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10CV62

Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks: 100

- Note: 1. Answer TWO full questions from Part-A and ONE full question from Part-B.**
2. Use of IS:456-2000 and SP-16 is permitted.
3. Missing data may be suitably assumed.

PART – A

- 1** Draw plan of a two way slab with corners held down condition for the following data :
Room dimension : 5 m × 4 m
Thickness of slab : 120 mm
Reinforcement in middle strip:
Parallel to shorter edge: # 10 mm @ 150 mm c/c
Parallel to longer span: # 8 mm @ 175 mm c/c
Reinforcement in edge strip:
Parallel to shorter edge: # 8 @ 100 c/c
Parallel to longer span: # 8 @ 150 c/c
Corner Reinforcement:
8 @ 100 c/c provided as a mesh over a grid of 800 mm × 800 mm
Prepare a bar bending schedule. (20 Marks)
- 2** Draw to a suitable scale the sectional elevation of a flight of stairs showing the reinforcement details for the following data prepare a bar bending schedule:
Number of steps in each flight = 12
Tread = 300 mm
Rise = 150 mm
Stair Hall = 5.5 m × 2.5 m
Thickness of waist slab = 180 mm
Width of stair = 1200 mm
Main bars = 7 numbers 12 mm dia
Distribution steel = dia 8 mm @ 250 c/c
Landing beam = 230 × 300 mm
Floor height = 3.6 m
The stair spans between the landing beam
concrete grade and steel = M20 and Fe415
Effective cover to reinforcement = 20 mm (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.

- 3 Draw to a suitable scale the plan and sectional elevation of column and footing for the following requirement:
 Size of column = 230×600 mm
 Reinforcement in column = $6 - 20 \phi$
 Lateral ties = $6\phi @ 230$ c/c
 Size of footing = $1.75 \text{ m} \times 2.0 \text{ m}$
 Reinforcement in footing:
 Long bars = $10 - 10\phi$
 Short bars = $13 - 10\phi$
 Thickness of footing at the face of the column = 1000 mm
 Thickness at the edge = 250 mm
 Concrete grade = M25
 Steel = Fe 415
 Prepare a bar bending schedule. (20 Marks)

PART – B

- 4 Design a combined footing for two columns of size 300×300 mm and 400×400 mm subjected 500 kN and 700 kN respectively. The centre to centre spacing between columns is 3.5 m. The width of the footing is restricted to 1.5 m. Take safe bearing capacity of soil = 150 kN/m^2 . Use M25 concrete and Fe 415 steel. (35 Marks)
 Design slab and beam type combined footing.
 Draw to a suitable scale.
 i) Longitudinal section of footing
 ii) Cross sections of footing. (25 Marks)
- 5 Design a cantilever retaining wall to retain an earth embankment with a horizontal top 4m 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 top. The safe bearing capacity of soil is 200 kN/m^2 . The coefficient of friction between soil and concrete is 0.5 . Adopt M20 Grade concrete and Fe 415 grade steel. (40 Marks)
 Draw to a suitable scale.
 i) Cross section of retaining wall.
 ii) Longitudinal section.
 iii) Sectional plan of top and bottom showing details of reinforcement in base slab. (20 Marks)

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10CV63

Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
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. Describe the role played by rail transport in growth and development of a country. (08 Marks)
b. Compare advantages and disadvantages of air transport with rail transport at least priority wise any three? (12 Marks)
- 2 a. Draw a neat sketch of double line B.G. track and mention various components. (08 Marks)
b. With neat sketch, explain what is coning of wheels what are advantages of coning of wheels. (12 Marks)
- 3 a. Describe the functions of sleepers, fastenings and fixtures. (08 Marks)
b. What is the purpose of designing alignment of track? Derive the equation for the theoretical cant, for B.G., M.G. and N.G. (12 Marks)
- 4 a. What are the objectives of providing transition curve? Draw neat sketch of Bernoulli's lemniscate on Fraud's cubic parabola and spiral transition curves. (12 Marks)
b. Calculate all the necessary elements required to set out a 1 in 8½ turnout, taking off from a straight B.G. track with its curve starting from the toe of the switch ie tangential to the gauge face of the outer main rail and passes thorough theoretical nose of crossing ie. TNC. Given heel divergence $d = 11.4$ cm. (08 Marks)

