Register Number :

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B.E. DEGREE EXAMINATION, 2013

(CIVIL / CIVIL AND STRUCTURAL ENGINEERING)

(FIFTH SEMESTER)

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

November] [Time : 3 Hours

Maximum : 75 Marks

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

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

Turn Over

UNIT – I

1. (a) Show that

$$\Delta^n \cos(ax + b) = 2 \sin\left(\frac{ah}{2}\right)\cos\left[(ax+b)+\frac{n(\pi+ah)}{2}\right].$$

the interval of spacing being h. (8)

(b) Solve : $y_{n+2} + y_n = \sin(n)$ (7)

(OR)

2. (a) Estimate the production for 1964 and 1966 from the following data: (8)

Year	1961	1962	1963	1964	1965	1966	1967
Production	200	220	260	-	350	-	430

(b) Solve : $y_{n+2} - 5y_{n+1} + 6y_n = n^2 + n + 1$.

(7)

UNIT – II

3. (a) Using Newton's divided difference formula, evaluate f(8) and f(15) given

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

(8)

(b) Evaluate: $\int_0^1 \frac{dx}{1+x^2}$

Using

(i) Trepezoidal rule

and (ii) Simpson' rule,

taking h = 0·25 and evaluate π in each case.

(7)

4. (a) Using Gauss's backward interpolation formula, find the population for the year 1936 given that

year-X	1901	1911	1921	1931
Population in thousand-Y	12	15	20	27

1941	1951
39	52

(8)

(b) The velocity V of a particle at distance S from a point on its path is given by the table below:

S in metre	0	10	20	30
V m/ Sec	47	58	64	65

40	50	60
61	52	38

Estimate the time taken to travel 60 metres by using Simpson's one-third rule. (7)

UNIT - III

5. (a) Find the positive root of the equation

$$2x = 3x + \cos x$$

by bisection method. Correct to three places of decimals. (8)

(b) Solve the following system of equations by using Gauss – Seidel method. Correct to three places of decimals.

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

and $6x + 3y + 12z = 35$. (7)

(OR)

6. (a) Solve the equation $x \tan x + 1 = 0$ by regula-falsi method whose root lies between 2·5 and 3 correct to three places of decimals. (8)

(b) Using Crout's method, solve the following system of equations:

$$2x - 6y + 8z = 24$$

$$5x + 4y - 3z = 2$$

and $3x + y + 2z = 16$ (7)

UNIT – IV

7. (a) Using Picard's method, solve:

$$\frac{dy}{dx} = 1 + xy$$

with $y = 0$, when $x = 0$.

(upto fourth approximation) (8)

(b) Using fourth order Runge-Kutta method, solve at $x = 0{\cdot}2$; (7)

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = 0,$$

$$y(0) = 1,$$

$$\frac{dy}{dx}(0) = 0$$

(OR)

8. (a) Solve $\frac{dy}{dx} + 2xy^2 = 0$ with $y(0) = 1$ by Euler's modified method and find the solution y at $x = 0{\cdot}25$ and $0{\cdot}5$. (8)

(b) Find the approximate value of y(0·4) using the Adams-Bashforth method for the initial value problem

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

y(0) = 1, y(0·1) = 1·31, y(0·2) = 1·231, and y(0·3) = 1·40254. (7)

UNIT – V

9. Using Crank – Nicholson method, solve:

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial y^2}, \quad 0 < x < 5, \quad t > 0,$$

with u(0, t) = 0, u (5, t) = 100, u (x, 0) = 20 for one time step. (15)

(OR)

10. Solve: $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$

Given $u(0, y) = 0$, $u(4, y) = 8 + 2y$,

$u(x, 0) = \frac{1}{2} x^2$ and $u(x, 4) = x^2$

in the square region $0 \leq x \leq 4$, $0 \leq y \leq 4$

by the relaxation method at the nodal points with spacing $\Delta x = \Delta y = 1$. (15)

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B.E. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-502. SURVEYING - II

November] [Time : 3 Hours

Maximum : 75 Marks

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

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

UNIT – I

1. A tacheometer is set up at an intermediate point on a traverse course PQ and the following observations are made on a vertically held staff :

Turn Over

Staff Station	Vertical angle	Staff intercept	Axial hair readings
P	+8°36′	2·350	2·105
Q	+ 6°6′	2·055	1·895

The instrument is fitted with an anallatic lens and the constant is 100. Compute the length of PQ and reduced level of Q, that of P being 321·50 metres. (15)

(OR)

2. Two sets of tacheometric readings were taken from an instrument station-A, the reduced level of which was 100·06 m to a staff station-B.

   (a) Instrument P multiplying constant 100, additive constant 0·06 m, staff held vertical.

   (b) Instrument-Q- multiplying constant 90, additive constant 0·06 m, staff held normal to the line of sight.

