Register Number :

Name of the Candidate :

0 2 3 4

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 Mechanical)

April] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. (a) Find the missing term in the following : (8)

x:	1	2	3	4	5	6	7
y:	2	4	8	-	32	64	128

(b) Solve : $y_{n+2} - 3y_{n+1} + 2y_n = 5^n + 2^n$ (7)

2. (a) Prove that : $\left(\frac{\Delta^2}{E}\right) e^x \frac{E\left(e^x\right)}{\Delta^2\left(e^x\right)} = e^x$, taking h as the inverval of differencing. (8)

(b) Solve : $y_{n+2} - 5y_{n+2} + 6y_n = n$. (7)

UNIT - II

3. (a) From the following table, find tan 45° 15′ : (8)

x° :	45	46	47	48	49
tan x:	1·000	1·0355	1·0724	1·1106	1·1513

(b) Evaluate $\int_{02}^{14} \log_e x \, dx$, taking $h = 0{\cdot}2$ using Simpson's $\frac{1}{3}^{rd}$ rule. (7)

4. (a) Find the cubic function f (x) for the given data and find f (3) using Newton's divided difference formula : (8)

x	0	1	2	4
f(x)	1	4	15	85

(b) Find the first and second derivatives of f(x) at $x = 1{\cdot}5$, if (7)

x:	1·5	2·0	2·5	3·0	3·5	4·0
f(x):	3·375	7·000	13·625	24·0	38·875	59·000

UNIT - III

5. (a) Find the positive root of $x^3 - x^2 - 2 = 0$ correct to 4 decimal places by Regula-Falsi method. (8)

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

$$x + y + z = 6.$$
$$x + 2y + 3z = 14.$$
$$x - 2y + 3z = 6.$$

6. (a) Find the real root of the equation $\cos x - xe^x = 0$ by method of iteration. (8)

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

$$10x + y = z = 12.$$
$$x + 10y + z = 12.$$
$$x + y + 10z = 12.$$

UNIT - IV

7. (a) Using Runge-Kutta method of fourth order, find y(0·2) and y(0·4) from

$$\frac{dy}{dx} = x^2 + y^2, \; y(0) = 1.$$ (8)

(b) Using Milne's method, evaluate y(0·4) if y satisfies $\frac{dy}{dx} = xy + y^2$, $y(0{\cdot}1) = 1$

$y(0{\cdot}1) = 1{\cdot}1167$, $y(0{\cdot}2) = 1{\cdot}2767$, $y(0{\cdot}3) = 1{\cdot}5023$. (7)

8. (a) Using Picard's method to approximate the value of y when $x = 0{\cdot}25$ given that

$$\frac{dy}{dx} = 3x + y^2 \text{ and } y(0) = 1.$$ (8)

(b) Using modified Euler's method, find y(0·1) and y(0·2) given $y' = \frac{y - x}{y + x}$, y(0) = 1. (7)

UNIT - V

9. Find the solution of $2\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ when u(0, t) = u(4, t) = 0 and u(x, 0) = x (4 – x) taking $h = 1$ by Bender-Schmidt's method. (15)

10. Solve : $\frac{\partial^2 u}{\partial t^2} - 4\frac{\partial^2 u}{\partial x^2} = 0$ with the boundary conditions u(0, t) = 0 = u(4, t) and $u_t(x, 0) = 0$ and u(x, 0) = x (4 – x) taking $h = 1$ for 4 time steps. (15)

Register Number:

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0235

B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-502/PCLEC-102. SURVEYING-II

(Common with Part-Time)

April] Maximum : 75 Marks [Time : 3 Hours

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

UNIT-I

1. A tachometer was setup at a station A and the readings in a vertically held staff at B are 2.255, 2.605 and 2.955 the line of sight being at an inclination of +8″24′. Another observation on the vertically held staff at BM gave the readings 1.640, 1.920 and 2.200, the inclination of line of sight being +1″6′. Calculate the horizontal distance between A and B elevation of B, if RL of BM is 418.685m. (k=100, c=0.3).
2. Explain in detail various methods of reading the staff.

UNIT-II

3. Explain the procedure for setting out a compound curve.
4. Explain the setting out a simple curve by single theodolite method.

UNIT-III

5. Derive the equation for well conditional triangle.
6. From a satellite station S 5.8 meter from the main triangulation station, the following angles were observed.

A	0°	0′	0″
B	132°	18′	30″
C	232°	24′	6″
D	296°	6′	11″

The length AB, AC and AD were computed to be 3265.5m, 4022.2m and 3086.4m resp. Determine the directions AB, AC and AD.

UNIT-IV

7. Find the most probable valve of the angels A from the following observation equation.

   A=30°28′40″

   3A=91°25′55″

   4A=121°54′30″
8. Explain the method of least square in detail.

