B.E. DEGREE EXAMINATION, 2016

[CIVIL, CIVIL AND STRUCTURAL, MECHANICAL ENGINEERING]

(FIFTH SEMESTER)

CLEC - 501 / CSEC - 501 / MEEC - 501 / PMEEC - 401. NUMERICAL METHODS

(For the candidates who joined in 2011-12 and after)

(Common with Part - Time (Mechanical))

November] [Time : 3 Hours

Maximum : 75 Marks.

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT - I

1. (a) Evaluate $\Delta \log f(x)$, the interval of differencing being h. (8)

   (b) Solve $y_{1+2} + 6y_{n+1} + 9y_n = 2^n + 4n$. (7)

(OR)

2. (a) Prove that $\left(\frac{\Delta^2}{E}\right) u_x \neq \frac{\Delta^2 u_x}{E u_x}$, taking '$h$' as the interval of differencing. (8)

   (b) Solve: $y_{n+2} - 2y_{n+1} + y_n = n2^n$. (7)

UNIT - II

3. (a) Use Gauss's interpolation formula, find y (16) given that (8)

x:	5	10	15	20	25
y:	26·782	19·951	14·001	8·762	4·163

   (b) Evaluate $I = \int_4^{5.2} \log_e x \, dx$ using Simpson's rule by taking $h = 0{\cdot}2$. (7)

(OR)

4. (a) Using Lagrange's interpolation formula, find y (10) from the following table: (8)

x:	5	6	9	11
y:	12	13	14	16

(b) The following data gives the corresponding values for pressure and specific volume of a superheated steam: (7)

Volume v:	2	4	6	8	10
Pressure p:	105	42·7	25·3	16·7	13

Find the rate of change of pressure with respect to volume when $v = 2$.

UNIT - III

5. (a) Find the positive root of $x^3 - x - 1 = 0$ correct to 4 decimal places by bisection method. (8)

(b) Sovle the following system by Gauss - Jordan method. (7)

$3x + 4y + 5z = 18;$

$2x - y + 8z = 13;$

$5x - 2y + 72 = 20.$

(OR)

6. (a) Find a positive root of $x \log_{10} x = 1{\cdot}2$ by Newton's method correct to 4 decimal places. (8)

(b) Solve the following system by Gauss-seidel method. (7)

$10x - 5y - 2z = 3;$

$4x - 10y + 3z = -3;$

$x + 6y + 10z = -3.$

UNIT - IV

7. (a) Using Euler's Modified method , get y (0·2) and y (0·4) given $\frac{dy}{dx} = y - x^2 \; y(0) = 1.$ (8)

(b) Determine y at $x = 0{\cdot}2$ by using Runge - Kutta method of fourth order by solving

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}, \; y(0) = 1.$$ (7)

(OR)

3128

B.E. DEGREE EXAMINATION, 2016

[CIVIL ENGINEERING]

(FIFTH SEMESTER)

CLEC - 502. SURVEYING - II

November] [Time : 3 Hours

Maximum : 75 Marks.

Answer any ONE FULL question from each unit.

UNIT - I

1. A tacheometer was setup at station A and the following readings were obtained on a vertically held staff:

station	staff station	vertical Angle	Hair readings	Remarks
A	B.M	-2°18'	3.225,3.550,3.875	R.L of B.M=
	B	+8°36'	1.650,2515,3.380	437.655m

Calculate the horizontal distance from A to B and R.L of B, if the constants of the instrument were 100 & 0.40. (15)

(OR)

2. (a) Explain how you would determine the constants of a tacheometer. (8)

(b) What are the advantages of an anallactic lens used in a tacheometer? (7)

UNIT - II

3. Explain the procedure for setting out of simple circular curve by deflection angles. (15)

(OR)

4. A compound curve is to connect two straights having a deflection angle of 90°. As determined from the plan, the lengths of the two tangents are 350 m and 400 m respectively. Calculate the length of the two arcs if the radius of the first curve is 300 metres. (15)

UNIT - III

5. What are the requirements of signal? Explain about the various types of signals with neat sketches. (15)

(OR)

6. From the eccentric station S, 12.25 m to the west of the main station B, the following angles were measured,

$\angle BSC = 76^\circ 25' 32''$ $\angle CSA = 54^\circ 32' 20''$

The stations S and C are to the opposite sides of the line AB. Calculate the correct angle ABC, if the lengths AB and BC are 5286.5 m and 4932.2 m respectively. (15)

UNIT - IV

7. The following are the observed values of A,B and C at a station, the angles being subject to the condition that A + B = C:

A = 30° 12′ 28″·2°

B = 35° 48′ 12″·6°

C = 30° 0′ 44″·4° .

