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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

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

(Common with Civil and Structural, Mechanical and Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

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

Answer any ONE FULL question from each unit.

UNIT – I

1. (a) Evaluate : $\Delta^2 \left(\frac{5x + 12}{x^2 + 5x + 6} \right)$, the interval of differencing being unity. (7)

(b) Solve : $y_{n+2} - 8y_{n+1} + 16\, y_n = 4^n$. (8)

(OR)

2. (a) Using difference operator, show that $\Delta^3 y_2 = \nabla^3 y_5$. (8)

(b) Solve : $y_{n+2} - 5y_{n+1} + 4\, y_n = n + 2^n$. (7)

UNIT - II

3. (a) The following table gives the values of x and $y = \sqrt{x}$. (8)

x	1·0	1·05	1·10	1·15	1·20	1·25	1·30
y	1·0000	1·0242	1·0480	1·0714	1·0944	1·1170	1·1392

using Stirling formula find $\sqrt{1{\cdot}12}$..

(b) Evaluate : $\int_0^6 \frac{dx}{1 + x^2}$ by using Simpson's $\frac{3^{th}}{8}$ rule and compare the result with its actual value. (7)

(OR)

4. (a) From the following table, express f(x) as a polynomial in x and find f(9) using Newton's divided difference formula : (8)

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

(b) Find the value of cos (1·74) from the following table : (7)

x:	1·70	1·74	1·78	1·82	1·86
sin x	0·9916	0·9857	0·9781	0·9691	0·9584

UNIT - III

5. (a) Find the root of the equation $x^3 + x^2 = 100$ correct to four decimal places by iteration method. (8)

(b) Solve the following system by Gauss-Jordan method : (7)

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

$7x + y - 5z = 8.$

$3x + 7y + 4z = 10.$

(OR)

6. (a) Find the real root of $2x^3 - 3x - 6 = 0$ by Newton's method correct to five decimal places. (8)

(b) Solve the following system by Crout's method: (7)

$2x + y + 4z = 12.$

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

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

UNIT - IV

7. (a) Given $\frac{dy}{dx} + y = 0$ and y(0) =1, find the value of y at x = 0·01 (0·01) 0·04 by Euler's method. (8)

(b) Apply Rung-Kutta method to find an approximate value of y for x = 0·1 and x = 0·2 if, $\frac{dy}{dx} = x + y^2$ given y (0)=1. (7)

(OR)

8. (a) Using Taylor series method, find y(1·1) and y(1·2) given $\frac{dy}{dx} = x\, y^{1/3}$ and y (1)=1. (8)

(b) Solve $\frac{dy}{dx} = y + e^x$, y (0) = 0 for x 0·2, 0·4 by improved Euler's method. (7)

UNIT - V

9. Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 8x^2 y^2$ over a square mesh given u = 0 on the boundary dividing the square mesh into 16 subsquares of length 1- unit. (15)

(OR)

10. Solve: $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, $0 < x < 1$, $t > 0$ u (x,0) = 100 x (1 − x), u (0, t) = 0 = u (1,t) taking h = 0·25 for one time step by Crank Nicholson method. (15)

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-502 / PCLEC-102. SURVEYING - II

(Common with Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

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

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. Determine the gradient from a point A to a point B from the following observations made with a tacheometer fitted with anallaetic lens. The constant of the instrument was 100 and the staff was held vertically :

Inst. Station	Staff Point	Bearing	Vertical Angle	Staff Readings (m)
P	A	134°	+10°32′	1·360, 1·915, 2·470
	B	224°	+5°6′	1·065, 1·885, 2·705

(OR)

2. Explain the principle of subtense bar method and derive the expression for the horizontal distance between axis and the staff.

UNIT - II

3. Explain the methods of setting out of simple circular curve by

   (a) By successive bisection of arcs. (b) By offsets from tangents.

(OR)

4. Explain the procedure for setting out of compound curve by double theodolite methods.

UNIT - III

5. What are the principal objects to be kept in view in selecting the ground for a baseline in large survey? Enumerate in sequence the operations necessary before the measurement of baseline commences. State the correction to be applied in baseline measurements.

(OR)

6. What is meant by satellite station and reduction to centre? Derive expression for reducing the angles measured at the satellite stations to centre.

UNIT - IV

7. Adjust the angles α and β observations of which give :

   $\alpha = 20^\circ 10' 10''$ weight 6. $\beta = 30^\circ 20' 30''$ weight 4.

