B.Tech. DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
Civil Engineering
Paper - I : STRUCTURAL ANALYSIS - I

Time : 3 Hours
Maximum Marks : 75

Answer question No. 1 compulsory

1) a) State clapeyrons theorem of three moments.
   
   b) What is a propped cantilever?
   
   c) Explain sinking & rotation of a support.
   
   d) What are influence lines?
   
   e) Define Redundancy.
   
   f) What is a composite structure?
   
   g) Draw BMD for a fixed beam of length 5m & carrying a UDL of 10kN/m.
   
   h) State Maxwells reciprocal theorem.
   
   i) Write any two applications of Castigiano’s theorem.
   
   j) Draw a simple truss.
   
   k) Define shear force & Bending moment.
   
   l) State Castigiano’s first theorem.
   
   m) What are the various types of beams.
n) Write two advantages of fixed beams.

o) Define Betti’s Law.

UNIT – I

2) a) State and explain Virtual Work method for deflections.  

b) Using Castigliano’s Second theorem find the deflections in the following cases: EI = Constant.

i) [Diagram]

Find deflection at C.

ii) [Diagram]

Find deflection and rotation at B.

OR

3) a) Explain Maxwell – Betti’s generalised reciprocal theorem.

b) Find the deflection at the centre of the beam of span l carrying a varying load of Intensity ‘O’ at one end and W per unit length at the other end. Assume uniform flexural rigidity.

UNIT - II

4) a) Write the importance of influence line diagrams.

b) Draw influence line diagram for reactions at supports for a fixed beam of length l.

c) Write short notes on absolute bending moment.

OR

5) A girder of span 20 m carries two wheel loads 100 kN and 200 kN spaced 4m apart. They move on the girder. Find maximum & negative shear force at a section 6m from the left end. Also find BM that can occur at 10 m from the left end. Any wheel load can lead the other. Use ILD method.
6) a) For the Propped Cantilever shown find the support reaction and plot the BMD. (8)

\[\text{Diagram of the propped cantilever}\]

b) Find the fixed end moments and plot the SF & BMD for the beam loaded as shown in figure. (7)

OR

7) a) Analyse the given fixed beam by using Clapeyron’s theorem of three moments. (7)

\[\text{Diagram of the fixed beam}\]

b) Draw SFD & BMD for a fixed beam of span 4 meters, carrying a point load of 80kN from left end at 1m distance. (8)

UNIT - IV

8) a) A continuous beam ABC of uniform section has two equal spans AB & BC, each of length \(l\). During loading support B sinks by \(\delta_1\) & support C sinks by \(\delta_2\). Find the reactions at supports in terms of \(\delta_1, \delta_2, l\) and flexural rigidity EI of the beam. (8)

\[\text{Diagram of the continuous beam}\]

b) Write short notes on:
   i) Statically determinate structures.
   ii) Statically Indeterminate structures.

OR
9) Find the forces in all the members of the flame shown. Due to vertical settlement of 1 cm at support ‘B’. All the members have same cross sectional area of 20 cm$^2$. ‘E’ young’s modulus for all members is $2 \times 10^5$ N/mm$^2$. 

(15)
B.Tech. DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
CIVIL ENGINEERING
Paper - II : Environmental Engineering - I

Time : 3 Hours  Maximum Marks : 75

Answer question No.1 compulsory (15)
Answer ONE question from each unit (4 × 15 = 60)

1)  a) What is the efficiency of RSF when compared to SSF?
    
    b) Distinguish between water quality objectives and water quality standards?
    
    c) What is jar test?
    
    d) What is the functions of a balancing reservoir?
    
    e) What is the method of analysis of total dissolved solids called?
    
    f) What is Indian Standard per capita water consumption?
    
    g) What are pressure filter?
    
    h) Define hardness of water.
    
    i) Define plumbing.
    
    j) What is the drinking water standard for fluorides?
    
    k) What is Residual chlorine?
    
    l) Mention the principle involved in sedimentation.
    
    m) What is the purpose of Booster pumps?
What is florosis?
Define house plumbing?

UNIT – I
2) a) Explain the role of environmental engineers?

b) Describe factors affecting precapita consumption?

