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10CV61

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019

Environmental Engineering - I

Time: 3 hrs.

Max. Marks:100

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

PART - A

- 1 a. Enumerate beneficial uses of water. (04 Marks)
- b. What is meant by per capita demand? Discuss the factors that affect the per capita demand of water. (08 Marks)
- c. Determine the population of a town after three decades for the available census data, using GIM and IIM methods. (08 Marks)

Year	1962	1972	1982	1992	2002
Population	45,000	48,000	54,000	62,000	67,000

- 2 a. Distinguish between infiltration gallery and infiltration well. (06 Marks)
- b. What are intake structures? Explain the factors to be considered while selecting a location for intake structure. (08 Marks)
- c. Briefly explain the Testing of the pipe lines. (06 Marks)
- 3 a. Explain types of Sampling in detail. (04 Marks)
- b. Write the desirable limits and its environmental significance for the following parameters as per BIS standards :
i) pH ii) Total hardness iii) Chloride iv) Fluoride v) Iron. (10 Marks)
- c. In a water treatment plant the pH values of incoming and outgoing waters are 7.2 and 8.4 respectively. Find the average value of pH, assuming linear variation of pH with time. (06 Marks)
- 4 a. With a help of flow diagram, explain briefly the complete sequence of a water treatment plant. (08 Marks)
- b. Determine the quantity of alum required in order to treat 13 MLD of water at a treatment plant. Where 12mg/litre of alum dose is required. Also determine the amount of carbon dioxide gas which will be released per litre of water treated. Assume molecular weight of Al = 26.97, S = 32.066, O = 16, H = 1.008, C = 12.01. (06 Marks)
- c. How you will determine the optimum coagulant dosage in lab using Jar test apparatus? Discuss with sketch. (06 Marks)

PART - B

- 5 a. Explain with the help of a diagram, rapid sand filtration. (10 Marks)
- b. Design 5 slow sand filter beds for the following data for a town having population of 60,000.
Rate of water supply = 120 lpcd ; Rate of Filtration = 180 l/m²/hr ;
Length of each bed = 2.5 times the width.
Consider the maximum daily demand as 1.8 times the average daily demand. Also consider one unit out of 5 units will be kept as stand by unit. (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.

- 6 a. What is meant by disinfection of water? Explain the break point chlorination, with neat sketch. (06 Marks)
- b. Briefly explain Zeolite process of hardness removal. (06 Marks)
- c. A town having population of about 50,000 is to be supplied water at the rate of 150 lpcd. The disinfection of water is to be carried out with bleaching powder containing 30% of active chlorine. If the chlorine dose required for disinfection is 0.3 mg/l. Calculate the quantity of bleaching powder per year. (08 Marks)
- 7 a. What is meant by Defluoridation and Fluoridation? Explain the "Nalagonda technique" of defluoridation. (08 Marks)
- b. Write brief note on significance of taste and colour removal. (06 Marks)
- c. What are the requirements of an ideal distribution system? (06 Marks)
- 8 a. With neat sketch, explain the following :
i) Sluice valves ii) Fire hydrants. (10 Marks)
- b. Explain with neat sketches, the dead end system and grid iron system of layouts of distribution system. (10 Marks)

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10CV63

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019

Transportation Engineering - II

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1
 - a. Draw neatly the cross section of a straight Broad railway track in cutting for a double lane. (06 Marks)
 - b. Mention the requirements of an ideal Permanent way. (06 Marks)
 - c. Define Creep. What are possible cause effects of creep? (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. Calculate the quantity of material required for the construction of B.G track of length 19500m, with rail section 52kg per metre and standard length 13m. Take sleeper density $[n + 4]$. (06 Marks)
 - c. A locomotive on M.G track has three pairs of driving wheels each carrying 20 tones. What maximum load can it pull on level track with curvature of 2^0 at 50 kmph? (06 Marks)
- 3
 - a. Explain the following : i) Ruling gradient ii) Momentum gradient iii) Grade compensation on curve. (06 Marks)
 - b. With usual notation, derive the expression for super elevation for B.G , M.G and N.G track. (06 Marks)
 - c. A 5^0 curve diverges from a 3^0 main curve in the layout of B.G yard. If 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 neat sketch of a left hand turn out and show various parts on it. (06 Marks)
 - b. With a neat sketch, explain the working of a semaphore signal. (08 Marks)
 - c. Write short notes on any two of following :
 - i) Turn table ii) Water column iii) Buffer stops. (06 Marks)

