Register Number :

Name of the Candidate :

0 2 2 2

B.E. DEGREE EXAMINATION, 2014

(CIVIL, CIVIL AND STRUCTURAL ENGINEERING)

(FIFTH SEMESTER)

CLEC-501 / CSEC-501. NUMERIICAL METHODS

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 Marks for those who joined before 2011-12)

Answer any ONE FULL question from each unit.
EACH question carries FIFTEEN marks.

UNIT – I

1. (a) Evaluate $\Delta^2\left(\frac{5x+12}{x^2+5x+6}\right)$, the interval of differencing being unity. (8)

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

(OR)

2. (a) Prove that $\left(\frac{\Delta^2}{E}\right) e^x \cdot \frac{E(e^x)}{\Delta^2 e^x} = e^x$, taking h as the interval of differencing. (8)

   (b) Solve : $y_{n+2} - 6y_{n+1} + 8y_n = 2^n + 6n$. (7)

UNIT - II

3. (a) Use Lagrange's formula to fit a polynomial to the data and hence, find the value of y at $x = 1$ and 4. (8)

x:	–1	0	2	3
y(x)	–8	3	1	12

Turn Over

(b) Compute the value of $\int_{0\cdot2}^{1\cdot4} \left(\sin x - \log_e x + e^x \right) dx$ taking $h = 0\cdot2$ by sing Simpson's rule. (7)

(OR)

4. (a) From the following data, find y at $x = 43$ and $x = 84$. (8)

x:	40	50	60	70	80	90
y(x)	184	204	226	250	276	304

(b) Find the velocity and acceleration of the slider of a machine which moves along a fixed straight rod when $t = 0\cdot3$ with the following data; (7)

t (sec.)	0·0	0·1	0·2	0·3	0·4	0·5	0·6
x(cm) distance along the rod	30·13	31·62	32·87	33·64	33·95	33·81	33·24

UNIT III

5. (a) Find the positive root of $x^3 - 9x + 1 = 0$, correct to four places of decimals by bisection method. (8)

(b) Solve by Crout's method, the following :

$x + y + z = 3$; $2x - y + 3z = 16$; $3x + y - z + 3 = 0$. (7)

(OR)

6. (a) Find a positive root of $xe^x = \cos x$ by Newton's method, correct to four places of decimals. (8)

(b) Solve the following system by Gauss-Jordan method:

$x + 3y + 10z = 24$; $2x + 17y + 4z = 35$; $28x + 4y - z = 32$. (7)

UNIT - IV

7. (a) Determine the solution y at $x = 0{\cdot}2$ and $0{\cdot}4$ by using Runge-Kutta method of fourth order by solving $\frac{dy}{dx} = \frac{y - x^2}{y + x^2}$, $y(0) = 1$. (8)

   (b) Using Milne's predictor and corrector method, evaluate y (0·4), if y satisfies $\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^2}$ and y (1) =1, y(1·1)= 0·996, y(1·2) = 0·986, y(1·3)= 0·972. (7)

(OR)

8. (a) Using Picard's method to approximate the value of y when $x = 0{\cdot}25$. given that $\frac{dy}{dx} = 3x + y^2$ and y(0) =1 (upto second approximations) (8)

   (b) Using Euler's modified method, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$,

   given y(0) = 1 at $x = 0{\cdot}1$ and 0·2. (8)

UNIT - V

9. Find the solution of the parabolic equation $2\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ when u (0, t) = u (4, t) = 0 and u (x, 0) = x (4 – x), taking $h = 1$ by Bender-Schmidt's method upto t =5. (15)

(OR)

10. Find the nodal values of the wave equation $2\frac{\partial^2 u}{\partial t^2} = 16\frac{\partial^2 u}{\partial x^2}$ given that u (0, t) = u (5, t) = 0; u (x, 0) = x^2 (5 – x) and $\frac{\partial u}{\partial t}(x, 0) = 0$ taking $x = 1$ and $\Delta x = 1$ upto two time levels. (15)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-502 / PCLEC-102. SURVEYING - II

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum : 60 Marks for those who joined before 2011-12)

Answer ONE FULL question from each unit
*EACH full question carries **15** marks.*

