

Register Number :

Name of the Candidate :

0177 - A

**B.E. DEGREE EXAMINATION, 2017**

( CIVIL ENGINEERING )

( FOURTH SEMESTER )

CLEC-401 / CSEC - 401 / MEEC-401 / MFEC-401 / CHEC-401.

ENGINEERING MATHEMATICS - IV

( For candidates who joined from 2015-16 and after )

CLEC-401 / CSEC - 401 / CHEC-401. ENGINEERING MATHEMATICS - III

MEEC-401 / MFEC-401. PROBABILITY AND STATISTICS

( For candidates who joined in 2014-15 and before )

( Common with Civil and Structural, Mechanical ( Manufacturing ) and  
Chemical Engineering )

April ]

[ Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

Use of Statistical Table is permitted.

ALL questions carry EQUAE marks.

UNIT - I

1. (a) A discrete random variable  $x$  has the following probability distribution :

Values of $x$ :	0	1	2	3	4	5	6	7	8
$P(X = x)$ :	1	3a	5a	7a	9a	11a	13a	15a	17a

- (i) Find the value of 'a'. (ii)  $P(x < 3)$ .  
(iii) Find the mean value and variance. (9)
- (b) Find the m.g.f for the distribution whose pdf is  $f(x) = ke^{-x}$ ,  $0 \leq x \leq \infty$ . (6)
2. The joint pdf of the random variable  $(x, y)$  is given by
- $$f(x, y) = kxye^{-(x^2 + y^2)}, \quad x > 0, y > 0.$$
- (a) Find  $k$ . (b) Find the marginal distribution functions.  
(c) Prove that  $x$  and  $y$  are independent. (15)

## UNIT - II

3. (a) Show that the random process  $x(t) = A \sin(\omega t + \theta)$  is WSS where  $A$  and  $\omega$  are constants and  $\theta$  is uniformly distributed in  $(0, 2\pi)$ . (8)
- (b) Find the mean and variance of the stationary process  $\{x(t)\}$ , whose auto correlation function is given by  $R(\tau) = 2 + 4e^{-2|\tau|}$ . (7)
4. (a) Find the cross correlation function of  $w(t) = A(t) + B(t)$  and  $z(t) = A(t) - B(t)$ , where  $A(t)$  and  $B(t)$  are statistically independent random variable with zero means and auto correlation functions. (8)
- (b) Prove that  $R_{xx}(\tau)$  is an even function. (7)

## UNIT - III

5. (a) The following data give the number of aircraft accidents that occurred during the various days of the week.

Day	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	15	19	13	12	16	15

Test whether the accidents are uniformly distributed over the week. (8)

- (b) A machine produces 16 imperfect articles in a sample of 500. After machine is overhauled, it produces 3 imperfect articles in a batch of 100. Has the machine improved? (7)
6. (a) Two independent samples of sizes 8 and 7 contained the following values :

Sample-1 :	19	17	15	21	16	18	16	14
Sample-2 :	15	14	15	19	15	18	16	--

- I If the difference between the sample mean significant? (8)
- (b) Two samples of size 9 and 8 give the sum of the squares of the deviations from their respective means equal to 160 and 91 respectively. Can the sample be regarded as drawn from the same normal population of variance? (7)

## UNIT - IV

7. Carry out the analysis of the following Latin square design : (15)

A (50) B (70) C (70) D (80) E (90)  
 B (70) C (90) D (80) E (80) A (50)  
 C (60) D (50) E (90) A (80) B (90)  
 D (50) E (60) A (80) B (50) C (70)  
 E (80) A (90) B (50) C (70) D (60)

8. The data given below are the number of defects in 10 samples of 100 items each. Construct a  $p$ -chart and an  $np$ -chart and comment on the results : (15)

Sample no:	1	2	3	4	5	6	7	8	9	10
No. of defectives:	6	16	7	3	8	12	7	11	11	4

UNIT - V

9. A relay circuit has an MTBF of 0.8 year. Assuming random failures
- Calculate the probability that the circuit will survive for one year without failure.
  - What is the probability that there will be more than two failures in the first year?
  - What is the expected number of failures per year? (15)
10. Find the reliabilities for the system given below ( figure -1): (15)

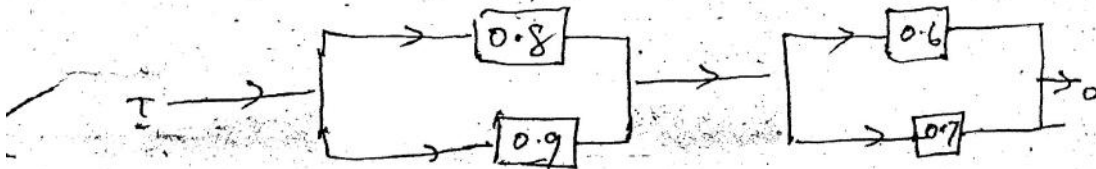


Figure - 1.

