B.E. DEGREE EXAMINATION, 2012

(CIVIL / CIVIL AND STRUCTURAL ENGINEERING)

(FIFTH SEMESTER)

CLEC-501 /CSEC-501.
NUMERICAL METHODS

November] [Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.
Use of packet calculators is permitted.
ALL questions carry EQUAL marks.

2

UNIT – I

1. (a) Prove with the usual notations that

$$1 + \mu^2 \delta^2 = \left(1 + \frac{1}{2}\delta^2\right)^2 \quad (6)$$

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

2. (a) Prove with the usual notations that

$$\nabla = \delta E^{-\frac{1}{2}}$$

and $\nabla = 1 - e^{-hD}$ (6)

(b) Solve $y_{n+2} - 3y_{n+1} + 2y_n = 5^n + 2^n$ (6)

3

UNIT – II

3. (a) Find the maximum and minimum values of y from the table:

x	0	1	2	3	4	5
y	0	0·25	0	2·25	16	56·25

(6)

3. (b) The table below gives the velocity v of a moving particle at time t seconds. Find the distance covered by the particle in 12 seconds and also the acceleration at $t = 2$ seconds.

t	0	2	4	6	8	10	12
v	4	6	16	34	60	94	136

(6)

4

4. (a) The population of a certain town is given below. Find the rate of growth of the population in 1971, 1981, 2001 and 2011.

Year	x	1971	1981	1991	2001	2011
Population In lakhs.	y	40·62	60·80	79·95	100·50	132·65

(6)

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

(i) Trapezoidal rule.

(ii) Simpson's one third rule. (6)

UNIT – III

5. (a) Find the approximate root of

$$x \log_{10} x - 1{\cdot}2 = 0$$

by false position method. (6)

5

(b) Solve the following system of equation

$$8x + y + z = 8,$$

$$2x + 4y + z = 4,$$

$$x + 3y + 5z + 5$$

by Gauss-Seidel method. (6)

6. (a) Solve $x^3 - x^2 - x - 2 = 0$

Using Graff's root squaring method. (6)

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

$$x + y + z + 3,$$

$$2x - y + 3z = 16,$$

$$3x + y - z = -3.$$ (6)

UNIT – IV

7. Using Runge-Kutta method of fourth order,

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

given $y(0) = 1$ at $x = 0{\cdot}2, 0{\cdot}4$ (12)

8. Determine the value of y(0·4) using Milne's method given

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

$y(0) = 1.$

Use Taylor series to get the values of y(0·1), y (0·2) and y(0·3) . (12)

9. Solve : $\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$, $0 \le x \le 1$, $t \ge 0$

with $u(x, 0) = x(1 - x)$, $0 \le x \le 1$

$u_t(x, 0) = 0$, $0 \le x \le 1$

$u(o, t) = u(1, t) = 0$ vt $= 0$

for five time steps with $h = 0{\cdot}2$. (12)

10. Approximate the solution of the following elliptic partial differential equation.

$$\frac{\partial^2 u}{\partial t^2} + \frac{\partial^2 u}{\partial y^2} = e^{xy}(x^2 + y^2),$$

$0 < x < 1$, $0 < y < 1$,

$u(0, y) = 1$, $u(1, y) = e^y$, $0 \le y \le 1$ and

$u(x, 0) = 1$, $u(x, 1) = e^x$, $0 \le x \le 1$

Using $h = k = \frac{1}{3}$. (12)

B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-502. SURVEYING-II

Nov.] [Time: 3 Hours

Maximum: 60 Marks

Answer any ONE Question from each UNIT ***(5×12=60)***

All questions carry equal marks

UNIT-I

1. a) Describe the method of determining the constants of a tacheometer from field measurements. (8)

   b) Explain the uses of subtense bar. (4)

2. Determine the gradient from a point A to a point B from the following observations made with a tacheometer filted with an anallactic lense. The constant of instrument was 100 the staff held vertically. (12)

Instrument station	Staff point	Bearing	Vertical angle	Staff readings		
P	A	134°	+10°32′	1.360	1.915	2.470
	B	224°	+5°6′	1.065	1.885	2.705

