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10CV61

Sixth Semester B.E. Degree Examination, June/July 2019
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. ***Missing data may be suitably assumed.***

PART – A

1 a. Discuss the necessity of having a planned water supply scheme for a city. **(04 Marks)**
b. List and discuss the factors affecting per capita demand. **(10 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 47000 by geometric increase method. **(06 Marks)**

2 a. Briefly explain the surface and groundwater sources with respect to quality and quantity. **(06 Marks)**
b. With the help of neat sketch, explain twin well type of a river intake. **(08 Marks)**
c. Briefly explain the factors affecting the selection of a particular type of pump. **(06 Marks)**

3 a. Write the significance and BIS for the following water quality parameters:
i) p^H ii) Nitrate iii) Fluoride iv) Iron v) E-Col **(10 Marks)**
b. Briefly explain the water borne diseases and their control. **(05 Marks)**
c. Briefly explain the methods of sampling of water for examination. **(05 Marks)**

4 a. With the help of flowchart, write the functions of various units of water treatment plant. **(08 Marks)**
b. Briefly explain the theory of sedimentation. **(06 Marks)**
c. A water work has o purify the water for a town whose daily demand in 9×10^6 lit/day. Design the suitable rectangular sedimentation tank of the water works filled with mechanical sludge remover. Assume the velocity of flow in the sedimentation tank as 22 cm/minute and the detention time as 8 hours. **(06 Marks)**

PART – B

5 a. Explain in detail, the mechanism involved in water filtration. **(06 Marks)**
b. With the help of neat sketch, explain rapid sand filter. **(08 Marks)**
c. Design suitable dimensions for a rapid sand filter to treat 4 MLD of water supply and assume that 4% of filtered water is required for washing of filter every day. **(06 Marks)**

6 a. What is meant by disinfection of water? Discuss the theory of disinfection by chlorine. **(06 Marks)**
b. Briefly explain the different methods of disinfection. **(08 Marks)**
c. With the relevant chemical equation, explain the zeolite process of water softening. **(06 Marks)**

7 a. What is meant by Fluoridation and Defluoridation? With the help of line diagram, explain 'Nalaganda Technic' of defluoridation. **(08 Marks)**
b. List the various layouts used in water distribution system. Discuss in detail 'dead-end' system. **(06 Marks)**
c. Mention the system of water supply and write the limitations of intermittent system. **(06 Marks)**

8 Write short notes on: **(20 Marks)**
a. Fire hydrants b. Water meters c. Check valve d. Pressure release valve

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10CV62

Sixth Semester B.E. Degree Examination, June/July 2019

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-456-2000 is permitted.***
3. ***Missing data may be assumed.***

PART – A

1 A two way slab for a hall of inner dimension 3m × 5m has following details:
Slab is discontinuous on all four edges
Thickness of slab = 150 mm, thickness of wall = 230 mm
Steel in short span = 10 mm dia @ 150 mm c/c
Steel in longer span = 10 mm dia @ 175 mm c/c
Torsional steel = 10 mm dia @ 160 mm c/c
Grade of concrete = M20
Grade of steel = Fe 415.
Draw to a suitable scale the following:
a. Plan showing the details of reinforcement
b. C/S of slab at mid span along shorter span and longer span **(20 Marks)**

2 A rectangular RCC column and footing has the following details:
Dimensions of column = 230 × 450 mm
Size of footing = 2400 × 1800 mm
Depth of footing at the junction = 500 mm
Depth of footing edge = 300 mm
Depth of foundation below ground level = 1500 mm
Reinforcement details:
Column: Longitudinal reinforcement = 8 # 16 mm ϕ
Lateral ties = 8 mm dia @ 180 mm c/c
Footing: Shorter span = 12 mm ϕ @ 100 mm c/c
Longer span = 12 mm ϕ @ 125 mm c/c
Use M20 concrete and Fe415 steel.
Draw the suitable scale, the following:
a. Sectional plan of column and footing
b. Sectional elevation of column and footing
c. Prepare the bar bending schedule. **(20 Marks)**

3 A Dog legged staircase has following data:
i) Hall dimensions = 5.5 × 2.6 m
ii) Vertical distance between the floor = 3.3 m
iii) Thickness of waist slab = 180 mm
iv) Width of stair = 1.25 m
v) Step dimension – Tread = 300 mm, Rise = 150 mm

vi) Wall thickness = 0.23 m

vii) Reinforcement details

Main bars = 12 mm ϕ @ 150 mm c/c

Distribution bars = 8 mm ϕ @ 170 mm c/c

Use M20 concrete and Fe415 steel.