OR

3) a) Distinguish between surface water quality and ground water quality.

b) Explain the methods of population forecasting.

UNIT - II
4) a) Explain the theory of sedimentation.

b) What are the various methods of purification of water? Explain.

OR

5) a) How are pumps classified? Explain.

b) Write in detail the determination of turbidity.

UNIT - III
6) a) Explain the methods of removal colour, odour and taste from water.

b) Explain the methods of removing temporary and permanent hardness.

OR

7) a) Design slow sand filter for treating 2 MLD of water.

b) What are the harmful effects of excess flourides?

UNIT - IV
8) a) Explain the procedure of determine the capacity of a balancing reservoir?

b) With neat sketches explain the appurtenances used in distribution system.

OR

9) a) Explain the one – pipe and two – pipe system of plumping.

b) Write a short notes on Sanitary fittings?
B.Tech DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
Civil Engineering
Paper - III : WATER RESOURCES ENGINEERING - I

Time : 3 Hours
Maximum Marks : 75

Answer question No.1 compulsory (15)

Answer ONE question from each unit (4 × 15 = 60)

1) a) Define hydrograph.

b) What is run off?

c) What is the purpose of well development?

d) What is saturation capacity?

e) Define Precipitation.

f) What is the difference between canal falls and canal escape?

g) What is meant by balancing depth?

h) Define head regulators.

i) Define canal regulators.

j) Explain rotational formula with units.

k) Define zone of saturation.

l) Define Kor depth and Kor period.

m) What is specific retention?

n) Define specific yield.

o) List out losses in canal.
UNIT – I
2) a) Explain various types of precipitation.
   b) Describe various methods of computing average rainfall over a basin.

   OR

3) a) Explain about different types of Aquifers.
   b) Give the classification of water resources development project and mention the functional requirements of a multi purpose project.

UNIT - II
4) a) What are the functional requirements of multi-purpose projects?
   b) Explain about benefits and ill – effects of irrigation.

   OR

5) a) List out and explain various methods of surface irrigation.
   b) A field channel has culturable commanded area of 2000 hectary. The intensity of irrigation for gram is 30% and for wheat is 50%. Gram has Kor period of 18 days and Kor depth of 12 cm, while wheat has a Kor period of 15 days and Kor depth of 15 cm. Calculate the discharge of the field channel.

UNIT - III
6) a) What are the causes and ill effects of water logging?
   b) A channel has to be designed for the following data; discharge $q = 30$ m$^3$/sec, silt factor $f = 1.0$, side slope $= \frac{1}{2} : 1$. Find also the longitudinal slope.

   OR

7) Explain about Kennedy’s theory of silt supporting capacity and its drawbacks.

UNIT - IV
8) a) Explain about the component parts of a diversion head work with neat sketch.
   b) Write about the causes of failures of weirs and their remedies.

   OR

9) a) Differentiate between non-modular and semi-modular outlets. Give examples.
   b) Discuss about the necessity and location of falls.
B.Tech. DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
CIVIL ENGINEERING
Paper - IV : Design of Concrete Structures - I

Time : 3 Hours
Maximum Marks : 75

Answer ONE question from each unit

All questions carry equal marks

UNIT – I

1) An isolated T-beam of span 4.5m has a 800mm wide flange 100 mm thick. The overall depth of the beam is 450 mm and the width of the rib is 250 mm. The beam is reinforced with 4 bars of 20 mm diameter. If the permissible stresses in concrete and steel are 7 N/mm² and 230 N/mm², find moment of resistance. Take m = 13.33 use working stress method.

OR

2) a) What are the assumptions made in a Working stress Design?
   b) What are the differences between Balanced section, under Reinforced section & over Reinforced section? Explain.

UNIT - II

3) A doubly reinforced beam section is 250m wide and 500 mm deep to the centre of tensile reinforcement. It is reinforced with 2 bars of 16 mm diameter as compressive reinforcement at an effective cover of 50 mm and 4 bars of 20 mm diameter as tensile steel. Find moment of resistance of the beam section. Use M₂₀ concrete and Fe₄₁₅ steel. Use limit state method.