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**B.E. DEGREE EXAMINATION, 2017**

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

**CLEC-402. SURVEYING - I**

April ]

[ Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

**UNIT - I**

1. Explain the following terms :

(a) Base line. (b) Check line. (c) Tie line. (d) Oblique offset. (e) Swing offset.

2. To continue a survey line, in passing an obstacle in the form of pond, stations A and D on the main line, were taken on opposite sides of the pond. On the left of AD, a line AB, 225 m long was laid down and a second line AC, 275 m long was laid down on the right of AD, the points B, D and C being in the same straight line. BD and DC were then chained and found to be 125 m and 137.5 m respectively. Find the length of AD.

**UNIT - II**

3. (a) What is local attraction ? How is it detected and eliminated ? (7)  
(b) What are the temporary adjustments to be done in prismatic compass ? Explain. (8)
4. The following bearings were observed with a compass :

AB 74° 0'	BA 254° 0'
BC 91° 0'	CB 271° 0'
CD 166° 0'	DC 343° 0'
DE 177° 0'	ED 0° 0'
EA 189° 0'	AE 9° 0'

Where do you suspect local attraction ? Find the correct bearings.

**UNIT - II**

5. What is two point problem ? How is it solved ? Explain with neat sketches.

6. The following were taken from a chain line to an irregular boundary line at an interval of 10 m. Compute the area by

- (a) Trapezoidal rule, (b) Simpson's rule.

Offsets are : 0, 2.5, 3.5, 5.0, 4.6, 3.20, 0.

#### UNIT - IV

7. Describe in detail how you would proceed in the field for

- (a) Profile levelling, (b) Cross sectioning.

8. Discuss the effects of curvature and refraction in levelling. Find the correction due to each and the combined correction. Why are these effects ignored in ordinary levelling?

#### UNIT - V

9. Discuss the various methods of theodolite traversing.

10. A closed traverse was conducted round an obstacle and the following observations were made. Work out the missing quantities.

Side	Length (m)	Azimuth
AB	500	98° 30'
BC	620	30° 20'
CD	468	298° 30'
DE	?	230° 0'
EA	?	150° 10'

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( FOURTH SEMESTER )

**CLEC-403. MECHANICS OF SOLIDS - II**

April ]

[ Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

**UNIT - I**

1. Determine the member forces for the truss loaded as shown in figure - 1.

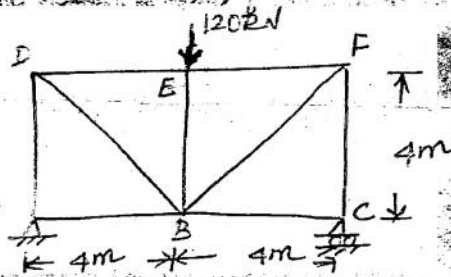


Figure - 1.

2. Determine the vertical displacement at the free end E in the frame as shown in figure - 2.  
Assume  $EI = 20000 \text{ kN/m}^2$ .

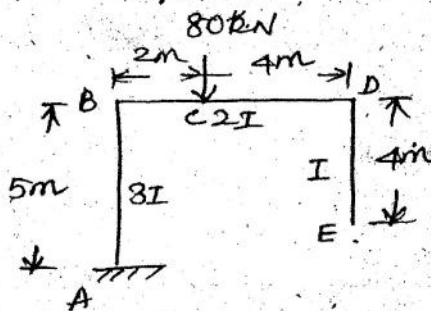


Figure - 2.

## UNIT - II

3. A cantilever of I-section, 2.5 m long is subjected to a load of 50 kN at the free end as shown in figure - 3. Determine the resulting bending stresses at corners A and B on the fixed section of the cantilever.

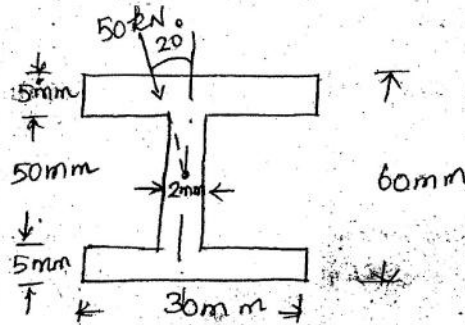


Figure - 3.

