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10CV61

Sixth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Environmental Engineering – I

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Define Intake and explain various factors influencing the selection of a site for intake. (06 Marks)
 b. Explain a submerged intake with the aid of neat sketch. (08 Marks)
 c. List the factors influencing the selection of pump and explain any two. (06 Marks)
- 2 a. List the various methods of population forecasting and explain any two in detail. (08 Marks)
 b. Define rate of demand and explain the various factors influencing the per capita demand. (08 Marks)
 c. The population of a town is as below:

Year	1980	1990	2000	2010
Population in thousands	30,000	36,000	45,000	53,000

 Estimate the population in the year 2040 by arithmetical increase method. (04 Marks)
- 3 a. Explain the significance of the following impurities with respect to quality of water:
 i) Turbidity ii) Hardness iii) Fluoride iv) Nitrate (08 Marks)
 b. Explain the multiple fermentation tube test. (08 Marks)
 c. Write a note on water borne diseases and their control. (04 Marks)
- 4 a. Define sedimentation. Show that settlement of the particles in sedimentation unit is independent of depth. (08 Marks)
 b. Explain the method of determining optimum dosage of coagulant with the aid of neat sketch. (06 Marks)
 c. A circular sedimentation fitted with standard mechanical sludge removal is to handle 5 million litres/day of sewage. Take detention period as 5 hr and depth of tank as 3 m. Find the dia. of the tank. (06 Marks)

PART – B

- 5 a. Define filtration. Explain the principle underlying filtration process. (10 Marks)
 b. List and explain the various operating problems during the filtration process. (10 Marks)
- 6 a. Define chlorination and explain the various forms of chlorination. (08 Marks)
 b. It is required to supply water for a town with a population of 30,000 at per capita demand of 150 litres. The disinfectant to be used is the bleaching powder which contains 30% of available chlorine. Determine how much bleaching powder is required annually at water works with 0.3 mg/L of chlorine dose is required for disinfection. (06 Marks)
 c. Explain the zeolite process of hardness removal. (06 Marks)

- 7 a. List the different layout of distribution system and explain the Grid iron distribution system in detail. (08 Marks)
- b. Explain fluoridation and defluoridation in detail. (06 Marks)
- c. Explain the Sluice valve used usually in distribution system with a neat sketch. (06 Marks)

8 Write short notes on any four of the following :

- a. Five demands of water
- b. Infiltration Gallery
- c. Indicator organism.
- d. Air Binding
- e. Nalgonda technique
- f. Nomograms.

(20 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2014/Jan.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 question from Part-B.**
2. Use of IS 456-2000 and SP-16 is permitted.
3. Assume any missing data suitably.

PART – A

- 1** Prepare a general layout showing the position and size of columns and footing to a suitable scale for an industrial building:
 A clear dimension of factory shed floor is 11.75×19.75 m
 Spacing of columns – 4 m c/c
 Size of column – 250 × 450 mm
 Span of steel Truss – 12 m c/c
 RCC columns are provided at the gable wall sides and their size is 250×400 mm, to be provided at 4 m c/c.
 All the walls around are 250 mm thick.
 Size of footing – 1.5 × 2.0 m
 Thickness of footing 400 mm uniform.
 Depth of foundation 1.2 m below ground level. (20 Marks)
- 2** One way continuous slab has been provided for a hall of clear dimensions 8m × 14.25m. The slab is supposed on RCC beams. The following details are given:
 i) C/c distance of supporting beams = 3.5 m
 ii) Columns dimensions on which beam rest = 250mm × 500mm
 iii) C/s of the beams 250×600mm
 iv) Slab thickness = 150 mm
 v) Beam depth is inclusive of slab depth
 vi) Main positive reinforcement at the end and interior panels = 10 mm ϕ @ 120mm c/c.
 vii) Main negative reinforcement at all the supports = 10 mm ϕ @ 120 mm c/c
 viii) Distribution steel = 8 mm ϕ 250 mm c/c
 ix) Grade of concrete and steel = M20 and Fe415.
 Show the structural details with a suitable scale and draw the following :
 a. Sectional elevation of slab (10 Marks)
 b. Plan showing the details of reinforcement (Bottom view & Top view) (10 Marks)
- 3** A square RCC column 450×450mm is to rest on sloped RCC square footing. The depth of foundation is 1.5m below ground level. The depth of the footing is reduced from 750mm at the face of the column to 300 mm at the edge of the footing. The footing size is 2.0×2.0m. The column reinforcement consists of 8 bars of 20 mm diameter, with 8 mm dia lateral ties at 200 mm c/c and the footing reinforcement consist of 12 mm diameter bars at 150 mm c/c both ways. M₂₀ grade concrete and Fe 415 grade steel are used. Draw to a suitable scale, the vertical section and plan of the footing and column showing the reinforcement details, and also prepare bar bending schedule. (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.