UNIT-V

9. Explain the various astronomical co-ordinate systems in detail.
10. Explain the various elements of a spherical triangle and its solution by Napier's rule.

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Name of the Candidate:

0236

B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

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

(Common with Part-Time)

April] Maximum : 75 Marks [Time : 3 Hours

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

UNIT-I

1. Propped cantilever beam of span 6m having the prop at the end is subjected to two concentrated loads of 24KN and 48KN at one third point respectively from the left fixed end supports. Draw the shear force and bending moment diagram.
2. A continuous beam ABC carries a UDL of 50KN/m run on AB and BC. The support B sinks by 5mm. Below A and C, the value of EI is constant. E=200Gpa, I=332×10^6mm^4. Draw BMD and SFD.

UNIT-II

3. Draw the influence line for bending moment at D, the middle point of span BC of continuous beam ABC with ends A and C simply supported. Compute the ordinates at every 2m intervals. Span AB=BC =8m.
4. A uniformly distributed load of 2KN/m run, 6m long crosses a girder of 18m span. Construct the maximum shear force and bending moment diagram and also calculate the values at section at 3m, 5m, and 8m from the left hand support.

UNIT-III

5. Explain step by step procedure to find the horizontal reaction and support moments of fixed arch.
6. A parabolic three hinged arch carries a UDL of 30KN/m on the left half of the span. It has a span of 16m and a central rise of 3m. Determine the resultant reactions at supports. Find the bending moment, normal thrust and the radial shear at xx, 2m from the left support.

UNIT-IV

7. A suspension cable having supports at the same level, has a span of 30m and a maximum dip of 3m. The cable is loaded with a UIDL of 10KN/m. throughout its length. Find from first principles, the maximum tension in the cable.
8. A two hinged parabolic arch of span L and rise h carries a UDL W per meter run over the whole span. Assuming $I\text{-}I_0 \sec_\alpha$, find the expression for the horizontal thrust developed.

UNIT-V

9. A beam of ABC, 16m long, fixed at A and C and continuous over support B, carries an uniformly distributed load of 3KN/m over the span AB and a point and a point load of 10KN at mid span of BC. The span AB=8m and span BC=8m. EI is constant throughout. Analyse the beam using moment distribution method.
10. A beam ABC, 7 meters long is fixed at A and simply supported at B, 4 meters from A so as to provide an overhanging beam BC 3 meters long. It carries a point load of 5KN at C. Analyse the beam, using moment distribution method.

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0 2 3 7

B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-504 / PCLEC-302. SOIL MECHANICS

(Common with Part-Time)

April] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT - I

1. A soil sample has a porosity of 40 %. The specific gravity of solids is 2·70. Calculate void ratio, dry density and unit weight of soil if the soil is completely saturated. (15)

2. (a) List the assumptions and limitations of one dimensional consolidation theory. (8)

   (b) Discuss in detail the various field compaction methods. (7)

UNIT - II

3. A 3 mm thick sandy stratum has co-efficient of permeability of 3×10^{-3} m/s. A separate test gave a porosity of 40·% and bulk unit weight of 20·6 kN/m^2 at a moisture content of 30 %. Determine the head at which upward seepage will cause a quick sand condition. Also, find the discharge velocity and seepage velocity under quick sand condition. (15)

4. (a) How will you determine the average permeability of soil deposit consisting of number of layers ? What is its use in soil engineering ? (8)

   (b) Derive an equation to determine the co-efficient of permeability from a pumping out test in an unconfined aquifier. (7)

UNIT - III

5. How will you determine the co-efficient of compression index from an odometer test ? (15)

6. An under drained sample of 30 cm thick got 50 % consolidation in 20 minutes with drainage allowed at top and bottom in the laboratory. If the clay layer from which sample was obtained is 3 m thick in field condition, estimate the time it will take to consolidate 50 % with double surface drainage and in both case consolidation uniform. (15)

UNIT - IV

7. Explain the direct shear test to determine the shear strength of soil. (15)

8. A vane 30 cm long, 8 cm in diameter was pressed into soft clay at the bottom of bore hole. Torque was applied gradually increased to 45 N-m when failure took place. Subsequently the vane rapidly so as to completely re-mould the soil. The re-moulded soil was sheared at a torque of 18 N-m. Calculate the cohesion of clay in the natural and re-moulded state and also, the vane of sensitivity. (15)

UNIT - V

9. What are the different types of slope failures ? Discuss the various methods of improving the stability of slopes. (15)

10. A sample of clay has liquid limit of 62 % and plasticity index is 32 %. What is the state of consistency of the soil if the soil in its natural state has a water content of 34 % ? Calculate the shrinkage limit if the void ratio of the sample at the shrinkage limit is 0·70. Assume $g = 2{\cdot}7$. (15)

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B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-505. STRUCTURAL ENGINEERING - II

(Revised Regulations)

(For the candidates of 2011-12 batch and later)

April] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

Use of IS-456, IS-3370, IRC and Steel Tables are permitted.