PART – B

- 5
 - a. Explain the factors which influence the airport site selection. (08 Marks)
 - b. Write a brief note on Airport classification. (06 Marks)
 - c. Mention the various assumptions made in basic length of runway. (06 Marks)
- 6
 - a. Explain the various factors which affect the location of Exit taxiway. (08 Marks)
 - b. Design an exist taxiway joining a runway and parallel main taxiway. The total angle of turn 30^0 and the turn off speed is 80 kmph. Draw a neat sketch and show there in all design elements. [Assume $R_1 = 73.1m$ for 80 kmph speed]. (12 Marks)

- 7 a. Explain various shapes of tunnels, with neat sketches. (06 Marks)
b. Mention the objects of tunnel lining. List materials used for lining. (06 Marks)
c. Write short notes on : (08 Marks)
i) Tunnel lining ii) Tunnel drainage.
- 8 a. Explain with neat sketches, the Natural classification of harbours. (06 Marks)
b. What is Break water? Explain with neat sketch, wall break water. (08 Marks)
c. What is Dry dock? Explain the construction and uses of dry dock. (06 Marks)

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10CV64

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Geotechnical Engineering - II

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1** a. State the objectives of Soil exploration programme. (06 Marks)
 b. List the methods used for controlling ground water during excavation and explain the Electro – Osmosis method. (06 Marks)
 c. A Seismic refraction study of an area has given the following data. Determine the seismic velocity for the surface layer and under laying layer. Also determine the thickness of upper layer. (08 Marks)

Distance from Impact point to Geo phone (m)	15	30	60	90	120
Time to receive wave (sec)	0.025	0.05	0.10	0.11	0.12

- 2** a. Explain Equivalent point load method for determining vertical stress at any point within loaded area. (06 Marks)
 b. Distinguish between Boussinesq's and Westergard's theories of stress distribution. (06 Marks)
 c. Calculate the vertical stresses in the soil 3m below the foundation vertically below the 500kN load and 400kN load columns at 6m apart. (08 Marks)
- 3** a. State the assumptions made in the derivation of Laplace equation. (06 Marks)
 b. What is Phreatic line. Explain the Casagrande's method to locate the phreatic line in a homogenous earth dam with a horizontal filter at toe. (08 Marks)
 c. For a homogeneous earthen dam 52m heigh and 2m free board, a flow net constructed with four flow channels and number of potential drops are 25. The dam has a horizontal filter of 40m at its down stream end. Calculate discharge per meter length of dam if the coefficient of permeability of dam material is 3×10^{-3} cm/second. (06 Marks)
- 4** a. Distinguish between Coulomb's Earth Pressure theory and Rankine's Earth Pressure theory. (05 Marks)
 b. Derive the equations for the earth pressure coefficient K_a and K_p by considering backfill with horizontal surface. Use Rankines theory. (05 Marks)
 c. A retaining wall 4m high has a smooth vertical back. The back fill has a horizontal surface in level with top of the wall. The uniform surcharge load of 36kN/m^2 over the backfill unit weight of the backfill is 18kN/m^3 and angle of shearing resistance is 30° and cohesion is zero. Determine the magnitude and point of application of active pressure per meter length of the wall. (10 Marks)

PART – B

- 5 a. State and explain causes and types of failure of slopes. (05 Marks)
b. State and explain different types of slopes and list the assumptions made in slope stability analysis. (05 Marks)
c. Explain Stability of Finite slopes by method of slices. (05 Marks)
d. A 5m deep canal has side slopes of 1:1, the properties of soil are $C = 20\text{kN/m}^2$, $\phi = 10^\circ$, $e = 0.08$ 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. (05 Marks)
- 6 a. State the factors influencing bearing capacity of soil. (04 Marks)
b. Distinguish between General shear failure and Local or Punching shear failure. (04 Marks)
c. Explain Plate load test for determining the ultimate bearing capacity of soil with neat sketch. (06 Marks)
d. A foundation 2.0m square is at 1.2m below ground level in sandy soil with a unit weight of 19.2 kN/m^3 above water table and submerged unit weight of 10.1kN/m^3 . If $C = 0$ and $\phi = 30^\circ$. Find ultimate bearing capacity when i) Water table is much below the base of foundation ii) Water table rises to the base of foundation iii) Water table rises to ground level. Take $N_q = 22$ and $N_r = 20$. (06 Marks)
- 7 a. Explain importance and concept of settlement analysis. (06 Marks)
b. State the factors influencing the settlement of foundation soil. (04 Marks)
c. Determine the consolidation settlement for saturated clay 8m thick underlies a proposed new building. The existing overburden pressure at the centre of clay layer is 300 KPa and load due to a new building increases the pressure by 200KPa. The liquid limit of soil is 75%, Water content of soil is 50% and $G_s = 2.7$. (10 Marks)
- 8 a. State and explain different types of classification of pile foundation. (06 Marks)
b. State the factors influencing the choice of foundation. (04 Marks)
c. Write short notes on Mat foundation. (05 Marks)
d. What is combined footing? Explain different types of combined footing. (05 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Hydraulic Structures and Irrigation Design–Drawing

Time: 4 hrs.

