Register Number :

Name of the Candidate :

4139

B.E. DEGREE EXAMINATION, 2017

(CIVIL, CIVIL AND STRUCTURAL, MECHANICAL ENGINEERING)

(FIFTH SEMESTER)

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

(Common with Part- Time)

November] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT - I

1. (a) Express $y = x^4 + 3x^3 - 5x^2 + 6x + 7 = 0$ in factorial polynomials and find $\Delta^4 y$ with interval of spacing $h = 1$. (7)

   (b) Solve : $y_{n+2} - 4y_{n+1} + 3y_n = 2^n + 3^n + 7$. (8)

(OR)

2. (a) (i) Find $\left(E^{-1} \Delta \right) x^3$ with interval of spacing is unity. (4)

   (ii) Prove that with usual notation : $\mu = \frac{2+\Delta}{2\sqrt{1+\Delta}} = \sqrt{1+\frac{1}{4}\delta^2}$ (4)

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

UNIT - II

3. (a) Construct a polynomial from the following data :

x :	0	1	2	3	4
y(x) :	1	11	21	28	29

   and hence, find when $x = 1{\cdot}5$. (7)

(b) Evalaute : $I = \int_{4}^{5\cdot2} \log_e x \, dx$

by using (i) Trapeziodal rule. (ii) Simpson's rule. (8)

(OR)

4. (a) Show that the divided difference of second order can be expressed as the quotient of two determinants of third order. (7)

(b) Find the first and second derivative of the function tabulated below at $x = 0{\cdot}6$, by using Stirling's formulae :

x :	0·4	0·5	0·6	0·7	0·8
y(x) :	1·5836	1·7974	2·0442	2·3275	2·6511

(8)

UNIT - III

5. (a) Solve the postive root by Newton's method the equation $2x - \log_{10} x = 7$ correct to three places of decimals. (7)

(b) Solve the following system by Gauss-Seidel methods :

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

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

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

correct to four places of decimals. (8)

(OR)

6. (a) Solve the following equation by False position method :

$2x - 3 \sin x = 5$, correct to three places of decimals. (7)

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

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

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

$5x - 2y + 7z = 20.$ (8)

UNIT - IV

7. (a) By means of Taylor series expansion, find y at $x = 0{\cdot}1$ and $0{\cdot}2$ correct to three decimal places $\frac{dy}{dx} - 2y = 3e^x$, $y(0) = 0$. (7)

(b) Given $\frac{dy}{dx} + x y^2 = 0$, $y(0) = 2$ find $y(0{\cdot}2)$ with $h = 0{\cdot}1$, using improved Euler's method. (8)

(OR)

8. (a) Given $y'' + xy' + + y = 0$, $y(0) = 1$, $y'(0) = 0$, find the value of y(0·1) using Runge-Kutta method fourth order. (8)

(b) Using Picards iterative formula, solve : $\frac{dy}{dx} = \frac{x^2}{1+y^2}$, $y(0) = 0$, and determine y at $x = 0{\cdot}25$ and $x = 0{\cdot}5$. (7)

UNIT - V

9. Solve : $\nabla^2 u = 8x^2 y^2$ for square mesh, given $u = 0$ on the four boundaries dividing the square into 16 sub-squares of length 1 unit. (15)

(OR)

10. Solve : $\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$, $0 < x < 1$, $t > 0$,

given $u(0, t) = 0$, $u(x, 0) = \frac{\delta u}{\delta x}(x, 0) = 0$, and $u(1, t) = 100 \sin(\pi t)$.

Compute u (x, t) for two time steps. (15)

Register Number :

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4140

B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-502/ PCLEC-102. SURVEYING - II

(Common with Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT - I

1. (a) The elevation of a point P is to be observed from two adjacent stations of a tachometric survey. The staff was held vertically upon the point, and the instrument is fitted with an analytic lens. The constants are 100. Compute the elevation of point P from the following data :

Instrument Station	Height of axis	Staff Point	Vertical Angle	Staff readings	Elevation of station
A	1·42	P	+2° 24′	1·230, 2·055, 2·880	77·750
B	1·40	P	–3° 36′	0·785, 1·800, 2·815	97·135

(OR)

(b) The strata intercept read by means of a fixed hair constant on a vertically held staff is 1·05 m, the angle of elevation being 5° 36′ . The constants are 100 and 0·3. What would be the total number of turns registered on a movable hair instrument at the same station for a 1·75 m intercept on a staff held on the same point, the vertical angle in this case being 5° 24′ and constants are 1000 and 0·5.

UNIT - II

2. (a) Explain the elements of a simple curve, with a neat sketch.

(OR)

(b) Explain the setting out a simple curve by chain and tape method.

UNIT - III

3. (a) Two stations A and B are 72 km apart. The elevations of station A and B are 372 m and 458 m respectively. The intervening ground has a uniform elevation of 328 m. Find the height of the signal required at B, if the line of sight has to pass at least 3 m above the ground at all points.

