42.4$. (10 Marks)
 - i) Water table 4m below ground level
 - ii) Water table 1.2m below ground level.

- 7 a. What are the different types of settlement of footings? Explain. (08 Marks)
- b. Determine the elastic settlement of footing $3\text{m} \times 3\text{m}$ resting on a sandy soil. Given $E_s = 45000\text{kN/m}^2$ and $\mu = 0.3$, Footing carries a load of 2000kN . Take $I_w = 0.82$. (06 Marks)
- c. A normally consolidated clay layer is 18m thick. Natural water content is 45% , saturated unit weight is 18kN/m^3 , specific gravity is 2.7 and liquid limit is 63% . The vertical stress increment at the centre of clay layer due to foundation load is 9kN/m^2 . Determine the settlement. (06 Marks)
- 8 a. Explain the factors influencing the selection of depth of foundation. (06 Marks)
- b. Discuss the proportioning of combined Trapezoidal footings. (08 Marks)
- c. Explain determination of the pile load capacity in detail. (06 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2015
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs.

Max. Marks:100

Note: 1. Answer any TWO full questions from Part-A and ONE full question from Part-B.
2. Any missing data may be suitably assumed.

PART – A

- 1 a. Explain the different storage zones of a reservoir with the help of diagram. (05 Marks)
b. Briefly explain the procedure for determining the storage capacity and yield of a reservoir using mass curve. (10 Marks)
- 2 a. Explain the different types of force acting on a gravity dam. (07 Marks)
b. Briefly explain elementary profile of a gravity dam. (08 Marks)
- 3 a. Explain the design criteria for earthen dam. (07 Marks)
b. Explain the causes for failure of earthen dam. (08 Marks)

PART – B

- 4 Design a surplus weir with stepped apron of a tank forming part of a chain of tanks with the following details: (25 Marks)

Combined catchment area	= 24.5 km ²
Intercepted catchment area	= 20.4 km ²
Maximum water level	= +123.75
Full tank level	= +123.00
Ground level @ proposed side	= +122.00
Ground level below proposed weir upto a reach of 5m (Fall)	= +121.00
Tank bund level (TBL)	= +125.50
Top width of tank bund	= 2.0 m
Side slope of bund on either side	= 2:1
Level of hard strata	= +120.50
Ryve's coefficient for combined catchment	= 9
Ryve's coefficient for intercepted catchment	= 1.6
Take hydraulic gradient	= 1:5

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)

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.

5 Design a canal drop of 2m with following data:

(25 Marks)

Particulars	U/S canal	D/S canal
Full supply discharge	4 cumecs	4 cumecs
Bed width	6m	6m
Bed level	+21.00	+19.00
Full supply depth	1.5m	1.5m
Full Simply Level (FSL)	+22.50	+20.50
Top width of bank	2m	2m
Top Bank Level (TBL)	+23.50	+21.50

Side slopes = 1:1 (cutting)

$1\frac{1}{2} : 1$ (filling)

Half supply depth = 1m

Ground level at site = +21.50

Good soil available for foundation = +19.50.

Draw

- Half plan at foundation and half plan at top.
- Longitudinal section.
- Cross section showing half elevation and half section.

(20 Marks)

(15 Marks)

(10 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2015

Ground Water Hydrology

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Define the terms :
 - i) Juvenile water
 - ii) Vadose water
 - iii) Connate water
 - iv) Meteoric water. (08 Marks)
- b. Explain confined and unconfined aquifers. (06 Marks)
- c. Explain the vertical distribution of sub surface water. (06 Marks)

- 2 a. Define porosity and specific yield, state the relationship between them. (04 Marks)
- b. Explain storage coefficient with a neat diagram, and derive an expression for storage co-efficient. (06 Marks)
- c. An artesian aquifer 20 m thickness has a porosity of 20% and bulk modulus of compression 10^8 N/m^2 . Estimate storage coefficient of the aquifer. What fraction of this is attributable to the expansibility of water? (10 Marks)

- 3 a. Explain the following :
 - i) Darcy's law
 - ii) Transmissibility coefficient
 - iii) Permeability
 - iv) Safe yield. (12 Marks)
- b. Explain the land subsidence due to ground water with draws. (05 Marks)
- c. Explain the term Intrinsic permeability. (03 Marks)

- 4 a. Derive an expression for discharge from a well of steady radial flow in an unconfined aquifer. (12 Marks)
- b. A well of 0.5m diameter penetrates fully into a confined aquifer of thickness 20m and hydraulic conductivity $8.2 \times 10^{-4} \text{ m/s}$. What is the maximum yield expected from this well if the drawdown in the well is not to exceed 3m. The radius of influence may be taken as 260m. (08 Marks)

PART – B

- 5 a. Calculate the discharge of tube well for the following data :