Max. Marks:100

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

PART – A

- 1 a. Explain stepwise procedure for fixing capacity of a reservoir using mass curve method. (07 Marks)
- b. A reservoir has the following data. Find probable use full life of the reservoir. Reservoir capacity = 20 million–m³. Average annual flood inflow = 40 million–m³ volume of annual sediment = 0.060 million–m³. Life of reservoir terminates when 80% of initial capacity is filled up. C/I ratio v/s trap efficiency(η)(%) is as given in table below :

c/I ratio	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
η %	86	92	94	95	96	96.5	97	97	97	97.5

Assume 20% of initial capacity is filled up in first interval. (08 Marks)

- 2 a. Explain different forces acting on a gravity dam. (10 Marks)
- b. With sketch, explain practical profile of a gravity dam. (05 Marks)
- 3 a. Explain construction methods of earth Dam. (05 Marks)
- b. Explain with sketches, different types of failures of earth dam. (10 Marks)

PART – B

- 4 Design the surplus work of tank using following data : (25 Marks)

Combined catchment area	29.5 km ²
Intercepted catchment area	22.8 km ²
Tank Bund Level (TBL)	19.5 m
Top width of bund	2m
GL at proposed site	15.8m
GL below the weir up to a reach of 10 mt (fall)	14.8m
Side slopes of bund on either side	2H : 1V
Hydraulic gradient	1 in 5
MWL (Max water level)	18.3m
FTL (Full Tank Level)	17.5m
Level of hard soil	14.00m
Ryve's coefficient for combined catchment area	9
Ryve's coefficient for intercepted catchment	1.5

Take $C_d = 0.6$ for weir, sp.Gr masonry/concrete as 2.3, make provision to store water up to MWL. The abutments, wing walls, return walls are to be properly designed. The water side faces of abutments, WW and RW can be battered or kept vertical.

Draw to a suitable scale following views :

- a. Cross section across weir. (10 Marks)
- b. Half plan top and half plan at foundation. (20 Marks)
- c. Half elevation and half sectional elevation. (15 Marks)

5 Design a canal drop for following data :

(25 Marks)

Hydraulic particulars	U/s canal	D/s canal
Full supply discharge	4.0 m ³ /s	4.0 m ³ /s
Bed level	10.00m	8.00m
Full supply level	11.50m	9.50m
Bed width	6m	6m
Top of embankment	12.50	10.50
Top width of embankment	2m	2m
Half supply depth	1.0m	–
Full supply depth	1.5m	1.5m

General ground level at the site of work is 10.50mt, good soil for foundation is available at 8.50mt. Take $C_d = 0.7$ for notch and sp.Gr of masonry/concrete = 2.3. Draw to a suitable scale :

- Cross section along the canal. (10 Marks)
- Half plan at top and half plan at foundation. (20 Marks)
- Half elevation and half longitudinal section. (15 Marks)

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10CV666

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. Explain the factors to be considered in the selection of water in formulating a rural water supply project. (06 Marks)
- b. List and explain different types of water borne diseases with precautionary measures to be taken to control the water borne diseases. (08 Marks)
- c. Explain the health significance of the following drinking water quality parameters along with desirable and permissible limits :
 i) Fluoride ii) Chloride iii) Hardness iv) pH. (06 Marks)
- 2 a. Enumerate the different methods of disinfection of water and explain the process disinfection of water by chlorination and its advantages. (08 Marks)
- b. With neat sketch, explain Nalagonda technique for removal of fluoride. (06 Marks)
- c. Explain the lime soda process of hardness removal with necessary chemical reactions. (06 Marks)
- 3 a. What are main objectives of Rural sanitation in villages? Explain in brief. (08 Marks)
- b. With the aid of neat sketch, explain following types of latrines :
 i) Pit Privy ii) Aqua Privy. (12 Marks)
- 4 a. Explain the methods of rain water harvesting in rural areas with its objectives. (10 Marks)
- b. Explain the disposal of storm water and sullage disposal in rural areas. (10 Marks)