Assume suitable data wherever necesssary and mention it clearly.

ALL questions carry EQUAL marks.

UNIT – I

1. The substitute frame of a multistoreyed building having 3 bays has a continuous beam ABCD with AB = 3·0 m, BC = 2·5 m and CD = 3·0 m. The beams are spaced at 3·2 m intervals.

   Thickness of floor slab = 120 mm. Live load = 4 kN/m^2.

   Floor finish = 0·60 kN/m^2. Size of beams = 250 mm × 400 mm.

   Size of columns = 250 mm × 400 mm. Height between floors = 4 m.

   Analyse the substitute frame and estimate the maximum design moments in the beams and columns.

2. Enumerate with sketches, the procedure for analysis of multistorey frames subjected to horizontal forces using cantilever method.

UNIT - II

3. Design a T-shaped cantilever retaining wall for the following data :

   (a) Height of wall above ground = 3·8 m. (b) Depth of foundation = 1·3 m.

   (c) Unit weight of earth fill = 19 kN/m^3. (d) Angle of internal friction = 25°.

   (e) Co-efficient of friction between soil and concrete = 0·44.

   (f) Safe bearing capacity of soil = 150 kN/m^2.

   (g) Adopt M-20 grade concerete and Fe-415 grade steel.

4. A counterfort retaining wall has a total height of 12 m from foundation level. The backfill has a horizontal top. The unit weight and the angle of internal friction of soil are 18 kN/m^3 and 36° respectively. Base slab width and thickness are 6·5 m and 450 mm respectively. Toe width from the face of the wall is 700 mm, thickness of wall is 280 mm. The counterforts are spaced at 3 m /cc, thickness of counterfort is 300 mm. Calculate the pressure under the base and design the toe slab.

UNIT - III

5. A spherical cover dome is to be provided for a circular water tank with inner diameter of 5 m. The rise of the dome is 1·2 m. Live load on the dome is 1·5 kN/m^2. Design the cover dome and its supporting ring beam.

6. A square water tank 5 m × 5 m × 3 m in height is supported on ground and open at top. Assuming the base of the wall as hinged, design the thickness of wall and its reinforcement. Use M-20 grade concrete and Fe-415 steel.

UNIT - IV

7. Discuss elaborately on the loadings involved in road bridge with neat sketches.

8. Design a RCC Tee beam girder bridge to suit the following data and sketch the typical details of reinforcement :

   (a) Clear width of roadway = 7·5 m
   (b) Span (centre to centre of bearings) = 15 m.
   (c) Live load = IRC class AA.
   (d) Average thickness of wearing coat = 80 mm.
   (e) Grade of concrete = M-20 mix.
   (f) Grade of steel = Fe-415 tor steel.

UNIT - V

9. Explain in detail the various components and their functions of an industrial roof truss with neat sketches.

10. Design the purlin for the following specifications by using angle section :

    (a) Span of truss = 15 m/cc.
    (b) Pitch = $\frac{1}{5}$ of span.
    (c) Spacing of truss = 3·5 m/cc.
    (d) Spacing of purlins = 1·5 m/cc
    (e) Load from roofing materials = 0·2 kN/m^2.
    (f) Wind load = 1·2 kN/m^2.

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B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FIFTH SEMESTER)

CLEC-506. TRANSPORTATION ENGINEERING – II

April] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. (a) Narrate the requirments of an ideal permanent way. (7)
   (b) List out the factors which govern the cross section and length of rails. (8)
2. Give a detailed account of the various maintenance practices followed in permanent ways. (15)

UNIT - II

3. Explain the terms "points and crossings" in railways and their components with neat sketches. (15)
4. (a) List out the criteria for the selection of a site for a railway station. (7)
   (b) Explain the various types of track junctions with neat sketches. (8)

UNIT - III

5. State the need for lining the tunnels and explain the method of lining the tunnels using shortcrete. (15)
6. Explain the setting of tunnels in different stages. (15)

UNIT - IV

7. (a) List out the requirements of a good harbour and explain them. (7)
   (b) Narrate the classification of harbours based on utility. (8)
8. Name the common types of breakwaters and their advantages and disadvantages. (15)

UNIT - V

9. (a) Write the classification of nagivational channels and explain them. (7)
   (b) List out the various factors to be considered in the alignment of nagivation channels. (8)
10. Name the different types of dredging devices commonly used in harbour engineering and state their merits and demerits. (15)