Register Number :

Name of the Candidate :

0 2 4 1

B.E. DEGREE EXAMINATION, 2013

(CIVIL / CIVIL & STRUCTURAL ENGINEERING)

(FIFTH SEMESTER)

CLEC-501 / CSEC-501.NUMERICAL METHODS

May] [Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.
Use of Packet calculator is permitted.
EACH question carries TWELVE marks.

UNIT – I

1. (a) Prove with the usual notations that

$$hD = \log(1+\Delta) = -\log(1-\nabla) = \sin h^{-1}(\mu\delta).$$

(6)

Turn Over

(b) Solve :

$$y_{n+2} - 5y_{n+1} + 6y_n = x^2 + x + 1. \quad (6)$$

(OR)

2. (a) Prove with the usual notations that

$$\delta = \Delta(1+\Delta)^{-1/2} = \nabla(1-\nabla)^{-1/2}. \quad (6)$$

(b) Solve :

$$y_{n+2} - 2y_{n+1} + y_n = 2^n x^2. \quad (6)$$

UNIT - II

3. (a) Find y' and y'' at $x = 1{\cdot}2$, given

x	1	1·2	1·4	1·6	1·8
y	2·7183	3·3201	4·0552	4·953	6·0496

2	2·2
7·389	9·025

(6)

(b) Compute the value of

$$\int_{0\cdot2}^{1\cdot4} \left(\sin x - \log x + e^x\right) dx.$$

taking $h = 0{\cdot}2$ and using

(i) Trapezoidal rule.

(ii) By Simpson's rule.

Compare your result by integration. (6)

(OR)

4. (a) Find the gradient of the road of the middle point of the elevation above a datum line of seven points of road which are given below : (6)

x :	0	300	600	900	1200
y :	135	149	157	183	201

1500	1800
205	193

(b) Evaluate

$$\int_0^1 e^{-x}dx.$$

with 10 intervals by

(i) Trapezoidal rule.

(ii) Simpson's rule. (6)

UNIT - III

5. (a) Solve the equation

$$x \tan x + 1 = 0$$

by Regula Falsi method starting with $a = 2{\cdot}5$ and $b = 3$ correct to three decimal places. (6)

(b) Solve by Gauss Seidel method, the following system : (6)

$$28x + 4y - z = 32.$$

$$x + 3y + 10z = 24.$$

$$2x + 17y + 4z = 35.$$

(OR)

6. (a) Solve :

$$x^3 - 2x + 2 = 0$$

by Graeffe's root squaring method. (6)

(b) Find the inverse of

$$A = \begin{pmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 0 \end{pmatrix}$$

by Crout's method. (6)

UNIT - IV

7. Given that

$$y\frac{dy}{dx} = y^2 - 2x,\ y(0) = 1.$$

Compute $y(0{\cdot}2)$ and $y(0{\cdot}4)$ using Runge-Kutta method of fourth order with $h = 0{\cdot}2$. (12)

(OR)

8. Solve

$$\frac{dy}{dx} = x^2 + y^2 - 2$$

using Milne's predictor-corrector method for $x = 0.3$ given the initial value

$x = 0$

$y = 1$,

the values of y for

$x = -0.1$, 0.1 and 0.2

should be computed by a Taylor series expansion. (12)

UNIT - V

9. Solve the Laplace's equation over the square mesh of side 4 units, satisfying the boundary conditons

$u(0, y) = 0,\ 0 \le y \le 4.$

$u(4, y) = 12 + y,\ 0 \le y \le 4.$

$u(x, 0) = 3x,\ 0 \le x \le 4.$

$u(x, 4) = x^2,\ 0 \le x \le 4$ (12)

(OR)

10. Solve

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$$

in $0 < x < 5$,

$t > 0$

given that

$u(x, 0) = 20$,

$u(0, t) = 0$.

$u(5, 0) = 100$.

Compute u for one time step with $h = 1$, by Crank-Nicholson method. (12)

Register Number :

Name of the Candidate :

0 2 4 2

B.E. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-502 / SURVEYING - II

May] [Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.
ALL questions carry EQUAL marks.

UNIT – I

1. Explain in detail about Watts Microptic Theodolite and the Tavislock Theodolite with necessary drawings.

(OR)

2. Write briefly about the principle behind the sextant and also explain the necessary adjustments for box and nautical sextant.

Turn Over

UNIT – II

3. Briefly discuss the instrumental methods commonly used for setting out simple curves.

(OR)

4. Write down the step by step procedure for setting out of compound curve and also explain the elements of a reserve curve.