Find the most probable values of A, B and C. (15)

(OR)

8. The angles of a triangle ABC were recorded as follows:

A = 77° 14′ 20″ weight 4

B = 49° 40′ 35″ weight 3

C = 53° 04′ 52″ weight 2

Give the corrected values of the angles.

UNIT - V

9. (a) What is equation of time? show, by mean of sketches that it vanishes four times a year. (10)

(b) Explain the following terms: (i) Celestial sphere. (ii) Parallax. (5)

(OR)

10. To determine the azimuth of reference object from station B (Lat. 51° 30′ 31″ N) of a triangulation survey, the Sun was observed at $4^h\ 30^m\ 13^s$ P.M (G.M.T) after crossing the meridian. The observed altitude of the Sun's centre was 38° 28′ 25″ and the horizontal angle measured anticlockwise from R.O to the Sun was 161° 35′ 20″. The apparent declination of the Sun at G.M.N was 20° 5′ 38″., increasing 30″.42 per hour. The Sun's horizontal parallax may be taken as 8″.7 and the refraction correction - $58'' \cot\alpha$. Calculate the azimuth of R.O. (15)

3129

B.E. DEGREE EXAMINATION, 2016

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-503 / PCLEC-105 · (B). STRUCTURAL MECHANICS - I

November] [Time : 3 Hours

Maximum : 75 Marks

(5 × 15 = 75)

Answer ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. A beam AB of span L is fixed at its ends are carrying a central point load W. Determine the fixed end moments, if the moment of inertia for central half of the span is 2I and that for both the quarters of the span is I.

(OR)

2. Using column analogy method, plot the bending moment diagram for the frame shown in figure - 1.

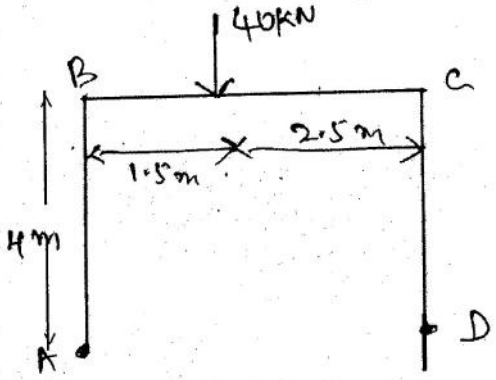

Figure - 1.

UNIT - II

3. Two points loads of 250 kN and 200 kN spaced 2·5 m apart cross a girder of span 15 m with left to right with the 200 kN leading. Draw the Influence Line diagram (ILD) for shear force and bending moment and find the values of maximum shear force and bending moment at 5 m from the left hand support. Also, determine the absolute maximum bending moment due to the given loading conditions.

(OR)

4. Draw the Influence Line diagram (ILD) for the reaction at the propped support of a propped cantilever beam of span 5 m. Take EI as constant.

UNIT - III

5. A parabolic two hinged arch of span 40 m and a central rise of 5 m is subjected to a central concentrated load of 30 kN. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal thrust and reactions at the hinge. Also, determine maximum bending moment.

(OR)

6. A parabolic three hinged arch of span 20 m with a central rise of 4 m is hinged at the crown and the ends are supported. It carries a UDL of 30 kN/m on the left half of the span. Determine the
   (a) Resultant reactions at the supports and
   (b) Bending moment and the radial shear at a section 8 m from the left side support.

UNIT - IV

7. A steel wire of uniform section, is hung in the form of a parabola. Find the maximum horizontal span, if the central dip is $\frac{1}{12}^{th}$ of the span and stress in the steel wire is not to exceed $1{\cdot}2 \times 10^5$ kN/m^2. Take density of steel as $7{\cdot}8 \times 10^5$ kN/m^3.

(OR)

8. A cable is supported at 120 m apart at the same level has a central dip of 10 m. Find the increase in the dip due to rise in temperature of 200° C. (Consider $\alpha = 12 \times 10^{-6°}$ C.)