PART – B

- 4 Design a combined footing for the two RCC columns separated by a distance of 4 m c/c. Column 'A' is 500×500 mm and carries a load of 1250 kN and column B is 600×600 mm and carries a load of 1600 kN. The bearing capacity of soil is 200 kN/m² (safe). Use M₂₀ concrete and Fe₄₁₅ steel. The width of the footing is restricted to 2.5 m. (40 Marks)

Draw to a suitable scale

- i) Longitudinal sectional elevation (14 Marks)
 - ii) C/s at two different places to show the maximum details of reinforcement. (06 Marks)
- 5 A single bay fixed portal frame has an effective span of 7 m and an effective height of 4.2 m. Spacing of portal frames is 4.2 m. Consider an imposed load of 3 kN/m² on the slab. Column size is 400mm × 400mm shall be adopted. Design the continuous slab, and portal frame considering M₂₀ grade concrete and Fe₄₁₅ steel. SBC of soil is 130 kN/m². (40 Marks)

Draw the half sectional elevation of the portal frame showing the details of reinforcement in footing, column and the beam of the portal frame. Also show the cross-sectional details of beam at midspan and support. (20 Marks)

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10CV63

Sixth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Transportation 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 suitably if any.

PART – A

1. a. Draw a cross section of a permanent way in embankment and discuss in brief the basic functions of various components of a railway track. **(10 Marks)**
b. Bring out the advantages of coning of wheels with a figure. **(05 Marks)**
c. Briefly discuss on double headed (DH), bull headed (BH) and flat footed (FF) rails. How are rails designated? **(05 Marks)**
2. a. Briefly discuss on the following fasteners:
i) Dog spike.
ii) Pandrol clip for concrete sleepers. **(05 Marks)**
b. With figure bring out the requirements of fish plate and bearing plate for railway track. **(08 Marks)**
c. Calculate the maximum permissible train load that can be pulled by a locomotive having four pairs of driving wheels carrying an axle load of 22 tonnes each. The train has to run at a speed of 90 kmph on a straight level track (B.G). Also calculate the speed reduction if the train has to climb an 1 in 175 gradient. **(07 Marks)**
3. a. Briefly discuss on the following:
i) Grade compensation on curves.
ii) Negative cant. **(06 Marks)**
b. Determine the length of transition curve if the design speed of train on curve is 95 kmph on a B.G. track. **(06 Marks)**
c. A 5 degree curve diverges from a 3 degree main curve in reverse direction in the layout of a B.G. yard. If the speed on the branch line is restricted to 40 kmph then determine the restricted speed on the main line. **(08 Marks)**
4. a. Discuss on the following components of a turnout with a sketch:
i) Theoretical and actual nose centre.
ii) Switch angle and crossing angle. **(06 Marks)**
b. Calculate all the necessary elements required to set out a 1 in 12 turnout taking off from a straight B.G. track with its curve tangential to the gauge face of the outer main rail a head of the toe of the tongue rail and passing through TNC? Given heel divergence (d) = 11.4cms, TNC = theoretical nose centre. **(08 Marks)**
c. Briefly discuss on: i) Cross over; ii) Diamond crossings and iii) Signals. **(06 Marks)**