PART – B

- 5 a. List and explain aircraft characteristics which affect the planning and design of airports. (10 Marks)
b. Mention the factors considered in the selection of a suitable site for airport in view of criteria for temperature, elevation and gradient. (10 Marks)
- 6 a. Define optimum airport capacity. Mention various factors affecting airport capacity and explain with neat sketch. (10 Marks)
b. What is wind rose diagram? Explain any one method of constructing wind rose diagram. (10 Marks)
- 7 a. Explain the principle adopted in design of taxiway connecting runway. And different runway orientation explain with neat sketch. (10 Marks)
b. If the cross – wind component is more than 25 kmph, how runway capacity can be enhanced by adopting holding apron near exit taxiway draw a neat sketch and explain. (10 Marks)
- 8 a. With the help of neat sketch, explain the transfer of centre – line from surface to tunnel. (08 Marks)
b. Explain the classification of harbours or dock based on function or purpose. (06 Marks)
c. What is fender or tetrapods adopted in design of break water or dolphins? (06 Marks)

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10CV64

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

PART - A

- 1
 - a. State the objectives of soil exploration programme. (06 Marks)
 - b. Indicate with neat sketches, selection of number and depth of boring for various civil engineering projects. (08 Marks)
 - c. List the methods used for controlling ground water during excavation and explain the electro – osmosis method. (06 Marks)
- 2
 - a. Distinguish between Boussinesq's and Westergaard's theories of stress distribution. (06 Marks)
 - b. Explain the basis of construction of Newmark's chart and discuss how it is used. (06 Marks)
 - c. A circular area on the ground surface 6m in diameter carries a uniformly distributed load of 150kN/m². Calculate the vertical stress at depths of 3m, 6m, 9m and 12m. Also plot the variation of stress with depth. (08 Marks)
- 3
 - a. What is Flownet? Explain their properties and uses. (06 Marks)
 - b. What is Phreatic line? Describe the Casagrande's method to locate the phreatic line in a homogenous earth dam with a horizontal filter at its toe. (08 Marks)
 - c. For a homogeneous earth dam 32m height and 2m free board, a flow net was constructed with four flow channels. The number of potential drops was 20. The dam has a horizontal fitter at the base near the toe. The coefficient of permeability of the soil is 3×10^{-6} cm/s. Calculate the anticipated seepage, if the length of the dam is 150m. (06 Marks)
- 4
 - a. Explain active and passive earth pressure, with the help of neat sketches. (06 Marks)
 - b. With neat sketch, explain Rebhann's graphical method of finding active earth pressure on a retaining wall. (06 Marks)
 - c. A retaining wall with a smooth vertical back is 6m high and retains cohesionless soil with a bulk unit weight of 18kN/m³ and $\phi = 30^\circ$. The top of the soil is level with the top of the wall and is horizontal. If the soil surface carries a uniformly distributed load of 5kN/m². Determine using Rankine's theory, the total active earth thrust and draw the active earth pressure distribution diagram. (08 Marks)

PART - B

- 5
 - a. List out the causes of slope failure and explain with neat sketches type of failure of finite slopes. (06 Marks)
 - b. Explain friction circle method of stability analysis of slopes. (08 Marks)
 - c. A canal having side slope 1:1 is proposed to be constructed in a cohesive soil to a depth of 10m below the ground surface. The soil properties are $\phi_u = 15^\circ$, $C_u = 10\text{kN/m}^2$, $e = 1.0$ and $G = 2.65$. Determine the factor of safety with respect to cohesion against failure of bank slopes. i) When canal runs full, if $S_n = 0.08$ ii) When sudden drawdown of water takes place in the canal, if $S_n = 0.127$. (06 Marks)

