

Register Number :

Name of the Candidate :

**3 0 6 5**

**B.E. DEGREE EXAMINATION, 2013**

**( CIVIL, CIVIL AND STRUCTURAL, MECHANICAL  
[ MANUFACTURING ] AND CHEMICAL  
ENGINEERING )**

**( FOURTH SEMESTER )**

**CLEC-401.**

**ENGINEERING MATHEMATICS - III /  
PROBABILITY AND STATISTICS**

November ]

[ Time : 3 Hours

Maximum : 75 Marks

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

*Answer any ONE FULL question from each unit.*

*Use of statistical table is permitted.*

*ALL questions carry EQUAL marks.*

**Turn Over**

## UNIT - II

1. (a) A continuous r.v.  $X$  has p.d.f

$$f(x) = kx^2 e^{-x} \quad x \geq 0.$$

Find:

(i)  $k$ .

(ii)  $r^{\text{th}}$  moment (m.m)

(iii) mean and variance.

(6)

- (b) A r.v.  $X$  has the probability function

$$P(X) = \frac{1}{2^x},$$

$$x = 1, 2, \dots$$

find its m.g.f and mean.

(7)

2. If the joint p.d.f. of two r.v.  $x, y$  is: (15)

$$f(x, y) = \begin{cases} x^2 + \frac{xy}{3} & 0 < X < 1; 0 < Y < 2 \\ 0 & \text{otherwise} \end{cases}$$

Find :

(i)  $P(X > \frac{1}{2})$

(ii)  $P(Y > 1)$

(iii)  $P(Y < X)$

(iv)  $P\left(y < \frac{1}{2} \mid X < \frac{1}{2}\right)$

(v)  $P(X + Y \geq 1)$

### UNIT - II

3. (a) Show that the R.P  $X(t) = A \cos(\omega t + \theta)$   
 $A$  and  $\omega$  are constants,  $\theta$  is uniformly  
 distributed r.v. in  $(0, 2\pi)$  is WSS. (8)

Turn Over

(b) Show that : (7)

$$(i) R_{XX}(\tau) = R_{XX}(-\tau)$$

$$(ii) \lim_{\tau \rightarrow \infty} (R_{XX}(\tau)) = (\bar{x})^2$$

4. (a) Find the mean and variance of the stationary R.P. whose auto correlation is (8)

$$R_{XX}(\tau) = 18 + \frac{2}{6 + \tau^2}$$

(b) Show that : (7)

$$R_{XY}(\tau) = R_{YX}(-\tau)$$

### UNIT - III

5. (a) In a sample of 500 people, 280 are rice eaters, and the rest wheat eaters. Can it be assumed that both food articles are equally popular? (8)

- (b) Ten individuals are chosen at random from a population and their heights are found to be in inches 63, 63, 64, 65, 66, 69, 69, 70, 70, 71. Discuss the suggestion that the mean height in the universe is 65 inches.

(7)

6. (a) Two random samples of sizes 1000 and 2000 farms gave an average yield of 2000kg and 2050 kg respectively. The variance of wheat farms in the country may be taken as 100 kg. Examine whether the two samples differ significantly in yield.

(8)

- (b) Two independent samples of 8 and 7 items respectively have the following values of variable:

Sample-I	39	41	43	41
Sample-II	40	42	40	44

45	39	42	44
39	38	40	--

Do the estimates of the population variance differ significantly? (7)

**Turn Over**

## UNIT - IV

7. Weekly sales in ₹ in small shops in three towns A, B and C are as follows:

A	620	600	740	800	-
B	410	380	350	-	-
C	920	870	1040	1030	1010

Can we conclude that the shops in the three towns have the same average sales? (15)

8. Assume that 20.5 litre milk bottles are selected at random from a process. The number of air bubbles (defects) observed from the bottles is given in the table:

Sample order	1	2	3	4	5	6	7	8
Defect (C)	4	5	7	3	3	5	6	2

9	10	11	12	13	14	15
4	8	3	5	4	3	4

Draw a Control Chart for the data. (15)

## UNIT - V

9. A relay circuit has an MTBF of 0.8 year. Assuming random failures,

(i) Calculate the probability that the circuit will survive one year with out failure.

(ii) What is the probability that there will be more than two failures in the first year?