   $\alpha + \beta = 50^\circ 30' 50''$ weight 2.

(OR)

8. The observations closing the horizon at a station are

   $A = 24^\circ 22' 18{\cdot}2''$ weight 1. $B = 30^\circ 12' 24{\cdot}4''$ weight 2.

   $A + B = 54^\circ 34' 48{\cdot}6''$ weight 3. $C = 305^\circ 25' 13{\cdot}9''$ weight 2.

   $B + C = 335^\circ 37' 38{\cdot}0''$ weight 3.

   Find the most probable values of angles A, B and C.

UNIT - V

9. What are the systems of co-ordiantes employed to locate position of a heavenly body? Why it is necessary to have several systems instead of one?

(OR)

10. Explain the systems of time reckoning known as sidereal apparent solar and mean solar time and show how they differ from each other.

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

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

(Common with Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

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

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. Determine the end moments developed in the beam as shown in figure-1 by column analogy method.

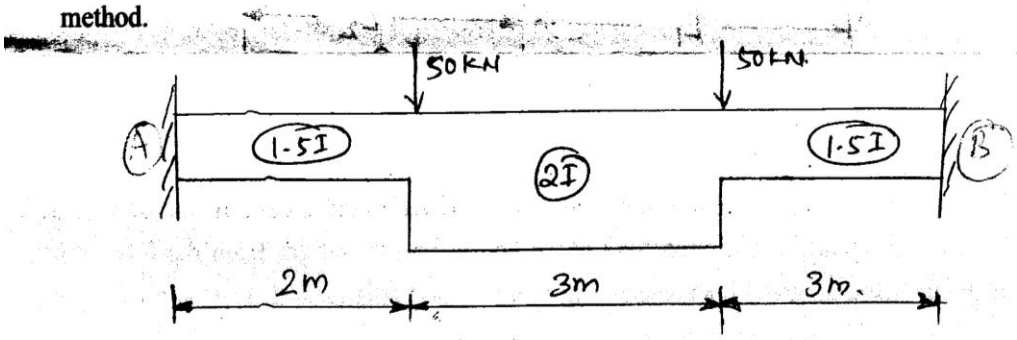

Figure-1.

(OR)

2. Analyse the continuous beam ABC as shown in figure-2, if the support 'B' sinks by 10 mm. Given that E = 200 kN/mm^2 and I = 10^8mm^4.

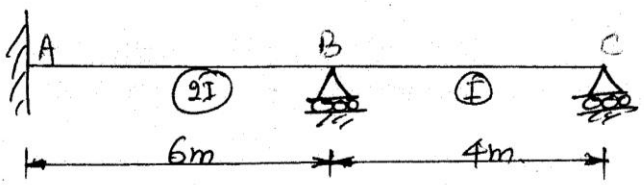

Figure-2

UNIT - II

3. A simply supported beam has a span of 15 m uniformly distributed load of 40 kN/m and 5 m long crosses the girder from the left to right. Draw the influence line diagram for shear force and bending moment at a section 6 m from left end.

(OR)

4. Four point loads 8, 15, 15 and 10 kN have centre to centre spacing of 2 m between consecutive loads and they traverse a grider of 30 m span from left to right with 10 kN load leading. Calculate the maximum bending moment and shear force at 8 m from the left support.

UNIT - III

5. A three hinged parabolic arch having supports at different levels are shown in figure-3, carries a uniformly distrbuted load of intensity 30 kN/m over the portion left of the crown. Find the bending moment, normal thrust and radial shear force developed at a section 15 m from the left support.

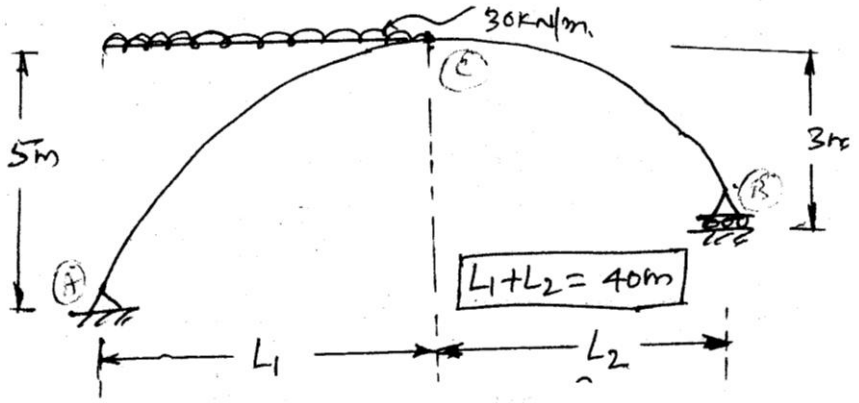

Figure-3.