Draw to a suitable scale:

a. Plan of staircase
b. Sectional elevation
c. Bar bending schedule **(20 Marks)**

PART – B

4 Design a combined footing for two column size 400 × 400 mm and 600 × 600 mm carry loads of 600 kN and 1000 kN respectively. The c/c distance of the column is 4m. Take SBC of soil as 150 kN/m^2. Use M20 concrete and Fe415 steel.

Draw the following to the suitable scale:

a. Sectional elevation
b. Plan of base slab
c. C/S of different places to show the minimum details of shear reinforcement. **(60 Marks)**

5 Design a cantilever retaining wall to retain earth embankment 5m high above ground level. The density of earth is 18 kN/m^3 and its angle of repose is 30°. The embankment is horizontal at the top. The safe bearing capacity of the soil is 200 kN/m^2 and the coefficient of friction between soil and concrete is 0.5. Adopt M20 concrete and Fe415 steel.

Draw to a suitable scale:

a. Cross section of retaining wall
b. Longitudinal section
c. Sectional plan at top and bottom showing details of reinforcement in base slab. **(60 Marks)**

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10CV63

Sixth Semester B.E. Degree Examination, June/July 2019

Transportation Engineering – II

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Draw a neat cross section of a B.G. track in cutting for double line on a straight track and indicate the important dimensions. **(06 Marks)**

b. Define creep of rails. Explain the method of measurement of creep. **(06 Marks)**

c. Briefly explain the methods of welding of rails. Indicate the suitability of each. **(08 Marks)**

2 a. Write a brief note on Pandrol clip. **(06 Marks)**

b. Write equations for tractive resistance due to "starting" and "acceleration". Explain the terms in the equations. What would be the gradient for a B.G, track when the grade resistance together with curve resistance due to a curve of 3° shall be equal to the resistance due to ruling gradient of 1 in 100? **(06 Marks)**

c. What is meant by "crib ballast", "box ballast" and "ballast cushion"? Explain the functions of ballast. **(08 Marks)**

3 a. Explain ruling gradient and momentum gradient.
If the ruling gradient is 1 in 150 on a particular section of M.G track and at the same time a curve of 4° is situated on the gradient, what should be the allowable gradient? **(06 Marks)**

b. What is negative cant? For an unsymmetrical split, explain the method of determining the allowable speed on main track when speed on branch track is given. **(06 Marks)**

c. Find the length of transition curve on a B.G. track using the following data:
Maximum speed = 80 kmph
Cant provided = 75 mm
Rate of change of radial acceleration = 0.3 m/s^3
Radius of curve = 350 m. **(08 Marks)**

4 a. With the help of suitable diagram(s), explain "Switch angle", "heel divergence", "throw of switch" and "crossing number". **(06 Marks)**

b. Calculate the elements of a B.G. turnout using the following data:
Number of crossing = 12
Heel divergence = 133 mm
Switch angle = 1°8′
Show the elements on the diagram. **(06 Marks)**

c. With a neat sketch, explain (i) turn table (ii) shunting signal. **(08 Marks)**

PART – B

5 a. Sketch the layout of an airport and indicate the components. Explain the functions of the components. **(06 Marks)**

b. What is wind rose? With the diagram of any one type of wind rose, explain the method of getting the best orientation for runway. **(06 Marks)**

c. Briefly explain the various aircraft characteristics that affect the planning and design of airports. **(08 Marks)**

6 a. Briefly explain the various runway geometrics, as per ICAD. **(06 Marks)**

b. Design an exit taxiway which joins a runway and a main parallel taxiway. Total angle of turn = 40°, turn off speed = 65 kmph. **(06 Marks)**

c. Define basic runway length. Explain the various corrections (with equations) to be applied for the basic runway length. **(08 Marks)**

7 a. What are the advantages and disadvantages of tunnels? **(06 Marks)**

b. The centre line of a tunnel is represented by two plumb lines C and D, 4 m apart, hanging vertically on a shaft, the whole circle bearings of line CD being 80°40′15″. A theodolite is set up underground at a point A, distant 3.902 m and roughly east of nearer plumb line D and the observed value of the angle CAD is found to be 16′12″. Calculate bearing of the line CA and the perpendicular distance of A from the centre line of the tunnel. **(06 Marks)**

c. Explain liner plate method of tunneling. **(08 Marks)**

8 a. How are harbours classified based on their utility and situation? What are the requirements of commercial harbor? **(06 Marks)**

b. Write a brief note on tetrapods. **(06 Marks)**

c. Write plan and enlarged cross section of dry dock. Briefly explain. **(08 Marks)**