UNIT – III

5. Write a brief notes on the followings:

   (a) Selection of site for base line. (6)

   (b) Selection of site for Triangulation Station. (6)

(OR)

6. (a) Discuss briefly about reconnaissance in triangulation system. (6)

   (b) Two triangulation stations A & B are 60 kms apart and have elevations 240 m and 280 m respectively. Find the minimum height of signal required at B, so that the line of sight may not pass near the ground

than 2 metres. The intervening ground may be assumed to have a uniform elevation of 200 m. (6)

UNIT – IV

7. (a) Explain the method of correlates. (6)

   (b) Explain the laws of accidental errors. (6)

(OR)

8. (a) Form the normal equations for x, y & z in the following equations of equal weight.

$$3x + 3y + z - 4 = 0$$

$$x + 2y + 2z - 6 = 0$$

$$5x + y + 4z - 21 = 0$$ (6)

   (b) If the weight of the above equations are 2, 3 & 1 respectively form the normal equation for x, y & z. (6)

UNIT – V

9. Write briefly about any three methods for determining the longitude of heavenly body.

(OR)

10. Explain in detail about different systems which are commonly used for measuring the time.

Register Number :

Name of the Candidate :

0 2 4 3

B.E. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-503 / PCLEC-105.

STRUCTURAL MECHANICS - I

May] [Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.
ALL questions carry EQUAL marks.

Turn Over

UNIT - I

1. Draw the BMD for the beam shown in figure-1.

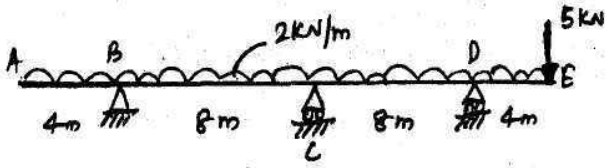

Figure-1.

(OR)

2. Using theorem of three moments, draw BMD and SFD for the beam shown in figure-2.

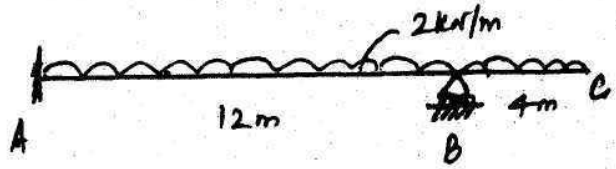

Figure-2.

UNIT – II

3. Draw the influence line diagram for the following forces in a simply supported beam of 6 m span and with 1·5 m overhang on either side :

   (a) ILD for support reactions.

   (b) ILD for shear force at 2·5 m from left support.

   (c) ILD for bending moment at 3·0 from left support.

(OR)

4. Four point loads of 120 kN, 160 kN, 180 kN, 100 kN spaced at 3 m between consecutive loads move on a girder of span 30 m, from the left to right wih 100 kN load leading. Calculate maximum bending moment at a point 10 m from left support. Also, calculate the position and value of the absolute maximum bending moment.

UNIT - III

5. A parabolic three hinged arch of span 30 m and central rise 7·50 m carries *udl* of 30 kN/m over the entire right half portion. It also carries two point loads of 30 kN and 35 kN at 3 m and 7 m from left support respectively. Determine the resultant reaction at supports and find the bending moment, normal thrust and radial shear at 7·5 m from left support. Also, find the intensity of maximum bending moment.

(OR)

6. A two hinged parabolic arch has a varying moment of inertia given by $I = I_0 \sec \theta$. The span of the arch is 30 m and central rise 7·50 m. Calculate the maximum positive and negative bending moments at a section 7·5 m from left support due to a rolling point load of 10 kN.

UNIT - IV

7. A suspension cable is hung between two points A and B separated by a horizontal distance of 100 m and carries a UDL of 30 kN/m. The maximum dip of the cable measured from A and B are 10 m and 5 m respectively. Determine the horizontal component of tension in the cable. Also, determine the length of the cable needed to connect A and B.

(OR)

8. A suspension cable of span 100 m and central dip of 10 m is stiffened by a three hinged girder. The dead load is 12 kN/m. Determine the maximum bending moment anywhere in the girder when a load of 120 kN rolls from left to right. Determine the maximum tension in the cable.