OR

4) A T-beam of flange width 1200mm, flange thickness 100mm, rib width 275 mm has an effective depth of 550 mm and is reinforced with 6 bars of 20 mm diameter and 4 bars of 16mm diameter. Find ultimate moment of resistance. Use M₂₀ concrete and Fe₄₁₅ steel. Use limit state method.

UNIT - III

5) a) Briefly explain the reasons for the development of diagonal tension cracks in R.C beams.
   b) Explain the various types of shear failures and shear design of R.C.C. beams.

OR
6) A reinforced concrete beam has a support section with a width of 250 mm and effective depth of 500 mm. The support section is reinforced with 3 bars of 20 mm diameter on the tension side. 8mm diameter two legged stirrups are provided at a spacing of 200 mm centers. Using M20 grade concrete and Fe415 steel, estimate the shear strength of the support section.

UNIT - IV

7) Design a balanced singly reinforced concrete beam section having an effective depth twice that of the width to support a uniformly distributed total (dead + live) load of 10kN/m over an effective span of 5m. Assume cover to tensile steel as 50 mm. Adopt M20 grade concrete and Fe415 grade steel. Use working stress method?

OR

8) The main stair of an office building has to be located in a stair measuring 3.5m × 5.5m. The vertical distance between the floors is 3.75m. Design the stairs. Allow a live load of 2000 N/m². Use M20 concrete and Fe415 steel. Use working stress method.

UNIT - V

9) A beam and slab floor of R.C.C. consists of a continuous slab supported on beams of 6m clear span having 400 mm end bearings. The beams are spaced at 2.75 meters T-beam. Use M20 concrete and Fe415 steel. Use limit state method.

OR

10) Design a cantilever beam with a clear span of 3.0 mt which carries a superimposed load of 25 kN/m run. Use M20 Mix and Fe415 steel by using LSM.
B. Tech. DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
Civil Engineering
Paper - V : DESIGN OF STEEL STRUCTURES - I

Assume Suitable Data.

Answer ONE question from each unit  
$(5 \times 15 = 75)$

UNIT - I

1) a) List the advantages and disadvantages of using steel as a structural member.  

b) A double riveted double cover butt joint is used to connect plates of 12 mm thick using Unwin’s formula, determine the diameter of rivet, rivet value, gauge and efficiency of joint. 

Take $\sigma_{ul} = 150$ MPa, $\tau_{vf} = 80$ MPa and $\sigma_{pf} = 250$ MPa

OR

2) Design a tension member using a channel section to carry an axial tension of 250 kN.

UNIT - II

3) A steel column 12 m long carries an axial load of 1,200 kN. The column is hinged at both its ends. Design an economical built-up section with lacing. Design the lacing also.

OR

4) A column section ISBH 400 @ 0.822 kN/m is carrying an axial load of 600 kN and a moment of 22.5 kNm and shear force of 45 kN. Design a column splice.

UNIT - III

5) Design a grillage foundation for a column carrying an axial load of 1600 kN inclusive of self weight. The bearing capacity of soil is 180 kN/m$^2$. The column base plate resting on the grillage is 600 mm $\times$ 600 mm.

OR

6) A column section ISHB 300 @ 0.63 kN/m with one cover plate 400 mm $\times$ 20 mm on either side is carrying an axial load of 3000 kN inclusive of self weight of base and column. Design a gusseted base. The allowable bending pressure in concrete is 4N/mm$^2$. The allowable bending stress in base plate is 185 N/mm$^2$. 

(DCE 315)
UNIT - IV

7) Design a simply supported beam with an effective span of 6m, carrying a uniform distributed load of 40 kN/m inclusive of self weight over the entire span. The overall depth of the beam is restricted to 350 mm. The compression flange of the beam is laterally supported throughout. Take $f_y$ as 250 N/mm$^2$.

OR

8) Design a beam of 6m effective span, carrying a uniformly distributed load of 20 kN/m. If the compression flange is laterally unsupported. Assume $f_y$ as 250 N/mm$^2$.

UNIT - V

9) Design a bracket connection to support an end reaction of 200 kN, the eccentricity of the load is 250 mm.