UNIT - I

1. Draw a neat sketch of a movable hair stadia diaphragm and label its parts. (15)

(OR)

2. Explain the principle of working of a sextant. How is it different from an optical square ? (15)

UNIT - II

3. (a) Explain the different obstacles encountered in chain surveying. (7)

   (b) List the instruments used for setting right angles. Explain the construction and function of a cross staff. (8)

(OR)

4. (a) Explain the requirements of a transition curve. (7)

   (b) Briefly explain the different methods of traversing with a theodolite. (8)

Turn Over

UNIT - III

5. (a) Explain with sketches, the different triangulation systems. (7)

   (b) Describe the different aspects of fieldwork in triangulation. (8)

(OR)

6. (a) Explain the different types of signals used in triangulation. (7)

   (b) List the different methods for base line measurement. (8)

UNIT - IV

7. Explain the method of making sets while measuring angles with the repetition and reiteration methods. (15)

(OR)

8. (a) State the laws of weights. (3)

   (b) Write a short note on probable value and probable error. (8)

   (c) Explain the method used to adjust a line of levels. (4)

UNIT - V

9. Find the co-ordinates in terms of the Azimuth and altitude of a star if the latitude of the observer is 42° North, the declination is 26° 30' and the hour angle is 42°. (15)

(OR)

10. (a) Enumerate the elements of spherical triangle. (7)

    (b) Write a short note for determination of latitude and longitude. (8)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-503 / PCLEC-105. STRUCTURAL MECHANICS - I

May]

[Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

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

UNIT – I

1. A uniformly distributed load of 1 kN per metre run 6 m long crosses a girder of 16 m span constant the maximum shear force and bending moment diagrams and calculate the values at sections at 3 m, 5 m and 8 m from the left hand support.

(OR)

2. A horizontal beam ABC is hinged at A and simply supported at B. The span is 15 m. The cantilever portion is 6 m long. Draw the influence line for bending moment for the points D and E respectively 2 m from A and 4 m from C. Determine the maximum bending moments at D and the maximum bending moment at E due to a rolling load of 1 kN/m of length 3 m. State the corresponding position of the load.

UNIT – II

3. Determine the influence line for R_A for the continuous beam as shown in figure-1. Compute the ordinates at every 1 m interval.

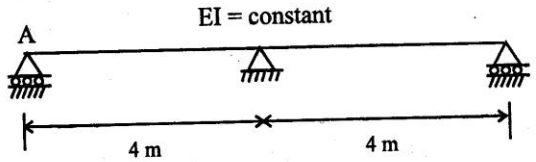


Figure - 1

(OR)

4. A beam ABCD, 16 m long is continuous over three spans. AB = 6 m, BC = 5 m and CD = 5 m. The supports being at the same level. There is a UDL of 20 kN/m over BC. On AB, there is a point load of 80 kN at 2 m from A and CD, there is a point load of 60 kN at 3 m from D. Calculate the moments and reactions at the support.

UNIT – III

5. A three hinged parabolic arch of 20 m span and 4 m central rise carries a point load of 4 kN at 4 m horizontally from the left hand hinge. Calculate the normal thrust and shear force at the section under the load. Also, calculate the maximum B.M positive and negative.

(OR)

6. A two hinged parabolic arch of span 40 m and rise 8 m subjected to a temperature rise of 22 K. Calculate the maximum bending stress of the crown due to the temperature rise if 11×10^{-6} per 1^{o} K and E = $2{\cdot}1 \times 10^{5}$ N/mm^2. The rib section is symmetrical and 1m deep.

UNIT – IV

7. A cable is used to support four equal and equidistant loads over a span of 24 m. Find the length of the cable required and its sectional area, if the safe tensile stress is 130 N/mm^2. The central dip of the cable is 2 m and loads are 6 kN each.

(OR)

8. A symmetrical three pinned stiffening girder of a suspension bridge is 200 m long. Determine the magnitude of the largest B.M that can be exerted by a moving load 200 kN uniformly distributed over a length of 10 m. Indicate the position of the load for this condition.