UNIT-II

3. Explain in detail about setting out of simple curve by linear methods. (12)

4. a) Calculate the ordinates at 10m distances for a circular curve having a long chord of 80m and a versed sine of 4m. (6)

   b) Write briefly about transient curves and its functions. (6)

UNIT-III

5. a) How will you determine the intervisibility of triangulation stations? (6)

   b) Explain in detail about the corrections to be applied for base line measurements. (6)

6. a) Explain briefly about signals and its types. (6)

   b) What is meant by triangulation adjustments? Explain different conditions and cases with neat sketch. (6)

UNIT-IV

7. a) Explain the different laws of weights as applicable to the theory of errors. (6)

b) The angles of triangle ABC were recorded as follows:

A=77°14′20″	wt.4
B=49°40′35″	wt.3
C=53°04′52″	wt.2

Give the corrected values of angles (6)

8. a) Explain the different methods of estimating the most probable values. (6)

b) Find the most probable values of angles A, B and C from the following observations.

A=42°36′28″	wt.2
B=28°12′42″	wt.2
C=65°25′16″	wt.1
A+B=70°49′10″	wt.2
B+C=93°37′58″	wt.1

(6)

UNIT-V

9. Write a brief note on determination of azimuth by exmeridian observations on star & sun. (12)

10. Explain in detail about spherical trigonometry and spherical triangle and its properties. (12)

Register Number :

Name of the Candidate :

3 1 3 8

B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FIRST SEMESTER)

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

November] [Time : 3 Hours

Maximum : 60 Marks

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

UNIT – I

1. Two wheel loads of 16 kN and 18 kN , at a fixed distance apart of 2 m, cross a beam of 10 m span. Draw the influence line for bending moment and shear force for a point 4 m from the left abutment and find the maximum bending moment and shear force at that point. (12)

(Contd.)

Turn Over

2. A UDL of 1 kN/m run, 6m long crosses a girder of 16 m span, Construct the S.F.D and BMD and calculate the values at sections at 3 m, 5 m and 8 m from the left hand support. (12)

UNIT – II

3. A beam ABC of length 4m rests on three supports equally spaced and is loaded with UDL of 3 kN/m throughout the length of the beam as shown in figure -1. Plot the B.M and S.F diagrams. (12)

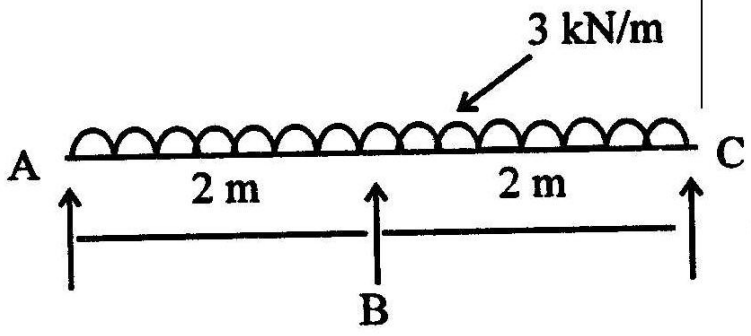

Figure -1.

(OR)

4. A continuous 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 beam is of same cross section throughout, find the B.M at the supports B and C and the pressure on each support. Plot the S.F and BM diagrams. (12)

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 positive & negative bending moment. (12)

(OR)

6. A parabolic arch, hinged at the ends has a span 30 m and rise 5 m. A concentrated load of 12 kN acts at 10 m from the left hinge. The second moment of area varies as the secant of the slope of the rib axis. Calculate the horizontal thrust and the reactions at the hinges. Also,

calculate the maximum bending moment anywhere on the arch. (12)

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 N dividing the 16m distance in four equal parts. Find the shape of the string and the tension in various portions. (12)

(OR)

8. A suspension cable, stiffened with a three hinged girder, has 100 m span and 10 m dip. The girder carries a load of 0.5 kN/m. Alive load of 10 kN rolls from left to right.

Determine

(i) the maximum BM anywhere in the girder.