UNIT - V

9. Analyze the continuous beam ABC with a span of 11 m as shown in figure - 2 by moment distribution method and draw the shear force diagram. Take EI as constant.

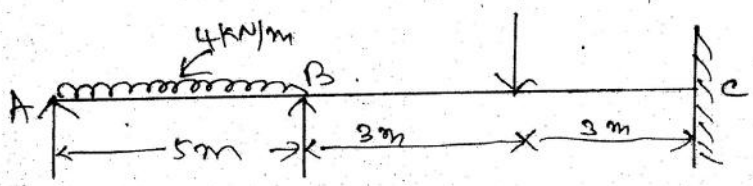

Figure - 2

(OR)

10. Analze the portal frame ABCD shown in figure - 3 by moment distribution method and draw the bending moment diagram.

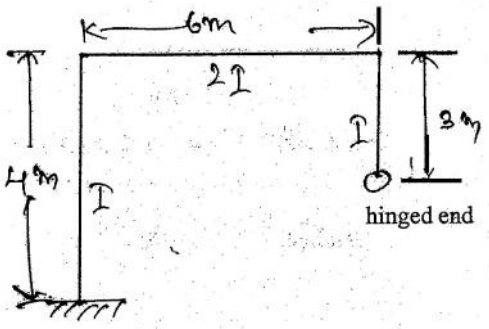

Figure - 3.

3130

B.E. DEGREE EXAMINATION, 2016

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-504 / PCLEC-302. SOIL MECHANICS

(Common with Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer ONE FULL question from each unit.

UNIT – I

1. Explain the standard protector compaction test with neat sketches. (15)

(OR)

2. A soil is to be excavated from burrow pit which has a density of 17·66 kN/m^3 and water content 12 %. The specific gravity of the soil particle is 2·7. The soil is compacted so that the water content is 18 % and dry density is 16·22 kN/m^3. Estimate the quantity of soil to be excavated from the pit, amount of water to be added and void ratios of soil in burrow pit and fill for 1000 cu.m of soil in full. (15)

UNIT - II

3. A layer of fine sand 3 m in thickness rests on a bed of soft clay and the water table is at depth of 2 m below the ground level. The porosity of sand is 50 % and the degree of saturation of sand above the water table is 60 % and specific gravity of solids is 2·7. The specific gravity of solids and water content of the clay are 2·72 and 40 % respectively. Draw the variation of stress upto 7 m depth from the ground level. (15)

(OR)

4. (a) State the properties and explain the uses of flow nets. (8)

   (b) Bring out the effects of compaction on various engineering properties of soil. (7)

UNIT - III

5. A layer of clay 2 m thick undergoing consolidation of beneath a building caused a settlement of 25 mm in 100 days after the weight of the building had been added. Lab results indicate that this corresponds to 25 % consolidation of the clay layer. Find the time of consolidation for 50 mm, 90 mm and 100 mm consolidation of the same layer. (15)

(OR)

6. Explain the New Mark's influence chart in detail. (15)

UNIT - IV

7. Explain the triaxial test to determine the shear strength of soil. (15)

(OR)

8. A sand deposit contains three distinct horizontal layers of equal thickness. The co-efficient of permeability of the upper and lower layers is 10^{-3} cm/sec and that the middle is 10^{-2} cm/sec. What are the values of horizontal and vertical co-efficients of three layers and what is their void ratio? (15)

UNIT - V

9. Explain in detail the Bishop's method of stability analysis of slopes. (15)

(OR)

10. (a) Discuss in detail the various methods of slope protection. (8)

    (b) Explain how factor of safety is obtained for a finite slope made of purely cohesive soil by slip circle method. (7)

B.E. DEGREE EXAMINATION, 2016

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505. STRUCTURAL ENGINEERING - II

(New Regulations)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer ONE FULL question from each unit.

Use of IS : 456 -2000, IS : 800-2007, SP : 7-1983, SP : 16-1980 are permitted.

ALL questions carry EQUAL marks.