OR

10) A beam ISMB 450 @ 724 N/m transmits a shear of 250 kN and a moment of 160 kNm to the flange of a steel column ISMB 400 @ 822 N/m. Design a suitable beam-column shop welded connection.
B.Tech. DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
CIVIL ENGINEERING
Paper - VI : Geo-Technical Engineering - I

Time : 3 Hours
Maximum Marks : 75

Answer question No. 1 compulsory

Answer one question from each unit

I) a) Write about
   i) Gravel
   ii) Silt

b) What are the various types of soils found in India?

c) Define specific gravity of soils.

d) Draw the three phase diagram.

e) State various Index Properties of Soil?

f) Define Reynolds number.

g) Write two examples for cohesive and non cohesive soils.

h) What is secondary consolidation?

i) What is sensitivity?

j) Define stream function.

k) Write the various systems of classification of soils.

l) Write the relationship between plastic limit and liquid limit.
m) State Terzaghi’s theory of consolidation.

n) What are the different laboratory tests for shear strength.

o) State Mohr – coloumb’s theory?

UNIT - I

2) a) Define soil? Write the scope of Geotechnical Engineering. (7)
   b) Explain the laboratory procedure for determination of liquid limit of a soil sample by Cassagrande’s method. (8)

   OR

3) a) Explain sand replacement method for determining field density? (8)
   b) Establish a relation between void ratio, degree of saturation, specific gravity and moisture content. (7)

UNIT - II

4) a) Write the structural classification of soils with neat sketches. (7)
   b) How do you determine effective stress in a soil mass under different loading conditions. (8)

   OR

5) a) Explain the procedure for determining coefficient of permeability with variable head method? (8)
   b) State Darcy’s law? Explain the validity of Darcy’s law by Reynolds number. (7)

UNIT – III

6) a) What is a flow net? What are the various characteristics of flow net? (7)
   b) What is compaction control? How do we implement compaction control in field. (8)

   OR

7) a) What are the factors affecting compaction? Explain in detail about modified procton test. (8)
   b) Write short notes on Laplace equations. (7)

UNIT – IV

8) a) Explain Terzaghis spring model analogy of soils. (7)
   b) Describe the method of conducting direct shear test in the laboratory. (8)

   OR

9) a) Explain about triaxial compression test, carried out in the laboratory. (8)
   b) Write about field implications of consolidation of soils. (7)
Answer question No. 1 compulsory  
(15)

Answer one question from each unit  
(4 × 15 = 60)

1) a) Write the principles of slope deflection method.

b) Define Sway.

c) What is Relative stiffness?

d) Write any two differences between sway & non sway.

e) State the assumptions of moment distribution method.

f) Define carry over moment & carry over factor.

g) Write an advantage of using Kanis method than other methods.

h) What is the effect of change in stress due to change in temperature in suspension bridge?

i) Write the necessity of SFD while solving problems of slope deflection equations.

j) Write an expression for FEM when the beam is sinking.

k) Define arch? Write the types of arches.

l) What is a multi storeyed frame?

m) Write 2 differences between two hinged and three hinged arches.
n) What are anchor cables?

o) Define Gravity loads.

**UNIT – I**

2) Analyse the continuous beam by slope deflection method and draw BMD & SFD. Consider moment of Inertia to be same throughout.

OR

3) Analyse the Portal frame by slope deflection method and draw the BMD.

**UNIT – II**

4) A continuous beam ABCD is loaded as shown Analyse the beam by Moment Distribution method.

OR

5) Analyse the frame by Moment Distribution method.
6) Analyse the rigid jointed frame by Kani’s method.