(ii) the maximum tension in the cable. (12)

UNIT-V

9. A continuous beam ABCD consists of three span and is loaded as shown in figure 2. Ends A and D are fixed. Determine the B.M at the supports and plot the B.M.D. (12)

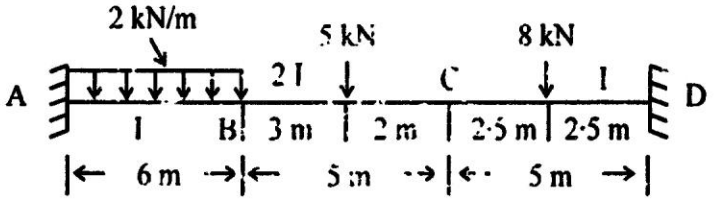

Figure - 2.

(OR)

10. A horizontal beam ABCD is carried on hinged supports and is continuous over three equal spans each of 3 m. All the supports are initially at the same level. The beam is loaded as shown in figure - 3. Plot the BMD and sketch the deflected shape of the beam if the support A settles by 10 mm, B settles by 30 mm and C settles by 20 mm. The moment of inertia of the whole beam is $2{\cdot}4 \times 10^6$ mm^4 units.

Take E = 2×10^5 N/mm^2. (12)

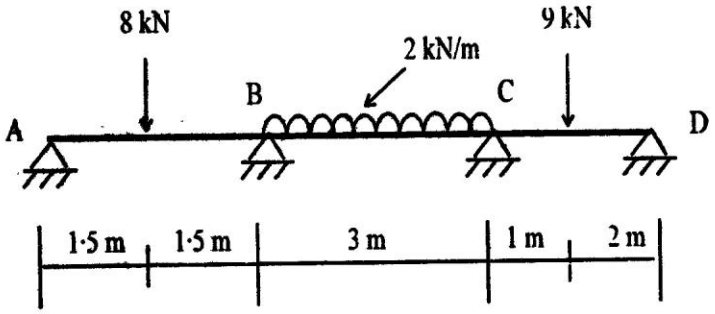

Figure - 3.

Register Number :

Name of the Candidate :

3139

B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-504 / PCLEC-302. SOIL MECHANICS

November] [Time : 3 Hours

Maximum : 60 Marks

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

UNIT - I

1. An undisturbed saturated specimen of clay has a volume of 18·9 cm^3 and a mass of 30·2 g. On oven drying, the mass reduces to 18·0 g. The volume of dry specimen as determined by displacement of mercury is 9·9 cm^3. Determine the shrinkage limit, specific gravity, shrinkage ratio and volumetric shrinkage. (12)

(OR)

Turn over

2. Discuss in brief the types of in-situ compaction equipment with a line sketch. (12)

UNIT - II

3. Differentiate between constant head type and variable head type permeameters. Explain anyone method. (12)

(OR)

4. A uniform soil deposit has a void ratio 0·6 and specific gravity of 2·65. The natural ground water is at 2·5 m below ground level. Due to capillary moisture, the degree of saturation above ground water table is 50%. Determine the neutral pressure, total pressure and effective pressure at depth of 6 m. (12)

UNIT - III

5. Explain stress distribution in soils for concentrated loads by Bossinesq's equation. (12)

(OR)

6. Explain Terzaghi's theory of one dimensional consolidation. List the various assumptions. (12)

UNIT - IV

7. A consolidated undrained triaxial test was conducted on normally consolidated clay yielding the following data :

   $\sigma_3 = 250$ N/m^2.

   $\sigma_d = 275$ N/m^2.

   Determine :

   (a) Angle of friction.

   (b) Angle which the failure plane makes with the major principal plane

   and (c) Normal stress and shear stress on the failure plane. (12)

(OR)

8. Explain Mohr-Coulomb failure theory. Explain vane shear test. (12)

UNIT - V

9. Describe the suitable method of stability analysis of slopes in purely saturated cohesive soil and cohesionless sand. (12)

(OR)

Turn over

10. Describe the friction circle method of analyzing the stability of slopes. (12)

Register Number :

Name of the Candidate :

3140

B.E. DEGREE EXAMINATION, 2012

(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.
ALL questions carry EQUAL marks.