4. An angle section as shown in figure - 4 is used as a simply supported beam over a span of 2.5 m. It carries a load of 200 N along the vertical axis and passing through centroid of the section. Calculate the deflection of the beam at the mid section and its deflection with the

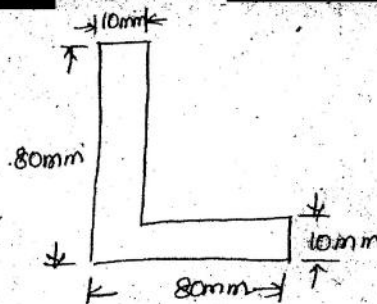


Figure - 4

## UNIT - III

5. A load of 75 kN is carried by a column made of cast iron. The external and internal diameters are 200 mm and 170 mm respectively. If the eccentricity of the load is 30 mm, find the maximum and minimum stress intensities.
6. Calculate the safe compressive load on a hollow cast iron column one end rigidly fixed and other pin-jointed, 150 mm outer and 100 mm inner diameter, 10 m long. Use Euler's formula with F.S. = 5 and  $E = 95 \text{ GN/m}^2$ .

## UNIT - IV

7. A thin cylindrical shell is 3 m long, and is having 1 m internal diameter and 15 mm thickness. Calculate the maximum intensity of shear stress induced and also, changes in the dimension of the shell, if it is subjected to an internal fluid pressure of  $2 \text{ N/mm}^2$ .

Take  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $\mu = 0.30$ .

8. A pipe of 150 mm internal diameter and 50 mm thickness carries a fluid at a pressure of  $15 \text{ MN/m}^2$ . Calculate the maximum and minimum intensities of circumferential stresses across the section. Also, sketch the radial stress and circumferential stress distribution across the section.

## UNIT - V

9. Draw the SFD and BMD for the fixed beam as shown in figure - 5.

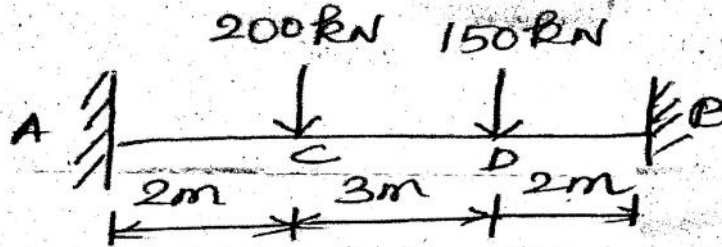


Figure - 5

10. For the propped cantilever as shown in figure - 6, find the support reactions and draw SFD and BMD.

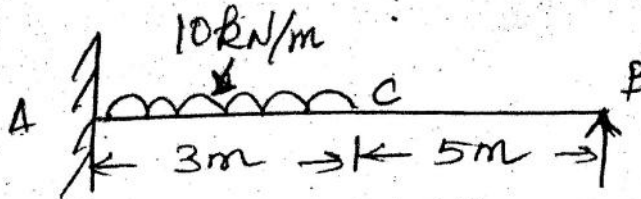


Figure - 6.



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**B.E. DEGREE EXAMINATION, 2017**

( CIVIL ENGINEERING )

( FOURTH SEMESTER )

**CLEC-404 / PCLEC-204. STRUCTURAL ENGINEERING - I**

( Common with Part-Time )

April ]

[ Time : 3 Hours

Maximum : 75 Marks

*Answer any ONE FULL question from each unit.*

*Use of IS : 456-2000, IS : 800-2007, IS : 813-1986 permitted.*

*ALL questions carry EQUAL marks.*

**UNIT - I**

1. Design a rectangular beam section subjected to an ultimate moment of 120 kN-m. Use concrete M-20 and steel Fe-415. Adopt limit state method.
2. Design a smallest concrete section of a RC beam to resist an ultimate moment of 62 kN-m, assuming width 230 mm, concrete grade M-20 and HYSD bars of grade Fe-415.

**UNIT - II**

3. Design a rectangular slab supported on its all four edges ( 600 mm thick ) over a classroom of size 4.8 m × 6.2 m. Two adjacent edges of the slab are discontinuous and the remaining two edges are continuous. A finishing surface of cement concrete of 20 mm shall be provided over the slab. The slab shall be used as classroom. M-20 grade of concrete and HYSD bars shall be used. The unit weight of finishing surface concrete is 24 kN/m<sup>3</sup>.
4. Design the interior span of a continuous one way slab for an office floor continuous over tee beams spaced at 3 metres.

Live load = 4 kN/m. Floor finish = 1 kN/m<sup>2</sup>.