OR

7) State the assumptions made in the following approximate methods for the analysis of multi storey frames subjected to horizontal forces.
   a) Portal method
   b) Cantilever method

UNIT - IV

8) A two hinged parabolic arch is loaded as shown
   Determine the (i) Horizontal thrust (ii) Maximum +ve & -ve moments (iii) SF & Normal thrust at 10m from the left support. Assume $I = I_o \sec \theta$, where $I_o$ is moment of inertia at crown and $\theta$ is slope at section under consideration.
9) a) What is a cable? What are the assumptions made in the analysis of cables?  

b) A suspension cable is supported at two points 20m apart, the left support is 2m above the right support. The cable is loaded with a UDL of 10kN/m throughout the span. The maximum dip in the cable from left support level is 4m. Find the maximum tension in the cable.
B.Tech. DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
CIVIL ENGINEERING
Paper - II : Transportation Engineering - I

Time : 3 Hours
Maximum Marks : 75

Answer question No.1 compulsory
(15 x 1 = 15)

Answer ONE question from each unit
(4 x 15 = 60)

1) a) What are the recommendations given by the Jayak’s committee?
   b) Classify Urban roads.
   c) Define off-tracking.
   d) What is central road fund?
   e) Define highway alignment.
   f) What is meant by detailed survey?
   g) Define group index.
   h) What is map study?
   i) What is central road research institute?
   j) Define grade compensation.
   k) What do you know about chamber?
   l) What is equivalent radius of resisting section?
   m) What is roughness co-efficient with reference to highway drainage?
n) What are the general properties of Bitopmen?

o) List out various gradients.

UNIT - I

2) a) Explain the recommendation of Jayakar committee for road development.
   b) What are the various methods of classification of roads?

   OR

3) a) Explain Telford method of road construction with neat sketch.
   b) Explain the necessity of highway planning.

UNIT - II

4) a) Define over taking sight distance? Derive the expression for calculating the over taking sight distance.
   b) Explain the steps to be followed in the superelevation design.

   OR

5) Write about different highway cross-section elements.

UNIT - III

6) a) Explain the construction procedure of bituminous roads.
   b) Explain the necessity of providing dowel and tie bars in the rigid pavements?

   OR

7) a) Describe the various temperature stresses developed in cement concrete pavements.
   b) Explain the CBR method of flexible pavement design.

UNIT - IV

8) a) What are the various types of failures in flexible pavement? Explain the causes.
   b) Describe the hydrologic analysis and hydraulic analysis of surface drainage system.

   OR

9) a) Explain construction procedure of roads in water logged areas.
   b) Explain the importance of highway drainage.
B.Tech DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
CIVIL ENGINEERING
Paper - III : Water Resources Engineering - II

Time : 3 Hours
Maximum Marks : 75

Answer Question No.1 Compulsory

Answer ONE question from each unit

I) a) What is purpose of pitot tube?
    b) What is meant by arch dam?
    c) What is fore bay?
    d) What is different types of dams?
    e) How do you find life of reservoir?
    f) How do you understanding by level crossing?
    g) Name various forces acting on gravity dam?
    h) Explain tail water curve.
    i) What is the purpose of pen stock?
    j) Give the classification of non-over flow dam’s.
    k) What is meant by spill way?
    l) Define load factor.
    m) What are galliers?
n) What is meant by load curve?
o) Explain jump height curve.

UNIT - I

2) a) Describe various types of river training and protection works?  

b) Describe the necessity of cross-drainage structure. How do you classify cross drainage work’s?

OR

3) a) Describe in brief various types of groynes used for rivers training draw a sketch of a groyne.

b) Classify aqueducts and explain under what circumstances each one is used.

UNIT - II

4) a) What do you understand by the demantary profile of a gravity dam? Derive expression for determining base width of such dam.

b) Explain the procedure of determination of reservoir capacity.

OR

5) a) Write a short note on:

i) Timber dam’s

ii) Coffer dam

b) What are the factors on which selection of site for a dam depend’s?

UNIT - III

6) A gravity dam has following diamentions.

- Height of dam = 102m
- Free board = 1.2m
- Slope of u/s face = 0.10:1
- Take $\alpha = 0.1$

a) hydrodynamic earthquake pressure and

b) its moment at a joint situated som below maximum water surface.