(OR)

(b) With neat sketches, explain opaque and luminuous signals.

UNIT - IV

4. (a) The following observations of three angles A, B and C were taken at a station.

A	= 75° 32′ 46·3″	with weight 3.
B	= 55° 09′ 53·2″	with weight 2.
C	= 108° 09′ 28·8″	with weight 2.
A+B	= 130° 42′ 41·6″	with weight 2.
B+C	= 163° 19′ 22·5″	with weight 1.
A+B+C	= 238° 52′ 9·8″	with weight 1.

Determine the most probable value of each angle.

(OR)

(b) Explain the method of correlates in detail.

UNIT - V

5. (a) Explain the following :

(i) Great and small circles. (ii) Hour circle and hour angle.

(OR)

(b) Explain in detail the different units of time.

Register Number :

Name of the Candidate :

4141

B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

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

(Common with Part - Time)

November] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT - I

1. (a) Using column analogy method, draw the bending moment diagram for the frame shown in figure - 1.

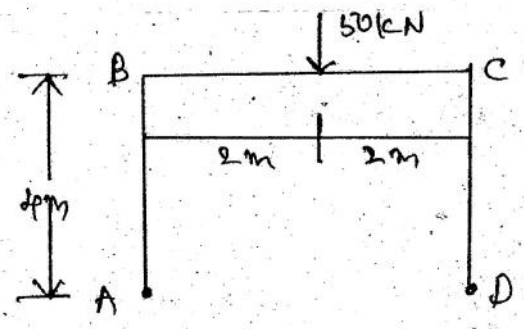

Figure - 1.

(OR)

(b) A continuous beam ABC carries a UDL of 50 kN/m run on AB and BC. The support B sinks by 5 mm. Below A and C, the value of EI is constant. E = 200 Gpa. I = 332 × 10^6 mm^4. Draw BMD and SFD.

UNIT - II

2. (a) A uniformly distributed load of 2 kN/m, 6 m long crosses a girder of span 18 m. Construct the maximum shear force and bending moment diagram and calculate the values at sections 3 m, 5 m and 8 m from the left hand support.

(OR)

(b) A beam ABC of uniform section, length 2 L, is hinged at the collinear supports at its centre and ends. Derive the equation to the influence lines for bending moments at the central support. Take L = 4 m, plot the influence line indicating the values at every quarter of each span.

UNIT - III

3. (a) A two hinged parabolic arch has a span of 30 m and rise 5 m. Calculate the maximum positive and negative bending moment at a distance 12 m from the left support, due to a single point load of 12 kN rolling from left to right.

(OR)

(b) A three hinged parabolic arch has a span of 30 m and rise 5 m carries a UDL of 45 kN/m on the whole span and point load of 200 kN at a distance of 5 m from the right end. Find the horizontal thrust, normal thrust and the bending moment at a section 6 m from the left end.

UNIT - IV

4. (a) Explain the following :

(i) Effect of temperature on the cable and(ii) Horizontal thrust on the cable.

(OR)

(b) A cable is supported at 100 m apart at the same level, has a central dip of 8 m.Find the increase in the dip due to rise in temperature of 120° C. Take $\alpha = 12 \times 10^{-60}$ C.

UNIT - V

5. (a) A beam ABC has 7 m span fixed at A and simply supported at B, 4 m from A so as to provide an overhanging BC 3 m long. It carries a point load of 5 kN at C. Analyse the frame by moment distribution method.

(OR)

(b) Analyse the portal frame ABCD has fixed ends at A and D joints B and C are rigid. Span AB = CD = 2 m, span BC = 5 m. A UDL of 6 kN/m acts on the span BC. Determine the bending moments at the supports, using moment distribution method.

Register Number :

Name of the Candidate :

4142

B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-504 / PCLEC-302. SOIL MECHANICS

(Common with Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

UNIT - I

1. An undistributed sample of soil has a volume of 100 cm^3 and mass of 190 gms. On oven drying for 24 hours, the mass of is reduced to 160 gms. If the specific gravity of grain is 2·68. Determine the water content, void ratio and degree of saturation of the soil. (15)

2. (a) Explain the various types of soil compaction methods adopted in laboratory. (8)

   (b) List the various factors which governing the soil compaction. (7)

UNIT - II

3. The water table in a deposit of sand 8 m thick is at a depth of 3 m below the surface. Above the water table, the sand is saturated with capillary water. The bulk density of sand is 19·62 kN/m^3. Calculate the effecitve pressure at 1 m, 3 m and 8 m below the surface. Hence, to plot the variations of total pressure, neutral pressure and effective pressure over the depth fo 8 m. (15)

4. (a) Explain the various permeability tests conducted in laboratory. (9)

   (b) What is flownet and its limitations ? (6)