(OR)

6. A three hinged symmetric parabolic arch has a span of 20 m and a central rise of 4 m. It is loaded with a uniformly distributed load of 30 kN/m for 8 m length from the left support. Draw influence line diagram for the bending moment at a section 6 m from the left support and determine the bending moment at the section.

UNIT - IV

7. A bridge cable is suspended from towers 80 m apart and carries a load of 30 kN/m on the entire span. If the maximum sag is 8m, calculate the maximum.tension in the cable. If the cable is supported by

   (a) Saddles. (b) Pulley, stayed by wires inclined at 30° to the horizontal,

   determine the forces acting on the towers.

(OR)

8. A suspension cable of 40 m span and 4 m dip is stiffened by a three hinged girder. The dead load is 10kN/m. Determine the maximum tension in the cable and maximum bending moment in the girder, due to a concentrated laod of 100 KN crossing the girder.

UNIT - V

9. Analyse the beam as shown in figure -4 and draw the bending moment diagram, if support 'B' yields by 10 mm. Take E = 15 kN/mm^2 and I = 0·4 × 10^{9}mm^4.

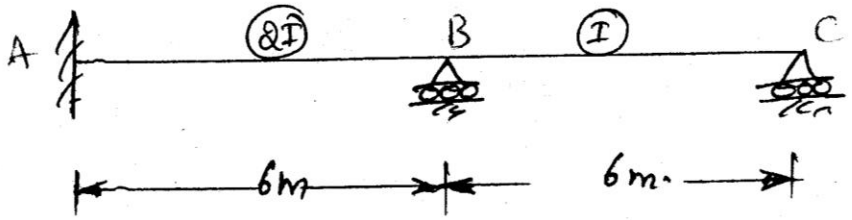

Figure-4

(OR)

10. Analyse the frame as shown in figure-5 and sketch the bending moment diagram.

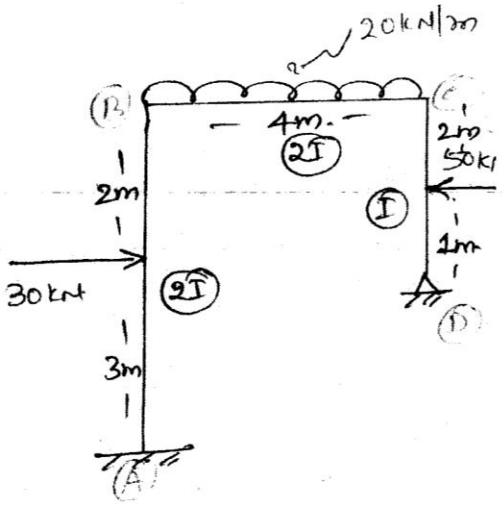

Figure-5.

Register Number:

Name of the Candidate:

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B.E. DEGREE EXAMINATION, 2015

(CIVIL / CIVIL AND STRUCTURAL ENGINEERING)

(FIFTH SEMESTER)

CLEC-504/PCLEC-302, CSEC-505/PCSEC-304. SOIL MECHANICS

(Common with Part Time)

November] [Time : 3 Hours

Maximum : 75 Marks

(Max: 60 marks for those who joint before 2011-12)

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

UNIT-I

1. An undisturbed sample of soil has a volume of 100cm^3 and mass of 190g. On oven drying for 24 hours, the mass is reduced to 160g. If the specific gravity of grains is 2.68, determine the water content, void ratio and degree of saturation of the soil.

2. Explain standard proctor test and factors affecting compaction.

UNIT-II

3. Determine the co-efficient of permeability by field methods.

4. In a falling head permeameter test, the initial head (t=0) is 40cm. The head drops by 5cm in 10 minutes. Calculate the time required to run the test for the final head to be at 20cm. If the sample is 6cm is height and 50cm^2 in cross-sectional area. Calculate the coefficient of permeability, taking area of stand pipe=0.5cm^2.

UNIT-III

5. Explain Terzaghi's theory of one-dimensional consolidation.

6. A water tank is supported by a ring foundation having outer diameter of 10m and inner diameter of 7.5m. The ring foundation transits uniform load intensity of 160kN/m^2. Compute the vertical stress induced at a depth of 4m, below the centre of ring foundation using (a) Boussinesq analysis and (b) Westergaurd's analysis taking u=0.