- 6 a. Discuss the effect of ground water table on bearing capacity of soil. (06 Marks)
b. Explain the following :
i) Corrections to SPT 'N' value.
ii) Use of plate load test results to calculate bearing capacity of soils. (08 Marks)
c. A circular footing rests on a pure clay with $q_u = 270 \text{ kN/m}^2$ at a depth of 1.8m. Determine the diameter of the footing if it has to transmit a load of 720 kN. Assume the bulk unit weight of soil as 18 kN/m^3 and the factor of safety as 3. (06 Marks)
- 7 a. Explain the following terms with formulae : i) Immediate settlement ii) Primary consolidation settlement iii) Differential settlement. (06 Marks)
b. Determine the immediate settlement of a footing $3\text{m} \times 3\text{m}$ resting on a sandy soil with $E_s = 45,000 \text{ kN/m}^2$ and $\mu = 0.3$. Footing carries a load of 2000kN. Assume $I_w = 0.82$. (04 Marks)
c. A compressible clay layer 2m thick underlies a thick sand bed which carries a footing $2\text{m} \times 3\text{m}$ with an allowable soil pressure of 250 kN/m^2 at a depth of 1.0m. Determine the consolidation settlement due to compressible clay layer located at a depth of 10m below the ground surface. The ground table is located at the ground level. The properties of clay layer are $r_{\text{sat}} = 19 \text{ kN/m}^3$, $W_L = 50\%$, Natural water content = 35%, $G = 2.72$ and density of sand is 20 kN/m^3 . (10 Marks)
- 8 a. Explain the factors influencing selection of depth of foundation. (06 Marks)
b. Mention the situations where pile foundation is necessary and explain the classification of piles based on function. (06 Marks)
c. Proportion a rectangular combined footing supporting two columns $400\text{mm} \times 400\text{mm}$ and $300\text{mm} \times 300\text{mm}$ in sections carrying loads of 750kN and 400kN respectively spaced at 4.5m C/C. Assume the offset of the footing edge from lighter column face as 0.35m and allowable bearing pressure of soil as 150 kN/m^2 . (08 Marks)

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10CV65

**Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Hydraulic Structures & 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 any missing data suitably.**

PART – A

- 1 a. Explain different storage zones of a reservoir. (04 Marks)
 b. Define the terms density currents and economic height of a dam. (04 Marks)
 c. A proposed reservoir has capacity of 500 ha-m. The catchment area is 125 km² & the annual stream flow averages 120 mm of runoff. If the annual sediment production is 0.03 ha-m/km², what is the probable life of the reservoir before its capacity is reduced to 10% of its initial capacity by sedimentation? The relationship between trap efficiency ($\eta\%$) and capacity inflow ratio C/I is as follows: (07 Marks)

C/I	0.01	0.02	0.04	0.06	0.1	0.2	0.3	0.5	0.7
$\eta\%$	43	60	74	80	87	93	95	96	97

- 2 a. Define Gravity dam with a neat sketch. Explain the various forces acting on Gravity dam. (08 Marks)
 b. Determine the maximum & minimum vertical stresses to which the foundation of the dam will be subjected from the following data:
 Total over turning moment about toe, $\Sigma M_c = 1.2 \times 10^6$ kN-m
 Total resisting moment about toe, $\Sigma M_p = 2.5 \times 10^6$ kN-m
 Total vertical force about toe $\Sigma V = 6 \times 10^4$ kN
 Base width of the dam = 55 m
 Slope of d/s face = 0.8 : 1
 Also calculate the maximum principal stress at the toe. Neglect tail water depth. (07 Marks)
- 3 a. Explain different types of earthen dams with neat sketches. (06 Marks)
 b. Explain the causes for failure of earthen dam. (09 Marks)

PART – B

- 4 Design a canal drop (Notch type) for the following particulars: (25 Marks)

Particulars	U/s Canal	d/s canal
Full supply discharge	10 m ³ /s	10 m ³ /s
Bed level	+120.0 m	+118.0 m
Full Supply level	+121.5 m	+119.5 m
Bed width	8.0 m	8.0 m
Top level of embankment	+122.5 m	+120.5 m
Top width of embankment	2.0 m	2.0 m
Side slopes	1 : 1 (Cut)	1.5 : 1 (Fill)
Average Ground level	120.5 m	120.5 m

Hard soil is available at 118.5 m.

Draw to a suitable scale:

- (i) Half plan at top & half at foundation. (20 Marks)
 (ii) Half elevation & half longitudinal section (15 Marks)
 (iii) Cross-section along the canal. (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 details of a canal regulator is as follows:

Particulars	U/s	d/s
Full supply discharge	18.0 m ³ /s	15.0 m ³ /s
Bed width	12 m	12 m
Full Supply level	+12.0 m	+12.0 m
Top Bank level	+13.0 m	+ 13.0 m
Bed level	+10 m	+10.0 m
Top width of bank	2.0 m	2.0 m
Side slopes	2 : 1	2 : 1

Bligh's coefficient = $C = 10$

General Ground Level at the site +12.0 m

Good soil for foundation is available at + 9.0 m

Splayed wingwalls are to be provided.