UNIT - I

1. Enumerate the analysis and design of multistoried frame considering all types of loads. (12)

(OR)

2. The roof of a hall is 36 m long and 12 m wide between centres of columns and consists of continuous RC slab over rectangular portal

Turn over

frames spaced 3 m apart. The roof is water proofed with tar felt. The portals may be assumed to be hinged at their bases. Design the continuous slab and one of the intermediate frames and draw a sectional elevation of the portal frames showing details of reinforcement. The ceiling height is 3·5 m above the hinge level. Use M20 concrete and mild steel reinforcement. (12)

UNIT - II

3. (a) Explain the methods of designing a shear key for a retaining wall. (8)

   (b) Classify the types of retaining wall. (4)

(OR)

4. 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^3 and co-efficient of friction between soil and concrete as 0·5. Use M 20 mix and Fe 415 bars. (12)

UNIT - III

5. Design a circular tank with a flexible base for capacity of 500, 000 litres. The depth of water is to be 4 m. Free board = 200 mm. Use M20 concrete and grade-I mild steel. Permissible direct tensile stress in concrete = 1·2 N/mm^2. Permissible stress in steel in direct tension = 100 N/mm^2. Sketch the details of reinforcement in tank walls. (12)

(OR)

6. A reinforced concrete tank is 6m × 3m with a maximum depth of 2·5 m of water. The tank rests on ground. 150 × 150 mm splays are provided at the junction of walls and base slab. Design the tank. Use M20 concrete and mild steel reinforcement. (12)

UNIT - IV

7. Design a simple slab bridge to the following requirements :

   (a) Clear span = 5·5 m

   (b) Clear width of carriage way = 6·8 m.

   (c) Live load = Class -A loading.

   (d) Concrete mix = M20. (12)

(OR)

Turn over

Spacing of purlins along slope of roof truss = 2m.

Slope of roof truss = 1 vertical,

2 horizontal.

Wind load on roof surface normal to roof = 1,000N/m^2.

Vertical load from roof, sheets etc. = 200 N/m^2.

(12)

2. Draw a neat dimensioned sketch of the permanent way cross section and explain the functions of various components. (12)

UNIT - II

3. Explain with a neat sketch, the component parts and working of a right hand turnout. (12)

(OR)

4. (a) What are the different types of railway stations? Explain the features of each station. (9)

   (b) Explain the function of buffer shop. (3)

UNIT - III

5. (a) How ventilation and drainage is provided in tunnel? (6)

   (b) Explain the 'Americal method' of soft ground tunneling. (6)

(OR)

6. What are the various methods of tunneling? Explain briefly. (12)

3141

B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-506.

TRANSPORTATION ENGINEERING - II

November] [Time : 3 Hours

Maximum : 60 Marks

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? (6)

   (b) Explain the telescopic method of plate laying. (6)

(OR)

UNIT - IV

7. What are the requirements of good harbour? Distinguish between refuge harbour and commercial harbour. (12)

(OR)

8. Classify different types of breakwater. Underwhat conditions a rubble mound breakwater is preferred? (12)

UNIT - V

9. Explain the various factors to be considered in alignment of navigational channel. (12)

(OR)

10. (a) Differentiate between a jetty and a wharf. State the condition underwhich each is preferred. (6)

    (b) Explain the reasons for dredging. How the dredged material is disposed off? (6)

Register Number: **3409**

Name of the Candidate:

B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

PCLEC-504.IRRIGATION STRUCTURE AND WATER POWER ENGINEERING

(For the students joined during 2007-08 and later)

(New Regulation)

Nov) (Time: 3 Hours

Maximum: 60 Marks

Answer any ONE FULL question from each unit

All questions carry equal marks

UNIT-I

1. a) Draw the layout and explain in detail about drip irrigation? (6)

   b) Why is it necessary to provide a 'fish ladder' on large rivers and how does it help in achieving the required objective? (6)

(OR)

2. Describe briefly the necessity and importance of irrigation works in our country. What are the different types of irrigation? Write brief notes on each of them? (12)

UNIT-II

3. a) How does the effect of barrage differ form that of weir on the regime of a river. (12)

   b) What is meant by "Flumed falls" and what are their advantages? (12)

(OR)

4. Write a short note on the following:
   a) Sarda type fall b) straight glacis fall c) Inglis fall (12)

UNIT-III

5. a) Briefly discuss the checks that are required to be made to investigate the stability of an Earthen dam. (6)

   b) Explain the design criteria for the design of high gravity dams. (6)