Use concrete M-20 and steel fe-415. Adopt limit state method. Sketch the steel reinforcement.

**UNIT - III**

5. A rectangular column of effective height of 4-m is subjected to characteristics axial load of 800 kN and bending moment of 100 kN-m about the major axis. Design a suitable section for the column so that the width should not exceed 400 mm. Use the minimum percentage of longitudinal steel. Assume  $f_y = 415 \text{ N/mm}^2$  and  $f_{ck} = 20 \text{ N/mm}^2$ .

6. A column  $300 \times 400$  mm has an unsupported length of 3 m and effective length of 3.6 m. If it is subjected to  $P_u = 1100$  kN-m and  $M_u = 230$  kN-m about the major axis, determine the longitudinal steel using  $f_{ck} = 25$  N/mm<sup>2</sup>.

#### UNIT - IV

7. An unequal angle 1.5 m long is connected to a gusset plate. It carries an ultimate tension of 230 kN. Design the section using bolted connection and 4 mm weld connection.
8. Two plates  $200 \times 80$  mm of grade Fe-410 are connected to 20 mm diameter bolts of grade 4.6 using butt joint. Design a bolted connection to transmit a pull equal to the strength of the plate. Also, sketch the bolts in the joint.

#### UNIT - V

9. Design a gusseted base connection for a column ISHB.450, 5 m long with cover plates of  $400 \times 20$  mm on both faces. The column carries a factored load of 5500 kN. Foundation block is made of M-20 grade concrete.
10. Design a welded plate girder for a effective span of 30 m carrying an uniformly distributed load of 30 kN/m and two concentrated load of 150 kN each acting at 10 mm from both ends. The girder is simply supported at ends and fully restrained against lateral buckling throughout the span.

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**B.E. DEGREE EXAMINATION, 2017**

**(CIVIL ENGINEERING)**

**(FOURTH SEMESTER)**

**CLEC- 405: ESTIMATION AND VALUATION**

April]

Maximum : 75 Marks

[Time : 3 Hours

*Answer any ONE full question from each Unit*

(5 × 15 = 75)

UNIT - I

1. The arches of a road culvert are to be constructed with first class brick work in cement mortar (1 : 5) and soffit of arches are to be finished with 12mm thick cement plaster (1:3) the culvert consist of two span of 4.5m each, rise of the arch is 1.2 m and thickness of arch is 40cm, clear road way in between the parapet is 9.6m and the thickness of parapet at the level is 45cm. calculate the quantities of brick work and cement plaster for the construction and finishing of the arches.
2. Estimate the quantities required for I cubic metre for bricks, Coarse aggregate, Fine aggregate and Cement assuming suitable grade of concrete.

UNIT - II

3. Discuss in detail the schedule of rates for labourers.
4. State the method involved in preparation of abstract for different construction works.

UNIT - III

5. Enumerate the tender documents.
6. How will you prepare data for drafting model tenders?

UNIT - IV

7. List out the types of contracts and explain the formation of contracts.
8. Describe in detail the arbitration and legal requirements.

UNIT - V

9. Explain in detail the procedure followed for valuation of lands and buildings.
10. Write short note on: a) Fixation of rent and b) Gift tax.

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( CIVIL ENGINEERING )

( FOURTH SEMESTER )

**CLEC-406. TRANSPORTATION ENGINEERING - I**

April ]

[ Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

**UNIT - I**

1. Write in detail the classification of highways :  
(a) According to the location and function. (b) According to traffic.  
(c) According to transported tonnage. ( 9 + 3 + 3 )
2. What is super-elevation and what are all the advantages of super-elevation ? Briefly explain the calculation of super-elevation. (15)

**UNIT - II**

3. Write short notes on the following tests conducted for bituminous materials with necessary sketches :  
(a) Ductility test. (b) Penetration test. (c) Softening test. ( 5 + 5 + 5 )
4. Describe the construction procedure of the following types of bituminous roads :  
(a) Bitumen bound macadam. (b) Bituminous concrete. ( 8 + 7 )

**UNIT - III**

5. Explain in detail about the traffic volume survey. (15)
6. Write short notes on the following traffic control devices :  
(a) Road markings. (b) Road signs. (c) Traffic signals. ( 5 + 5 + 5 )

**UNIT - IV**

7. Enumerate the methods that are adopted for traffic control in practice. (15)
8. List out the factors that hamper the environment due to traffic and its impact. (15)

**UNIT - V**

9. Describe in detail the factors governing the selection of site for construction of an airport. (15)
10. Mention the salient features of the facilities provided in the passenger terminal building of an airport. (15)