(iii) What is the expected number of failure per year? (15)

10. Calculate the reliability of the system as shown in figure-1. (15)

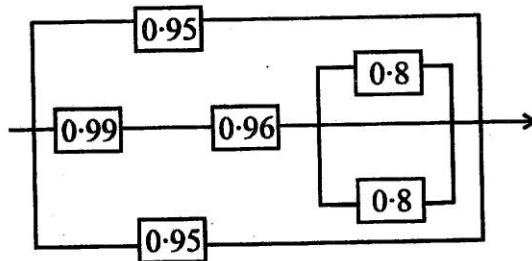


Figure - 1

Register Number :

Name of the Candidate :

**3 0 6 6**

**B.E. DEGREE EXAMINATION, 2013**

**( CIVIL ENGINEERING )**

**( FOURTH SEMESTER )**

**CLEC-402. SURVEYING - 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.  
EACH question carries FIFTEEN marks.*

**UNIT - I**

1. Explain the principle of chain surveying.  
What are the precautions to be considered  
while chaining? (15)

(OR)

**Turn Over**



2. Give a list of instruments used for setting right angles. Explain the construction and function of a cross staff. (15)

### UNIT - II

3. (a) Differentiate between prismatic and surveyor's compass. (8)
- (b) Explain the method of traversing. (7)

(OR)

4. Describe briefly the different types of variations in declination. (15)

### UNIT - III

5. Enlist and explain briefly the different methods of plane table surveying. (15)

(OR)

6. The offsets (in metres) taken from a chain line to a curved boundary are given below :

Chainage	0	5	10	15	20
Offset	2.5	3.8	8.4	7.6	10.5

25	35	45	55	65
9.3	5.8	7.8	6.9	8.4

Find the area between the chain line, the first and last offsets and the boundary by

- (a) Trapezoidal rule.  
 (b) Simpson's rule. (15)

#### UNIT - IV

7. Describe in detail the methods of reduction of levels and explain their merits and demerits. (15)

(OR)

8. (a) Explain any three important errors caused by a faulty levelling instrument. (8)

**Turn Over**

- (b) Define sensitiveness of bubble tube in levelling and its effect on accuracy of levelling. (7)

**UNIT - V**

9. Explain the step-by-step procedure for the reiteration method of measuring horizontal angles. (15)

(OR)

10. Explain briefly the different methods of traversing with a theodolite. (15)

Register Number :

Name of the Candidate :

**3 0 6 7**

**B.E. DEGREE EXAMINATION, 2013**

**( CIVIL ENGINEERING )**

**( FOURTH SEMESTER )**

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

November ]

[ Time : 3 Hours

Maximum : 75 Marks

*( Maximum 60 Marks for the students who  
joined before 2011-12)*

*Answer any ONE FULL question from each unit.*

*ALL questions carry EQUAL marks.*

**Turn Over**

## UNIT - I

1. Analyse the frame shown in figure-1 to determine the forces in all the members of the frame.

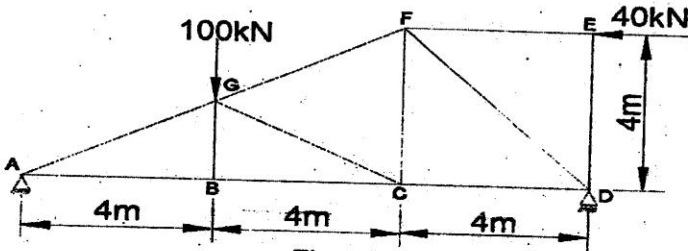


Figure -1

(OR)

2. Using Castigliano's theorem, find the reaction force at A and deflection at B in terms of  $P$ ,  $E$ ,  $I$  and  $L$  for the beam shown in figure-2.

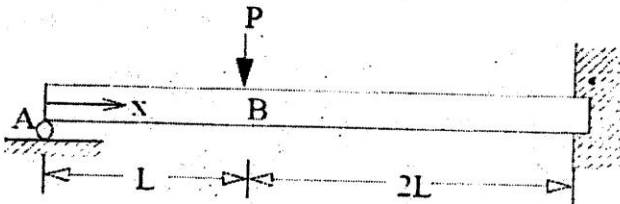


Figure-2

## UNIT - II

3. The T-section, cross section of web size  $160 \times 20$  mm and flange size  $120 \times 20$  mm of 3m long simply supported beam carrying a central load inclined at  $30^\circ$  to the Y-axis. Determine the maximum load the beam can sustain if the maximum tensile and compressive stresses are not allowed to exceed 40 MPa and 80 MPa respectively. Locate the neutral axis also. The load passes through the centroid of the section and acts on the flange.

(OR)

4. The cross section shown in figure-3 is a channel with turned ends. Locate shear centre for the section and sketch the shear flow in the section.

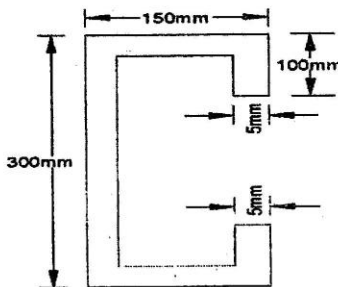


Figure-3

Turn Over

**UNIT - III**

5. State the assumptions made in Euler's column theory and also, derive the expression for crippling load when one end of column is fixed and other end is free.