Inst	AT	TO	HH of Inst.	Vertical angle	Stadia Readings (m)
P	A	B	1·5 m	26°	0·755, 1·005, 1·255
Q	A	B	1·450 m	26°	? ?

What should be the stadia readings with instrument-Q? (15)

UNIT - II

3. Two tangents intersect at chainage 59+60. the deflection angle being 50°30'. Calculate the necessary data for setting out a curve of 15 chains radius to connect the two tangents if it is intended to set out the curve by offsets from chords. Take peg interval equal to 100 links, length of the chain being equal to 20 metres. (100 links). 15)

(OR)

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

UNIT - IV

5. Briefly discuss the classification of triangulation system. (15)

(OR)

6. The altitude of two proposed stations-A and B 130 km apart are respectively 220 m and 1,160 m. The altitudes of two points 'C' and 'D' on the profiles between them are respectively 308 m and 632 m, the distances being AC = 55 km, and AD = 90 km. Determine whether A and B are intervisible, and if necessary, find the minimum height of a scaffolding at B, assuming A as the ground station. (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

   $A + B = C$,

   $A = 30^\circ\ 12'\ 28''\ 2.$

   $B = 35^\circ\ 48'\ 12''\ 6.$

   $C = 66^\circ\ 0'\ 44''\ 4.$

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

(OR)

8. The surveyor carried out levelling operations of a closed circuit ABCDA starting from A and made the following observations :

B was 8·164 m above A, weight 2.

C was 6·284 m above B, weight 2.

D was 5·626 m above C, weight 3.

and D was 19·964 m above A, weight 3.

Determine the probable heights of B, C and D above A by method of correlates. (15)

UNIT - V

9. Find the shortest distance between two places A and B given that the longitudes of A and b are 15° 0′ N and 12° 6′ N and their longitudes are 50·12′E and 54°0′E respectively. Find also, the direction of 'B' on the great circle route.

Radius of earth = 6,370 km. (15)

(OR)

10. (a) Determine the Azimuth and altitude of a star from the following data :

(i) Declination of star = 8° 30′ S.

(ii) Hour angle of star = 322°.

(iii) Latitude of the observer = 50°N. (10)

(b) Describe "Equation of time." (5)

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B.E. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

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

November] [Time : 3 Hours

Maximum : 75 Marks

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

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

UNIT – I

1. Two point loads of 4 kN and 6 kN spaced 6m apart cross a girder of 16m span, the 4 kN load leading from left to right. Construct the maximum shear force and bending moment diagrams, stating the absolute maximum values.

(OR)

2. A beam ABC is supported at A, B and C has a hinge at D distant 3m from A·AB = 7m and BC = 10m. Draw the influence lines for

   (a) Reactions at A, B and C.

   (b) Shear force at a point just to the right of B.

   (c) Bending moment at a section 1m to the right of B.

   If a UDL of intensity 2 kN/m and length 3 m travels from left to right, calculate above quantities from which influence line are drawn.

UNIT – II

3. Draw the influence line for

   (i) Reaction at B.

   and (ii) Moment at A for the propped cantilever as shown in figure-1.

   Compute the ordinates at intervals of 1·25m

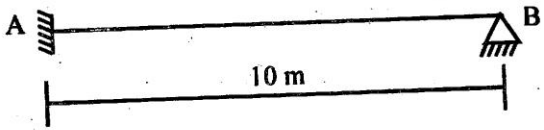


Figure - 1

(OR)

4. A cantilever beam ABCD covers three spans, AB = 6 m, BC = 12 m and CD = 4 m. It carries uniformly spread loads of 2 kN, 1 kN and 3 kN per metre run on AB, BC and CD respectively. If the girder is of same cross-section throughout, determine the B.M at the supports B and C and the pressure on each support. Plot the B.M.D and S.F.D.

UNIT – III

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

   (i) The magnitude of the thrust at the springings.

   (ii) The reactions at the supports.

   (iii) B.M of 6m from the left hand hinge.

   and (iv) The maximum positive and negative bending moment.

(OR)

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

UNIT – IV

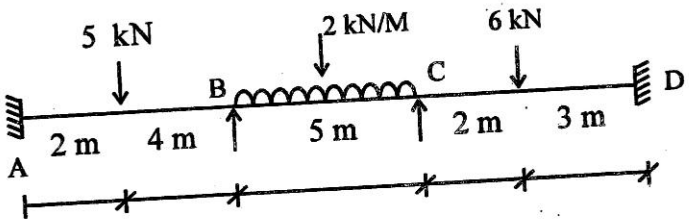
7. A light cable, 18 m long, is supported at two ends at the same level. The supports are 16 m apart. The cable supports three loads of 8, 10 and 12 kN dividing the 16 m distance in four equal parts. Find the shape of the string and the tension in various portions.