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10CV64

Sixth Semester B.E. Degree Examination, June/July 2019
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. Discuss the objectives of dewatering. List the different methods of dewatering and explain any one of them with neat sketch. **(10 Marks)**

b. By conducting a Seismic refraction study the following readings were obtained :

Time (sec)	0.1	0.2	0.3	0.4	0.45	0.50	0.55
Distance (M)	40	80	120	160	200	240	280

Geophones are placed at a spacing of 40m in a straight line and the time taken for the last wave to be received at each geophone is given , what is the velocities of wave in soil layers? What is the thickness of the top stratum? **(10 Marks)**

2 a. Explain the concept , procedure of construction and advantages of Newmark chart. **(10 Marks)**

b. A rectangular footing 2.4m × 2.0 carries a uniformly distributed load of 320 kN/m^2. Find the intensity of vertical pressure at a depth of 4.2m below the centre of the footing using Boussinesq equivalent point load method **(10 Marks)**

3 a. Explain with neat sketch a method of locating the phreatic line in a homogeneous earth dam with horizontal filter. **(08 Marks)**

b. A concrete dam fig. Q3(b) 17.5m base retains water to a level of 11.0m on the upstream. The water level on the downstream is 2.0m. The impervious stratum is 10.0m below the dam. The coefficient of permeability K = 1 × 10^{-6}m/sec. If dam is 50m long compute total quantity of seepage flow per day below the dam. Also compute seepage pressure at point P, 5m below the center of the dam. **(12 Marks)**

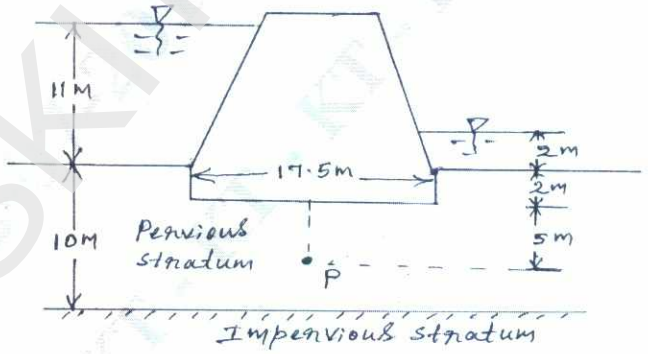

Fig.Q3(b)

4 a. Explain Rebhann's graphical method for determining active earth pressure on the basis of Coulomb's theory. **(08 Marks)**

b. A retaining wall of height 10m supports cohesionless soil with following properties : G = 2.65 ; e = 0.65 and $\phi = 30^0$. The water table lies at 3m depth. The surface of back fill is horizontal and carries uniform surcharge of intensity 14kN/m^2. Determine total active earth pressure and its point of application. Also draw lateral active earth pressure distribution diagram. **(12 Marks)**

PART - B

5 a. Discuss the stability of finite slope by Swedish method of slices for a cohesive frictional soil. **(06 Marks)**

b. Explain the Fellineous method for stability analysis of slopes. **(06 Marks)**

c. An embankment is to be constructed with a soil having $C = 20kN/m^2$; $\phi = 10^0$ and $\gamma = 19kN/m^3$. The desired factor of safety with respect to cohesion as well as friction is 1.5. Determine

i) Safe height of the desired slope if slope is 2H to 1V.

ii) Safe angle of slope if the desired height is 15. For $\phi = 10^0$ stability numbers are as follows : **(08 Marks)**

Stability No.	0.04	0.08
Slope angle	20^0	30^0

6 a. List the factors influencing bearing capacity of soil. **(04 Marks)**

b. Explain standard penetration test and its corrections. **(08 Marks)**

c. A strip footing 2m wide carries a load intensity of 400 KPa at a depth of 1.2m in sand. The saturated unit weight of sand is 19.5 kN/m^3 and unit weight above water table is 16.8kN/m^3. If $C = 0$ and $\phi = 35^0$, determine the factor of safety with respect to shear failure for the following locations of water table.

i) Water table is 4m below ground level.

ii) Water table is 1.2m below ground level. **(08 Marks)**

7 a. Write a note on settlement of footings. **(10 Marks)**

b. A saturated clay 8m thick underlies a proposed new building. The existing overburden pressure at the centre of clay length is 300KPa and load due to a new building increases the pressure by 200 KPa. The liquid limit of the soil is 75%. Water content of soil is 50% and the specific gravity of soil is 2.7. Estimate consolidation settlement. **(10 Marks)**