(OR)

6. A short length of tube, 4 cm internal diameter and 5 cm external diameter, failed in compression at a load of 240 kN. When a 2 m length of the same tube was tested as a strut with fixed ends, the load at failure was 158 kN. Assuming that yield stress in Rankine's formula is given by the first test, find the value of the Rankine's constant in the same formula. What will be the crippling load of this tube if it is used as a strut 3 m long with one end fixed and other hinged?

**UNIT - IV**

7. Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 10 mm thick, when the pipe contains a fluid at a pressure of

8 N/mm<sup>2</sup>. Also, sketch the radial pressure distribution and hoop stress distribution across the section.

(OR)

8. Determine the ratio of thickness to inner diameter of a tube subjected to internal pressure if the ratio of the internal pressure to the maximum circumferential is 0.5. For such a tube of 250 mm inside diameter, find the alteration of thickness of metal when the internal pressure is 80 N/mm<sup>2</sup>. Take  $E = 205 \times 10^3 \text{ N/mm}^2$ .

#### UNIT - V

9. Determine the frequency of transverse vibration of a beam for the following cases:
- (a) UDL of a simply supported beam.
  - (b) Concentrated load on a simply supported beam.

(OR)

10. A one kg mass is suspended by a spring having a stiffness of 0.6 N/mm. Determine the natural frequency and its statical deflection.



Register Number :

Name of the Candidate :

**3 0 6 8**

**B.E. DEGREE EXAMINATION, 2013**

**(CIVIL ENGINEERING)**

**(FOURTH SEMESTER)**

**CLEC-404 / PCLEC-204.**

**STRUCTURAL ENGINEERING - 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.  
IS-456, IS-800, SP-16 Codes and Steel Tables  
are permitted.*

*Assume suitable data wherever necessary.*

*ALL questions carry EQUAL marks.*

**Turn Over**

## UNIT - I

1. A RC beam of cross section  $300 \text{ mm} \times 500 \text{ mm}$  is reinforced with four bars of  $16 \text{ mm}$  diameter with an effective cover of  $50 \text{ mm}$ . The beam is simply supported over a span of  $5 \text{ m}$ . Find the maximum permissible uniformly distributed load on the beam. Use M-20 concrete and Fe-415 steel.

(OR)

2. A rectangular beam is to be simply supported on supports of  $230 \text{ mm}$  width. The clear span of the beam is  $6 \text{ m}$ . The beam is to have a width of  $300 \text{ mm}$ . The superimposed load is  $12 \text{ kN/m}$ . Using M-20 concrete and Fe-415 steel, design the beam.

## UNIT - II

3. Design a cantilever balcony slab projecting  $1.2 \text{ m}$  from a beam. Adopt live load of  $2.5 \text{ kN/m}^2$ . Use M-20 concrete and Fe-415 steel. Sketch the reinforcement details of the cantilever slab.

(OR)

4. Design a RC slab for a room  $4\text{ m} \times 5\text{ m}$  internal dimension. The slab is supported all around on walls of 300 mm thick. The slab has to carry a live load of  $4\text{ kN/m}^2$  and a floor finish of  $1\text{ kN/m}^2$ . Use M-20 concrete and Fe-415 steel. Assume the corners are held down.

### UNIT - III

5. Design a circular column of diameter 400 mm with helical reinforcement subjected to a working load 1,200 kN. Use M-25 concrete and Fe-415 steel. The column has unsupported length of 3 m and is effectively held in position at both ends but not restrained against rotations.

(OR)

6. Design a square footing for a short axially loaded column of size  $300\text{ mm} \times 300\text{ mm}$  carrying 600 kN load. Use M-20 concrete and Fe-415 steel. The safe bearing capacity of the soil is  $180\text{ kN/m}^2$ . Sketch the details of the reinforcement.

Turn Over

**UNIT - IV**

7. Two plates 200 mm wide and 8 mm thick are connected by a double cover butt joint using 6 mm cover plates. Design the bolted connection to transmit a pull equal to the strength of the plates. Assume M-20 bolts of grade 4.6 and F3-410 plates are used.

(OR)

8. A tie member of a roof truss consists of 2 ISA 100 × 75 × 8 mm. The angles are connected to either side of 10 mm thick gusset plates and the member is subjected to a working pull of 300 kN. Design the welded connection.

**UNIT - V**

9. A column 4 m long has to support a factored load of 6,000 kN. The column is effectively held at both ends and restrained in direction at one of the ends. Design the column using beam section and plates.