(OR)

8. A suspension bridge cable hangs between the two points A and B separated horizontally by 120 m and with A 20 m above B. The lowest point in the cables is 4 m below B. The cable supports a stiffening girder which is hinged vertically below A, B and the lowest point in the cable. Find the position and magnitude of the largest B.M which a point load of 10 kN can induce in the girder together with the position of the load.

UNIT – V

9. A continuous beam ABCD is fixed at ends A and D is loaded as shown in figure-2. Spans AB, BC and CD have moments of inertia of I, 1·5 I and I respectively and are of the same material. Determine the moments at the supports and plot BMD.



EI = constant

Figure - 2

(OR)

10. A portal frame ABCD is fixed at A and D and has stiff joints B and C. It carries a UDL w/unit length on BC. Plot the BMD. EI is constant for the whole of the frame.

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B.E. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505 / PCLEC-403.

STRUCTURAL ENGINEERING - II

November] [Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.
Use of IS-456,SP-16 IS-800 and Steel Tables are permitted.
Assume suitable data wherever necessary.
ALL questions carry EQUAL marks.

Turn Over

UNIT – I

1. The substitute frame of a multi storeyed building having three bays has a continuous beam ABCD,

   AB = 4 m,

   BC = 2·5 m

   and CD = 4 m.

   The beams are spaced at 3m intervals. Thickness of floor slab = 120 mm.

   Live load = 4 kN/m^2.

   Floor finish = 0·6 kN/m^2.

   The size of beams and columns is assumed as 250 mm × 400 mm.

   The height between the floors is 4m.

   Analyse the substitute frame.

(OR)

2. Explain the portal and cantilever method of analysis of a building frame subjected to horizontal / lateral loads.

UNIT - II

3. Design the vertical stem of a cantilever retaining wall to retain earth embankment 4 m high above ground level. The density of earth is 18 kN/m^3 and its angle of repose is 30°. The embankment is horizontal at its top. The SBC of soil is 200 kN/m^2. The co-efficient of friction between soil and concrete is 0·5. Use M-20 concrete and Fe-415 steel.

(OR)

4. Design a counterfort type retaining wall to suit the following data :

   Height above ground level = 6 m.

   SBC of the soil = 160 kN/m^2.

   Angle of repose = 30°.

   Unit weight of soil = 16 kN/m^3.

   Spacing of counterforts = 3m.

   Materials = M-20 concrete and Fe-415 steel.

UNIT - III

5. Design a circular tank with flexible base for a capacity of 1,00,000 litres of water. The depth of the tank may be taken as 4m. Use M-25 concrete and Fe-415 steel.

(OR)

6. Design the side walls of a square tank of capacity 70,000 litres of water.

Depth of water in the tank = 2·8 m.

Free board = 0·2 m.

Use M-20 concrete and Fe-415 steel.

UNIT - IV

7. Design a slab bridge to suit the following data :

Clear span = 6 m.

Clear width of roadway = 7·5 m.

Width of footpath = 1 m on either side.

Thickness of wearing coat = 100 mm

Loading = IRC class-AA tracked vehicle.

Materials = M-25 concrete and Fe-415 steel.

(OR)

8. A road bridge deck consists of a RC slab continuous over the beams spaced at 2 m centres and cross girders spaced at 5 m centres. Thickness of wearing coat = 100 mm. Type of loading IRC class-AA tracked vehicle. Adopt M-20 concrete and Fe-415 steel. Design the deck slab and sketch the details of the reinforcement.

UNIT - V

9. Explain the step by step design procedure of steel roof truss for an industrial building.

(OR)

10. Symmetric trusses of span 20 mm and height 5 m are spaced at 4·5 m centre to centre. Design the channel section purlins to be placed at suitable distances to resist the following loads :

    Weight of sheeting = 170 N/m^2.

    Live load = 400 N/m^2.

    Wind land = 1,200 N/m^2 suction.

    The spacing of the purlins may be taken as 1·4 m c/c.

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B.E. DEGREE EXAMINATION, 2013

(CIVIL AND STRUCTURAL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505. STRUCTURAL ENGINEERING - II

November] [Time : 3 Hours

Maximum : 75 Marks

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

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

UNIT – I

1. A reinforced concrete building on beams and columns has its slabs in panel of 6 m × 5 m. The thickness of the roof and floor slabs are 150 mm. Estimate the design load for the roof slab and the floor slab.

(OR)

Turn Over

2. A cross section is shown in figure-1. It is subjected to horizontal loads at the joints as shown. Determine the bending moment and shear force diagram for the various beams and columns of the frame by portal method.

