Register Number :

Name of the Candidate :

0 3 1 3

B.E. DEGREE EXAMINATION, 2018

(CIVIL, CIVIL AND STRUCTRUAL, MECHANICAL ENGINEERING)

(FIFTH SEMESTER)

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

(Common with Part- Time Mechanical)

May] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT - I

1. (a) Prove that the following with usual notations :

(i) $E^{1/2} = \left(1 + \frac{\delta^2}{4}\right)^{\frac{1}{2}} + \frac{\delta}{2}$. (4)

(ii) $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$. (3)

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

(OR)

2. (a) Express $u = x^4 - 12x^3 + 24x^2 - 30x + 9$ and its successive differences in factorial notation. Hence, show that $\Delta^5 u = 0$. (7)

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

UNIT - II

3. (a) Apply Gauss's forward central difference formula and estimate f (32) from the table

x :	25	30	35	40
y = f(x)	0·2707	0·3027	0·3386	0·3794

(8)

(b) Estimate first and second derivative at x = 2 , given

x :	0	1	3	6
y(x)	18	10	–18	40

(7)

(OR)

4. (a) Use Lagranges formula, find f(6) given

x :	2	5	7	10	12
f(x)	18	180	448	1210	2028

(6)

(b) Evaluate $\int_0^1 e^{-x^2}\,dx$, dividing the range into the eight equal parts by

(i) Trapezoidal rule and (ii) Simpson's rule. (9)

UNIT - III

5. (a) Find the positive root of x = cos x by bisection method. (7)

(b) Find all the roots of $x^3 - x^2 - x = 2$, using Graeffe's method (squaring thrice). (8)

(OR)

6. (a) Find the positive root of the equation $3x + \sin x = e^x$ by successive approximation method. (7)

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

$x + 5y + z = 14.$

$2x + y + 3z = 13.$

$3x + y + 4z = 17.$ (8)

UNIT - IV

7. (a) Using Taylor series method , solve :

$$\frac{d^2y}{dx^2} + y^2\frac{dy}{dx} = x^3,\ y(1) = 1 \quad \text{and} \quad y'(1) = 1.$$

and hence, find the value of y at $x = 1{\cdot}1$ and $1{\cdot}2$. (7)

(b) Given $\frac{dy}{dx} = \frac{1}{2}\left(1 + x^2\right) y^2$, $y(0) = 1$, $y(0{\cdot}1) = 1{\cdot}06$, $y(0{\cdot}2) = 1{\cdot}12$, $y(0{\cdot}3) = 1{\cdot}21$, evaluate $y(0{\cdot}4)$ by Milne's predictor and corrector method. (8)

(OR)

8. (a) Given $\frac{dy}{dx} = 1 - y$, $y(0) = 0$, determine

(i) $y(0{\cdot}2)$ by Euler's method.

(ii) $y(0{\cdot}4)$ by modified Euler's method by using the data in (i)and $y(0{\cdot}3)$ by improved Euler's method by using the data (i) and (ii) (9)

(9)

(b) Using Picard's method, solve upto second approximation and determine the value of y at $x = 0{\cdot}25$, given $\frac{dy}{dx} = y - x^2$, $y(0) = 1$. (6)

UNIT - V

9. Find the Liebmann's method the values at the interior lattice points of a square region of the harmonic function u (x, y) whose boundary values are shown below (figure- 1) : (15)

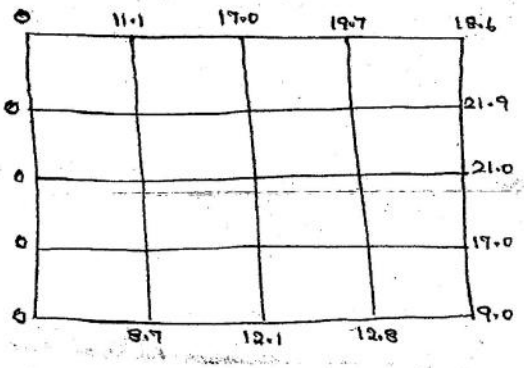

Figure- 1.