8 a. Explain the factors affecting the choice of foundation. **(06 Marks)**

b. Discuss the proportioning of isolated footing. **(06 Marks)**

c. Explain determination of the pile load capacity. **(08 Marks)**

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10CV65

Sixth Semester B.E. Degree Examination, June/July 2019
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs. Max. Marks:100

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

PART – A

1 a. Explain different storage zones of a reservoir. **(04 Marks)**

b. Write methods used for control of silting of reservoir. **(04 Marks)**

c. The following information is available regarding the relationship between trap efficiency and capacity inflow ratio for a reservoir:

Capacity/inflow ratio	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Trap efficiency (%)	83	93	95	95.5	96	96.5	97	97.2	97.3	97.5

Find the probable life of the reservoir with an initial reservoir capacity of 30 million cubic meter. If the annual flood inflow is 60 million cubic metre and the average annual sediment inflow is 3600000kN. The sp. weight of sediment is 12kN/m^3. Assume the usefull life of reservoir will terminate when 80% of initial capacity is filled with sediment. **(07 Marks)**

2 a. Define gravity dam. Explain the various forces acting on gravity dam with the help of neat sketch. **(07 Marks)**

b. Determine the maximum and minimum vertical stresses to which the foundation of the dam will be subjected from the following data:
Total overturning moment about toe $\sum M_O = 1.3 \times 10^6$ kN-m
Total resisting moment about toe $\sum M_R = 2.7 \times 10^6$ kN-m
Total vertical forces $\sum V = 56000$kN
Base width of the dam – 60.0m
Slope of d/s face 1H:1V
Also calculate the maximum principal stress at the toe. Neglect tail water depth. **(08 Marks)**

3 a. Explain different types of earthen dams with neat sketches. **(07 Marks)**

b. Explain the causes for failure of earthen dam. **(08 Marks)**

PART – B

4 Design a tank surplus weir for a major tank connected with series of tanks.
Field data:
Combined catchment area of group of tanks : 39.0 km^2
Intercepted catchment area : 27.3 km^2
General ground level at proposed site : +35.0m
Level at which good foundation soil is available : +33.0m
Slope at which proposed surplus weir works from its centerline reaches +34.0m in a distance of 10m
Construction details:
Full tank level: +36.50m
Maximum water level : +37.50m
Tank bund level : +39.00m
Top width of bund : 2.5m
Side slopes : 2:1

Other details:

Make provisions to store upto MWL. Design proper abutment, wing walls and return walls. Assume hydraulic gradient of 1 in 5 and Ryves constant = 9, modified Ryves coefficient fn intercepted catchment area = 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 **(12 Marks)**

c. Cross section across weir. **(13 Marks)**

5 Design a canal drop (notch type) for the following data: **(25 Marks)**

Particulars	u/s	D/s
Full supply discharge	6 m^3/sec	6 m^3/sec
Bed level	+52.0	+50.0
Full supply level	+53.5	+51.5
Bed width	8m	8m
Top level of embankment	+54.5	+52.5
Average ground level	+53.0	+51.0
Top width of embankment	2.0	2.0

Hard soil available at +50.0

Side slopes – in cutting 1:1

In embankment 1.5:1

Draw to a suitable scale:

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

b. Half elevation and half longitudinal section. **(12 Marks)**

c. Cross section along the canal. **(13 Marks)**

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10CV666

Sixth Semester B.E. Degree Examination, June/July 2019
Rural Water Supply and Sanitation

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are water born diseases? Explain them with classification and examples, Also mention the causative organism. **(10 Marks)**

b. Explain how well water is protected in rural areas. **(05 Marks)**

c. What are the permissible and desirable limits of the following water parameters?
i) p^H ii) Chlorides iii) Nitrates iv) Fluorides v) Total hardness. **(05 Marks)**

2 a. Explain the following water supply systems used in rural areas with their disadvantages.
i) BWS ii) MWS iii) PWS. **(10 Marks)**

b. Define defluoridation. Explain any two methods of defluoridation. **(10 Marks)**

3 With neat sketches explain the following :
i) Aqua privy ii) Soak pit iii) Septic Tank iv) water closet (WC). **(20 Marks)**

4 a. What is rain water harvesting? Explain the any two methods of rain water harvesting with the aid of neat sketches. **(10 Marks)**

b. Define sullage. Explain the methods used for disposal of storm water and sullage in rural areas. **(10 Marks)**