UNIT - III

5. Derive one dimensional Terzhaghi's consolidations theory. (15)

6. Find the intensity of vertical pressure and horizontal shear stress at a point 4 m directly below a 20 kN point load acting at a horizontal ground surface. What will be the vertical pressure and shear stress at a point 2 m horizontally away from the axis of loading but at a same depth of 4 m ? (15)

UNIT - IV

7. (a) A sample of cohensionless sand in a direct shear test fails under a shear stress of 160 kN/m^2. When the normal stress is 140 kN/m^2, find the angle of shearing resistance and principal stress failure. (10)

   (b) Discuss the limitations of Mohr-Coulmb's theory. (5)

8. Explain the tri-axial compression test to determine the shear strength of the soil. (15)

UNIT - V

9. Explain the friction circle method with a neat sketch. (15)

10. A 4 m high vertical wall supports a saturated cohesive clay soil ($\phi = 0$) with horizontal surface. The top 2·5 m of the backfill has bulk density of 17·6 kN/m^3 and apparent cohension of 15 kN/m^2. The bulk density and apparent cohension of the bottom 1·5 m is 19·2 kN/m^3 and 20 kN/m^2 respectively. If tension cracks developed, what would be the total active pressure on the wall ? Also, draw the pressure distribution diagram. (15)

Register Number :

Name of the Candidate :

4144

B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505. STRUCTURAL ENGINEERING

November] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT - I

1. Discuss the codal provisions of IS-456-2000 and compare with IS-456-1978.
2. Explain the procedure for analysis of multistorey frames subjected to horizontal forces by cantilever method.

UNIT - II

3. A cantilever retaining wall is to be provided to retain earth 5 m high above the ground level. The top surface is horizontal behind the wall, the unit weight of backfill and its angle of repose are 17·5 kN/m^3, and 30° respectively. Assume the co-efficient fo friction between soil and concrete to be 0·5. The safe bearing capacity of soil at the site is 150 kN/m^2. Use M 20 grade of concrete and Fe 415 steel grade. Estimate the preliminary dimensions of retaining wall and design the base slab.
4. Design a suitable counter fort retaining wall to support difference in ground elevation of 7·2 m. The foundation depth may be taken as 1·5 m below ground level, with a safe bearing capacity of 160 kN/m^2. Assume a level backfill with a unit weight of 16 kN/m^3 and an angle of repose 30°. Assume co-efficient of friction between soil and concrete as 0·42. Take M20 grade of concrete and Fe415 steel grade.

UNIT - III

5. Design a groundwater tank of internal dimension 6 m × 3 m × 3 m. The soil surrounding the tank always remains dry. The tank shall be provided with a roof slab. The soil weighs 16000 N/m^2, having an angle of repose of 30°. Use M20 grade concrete and Fe415 steel.
6. A reinforced concrete dome of 6 m base diameter with a rise of 1·25 m is to be designed for a water tank. The uniformly distributed liveload including finishes on dome may be taken as 2 kN/m^2. Adopt M20 concrete and grade one steel. Design the dome and the ring beam, permissible tensile stress in steel is 100 N/mm^2.

UNIT - IV

7. Explain the Pigeaude's curve for design of bridges.
8. The reinforcement concrete slab panel of a T-bam and slab deck is 2 m wide between main T beams and 4 m long between cross girders. Design the reinforced concrete slab using M20 grade of concrete and Fe415 grade steel. Assume the types of loading as IRCAA loading.

UNIT - V

9. Discuss on various loads on industrial buildings.
10. Explain in detail the various components and functions of an industrial roof truss with neat sketches.

B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-506. TRANSPORTATION ENGINEERING - II

November] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT - I

1. (a) List out the requirements of an ideal sleeper. (5)
   (b) Compare the characteristics of different types of sleepers. (10)
2. Sketch the cross section of a permanent way on embankment and describe the various parts. (15)

UNIT - II

3. (a) What are the points to be considered in the selection of a site for a railway station ?
   (b) Name the different types of yards. Describe the factors to be considered in the design of Marshalling yard.
4. (a) Draw a neat sketch of a left hand turn-out indicting all the components. (8)
   (b) Describe the functions of each components of left hand turn-out. (7)

UNIT - III

5. Describe the method adopted in tunneling through soft strata and hard rock. (15)
6. Describe the shield method of tunneling and method of excavation adopted. (15)

UNIT - IV

7. What are floating signals ? Briefly describe the different types of floating signals. (15)
8. (a) Explain briefly the principles involved in the selection of site for harbour. (7)
   (b) Write a short note on : (8)
   (i) Free port. (ii) Dead weight tonnage.

UNIT - V

9. (a) Explain the various factors to be considered in the alignment of navigation channels. (8)
   (b) How a wet dock differs from a tidal basin ? (7)
10. What is a dry dock ? Describe the various types of dry docks. (15)