PART – B

- 5 a. Mention the different characteristics of aircraft and how they affect the planning and design of airports. (06 Marks)
- b. Explain the procedure of orienting the runway. (06 Marks)
- c. What is meant by basic runway length? How is it determined on the basis of the performance characteristics of the aircraft using the air port? (08 Marks)
- 6 a. The runway length required for landing at sea level is 3000m in standard atmospheric condition and the length of runway for takeoff at sea level in standard atmospheric condition is 2500m. The reference temperature at the air port is 25°C. The atmosphere temperature at elevation of airport at 200m is 15°C. The effective runway gradient is 0.5%. Determine the runway length to be provided. (08 Marks)
- b. Explain briefly the various factors which affects the layout of taxiway. (06 Marks)
- c. What is the necessity of visual aids for airports? Write briefly note on Runway lighting, Taxiway lighting and Apron and Hangar lighting. (06 Marks)
- 7 a. During setting out of tunnel briefly bring out how do you set out tunnels centre line on the ground surface and transfer centre line from surface to underground. (10 Marks)
- b. Discuss on Needle beam method of tunneling in soils. (05 Marks)
- c. Briefly write a note on ventilation of tunnels. (05 Marks)
- 8 a. Give a sketch showing the layout of the harbour showing break water, entrance channel, turning basin, piers and wharfs. (06 Marks)
- b. Briefly discuss on relevance of wind, tides and littoral currents on the design of harbours. (06 Marks)
- c. Discuss on the following:
- i) Jetties and Quays
 - ii) Mooring Buoys
 - iii) Transit sheds and ware houses
 - iv) Break water types. (08 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2014/Jan.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. Discuss about the importance of sub – soil exploration program. (06 Marks)
 - b. Explain the method of seismic refraction. (07 Marks)
 - c. What are the methods available for dewatering? Explain any one method. (07 Marks)
- 2
 - a. Derive the expressions for vertical stress and shear stress by using Boussinesq's theory. Also compare this theory with Westergaard's theory. (08 Marks)
 - b. Write a note on pressure distribution diagrams. (06 Marks)
 - c. A load of 1000KN acts as a point load at the surface of a soil mass. Estimate the stress at a point 3m below and 4m away from the point of action of the load of Boussinesq's formula. Compare the value with the result from Westergaard's theory. (06 Marks)
- 3
 - a. What are flow nets? Explain the characteristics of flownet with a neat sketch. What are their uses? (08 Marks)
 - b. Explain Graphical method for drawing flow net. (06 Marks)
 - c. For a homogeneous earth dam 32m high and 2m free board, a flow net was constructed with 4 flow channels. The number of potential drops was 20. The dam has a horizontal filter at the base near the toe. The coefficient of permeability of the soil was 9×10^{-2} mm/s. Determine the anticipated seepage, if the length of the dam is 100m. (06 Marks)
- 4
 - a. Define At rest, Active and Passive Earth pressures. (06 Marks)
 - b. Explain Rankine's theory for calculating Active pressure in cohesion less soils for no surcharge. (06 Marks)
 - c. A retaining wall with a smooth vertical back is 10m high and retains a 2-layer sand backfill with the following properties.
 0 – 5m depth : $C' = 0$, $\phi' = 30^\circ$, $r = 18 \text{ KN/m}^3$
 Below $C' = 0$, $\phi' = 34^\circ$, $r = 20 \text{ KN/m}^3$.
 Show that active earth pressure distribution, assuming that the water table is well below the base of the wall. (08 Marks)

PART - B

- 5
 - a. What are the causes for failure of slopes? (06 Marks)
 - b. Discuss the Swedish method of slices for a cohesive frictional soil. (08 Marks)
 - c. An embankment is inclined at an angle of 35° and its height is 15m. the angle of shearing resistance is 15° and the cohesion intercept is 200 KN/m^2 . The unit weight of soil is 18.0 KN/m^3 . If Taylor's stability number is 0.06, find the factor of safety with respect to cohesion. (06 Marks)
- 6
 - a. Define safe bearing capacity, safe bearing pressure and allowable bearing pressure. (06 Marks)

- b. Write a note on standard penetration test and its corrections. (08 Marks)
- c. Calculate the ultimate bearing capacity of a 2m wide square footing resting on the ground surface of a sand deposit with the following properties :
- i) Unit weight 18.6 KN/m^3 ii) Angle of internal friction 35° . Also calculate UBC of same footing when it is placed at depth of 1m below the ground surface. Take $N_q = 41.4$, $N_r = 42.2$. (06 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 layer is 300KPa and load due to a new building increase the pressure by 200KPa. The liquid limit of the soil is 75%. Water content of soil is 50%. $GS = 2.7$. Estimate consolidation settlement. (10 Marks)
- 8 a. Explain the factors affecting the choice of foundation. (06 Marks)
- b. Discuss the proportion of isolated footing. (06 Marks)
- c. Write a note on classification of pile foundations. (08 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2014/Jan.2015

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. Define reservoir. Explain and classify the different types of reservoirs. (07 Marks)
b. The following information is available regarding the relationship between trap efficiency and capacity inflow ratio.