PART – B

5 a. Explain the different modes of transmission of communicable diseases. **(10 Marks)**

b. Explain the general methods adopted for control of communicable deseases. **(10 Marks)**

6 a. With neat sketch explain Banganlore method of composting and Indore method of composting. **(10 Marks)**

b. With neat sketch explain the construction and working of biogas plant. **(10 Marks)**

7 a. What is pasteurization? Explain essential requirements of milk sanitation. **(10 Marks)**

b. Explain the following milk quality tests.
i) Bulk tank milk test ii) Individual cow test. **(10 Marks)**

8 a. With neat sketches, explain the life cycle of a house fly. How is fly control carried out. **(10 Marks)**

b. Discuss the various diseases transmitted by mosquitos. **(10 Marks)**

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10CV667

Sixth Semester B.E. Degree Examination, June/July 2019
Traffic Engineering

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of statistical tables permitted.

PART – A

1 a. Define traffic engineering. Explain briefly the objectives and scope of traffic engineering. **(08 Marks)**

b. A vehicle moving at 40 kmph speed was stopped by applying the brakes and the length of skid mark was 12.2m. If the average skid resistance of the pavement is known to be 0.70, determine the brake efficiency of the test vehicle. **(08 Marks)**

c. Explain PIEV theory. **(04 Marks)**

2 a. Briefly explain human factors governing the road user characteristics. **(06 Marks)**

b. Explain various resistances offered during motion of vehicle with relevant equations. **(06 Marks)**

c. An Ambbassadar car travelling at a speed of 60kmph on a level WBM road in good condition is seuddenly allowed to coast by switching off the engine and putting the gear in neutral. What is the deceleration caused? Take weight of car = 1365kg, f = 0.025, C_a = 0.39, A = 2.15m^2. **(08 Marks)**

3 a. Mention the objectives of accident studies. Also mention the various causes of accidents. **(10 Marks)**

b. Spot speed studies were carried out at a certain stretch of a highway and the consolidated data collected are given below. Determine :
i. The upper and lower values of speed limits for regulation of mixed traffic flow
ii. The design speed for checking the geometric design elements of the highway.

Speed range kmph	No. of vehicles observed
0 to 10	12
10 to 20	18
20 to 30	68
30 to 40	89
40 to 50	204
50 to 60	255
60 to 70	119
70 to 80	43
80 to 90	33
90 to 100	9

(10 Marks)

4 a. Define PCU. What are the different factors affecting PCU? List the IRC recommended values for different vehicles. **(08 Marks)**

b. Two vehicles A and B approaching at right angles. A form west and B form south, collide with each other. After collision, vehicle A skids on a direction 50° North of west and vehicle B. 60° East of North. The initial skid distances of the vehicle A and B are 38 and 20m respectively before collision. The skid distances after collision are 15 and 36m respectively. If the weights of vehicles B and A are 6 and 4.0 tonnes, calculate the original speed of the vehicles. The average skid resistance of the pavement is found to be 0.55. **(12 Marks)**

PART – B

5 a. Form Greenshield's theory derive the relationship between speed, flow and density. **(06 Marks)**

b. The off-beak traffic flow arriving at random at toll booth facility is 90veh/hr and the peak flow is 180 veh/hr. The service rate, exponentially distributed at the booth is 3.5 per minute. What is the average number of customers in the queue for each flow? **(06 Marks)**

c. The speed and concentration of vehicles in a traffic stream were observed and the following data were obtained. Find the regression equation for determining the speed from concentration.

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

(08 Marks)

6 a. Write a short note on :

i. Traffic forecasting

ii. SIMULATION techniques **(10 Marks)**

b. The data given below shows the occupancy of parking lot consisting of 50 spaces. The count was taken as 15 minute interval during the 4 hours duration on 6 week days. Find by inspection whether the number of vacant spaces during any count follows a Poisson distribution.

Occupancy of parking spaces	50	49	48	47	46	45	44	43	42	41	≤ 40
Frequency	6	15	21	20	15	10	5	2	1	1	0

(10 Marks)

7 a. With the help of neat sketch, explain elements of a traffic rotary. **(06 Marks)**

b Mention different types of traffic signal system. Explain any one of them. **(06 Marks)**

c. The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU/hr, the saturation flow values on these roads are estimated as 1250 and 1000 PCU/hr respectively. The all-red time required for pedestrian crossing is 12 seconds. Design two phase traffic signal by Webster's method. **(08 Marks)**

8 Write short notes on the following :

a. ITS

b. MOVING CAR observer method

c. Mandatory signs

d. Street lighting. **(20 Marks)**

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