UNIT - V

9. Analyse the beam girder in figure-3 by moment distribution method and draw the BMD.

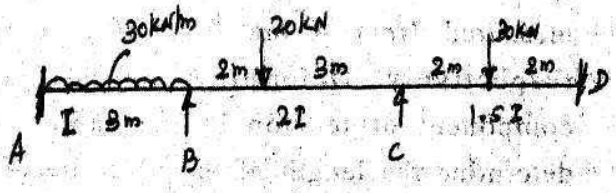

Figure-3

(OR)

10. Analyse the frame shown in figure-4 by moment distribution method and draw the BMD.

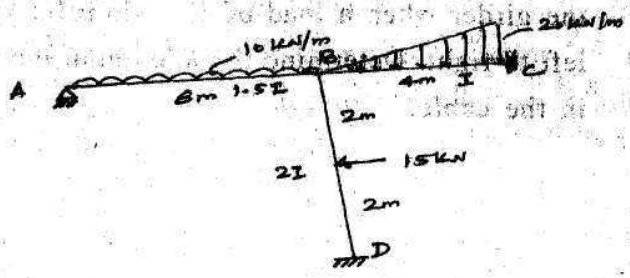

Figure-4

Register Number :

Name of the Candidate :

0 2 4 4

B.E. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-504 / PCLEC-302. SOIL MECHANICS

(New Regulations)

May] [Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. In a compaction test on a soil, the mass of wet soil when compacted in the mould was 1·855 kg. The water content of the soil 16%. If the volume of the mould was 0·95 litres, determine the dry density, void ratio, degree of saturation and percentage of air voids. Take G = 2·68 (12)

(OR)

Turn Over

2. (a) Define the terms:

(i) Void ratio.

(ii) Water content.

(iii) Degree of saturation. (6)

(b) Develop a relationship between the void ratio, water content, specific gravity of particles and degree of saturation. (6)

UNIT – II

3. The water table in a certain area is at a depth of 4 m below the ground surface. To a depth of 12 m, the soil consists of very fine sand having an average voids ratio of 0·7. Above water table the sand has an average degree of saturation of 50%. Calculate the effective pressure on a horizontal pane at a depth 10 metres below the ground surface. What will be the increase in the effective pressure if the soil gets saturated by capillary up to a height of 1m above the water table? Assume G = 2·65 (12)

(OR)

4. Calculate the co-efficient of permeability of soil sample, 6 cm height and 50 cm^2 in cross sectional area, if a quantity of water equal to 430 ml passed down in 10 minutes, under an effective constant head of 40 cm. On oven drying, the test specimen has mass of 498 g. Taking the specific gravity of soil solids as 2·65, calculate the seepage velocity of water during the test. (12)

UNIT – III

5. Explain Terzaghi's theory of one dimensional consolidation. List the various assumptions. (12)

(OR)

6. A water tank is supported by a ring foundation having outer diameter of 10 m and inner diameter of 7·5 m. The ring foundation transmits uniform load intensity 160 kN/m^2. Compute the vertical stress induced at a depth of 4 m below the centre of ring foundation, using

(a) Boussinsq analysis.

and (b) Westergaard's analysis. (12)

UNIT – IV

7. Briefly explain direct shear test. (12)

(OR)

8. Briefly discuss about triaxial testing with various drainage conditions. (12)

UNIT –V

9. Write notes of friction circle method of analyzing the stability of slopes. (12)

(OR)

10. A new canal is excavated to a depth of 5 m below ground level, through a soil having the following characteristics: $c = 14\ kN/m^2$ $\phi = 150$, $e = 0{\cdot}8$ and $G = 2{\cdot}70$. The slope of banks is 1 in 1. Calculate the factor of safety with respect of cohesion when the canal runs full. If it is suddenly and completely emptied, what will be the factor of safety? (12)

Register Number :

Name of the Candidate :

0245

B.E. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505 / PCLEC-403.
STRUCTURAL ENGINEERING - II

May] [Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.
Use of IS 456, SP15, IS 800 and Steel Tables are permitted.
Assume suitable data wherever necessary.
ALL questions carry EQUAL marks.

UNIT – I

1. What do you understand by substitute frame? How do you select it? Discuss the methods of analysis in detail.

(OR)

Turn Over

2. Analyse the building frame shown in figure-1 by portal method. Assume that all the columns have equal area of cross section for the purpose of analysis.