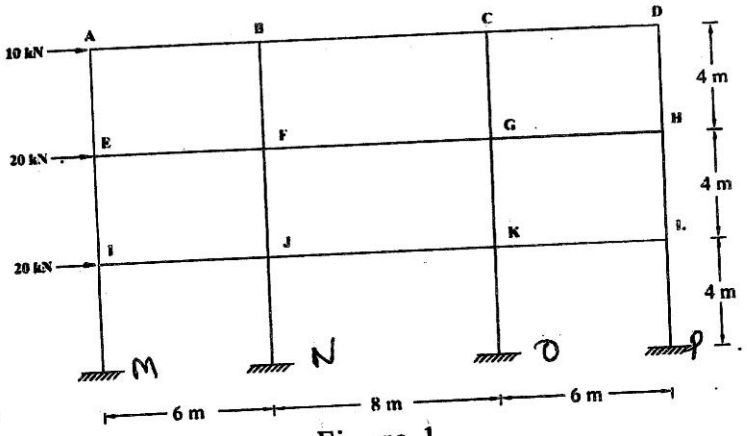

Figure-1

UNIT - II

3. Design a T-shaped 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. The safe bearing capacity of soil may be taken as 100 kN/m^2 and co-efficient of friction between soil and concrete as 0·5 . Use M-20 mix and Fe-415 bars.

(OR)

4. Design a counterfort retaining wall for the following data :

   (a) Height of wall above ground = 4·5 m.

   (b) Depth of foundation = 1·5 m.

   (c) Unit weight of earth fill = 17 kN/m^3.

   (d) Angle of internal friction= 20°.

   (e) Co-efficient of friction between soil and concrete = 0·45.

   (f) Safe bearing capacity of soil = 130kN/m^2.

   (g) The centre to centre distance between counterfort = 3m.

Use M-20 mix and Fe-415 steel.

UNIT - III

5. Design a circular tank with fixed base for capacity of 4 lakhs litres. The depth of water and free board are to be 4 m and 0·2 m respectively. Use M-20 concrete and Fe-415 HYSD bars. Take permissible direct tensile stresss in concrete is 1·2 N/mm^2, permissible stress in steel in direct tension is 100 N/mm^2. Sketch the details of reinforcement in tank walls.

(OR)

6. A reinforced concrete water tank resting on ground is 5 m × 2 m with a maximum depth of 3 m. Using M-20 concrete and Fe-415 HYSD bars, design the tank wall and also, sketch the details of reinforcements in tank walls.

UNIT - IV

7. Design a deck slab bridge for the following data :

   Clear span = 7 m

   Road type = NH (2 lane).

   Foot path = 1m on either side.

Wearing coat = 80 mm.

Loading : IRC class-AA (Tracked).

Materials : M-30 concrete, Fe-415 steel.

(OR)

8. A RCC slab panel of an RCC Tee beam and slab deck is 4 m wide between main Tee beams and 4 m long between cross girders. Design the RCC slab panel for IRC class-A loading using M-25 concrete and Fe-415 grade steel.

UNIT - V

9. List and explain the factors to be considered while designing an industrial building.

(OR)

10. Design the angle purlin for the following specifications :

Span of Truss = 9 m c/c.

Pitch = $\frac{1}{5}$ of span.

Spacing of purlin = 1·4 c/c.

Load from roofing materials etc. = 200N/m^2.

Wind load = 1,200 N/m^2.

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B.E. / B.Tech. DEGREE EXAMINATION, 2013

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-506. TRANSPORTATION ENGINEERING - II

November] [Time : 3 Hours

Maximum : 75 Marks

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

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

UNIT – I

1. (a) Define the term gauge in railway track. Why uniform gauge is desirable in a country? (8)

(b) Discuss the factors that control the alignment of a railway track. (7)

(OR)

2. Sketch the cross-section of a permanent way on embankment and detail the various parts. (15)

UNIT – II

3. Draw the sketch of a left-hand turnout and explain its operation. (15)

(OR)

4. (a) Describe with neat sketches the following track junctions. (8)

   (i) Single slip.

   (ii) Scissor cross-over.

   (b) Explain the following : (7)

   (i) Loading gauge.

   (ii) Buffer stop. (7)

UNIT – III

5. Describe the methods adopted in tunneling through soft strata. (15)

(OR)

6. (a) Sketch the size and shape of a single track railway tunnel. (8)

   (b) Explain how tunnels are ventilated. (7)

UNIT – IV

7. List the common types of break waters in use and bring out the advantages of each of them. (15)

(OR)

8. (a) What are the requirements of good harbour? Distinguish between refuge harbour and commercial harbour. (8)

   (b) Explain briefly the principle involved in the selection of site for a harbour. (7)

UNIT – V

9. Explain the various factors to be considered in alignment of navigational channel. (15).

(OR)

10. What are the different types of dredging devices commonly used in harbour engineering practice? Explain with a neat sketch the most efficient of these. (15)