UNIT – I

1. Analyse a two storey frame using portal method which are spaced at 3 m c/c having horizontal loads of 150 kN and 140 kN at 1^{st} and 2^{nd} storey. The frame consists of three spans of 5 m, 4 m, 3 m and a height of 3 m each. Assume suitable data as required. (15)

(OR)

2. Design the beam for the mid-span of a four storey frame using substitution frame method which are spaced at 4 m c/c having a live load of 3 kN/m^2 and dead load of 4 kN/m^2 on the frame. The frame consists of three spans of 5 m, 3 m, 2 m and a height of 3 m each and the size of the column is 450 × 350 mm and that of beam is 300 × 400 mm respectively. Adopt M 20 concrete and Fe 415 steel. The unit weight of concrete is 25 kN/m^3 and assume suitable data required. (15)

UNIT - II

3. A cantilever retaining wall has the following particulars :

   Height above foundation level = 5 m. Level of earth retained = horizontal.

   Angle of repose of soil retained = 30°. Density of earth retained = 15 kN/m^3.

   Co-efficient of friction between soil and base slab = 0·5.

   Safe bearing capacity of soil = 150 kN/m^2.

   Assuming the thickness of stem and base slab as 300 mm, calculate the base slab dimensions for stability considerations. (15)

(OR)

4. A counterfort retaining wall retains earth (with horizontal fill) to a height of 8 m from the top of the base slab. The counterforts are spaced at 3 m c/c. Co-efficient of internal friction and desnity of earth retained are 30° and 15 kN/m^3 respectively. Design an interior panel of the stem between two counterfort. Assume the thickness of the counterforts as 300 mm. (15)

UNIT - III

5. A rectangular OHT has inner dimensions 5 m × 3 m × 3 m height. Design a short wall for design forces in the vertical direction only. Assume the base of the wall to be fixed. Tank is open at the top. (15)

(OR)

6. Design the base slab of a circular water tank for a capacity of 5,00,000 litres and the depth of water to be stored in 5 m. The tank is supported by a masonry staging of 2 m height above ground level. Adopt M 20 concrete and Fe 415 steel for calculations and design.(15)

UNIT - IV

7. Design the side wall of a box culvert having inside dimensions 4 m × 4 m and is subjected to a superimposed load of 15,000 N/m^2 and a live load of 50,000 N/m^2 from the top. Assume unit weight of soil as 18,000 N/m^3 and angle of repose 30°. Adopt M 20 concrete and Fe 415 steel for calculation and design. (15)

(OR)

8. Design a solid slab bridge for class-A loading for the following data :

   Clear span = 5 m. Clear width of roadways = 7·5 m.

   Average thickness of wearing coat = 75 mm.

   Take unit weight of concrete as 25 kN/m^3. Use M 20 concrete and Fe 415 steel for design. (15)

UNIT - V

9. Design a purlin on sloping roof truss with dead load of 0·15 kN/m^2 (cladding and insulation), a live load of 2 kN/m^2 and wind load of 0·5 kN/m^2 (suction). The purlins are 2 m c/c and of span 4 m, simply supported on a rafter at a slope of 20°. Provide channel section purlin.(15)

(OR)

10. Discuss in detail the elements of an industrial building and also, the various types of loads on industrial building. (15)

3133

B.E. DEGREE EXAMINATION, 2016

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-506. TRANSPORTATION ENGINEERING - II

November] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. (a) Write a brief note on Indian Railways. (7)

   (b) What are the different gauges and what are the factors affecting the choice of gauge? (8)

(OR)

2. (a) What are the requirement of permanent way? (8)

   (b) Comparison between roadways and railways. (7)

UNIT - II

3. Explain with neat sketch points and crossing. (15)

(OR)

4. (a) List out the components of turnout and describe briefly. (9)

   (b) What are the methods adopted for sleepering of turnout? Explain with sketch. (6)

UNIT - III

5. (a) Define tunnel. (3)

   (b) List the advantages and disadvantages of tunnel and open cuts? (12)

(OR)

6. Write a brief note on the following :

   (a) Lining of tunnel. (b) Shafts. (c) Tunnel ventilation. (5 + 5 + 5)

UNIT - IV

7. What are the measures considered while selection of site and planning of harbours? (15)

(OR)

8. (a) What are the basic requirements of navigational signal? (3)

   (b) Explain fixed navigational structures. (12)

UNIT - V

9. (a) What is dredging? (3)

   (b) What are the types of dredgers? Explain. (12)

(OR)

10. (a) Briefly discuss the design consideration of floating docks. (8)

    (b) Clarify various types of floating docks and mention their advantages and disadvantages. (7)