UNIT – V

9. A beam ABC, 12 m long, fixed at A and C and continuous over support – B, is loaded as shown in figure-2. Calculate the end moments and plot the BMD.

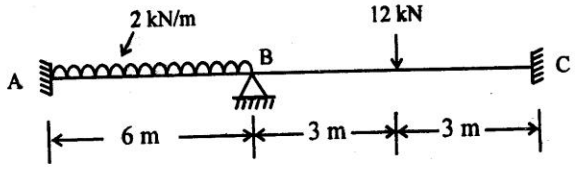
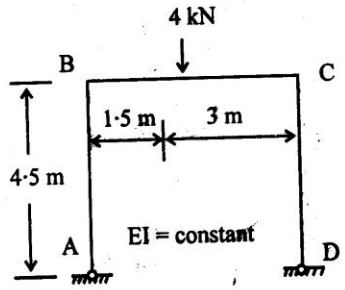


Figure- 2

(OR)

10. A portal frame ABCD is hinged at A and D, and has rigid joints at B and C. The frame is loaded as shown in figure-3. Plot the BMD for the frame.



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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-504 / PCSEC-302. SOIL MACHANICS

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

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

UNIT – I

1. (a) Define shrinkage limit & plastic limit. (5)

   (b) What are the factors affecting compaction? (10)

(OR)

2. The mass of a moist sample of soil is 25 kg. and is its volume is 0·014 m^3. After drying in an oven, the mass of soil reduces to 15·6 kg. Determine the water content, density of moist soil, dry density, void ratio, porosity and degree of saturation. Take grain specific gravity G = 2·68. (15)

UNIT – II

3. (a) What are the principles of permeability? (5)

   (b) Explain the methods of determination of co-efficient of permeability. (10)

(OR)

Turn Over

4. Determine the average co efficient of permeability in directions parallel and bedding planes of a stratified deposit of soil consisting of 3 layers of total thickness 2·5 m. the top and bottom layers are each 0·75 m thick. The co-efficient of permeability of the top middle and bottom layers are $2{\cdot}5 \times 10^{-4}$ cm/s, $3{\cdot}25 \times 10^{3}$ cm/s and 1×10^{-2} cm/s respectively. Assume the layer to be isotropic. (15)

UNIT – III

5. (a) Differentiate between total settlement and differential settlement. (5)

   (b) A Circular footing of 1·5 m radius transmits a uniform pressure of 90 kN/m^2. Calculate the vertical stress at point 1·5 m directly beneath its center. (10)

(OR)

6. Explain the components of settlement. And also, State the limitations of Boussinesq's equation. (15)

UNIT – IV

7. Explain direct shear test. What are the advantages of this test? What are its limitations? (15)

(OR)

8. In a drained triaxial compression test, a saturated sample of cohesionless sand fails under a deliver stress of 5·35 kg/cm^2. when the cell pressure is 1·5 kg/cm^2. Find the effective angle of shear resistance of sand and the approximate inclination of the failure plane to the horizontal using analytical method.

UNIT – V

9. Derive the equation for stability of infinite slope of cohesive soil and cohesionless soil. (15)

(OR)

10. (a) What are the uses of stability number? (5)

    (b) Write briefly about friction circle method. (10)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505. STRUCTURAL ENGINEERING - II

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

Answer any FIVE questions, choosing ONE 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. Design the beam for the mid span of the four storey frame using substitute frame method which are spaced at 3·5 metres center to center having a live load of 4 kN/m^2 and dead load of 3 kN/m^2 on the frame. The frame consists of three spans of 6 m, 4 m, 3 m and a height of 3·5 m each and the size of the column is 450 × 300 mm and that of beam is 300 × 450 mm respectively. Adopt M-20 grade concrete and Fe-415 steel. The unit weight of concrete may be taken as 25 kN/m^2 and assume suitable data, if required.(15)

(OR)

2. Analyse the two storey frame using portal or cantilever method which are spaced at 3·5 metres center to center having a horizontal load of 180 kN and 120 kN at first and second storey. The frame consists of three spans of 7 m, 3·5 m, 5 m and a height of 3·5 m each and assume suitable data, if required. (15)

Turn Over

UNIT – II

3. Design the stem of a cantilever type retaining wall for the following data:

   (i) Height of wall above ground = 4 m

   (ii) Depth of foundation = 1·2 m below ground level.