Design the Vent way, Gates, Apron & Protection works

(25 Marks)

Draw to suitable scale, the following views:

(i) Half longitudinal section & half longitudinal elevation.

(20 Marks)

(ii) Half plan at top & half at foundation.

(15 Marks)

(iii) Sectional elevation through regulator vent.

(10 Marks)

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10CV666

Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
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. Draw neat sketches wherever necessary.**

PART – A

- 1 a. Discuss the significance of protected water supply for a Rural community. (10 Marks)
b. List the drinking water quality standards as per IS – 10500 – 2012 and discuss the effect of parameters if they exceed the limit proposed by Indian standards. (10 Marks)
- 2 a. List different water treatment methods used to treat the water for rural supply system and explain Nalagonda method for defluoridation of water. (10 Marks)
b. List the different types of pumps used in water supply system and explain any one in detail. (10 Marks)
- 3 a. Discuss the concept of Eco – sanitation and water are the objectives of Eco – sanitation for a Rural community to maintain a hygienic surroundings. (10 Marks)
b. With a neat sketch, explain Two pit latrine Aqua Privy and Septic tank. (10 Marks)
- 4 a. Discuss the operation and significance of Rain water harvesting for an efficient use of water in a Rural community. (10 Marks)
b. What are the different composting methods used to dispose refuse in Rural community? (10 Marks)

PART – B

- 5 a. What are Communicable diseases? Explain different precautions to be taken for prevention of same. (10 Marks)
b. Explain different methods used for Refuse collection in a rural community. (10 Marks)
- 6 a. What are the different disposal methods used to dispose refuse in rural community? (10 Marks)
b. With a neat sketch, explain construction and working of Biogas plant. (10 Marks)
- 7 a. Explain significance of milk sanitation for a wealthy growth of rural community. (10 Marks)
b. What is Pasteurization of milk and what are different quality control measures to ensure good quality milk. (10 Marks)
- 8 a. With a neat sketch, explain life cycle of mosquito and list the different problems caused by mosquito in a Rural community. (10 Marks)
b. List the control measures to be taken by household to minimize the adverse effect of mosquito in Rural community. (10 Marks)

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10CV667

Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
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. Describe and explain static and dynamic characteristics of vehicle affecting road design. (10 Marks)
 b. List various factors to be considered in road design affecting driver and road user. Explain PIEV theory, with neat sketch. (10 Marks)
- 2 a. What are the objectives of carrying out traffic volume study and discuss various traffic studies? (10 Marks)
 b. Define : i) Basic capacity ii) Practical capacity iii) Possible capacity and factors affecting the capacity. (10 Marks)
- 3 a. Briefly explain procedure adopted in floating car method and analysis of data collected and representation of results. (10 Marks)
 b. A vehicle moving at 48 Kmph was stopped by applying brake and length of skid mark was 14m. If average skid resistance of the pavement is known to be 0.78, determine the brake efficiency of the vehicle. (10 Marks)
- 4 a. What are assumptions made in simple queuing theory? (10 Marks)
 b. Discuss the various types of parking, their advantages and disadvantages. (06 Marks)
 c. Explain maximization of off street parking during peak – hour traffic and minimization of on – street parking reduces accidents. (04 Marks)

PART - B

- 5 a. What are the advantages of traffic signs and signals? (06 Marks)
 b. State and explain general principles to be followed in installation of traffic signs. Any important three with locational reference. (10 Marks)
 c. Explain with diagram, the basic flow relationship between speed , flow and concentration. (04 Marks)
- 6 a. Explain briefly Poisson’s Distribution and its applications to traffic engineering. (10 Marks)
 b. What is Rotary? Mention the values, various design elements such as radius of inside circle, merging traffic, diverging traffic volume and weaving length minimum required and limitations if more than 4 legged junctions and no. of lanes in each direction. (10 Marks)
- 7 a. What is Glare? Explain the effect of glare of street lights on driver. With neat sketch, indicate how it can be avoided. (06 Marks)
 b. Explain design factors for highway lighting and importance of road arboriculture. (10 Marks)
 c. Describe road side furniture and significance. (04 Marks)
- 8 Write short notes on any Four :

a. Intelligent Transport System	b. Simulation Techniques and Advantages.
c. Level of Service	d. TSM action plan
e. Green shield theory	f. Collision diagram.

(20 Marks)

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