10. Solve by Crank-Nichelson method the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to $u(x, 0) = 0$, $u(0, t) = 0$ ($u(1, t) = y$ for only one time step. (15)

Register Number:

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0314

B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC–502/PCLEC–102: SURVEYING – II

(Common with Part Time)

April /May] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit **(5×15=75)**

UNIT – I

1. List out the adjustments of microptic alidade and explain it briefly. (15)
2. Write in detail about tachometric surveying and its classification. (15)

UNIT – II

3. a) Summarize briefly the procedures for setting out compound curve. (7)
   b) How reconnaissance survey is conducted for railway project? (8)
4. Elaborate the elements of reverse curves in detail with suitable sketch. (15)

UNIT – III

5. Write short notes on: 15)
   (i) Reconnaissance for triangulation
   (ii) Criteria for selection of the layout of triangles.
6. Explain in detail about the correction to base line measurement. (15)

UNIT – IV

7. What do you mean by figure adjustments? Explain in detail. (15)
8. Explain the methods of correlates. (15)

UNIT – V

9. Write short notes on: (15)
   (i) Great and small circle
   (ii) Poles
   (iii)Axis.
10. Give the procedure to calculate the arc length of a great circle. (15)

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Register Number:

Name of the Candidate:

0315

B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC–503/PCLEC–105: STRUCTURAL MECHANICS – I

(Common with Part Time)

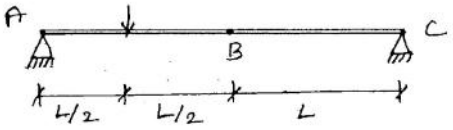
April /May] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit **(5×15=75)**

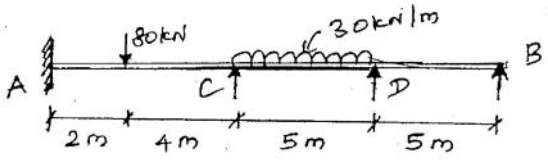
UNIT – I

1. A continuous beam ABC is loaded as shown in fig.no.1. Determine reaction and draw SFD and BMD. (15)



(fig no. 1)

2. For the beam as loaded in the fig.no.2. Draw the shear force and bending moment diagrams. (15)



(fig no. 2)

UNIT – II

3. Draw the influence line diagram for the following forces in a simply supported beam of 6m span and with 1.5m overhang on either side. (15)
   i) Influence line diagram for support reaction
   ii) Influence line diagram for shear force at 2.5m from left support
   iii) Influence line diagram for bending moment at 3m from left support.

4. Draw the influence line for (15)
   i) Reaction at B
   ii) Moment at A for the propped cantilever as shown in fig.no.3.
   Compare the ordinates at intervals of 1.5m.

UNIT – III

5. A two hinged parabolic arch has a span of 40m and a central rise of 8m. Calculate the maximum positive and negative bending moment at a section distant 12m from left hinge due to a single point load of 6kN rolling from left to right. 15)

6. A symmetrical three hinged circular arch has a span of 16m and a rise to the central hinge 4m. It carries a vertical load of 10kN at 4m from left hand end. Determine: (15)

   i) The magnitude of the thrust at the springing

   ii) The reaction at the supports

   iii) Bending moment of 6m from the left hand hinge

   iv) The maximum positive and negative bending moment.

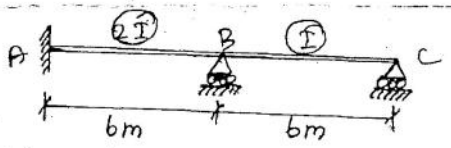
UNIT – IV

7. A cable is used to support four equal and equidistant loads over a span of 24m. Find the length of the cable required and its sectional area, if the safe tensile stress is 120N/mm². The central dip of the cable is 2m and loads are 6kN each. (15)

8. A suspension cable is supported at two points P and Q. 'P' being one meter above 'Q'. The distance PQ being 20m. The cable is subjected to four loads of 2kN, 4kN, 5kN and 3kN at distances 4m, 8m, 12m and 16m respectively from P. Find the maximum tension in a cable at point of application of first load is 1m with respect to level at P. Find also the length of the cable. (15)

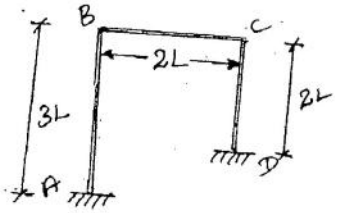
UNIT – V

9. Analyse the beam as shown in fig.no.4 and draw the bending moment diagram, if support B yields by 10mm, take E=15kN/mm² and I = 0.4 × 10⁹mm⁴. (15)



(fig.No.4)