PART – B

- 5 a. Define Communicable diseases and give their classification. (10 Marks)
- b. Define : i) Infection ii) Epidemic. (04 Marks)
- c. With neat sketch, discuss "Epidemiologic cycle of the control of communicable diseases". (06 Marks)
- 6 a. Explain briefly, two major collection and transport of refuse :
 i) Hauled Container System (HCS) ii) Stationary Container System (SCS). (10 Marks)
- b. List and explain in brief refuse (or) garbage disposal methods. (10 Marks)
- 7 a. Define Pasteurization. Explain the methods of Pasteurization, with neat sketches. (12 Marks)
- b. Explain briefly on :
 i) Cattle borne diseases ii) Cow shed planning. (08 Marks)
- 8 a. Explain the life cycle of a mosquito, with neat sketch. (06 Marks)
- b. Explain in brief diseases transmitted by mosquitoes. (08 Marks)
- c. Explain various Fly control measures. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Traffic Engineering

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1
 - a. Explain objectives and scope of traffic engineering. (06 Marks)
 - b. Briefly explain various road user characteristics and state how it affects driving conditions. (08 Marks)
 - c. A vehicle moving at 50 kmph was stopped by applying brake and the length of skid mark was 14.5m. If the average skid resistance of the pavement is known to be 0.70, determine the brake efficiency of the test vehicle. (06 Marks)
- 2
 - a. Discuss briefly the static and dynamic characteristics of vehicle influencing the traffic. (06Marks)
 - b. Explain the various forces that offer resistances to the motion of a vehicle. (06 Marks)
 - c. A passenger car weighing 2500kg is required to accelerate at a rate of 3.5m/sec^2 in the first gear from a speed of 10 kmph to 20 kmph. The gradient is +1.2% and the road has a black topped surface, with a frictional co-efficient of 0.02. The frontal projectional area of the car is 2.5m^2 with $C_a = 0.37$. The car has tyres of radius 0.35m with a $\lambda = 0.935$. The rear axle gear ratio is 3.85 : 1 and first gear ratio of 2.98 : 1. Assume transmission efficiency of 0.9 and hence calculate engine horse power needed. (08 Marks)
- 3
 - a. Discuss various traffic studies. What are the objectives of carrying out traffic volume studies? (08 Marks)
 - b. Explain the procedure to determine spot speed using enoscope. (04 Marks)
 - c. Grouping samples of speed, a sample is presented in the given table, in which, there are a total of 363 observations grouped into class intervals of 4 kmph. Calculate :
i) Design speed ii) Upper speed limit iii) Lower speed limit iv) Medium speed limit v) Arithmetic mean speed.

Midpoint of speed, kmph	28	32	36	40	44	48	52	56	60	64
No. of vehicles	9	74	79	75	66	33	17	6	1	3

(08 Marks)

- 4
 - a. Write a note on :
i) On-street parking
ii) Off-street parking. (06 Marks)
 - b. Explain the objectives of O-D studies. (04 Marks)
 - c. A vehicle of wt. 3 T skids through a distance equal to 40m, before colliding with another parked vehicle of weight 3T. After collision, both the vehicles skid through a distance equal to 16m, before stopping. Determine the speeds of vehicles assuming $f = 0.4$.
i) After collision ii) at collision iii) before collision. (10 Marks)

PART – B

- 5 a. Establish the relationship between speed, flow and concentration using green shield theory. (10 Marks)
- b. A toll booth at the entrance to a bridge can handle 120 vehicles/hour. The time to process the vehicles being exponentially distributed. The flow is 90 veh/hr with a Poisson's arrival pattern. Determine :
- Traffic intensity
 - Average length of que
 - Expected number of vehicles in the system
 - Average time spent by the vehicle in the system
 - Average time spent by the vehicle in the que. (10 Marks)
- 6 a. Explain the following :
- Chi square test
 - Simulation technique. (10 Marks)
- b. The spot speed at a particular location are normally distributed with a mean of 51.7 kmph and a standard deviation of 8.3 kmph. What is the probability that :
- The speed exceed 65 kmph.
 - Speeds lie between 40 kmph and 70 kmph
 - 85th percentile speed
- The values from normal distribution tables are :
 $\phi(1.6) = 0.952$, $\phi(2.21) = 0.9864$, $\phi(1.41) = 0.9207$, $\phi(z) = 0.85$ for which $z = 1.04$. (10 Marks)
- 7 a. Explain any three warning and informatory signs with neat sketches as per IRC standards. (10 Marks)
- b. The average normal flow of traffic on cross roads A and B during design period are 400 and 250 pcu/hr respectively. The saturation flow values on these roads are estimated as 1250 and 1000 pcu/hr. The all red time required for pedestrian crossing is 12 seconds. Design the two phase signal by Webster's approach and draw the phase diagram. (10 Marks)
- 8 a. With a neat sketch, explain the various elements in a traffic rotary. (10 Marks)
- b. Explain the importance and applications of ITS in traffic engineering. (10 Marks)