Diameter of the well	= 15 cm	
Draw down	= 4 m	
Length of tube well strainer below draw down	= 10 m	
Coefficient of permeability of aquifer	= 0.05 cm/sec	
Radius of circle of inflow	= 200 m.	(10 Marks)
- b. Explain Jacob method of pumping test to determine aquifer constant S and T. (10 Marks)

- 6 a. Explain the method of construction of dug well with neat sketches. (10 Marks)
b. Explain how the yield of an open well can be determined. (10 Marks)
- 7 a. Explain the Wenner and Schlumberger method of ground water exploration. (10 Marks)
b. A horizontal bed of SSt lies beneath the shale over burden in a seismic refraction conducted over horizontal surface of the shade. The direct wave at refracted wave lie simultaneously it can be detected 3600' away from shot point. If the velocity of wave in SSt bed is of 20,000'/sec and the travel time is 0.40 sec. Find the thickness of the overburden. (10 Marks)
- 8 a. Explain different methods of ground water recharging. (08 Marks)
b. Write short notes on :
i) Sonic logging
ii) Ground water runoff
iii) Types of strainers. (12 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2015
Rural Water Supply and Sanitation

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**
2. Write neat sketches, wherever necessary.

PART – A

- 1 a. List out the various sources of water that is available on the earth and explain. (10 Marks)
b. How do you protect new wells from contamination? Give step by step procedure. (05 Marks)
c. Write down the drinking water quality standards for the following : (05 Marks)
i) pH ii) Chlorides iii) Nitrates iv) Fluoride and v) Total Hardness.
- 2 a. Comparison between Reciprocating pumps and Centrifugal pumps. (10 Marks)
b. Explain any five disinfecting methods for water. (10 Marks)
- 3 a. What are the main objectives of Rural sanitation in villages? Brief out. (08 Marks)
b. With the aid of neat sketches, describe the following types of latrines : (12 Marks)
i) Pit Privy and ii) Aqua Privy.
- 4 a. Elaborate the composting methods practiced in rural areas on the mixture of night soil and refuse. (10 Marks)
b. How does one can practice Roof – top rain water harvesting? Explain. (10 Marks)

PART – B

- 5 a. Define i) Infection ii) Epidemic. (04 Marks)
b. Explain the Epidemiologic cycle. (06 Marks)
c. What are the types of collection and transportation systems adopted for refuse? Explain. (10 Marks)
- 6 a. Brief out the methods of disposal of refuse in rural areas. (10 Marks)
b. With the aid of neat sketch, write a note on Bio – gas plant. (10 Marks)
- 7 a. Write down and explain the essentials of a milk sanitation. (10 Marks)
b. Mention the types of pasteurizing the milk and describe them. (10 Marks)
- 8 Write short notes on any Four from following :
a. Mosquito related diseases.
b. Deflouridation Technique.
c. Break point chlorination.
d. Trench composting.
e. Advantages and disadvantages of separate system and water carriage system. (20 Marks)

Sixth Semester B.E. Degree Examination, June/July 2015
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. Briefly explain the human factors governing the road user behaviour. (10 Marks)
- b. List and explain the resistances which effect on motion of vehicle. (10 Marks)
- 2 a. Explain the concept of power requirement of vehicle. (10 Marks)
- b. What are the objectives of traffic volume study? (06 Marks)
- c. Write a note on thirtieth highest hourly volume. (04 Marks)
- 3 a. Define PCU. List and explain its characteristics. Also mention recommended IRC values of PCU. (10 Marks)
- b. With a neat sketch explain the concept of origin and destination survey. (10 Marks)
- 4 a. With the help of sketches briefly explain ON – Street parking. (10 Marks)
- b. List and explain the various causes of accidents. (10 Marks)

PART – B

- 5 a. Show the relationship between the variables Q, K and \bar{V}_s . (10 Marks)
- b. A toll booth at the entrance to a bridge can handle 120 Veh/hr the time to process the vehicle being exponentially distributed. The flow is 90 Veh/hr with Poisson arrival pattern. Determine i) The average number of vehicle in the systems. ii) The length of queue. iii) The average time spend by the vehicle in the system. iv) The average time spend by the vehicle in the queue. (10 Marks)
- 6 a. On a motorway, the number of vehicles. Arriving from one direction in successive 10 seconds intervals was counted and recorded in table.

Vehicles arriving in 10 seconds intervals	Frequency
0	11
1	28
2	30
3	18
4	8
5	4
6	1
7 and over	0

Find out the mean rate of arrival and with the help of Poisson distribution and compare the observed frequency. Does the data suggest that arrival pattern can be considered as random?

- (12 Marks)
- b. What are the advantages of simulating techniques? (08 Marks)
- 7 a. List and explain the types of traffic signals. (10 Marks)
- b. Explain any five types of regulatory signs. (10 Marks)
- 8 Write a note on
 - a) Rotary intersection
 - b) Grade separated intersection
 - c) Intelligent transport system
 - d) Street lighting. (20 Marks)