(OR)

10. Design a simply supported beam of 10 m effective span carrying a total factored load of 60 kN/m. The depth of the beam is restricted to 500 mm. The compression flange of the beam is laterlly supported by floor construction. Assume stiff end bearing as 75 mm.

Register Number :

Name of the Candidate :

**3 0 6 9**

**B.E. DEGREE EXAMINATION, 2013**

**(CIVIL ENGINEERING)**

**(FOURTH SEMESTER)**

**CLEC-405. ESTIMATION AND VALUATION**

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. Explain any two methods of approximate estimation with suitable examples. (15)

(OR)

2. List the procedure of preparing a detailed estimate for the construction of a canal.(15)

**Turn Over**

**UNIT - II**

3. State a few works for which lumpsum provisions are made in the analysis of rates. (15)

(OR)

4. Draw a model form used to prepare abstract estimate. (15)

**UNIT - III**

5. Write a detailed specification for

(a) Cement concrete 1:2:4.

(b) Cement mortar 1:3, 12 mm thick.

(15)

(OR)

6. Discuss briefly the drafting model tenders.

(15)

**UNIT - IV**

7. What are the different types of contracts? Explain them briefly with their merits and demerits. (15)

(OR)

8. What is meant by arbitration? Explain briefly its application in construction industry. (15)

**UNIT - V**

9. Explain briefly the valuation of land. Discuss the need of valuation for bank purposes. (15)

(OR)

10. Explain the procedure to calculate the reasonable rent of a private building when it is taken on lease by Government. (15)



Register Number :

Name of the Candidate :

**3 0 7 0**

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

**( CIVIL ENGINEERING )**

**( FOURTH SEMESTER )**

**CLEC-406.**

**TRANSPORTATION ENGINEERING - I**

*(For the students joined during 2007-08 and  
after )*

November ]

[ Time : 3 Hours

Maximum : 75 Marks

*( Maximum 60 Marks for the students who  
joined before 2011-12 )*

*Answer any ONE FULL question from each unit.*

*ALL questions carry EQUAL marks.*

**UNIT - I**

1. (a) What are the surveys to be carried out for locating a highway? Explain final location and detailed survey in brief.

(10)

**Turn Over**

- (b) How the roads are classified in Third Twenty Year Plan? Explain. (5)

(OR)

2. (a) Derive the equation for extra width to be provided for a road. (8)
- (b) A two lane road has a horizontal curve of radius 400 m. The design speed is 70 *kmph*. Find the super elevation. (7)

#### UNIT - II

- 3 Explain the significance of various physical tests on bitumen. Give the procedure for ductility test. (15)

(OR)

4. Explain briefly the specification of materials. Write down the construction steps for WBM road. (15)

#### UNIT - III

5. (a) Explain in detail warning signs and information signs. (8)

- (b) Explain briefly the various road markings commonly used. (7)

(OR)

6. Enumerate the advantages and disadvantages of traffic signals. (15)

**UNIT - IV**

7. Mention the various evaluation procedures. Explain any one in detail. (15)

(OR)

8. Discuss the applications of computer traffic engineering. (15)

**UNIT - V**

9. Describe in detail terminal buildings. (15)

(OR)

10. (a) State briefly the importance of drainage in airports. (5)

- (b) What are the requirements of a good hangar site? Draw a neat sketch of nose hangar. (10)

Register Number :

Name of the Candidate :

**3 0 7 2**

**B.E. DEGREE EXAMINATION, 2013**

**(CIVIL ENGINEERING)**

**(FOURTH SEMESTER)**

**CSEC-403 / PCSEC-105. SURVEYING**

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. Give a list of corrections, their values and signs for lengths measured with a tape.

(OR)

2. Enlist and explain the different methods of plane table surveying.

**Turn Over**

## UNIT - II

3. (a) Explain the rise and fall method of reduction of levels.
- (b) List the three important errors caused by a faulty levelling instrument.

(OR)

4. Explain any five important characteristics of contours with neat sketches.

## UNIT - III

5. Briefly explain the possible instrumental errors in theodolite work and the precautions that should be taken to eliminate them.

(OR)

6. From the traverse data given below, find the closing error, if any and its bearing :

Line →	PQ	QR	RS	SP
Length(m) →	340.2	350.6	440.8	423.2
Bearing →	70°30'	120°45'	223°30'	320°47'

**UNIT - IV**

7. Explain the subtense bar method of tachometry. Explain the difference between the fixed hair method and the movable train method of tachometry.

(OR)

8. Draw a neat sketch and describe the construction of a box sextant. How is it used for measuring angles?

**UNIT - V**

9. Explain the concept of order of triangulation and the specifications for different orders of triangulation.

(OR)

10. Explain the basic principle of trigonometric levelling and the difference between plane and geodetic method.