OR

7) a) What is gallery? Discuss various process for which galleries and provide in dams?

b) Derive an expression for the limiting height of a low gravity dam?
UNIT - IV

8) a) Write in detail about functioning of any two significant spillways.  

b) Describe with neat sketch the various seepage control measures through foundation of earth dam?
B.Tech DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
CIVIL ENGINEERING
Paper - IV : Design of Concrete Structures - II

Time : 3 Hours
Maximum Marks : 75

Answer ONE question from each unit \( (5 \times 15 = 75) \)

UNIT - I

1) Design a continuous reinforced concrete beam of rectangular section to support a dead load of 10 kN/m and live load of 10 kN/m over 3 spans of 6m each. The ends of the beam are simply supported. Use M20 grade concrete and Fe415 grade steel materials. \([15]\)

OR

2) Design a short R.C. column to take an axial load of 5000 kN. The size of the column is not to be more than 700 mm. Use spiral reinforcement adopt M25 grade of concrete and Fe415 grade steel. \([15]\)

UNIT - II

3) Design a two way slab for a residential roof to suit the following data: size of the roof is 4.5m×6.0m. Edge conditions are simply supported on all the sides on load bearing masonry walls 300 mm thick without any provision for torsion at corners. Use M20 grade of concrete and Fe415 grade of steel. \([15]\)

OR

4) Design an interior panel of a flat slab 5m×6m. The slab is supported on columns 500 mm in diameter. The floor of the slab is likely to be used for the conference hall use M20 grade of concrete and Fe415 grade of steel. \([15]\)

UNIT - III

5) Design the longitudinal and lateral reinforcement in a rectangular reinforced concrete column of size 300 mm × 400 mm when subjected to a design ultimate load of 1200kN and an ultimate moment of 150 kNm with respect to the major axis use M20 grade of concrete and Fe415 grade HYSD bars. \([15]\)

OR

6) A R.C. column of unsupported length of 3.0m is to be designed for a factored axial load of 2500 kN. Determine the cross sectional dimensions of the column and reinforcement required. \([15]\)
UNIT - IV

7) Determine suitable dimensions of a cantilever retaining wall which is required to support an earth 4.5m above ground level on the toe side of the wall. The back fill is inclined at 20° to the horizontal. The safe bearing capacity of soil may be taken as 150 kN/m² at a depth of 1.3m below ground level. The unit weight of backfill earth is 16 kN/m³ and angle of shearing resistance is 30°. The coefficient of friction between soil and concrete is 0.5. [15]

OR

8) a) What are the various types of retaining walls. Explain the cantilever type R.C.C retaining wall with neat sketches.

b) List the various forces and stability requirements to be considered in the design of retaining walls.

UNIT - V

9) Design a square footing for a column 300 mm × 500 mm carrying a load of 1350 kN. Assume soil with an allowable pressure of 200 kN/m² at a depth of 1.5m below the ground level. Use M20 grade of concrete and Fe 415 grade of steel. [15]

OR

10) A column carrying a load of 2500 kN has to be supported by four piles, each of size 300 mm × 300 mm. The piles are spaced at 1m centre. The column size is 600 mm × 600 mm. Design the pile cap. Use M20 grade concrete and Fe 415 steel. [15]
B.Tech DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
CIVIL ENGINEERING
Paper - V : Design of Steel Structures - II

Time : 3 Hours  Maximum Marks : 75

Answer ONE question from each unit

ALL question carry equal marks

Use of IS 800-1984 and steel tables is allowed. Any missed data can be assumed suitably

UNIT – I

1) Design an overhead rectangular tank of riveted steel, for a capacity of 50,000 litres. The available width of plates is 1.25m. The tank is supported on 4 columns, spaced 5.0m × 3.75m and each of height 10m.               [15]

OR

2) Design a circular elevated water tank for a capacity of 1,40,000 litres. The height of the tank bottom above the ground level is 12m the tank is supported over six columns.               [15]

UNIT - II

3) a) Discuss the importance of shear connectors in composite beams.               [15]
   b) What are the design requirements of shear connectors for design of composite action of beam?