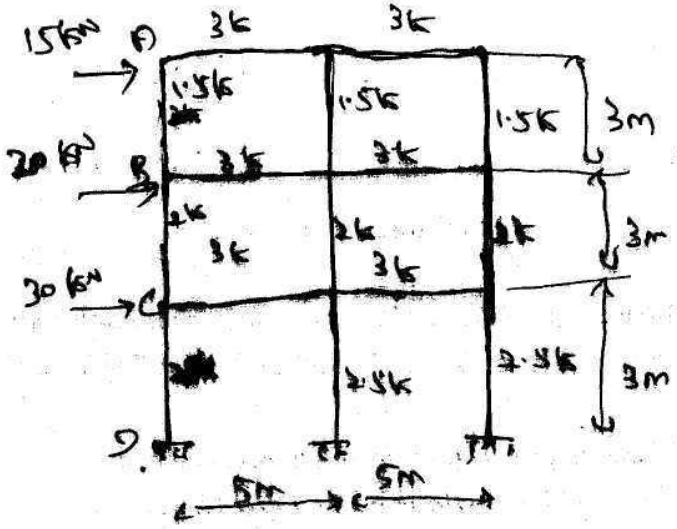

Figure -1

UNIT - II

3. Design a cantilever retaining wall to retain earth embankment 3 m high above ground level. The unit weight of earth is 18 kN/m^3 and its angle of repose is 30°. The embankment is horizontal at its top. SBC of soil is 150 kN/m^2. Co-efficient of friction between soil and concrete is 0·5. Use M20 concrete and Fe 415 steel.

(OR)

4. Design a counterfort retaining wall to retain 7 m high embankment above ground level. The foundation is to be taken 1 m deep where the SBC of soil is 180 kN/m^2. The top of the earth retained is horizontal and soil weighs 18 kN/m^3 with angle of repose 30°. Use M 20 concrete and Fe 415 steel.

UNIT - III

5. Design a rectangular water tank of size 5 m × 4 m × 3 m deep resting on firm ground. Use M 25 concrete and Fe 415 steel.

(OR)

6. Design a flat bottom circular elevated water tank of diameter 10 m and total height 4 m which is to be supported by a ring beam of 7·5 m diameter. The ring beam is to be supported by six columns equally placed. Use M 25 concrete and Fe 415 steel. Design the dome, top ring beam and cylindrical wall of the tank.

UNIT - IV

7. Design a reinforced concrete slab culvert for the following data :

   Clear span = 5m.

   Width of roadway = 6·8 m.

   Width of supports = 400 mm.

   Width of kerbs = 600 mm.

   Thickness of wearing coat = 80 mm.

   Loading = IRC class-A.

   Materials = M20 concrete and Fe 415 steel.

(OR)

8. Design the desk slab for a RC Tee beam bridge to suit the following data :

   Clear width of roadway = 7·5 m.

   Span (c/c bearing) = 16 m.

   Live load = IRC class-AA.

   Thickness of wearing coat = 80 mm.

   Material =M25 concrete and Fe 415steel.

   Size of the slab panel may be assumed as 2·5 m × 4m.

UNIT - V

9. What are the various elements of an industrial building? Explain them with neat sketches.

(OR)

10. Design a I-section for an industrial building to support a GI sheet roof to suit the following data :

    Spacing of trusses = 5 m.

    Spacing of purlins = 1·5 m.

Inclination of main rafter to horizontal 30°.

Weight of GI sheets = 130 N/m^2.

Wind load = 1·0 kN/m^2.

Imposed load = 1·5 kN/m^2.

Register Number :

Name of the Candidate :

0 2 4 7

B.E. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-506. TRANSPORATION ENGINEERING - II

May] [Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.
ALL questions carry EQUAL marks.

UNIT - I

1. (a) What are the requirements of an ideal permanent way? What are the factors that govern the cross section and length of rails? (8)

(b) Explain any two joints used in Indian railway lines with neat sketches. (4)

(OR)

Turn Over

2. Describe the step by step procedure of plate laying operation for construction of a broad gauge railway track. (12)

UNIT – II

3. Draw a neat sketch of points and crossings. Describe its components. (12)

(OR)

4. (a) How the railway stations are classified? Briefly explain with sketches the layout of junction stations. (6)

   (b) Draw sketch of a hump type of marshalling yard and explain its operation. (6)

UNIT – III

5. State the need for lining the tunnels and explain the method of lining the tunnel using shotcrete. (12)

(OR)

6. Describe shield method of tunneling and method of excavation adopted. (12)

UNIT - IV

7. What are floating signals? Briefly describe the different types of floating signals. (12)

(OR)

8. (a) Explain the classifications of harbours under different heads bringing out the requirements of each. (8)

   (b) Explain the functions of a breakwater. (4)

UNIT – V

9. Define dredging. Explain the reasons for its adoption. How the dredged material is disposed off? (12)

10. (a) How are navigational channel classified? (4)

    (b) What are the functions of wet docks. Explain with neat sketches. (8)