   (iii) Unit weight of earth fill = 14 kN/m^3.

   (iv) Safe bearing capacity of soil = 180 kN/m^2.

   (v) Coefficient of friction = 0·5.

   (vi) Angle of internal friction = 30^o.

   (vii) Concrete grade = M-20.

   (viii) Steel grade = Fe-415. (15)

(OR)

4. Design the counter fort for a retaining wall based on the following data:

   (i) Height of wall above ground = 6 m

   (ii) Spacing of counter forts = 3 m c/c

   (iii) Depth of foundation = 1·5 m

   (iv) Unit weight of earth fill = 16 kN/m^3

   (v) Safe bearing capacity of soil = 160 kN/m^2

   (vi) Coefficient of friction = 0·5

   (vii) Angle of internal friction = 30^o.

   (viii) Concrete grade = M-20.

   (ix) Steel grade = Fe-415. (15)

UNIT – III

5. Design the base slab of a circular water tank with domical top for a capacity of 4 lakh litres and the depth of water is to be 3 m with a free board of 0·25 m. The tank is supported by a masonry staging of 1 m height above ground level. Adopt M-20 grade concrete and Fe-415 steel. (15)

(OR)

6. Design the dome of an Intze type water tank of capacity 900,000 litres supported on an elevated tower comprising 8 columns. The base of the tank is 16 m above ground level and the depth of foundation is 1·5 m below ground level. Adopt M-20 grade concrete and Fe-415 steel. (15)

UNIT – IV

7. Design the side wall of a box culvert having inside dimension 3·5 m × 3·5 m and is subjected to a superimposed load of 12000 N/m^2 and a live load of 45000 N/m^2 from the top. Assume unit weight of the soil as 18000 N/m^3 and angle of repose 30°. Adopt M-20 grade concrete and Fe-415 steel. (15)

(OR)

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

   (i) Clear span = 4·5 m

   (ii) Clear width of roadways = 7 m

   (iii) Average thickness of wearing coat = 80 mm

   Use M-20 mix. Take unit weight of concrete as 24000 N/m^3. Fe-415 grade steel. (15)

UNIT – V

9. With neat sketch, explain in detail about the major components of an Industrial Building. (15)

(OR)

10. Design the rafter and purlin of a steel roof truss to suit the following data:

   (i) Span of truss = 20 m

   (ii) Type of truss = Fink truss

   (iii) Roof cover = Galvanized corrugated sheeting

   (iv) Materials = Rolled steel angles

   (v) Spacing of roof truss = 4·5 m

   (vi) Wind pressure = 1·5 kN/m^2.

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLCE-506. TRANSPORTATION ENGINEERING - II

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum : 60 Marks for those who joined before 2011-12)

Answer one FULL question from each unit
EACH full question carries 15 marks.

UNIT - I

1. Write down about the historical development and modernization of Indian Railways.(15)

(OR)

2. Draw a typical cross-section of a permanent way. Discuss in brief the basic functions of various components of a railway track. (15)

UNIT - II

3. Draw a neat diagram of simple right-hand and show its various component parts. Explain the working principle of the turnout. (15)

(OR)

4. Explain briefly the different types of station yards. With the aid of neat-sketches, explain the functioning and types of marshalling yard. (15)

UNIT - III

5. Briefly describe the drilling and mucking operations involved in tunnel work. (15)

(OR)

Turn Over

6. (a) How are shafts classified ? Explain briefly any one type of shafts. (10)

(b) Explain with neat sketches - Ground mould. (5)

UNIT - IV

7. Explain briefly about the classification of Harbour based upon the protction needed.(15)

(OR)

8. Explain with neat sketches how mound breakwaters are protected from wave action.(15)

UNIT - V

9. Draw a neat sketch of a dipper dredge and describe its use. What are the special advantages of this type of dredge ? (15)

(OR)

10 (a) What are the effects of dust inhalation in tunnel work ? (5)

(b) Why is lighting necessary in a tunnel ? Describe various types of tunnel lights. (10)