UNIT-IV

7. Determine the shear parameters by Triaxial test.

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

UNIT-V

9. Describe the Swedish circle method for the stability analysis of slobe

10. Calculate the factor of safety with respect to cohesion of a clay slope laid at 1 in 2 to a height of 10m, if the angle of internal friction ϕ=10°; C=25kN/m^2 and γ=19kN/m^3. What will be the critical height of the slope in this soil?

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505. STRUCTURAL ENGINEERING - II

(New Regulations)

November] [Time : 3 Hours

Maximum : 75 Marks

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

(OR)

2. Analyse a three storey frame using cantilever method which are spaced at 3 m c/c having a horizontal load of 200 kN, 190 kN and 180 kN at 1st, 2nd and 3rd storey. The frame conists of three spans of 6 m, 3 m and 4 m and a height of 3·05 m each, assume suitable data required. (15)

UNIT - II

3. Design the vertical stem and heel slab of a non-submerged reinforced concrete retaining wall of cantilever type, supporting an earthern enbankment 5 m high. Density of earth is 18 kN/m^3 and its angle of repose is 30°. The maximum permissible direct pressure on soil is 150 kN/m^2 at a depth of 1 m. Check for sliding and overturning if needed. (15)

(OR)

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

   Height of wall = 8 m. Back fill is horizontal.

   Unit weight of soil = 18 kN/m^3. Angle of internal friction = 30°.

   Spacing of counterforts = 3·5 m.

   Sketch the reinforcement details in the vertical wall. (15)

UNIT - III

5. A rectangular overhead water tank has the internal dimensions of 4 m × 5 m × 3 m (deep). Design the long wall of the tank and give a neat sketch of the reinforcement details. Adopt M-20 concrete and Fe-415 steel. (15)

(OR)

6. A cylindrical overhead tank, open at top has 3 m inner diameter and 3 m inner height. The thickness of wall and base slab is 250 mm. A ring beam to support the tank is provided on the periphery of the tank below the base slab. The ring beam is supported on four columns. Design the ring beam section for maximum design forces. (15)

UNIT - IV

7. Design a side wall of a box culvert having inside dimension 5 m × 5 m and is subjected to a superimposed load of 16 kN/m^2 and a live load of 45 kN/m^2 from the top. Assume unit weight of soil as 18·2 kN/m^3 and angle of repose 30°. Adopt M-20 concrete and Fe-415 steel. (15)

(OR)

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

   Clear span = 6 m. Clear width of roadways = 7 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. (15)

UNIT - V

9. The trusses for a factory building are spaced at 4·5 m c/c and the purlins are spaced at 1·8 m c/c. The pitch of the truss is $\frac{1}{4}$. Span of the truss is 10 m. Weight of roofing sheets is 190 N/m^2 and wind load on roof surface normal to the roof is 1100 N/m^2. Design an I-section purlin. (15)

(OR)

10. List out the various components of a roof truss and mark its significance. Also, discuss the various loads acting on the roof truss. (15)

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-506. TRANSPORTATION ENGINEERING - II

November] [Time : 3 Hours

Maximum : 75 Marks

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

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. (a) Write a brief note on history of Railways. (10)

   (b) What are the requirements of an ideal sleeper? (5)

(OR)

2. (a) Why it is desirable to have a uniform gauge in a country? (7)

   (b) What is wear of rails? What are the precautions should be taken to reduce it? (8)

UNIT - II

3. (a) What are the criteria for the selection of site of a railway station? (7)

   (b) What are the types of yards? What are the factors to be considered in the design of Marshalling yards? (8)

(OR)

4. (a) Explain level crossing with classification. (7)

   (b) What are the points to be governed in inspection and maintenance of points and crossings? (8)

UNIT - III

5. Explain setting out of tunnel in different stages. (15)

(OR)

6. What are the methods generally used to drive tunnel through water bearing strata? (15)

UNIT - IV

7. Write brief note on the following : (5 × 3 = 15)

   (a) Harbour. (b) Free Port. (c) Offshore Moorings. (iv) Turning basins.

   (e) Dead weight tonnage.

(OR)

8. What are the common types of break-water? Explain with neat sketch. (15)

UNIT - V

9. What are the advantages and disadvantages of

   (a) Direct labour dredging method? (b) Contract dredging method system? (7 + 8)

(OR)

10. Briefly describe the design principle of wet dock. How a wet dock differs from a tidal basin? (15)