(OR)

6. a) Describe the functions and types of galleries in Dams. (6)

   b) Define and explain the term 'Phreatic line' in earthen dams. (6)

UNIT-IV

7. Discuss with neat sketches, the three different types of aqueducts which can possibly be constructed depending upon the size of the drainage to be passed below the canal. (12)

(OR)

8. a) What is meant by guide banks? What are their functions and effects? (6)

   b) Describe various steps for the design of a lined canal. (6)

UNIT-V

9. a) Write short notes on hydropower potential of India. (6)

   b) What are the principal components of a hydroelectric scheme? (6)

(OR)

10. Describe with neat sketches the different types of canal escapes that may be constructed on modern canal projects. (12)

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Register Number:

3140-A

Name of the Candidate:

B.E. DEGREE EXAMINATION, 2012

(CIVIL AND STRUCTURAL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505. STRUCTURAL ENGINEERING-II

(Revised regulation)

[For the students joined during 2010-11 and after]

Nov.] [Time: 3 Hours

Maximum: 60 Marks

Answer any ONE Question from each UNIT ***(5×12=60)***

All questions carry equal marks

UNIT-I

1. Analyse the two storey frame using substitute frame method which are spaced at 4 m c/c having a horizontal load of 100 kN and 80 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.

2. For a hall 10 m wide and 20 m long, portal frames are to be provided at 4 m centre to centre. The portals are hinged at the base, and its height is 6.5 m. Design the roof slab and portal frame, if it carries a live load of 1.7 kN/m^2. Assume the SBC of soil as 240 kN/m^2. Use M 25 grade of concrete.

UNIT-II

3. Design a counterfort retaining wall based on the following data:
   Height of wall above ground level = 5.5 m
   SBC of soil =160kN/m^2
   Angle of internal friction = 32°
   Density of soil = 16.8 kN/m^3
   Spacing of counterforts =3.3 m c/c
   Adopt M25 grade concrete and Fe 415 HYSD bars.

4. Design the stem of a cantilever retaining wall based on the following data:
   Height of wall above ground level = 4.5 m
   SBC of soil = 220 kN/m^2
   Angle of internal friction = 30°
   Density of soil = 18.5 kN/m^3
   Co-efficient of friction between soil and concrete = 0.5
   Adopt M 25 grade concrete and Fe 415 HYSD bars.

UNIT-III

5. A circular tank has 12 m dia and 3 m water height. Determine hoop tension and its location of maximum bending moment.

6. Design an Intze-type overhead water tank of capacity of 1 million litres, supported on an elevated tower comprising 8 columns. The base of the tank is 16 m above ground level and the depth of foundations is 1m below ground level. Adopt M20 grade concrete and Fe4 15 grade HYSD bars. The design of the tank should conform to the stresses specified in IS. Draw the sectional elevation of the water tank showing reinforcement details in the dome, tank walls, ring girder, columns and braces.

UNIT-IV

7. Design a box culvert having inside dimensions 3.5 x 3.5 m. The box culvert is subjected to a superimposed dead load of 12 kN/m^2 and a live load of 45 kN/m^2 from the top. Assume unit weight of soil as 18 kN/m^3 and angle of repose of 30 degree. Use M 20 concrete and Fe 415 steel.

8. Design the R.C.C. tee beam girder for a national highway bridge to suit the following data: Using Courbon's method, compute the design moments and shears.

Clear width of Roadway	: 7.5 m
Width of kerbs	: 600 mm
Effective span	: 20 m
Live load	: IRC class AA tracked vehicle
Thickness of wearing coat	: 80 mm
Number of main girders	: 4 Nos.
Concrete	: M 20 Grade

UNIT-V

9. Discuss the step by step procedure for the analysis of the roof truss against wind loads on Industrial Buildings.

10. Design a purlin for a roof truss having the following data:

Span of roof truss	=6.0 m
Spacing of roof trusses	=3.0 m c/c
Spacing of purlins along the slope of roof truss	=2.0 m c/c
Inclination of roof	=30°
Wind pressure	=1.50 kN/m^2
Roof coverage	= A.C sheet weighing 200 N/m^2

Provide a channel section as purlin.