OR

4) Design a lintel over opening of 5m. The lintel is in a wall 430 mm thick. It has to support a uniform load of 150 KN in addition to the masonry. The weight of the masonry may be assumed to be 22 KN/m³ and the height of brick work above the lintel is 3.5m.               [15]

UNIT - III

5) Design a channel section purlin, for an industrial building situated in Hyderabad, to support a iron sheet roof for the following data               [15]

   Spacing of the truss c/c = 4.5m
   Span of truss = 12m
Spacing of purlins c/c = 1.5m
Intensity of wind pressure = 1.5 kN/m²
Weight of galvanized sheets = 120 N/m²
Yield stress of steel = 250 MPa

OR

6) Design a Roof Truss of span 20m. The pitch of truss is 1/5. The height of the truss at laves level is 15m. The centre to centre spacing of trusses is 5m. The building is situated in Vishakapatnam. Take \( f_y = 250 \text{ N/mm}^2 \) for the steel columns. \[15\]

UNIT - IV

7) The B.M. and S.F. at a particular section of a plate girder are 4500 k.N.m and 1000 kN respectively. Design a plate girder using thin web and end stiffener. \[15\]

OR

8) Design the cross section of a plate girder for the following data. \[15\]

Effective span of the girder = 18m
Superimposed loading = 45 kN/m. Design the connections also.

UNIT - V

9) Design the cross section of a deck type plate girder railway bridge for a broad gauge main line loading over an effective span of 24m. \[15\]

Spacing of plate girders = 1.8 m c/c
Weight of stock rails = 0.4 k N/m
Weight of guard rails = 0.25 kN/m
Weight of fastenings = 0.25 kN/m of track
Sleepers (Timber) = 250 × 150mm × 2.8m@ 0.4 c/c
Density of sleepers = 7.4 kN/m³

OR

10) The effective span of a plate girder deck type bridge for a single meter gauge track is 30m. The dead load, live load and impact load reaction is 900 kN. The vertical reaction due to overturning effect of wind at each end of the girder is 180 kN. Design a suitable Bearing. \[15\]
B.Tech DEGREE EXAMINATION, MAY - 2015
(Examination at the end of Third Year)
CIVIL ENGINEERING
Paper - VI : Geo-Technical Engineering - II

Time : 3 Hours
Maximum Marks : 75

Answer question No. 1 compulsory

Answer ONE question from each unit

1) a) What is disturbed sampling?

b) State four purposes of soil exploration.

c) List any three boring methods used in soil exploration.

d) Define Isobars.

e) Write stress-strain Parameters of a soil.

f) Write the types of retaining walls.

g) State Rankines earth Pressure theory.

h) Define (i) slope (ii) factor of safety.

i) Write any two assumptions in stability Analysis.

j) What are the various types of shear failure?

k) Define Negative skin friction.

l) What is sinking of well?

m) Define (i) tilt (ii) shift.
n) What is an under reamed pile?

o) Explain allowable settlement.

UNIT - I

2) a) Briefly explain Boussing’s solution for stress distribution? [8]

b) Write the assumptions and limitations of Boussing’s solutions. [7]

OR

3) a) Explain briefly about cone penetration tests. [8]

b) What is sub surface exploration? Write short notes on location of water table. [7]

UNIT - II

4) a) Write the assumptions in stability Analysis. Explain various methods of improving stability of slopes in brief. [7]

b) Explain different types of lateral earth pressures. [8]

OR

5) Describe Rankines earth pressure theory for cohesive soils and compare the same width coulombs wedge theory. [15]

UNIT - III

6) a) What is the safe bearing capacity of a circular footing of 1.5m diameter resting on the surface of a saturated way of unconfined compressive strength of 120 N/m$^2$ if the factor of safety is 3. [7]

b) Explain the causes of settlement in foundations and state the necessary precautions to control the settlements of foundation. [8]

OR

7) a) Determine the ultimate bearing capacity of a square footing 2m × 2m in a soil with unit weight of 18 kN/m$^3$, $\phi = 20^\circ$, $c = 20$ kN/m$^2$. Take the depth of the foundation as 1m. Use Terzaghi’s equation. [5]

b) Explain various limitations of plate load test. [5]

c) How is settlement of footings estimated. [5]
UNIT - IV

8) a) What are the various forces acting on a well foundation? Explain in detail individual components of a well with a neat sketch. [7]

b) What is the necessity of a pile foundation? Explain classification of piles in detail. [8]

OR

9) a) Write short notes on:
   i) Pile group and its efficiency.
   ii) Construction of piles.
   iii) Rectification of tilts and shifts. [9]

b) Explain about under reamed pile foundation in swelling soils. [6]

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