10. The portal frame shown in fig.no.5 has fixed ends. If D sinks by Δ, find the moments induced in the frame. All the members have uniform cross section. (15)



(fig No.5)

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Register Number :

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B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-504/ PCLEC-302. SOIL MECHANICS

(Common with Part-Time)

May] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT - I

1 The in-situ percentage voids of a sand deposit is 34 percent for determining the density index dried sand from the stratum was first filled loosely in a 1000 m^3 mould and was then vibrated to give a maximum density. The loose dry mass in the mould was 1610 gm and the dense dry mass at maximum compaction was found to be a 1980 gm. Determine the density index of the specific gravity of the sand particles is 2·67. (15)

2. Write the general classification of soil properties based on engineering purposes. (15)

UNIT - II

3. Calculate the co-efficient of permeability of a soil sample, 6 cm in height and 50cm^2 in cross sectional area, if a quantity of water equal to 430 ml paned 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. (15)

4. Explain the broad classification of modes of occurance of water in soil. (15)

UNIT - III

5. A clay layer, whose total settlement under a given loading is expected to be 12 cm settles 3 cm at the end of 1 month after the application of load increment. How many months will be required to reach a settlement of 6 cm ? How much settlement will occur in 10 months ? Assume the layer to have double drainage. (15)

6. (a) Discuss the various types of settlement and explain them. (10)

   (b) What is meant by influence chart and its uses ? (5)

UNIT - IV

7. Explain the various test involved to find shear strength of the soil specimen. (15)

8. A saturated specimen of cohesionless sand was tested in tri-axial compression and the sample failed at a deviator stress of 482kN/m^2. When the cell pressure was 100 kN/m^2, under drained conditions. Find the effective angle of shearing resistance of sand. What would be the deviator and major principal stress at failure for another identical of sand, if it is tested under cell pressure of 200 kN/m^2 ? (15)

UNIT - V

9. A new canal is excavated to a depth of 5 m below ground level, through a soil having the following characteristics :

   $C = 14kN/m^2$; $\phi = 15°$; $e = 0{\cdot}8$ and $Cs = 2{\cdot}70$

   The slope of banks is 1 in 1. Calculate the factor of safety with respect to cohesion when the canal runs full. If it is suddenly and completely dried, what will be the factor of safety ? (15)

10. (a) Discuss the various methods is to find the stability analysis. (10)

    (b)) Write the uses of stability member and define them. (5)

Register Number:

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0318

B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC–505: STRUCTURAL ENGINEERING

April /May] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit **(5 × 15 = 75)**

UNIT – I

1. Discuss the design procedure for analysis of multistory frames subjected to gravity and wind loads.
2. Compare the working stress and limit state method of design.

UNIT – II

3. Design a reinforced concrete cantilever type retaining wall, having a 5m full stem. The wall retains the soil with its top. The soil weighs 18000N/m^3, and has an angle of repose 30°. The SBC of soil is 200kN/m^2. Use M20 grade concrete and Fe 415 Steel.
4. Design a counter fort retaining wall for the following data.

Height of the wall above the ground level	= 6m
SBC of the soil	= 160 kN/m^2
Angle of friction	= 33°
Density of the soil	= 16 kN/m^3.
Spacing of the counter fort	= 3m c/c

Use M20 grade concrete and Fe 415 Steel.

UNIT – III

5. Design an underground reinforced concrete rectangular water tank for a capacity of 100 Kiloliters. Overall depth is restricted to 4m with a free board of 300mm. The dry density of soil is 160kN/m^3, and an angle of repose 30°, Use M20 grade of concrete and Fe 415 grade Steel.
6. The bottom slab of an overhead water tank is idealized as a circular slab of 8.25m effective diameter. The depth of water tank is 5m and self weight of the slab is 3 kN/m^2. The boundary conditions of slab may be assumed to be partially restrained at the edges. Design the slab using M20 grade of concrete and Fe 415 grade Steel.

UNIT – IV

7. Design a rectangular deck slab 5m × 4m in size and simply supported at the edges to support a service live load of 4 kN/m^2. Assume coefficient of orthotrophy as 0.7. Use M20 grade concrete and Fe 415 Steel.
8. Explain the design procedure for a solid slab bridge design.

UNIT – V

9. Explain the various types of industrial buildings.
10. Write short notes on (i) Loads on roof trusses and (ii) Design of purlins procedure.

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