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 percent	87	93	95	95.5	96	96.5	97	97	97	97.5

Find the probable life of the reservoir with an initial reservoir capacity of 30 million cubic meters, if the average annual flood is 60 million cubic meters and the average annual sediment inflow is 2,00,000 tonnes. Assume a specific weight of the sediment equal to 1.2 gm per c.c. The usual life of the reservoir will terminate when 80% of initial capacity is filled with sediment. (08 Marks)

- 2 a. Define gravity dam. Explain various forces that act on a gravity dam. (07 Marks)
b. Following data were obtained from the stability analysis of a concrete gravity dam:
i) Total overturning moment about toe = 1×10^6 kN-m
ii) Total resisting moment about toe = 2×10^6 kN-m
iii) Total vertical forces above base = 50000 kN
iv) Base width of the dam = 50 m
v) Slope of the D/S face = 0.8(H) : 1(V)

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. (08 Marks)

- 3 a. What is earthen dam? Sketch and classify the different types of earthen dams and explain briefly. (07 Marks)
b. List and briefly explain the methods of seepage control through foundation and body of earthen dams. (08 Marks)

PART – B

- 4 A sluice is an opening controlled by a gate for drawing supplies from a tank, reservoir or canal etc. The barrel of the sluice may be of masonry or cement concrete or R.C.C. pipe. Design a tank sluice for an earthen dam (tank bund) with the following particulars:

Maximum water level (MWL) = +126.0 m
Low water level (LWL) = +123.0 m
R.L of top of bund (TBL) = +123.00 m
Side slope of the bund = 2:1 on both sides
Top width of bund = 2.0 m
R.L of sill of sluice = +122.0 m

Bed level of canal = +122.0 m
 Side slopes of canal = 1½ : 1
 Canal bed width = 1.2 m
 Canal discharge = 0.2 m³/s
 Good foundation or hard rock level = +121.5 m
 General ground level = +122.5 m

(25 Marks)

- Design the barrel, cistern etc. Draw the following views:
- Longitudinal elevation along the centre of sluice barrel.
 - Half plan at top and half plan at foundation.
 - End view.

(20 Marks)

(15 Marks)

(10 Marks)

- 5 Design a canal drop of the notch type. Given the following data:

Canal details	Upstream (u/s)	Downstream (d/s)
FS discharge	6 cumec	6 cumec
CBL	+50.00	+48.00
FSL	+51.50	+49.50
HSL	+51.00	+49.00
Bed width	6 m	6 m
Top width of banks	2 m	2 m
Top level of banks	+52.50	+50.50
Side slopes (on either side):		
In cutting		1:1
In bank		1½ :1
General GL at site		+50.50
Hard soil for foundation is met at		+48.50

(25 Marks)

- Draw, to a suitable scale, completely dimensioned views of the followings:
- Half plan at top and half plan at foundation.
 - Longitudinal section of the canal drop.
 - Half cross-section along the drop wall and half elevation looking from the d/s side.

(20 Marks)

(15 Marks)

(10 Marks)

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- 6 a. What do you understand by water wells? Explain classification of open wells. (06 Marks)
b. Explain how the yield of an open well is determined by constant level pumping test. (06 Marks)
c. A fully penetrating well of diameter 0.3 m draws water from a confined aquifer of permeability 10^{-3} m/ sec and thickness of 15 m. If steady state discharge is found to be $\frac{1}{30}$ m³/sec. Compute the draw down at 10 m from the centre of the well and at the centre of the well. Take radius of influence 1000 m. (08 Marks)
- 7 a. What is ground water exploration? Explain the necessity of ground water exploration. (06 Marks)
b. Explain in detail, the Wenner's resistivity method of ground water exploration. (08 Marks)
c. Explain the role of bore hole data in ground water exploration. (06 Marks)
- 8 a. Explain the concept of artificial recharge. (06 Marks)
b. Explain any two methods of artificial recharge of ground water. (08 Marks)
c. Write a note on global water budget and India's water budget. (06 Marks)

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