

Register Number :

Name of the Candidate :

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**B.E. DEGREE EXAMINATION, 2012**

(CIVIL, CIVIL & STRUCTURAL, MECHANICAL,  
MANUFACTURING, CHEMICAL ENGINEERING)

(FOURTH SEMESTER)

**CLEC-401. ENGINEERING  
MATHEMATICS - III**

November ]

[ Time : 3 Hours

Maximum : 60 Marks

*Answer ONE FULL question from each unit.*

*ALL questions carry EQUAL marks.*

**UNIT - I**

1. (a) A Continuous r.v  $X$  has the p.d.f :

$$f(x) = \begin{cases} 2(x-1) & : 1 < x < 2 \\ 0 & : \text{otherwise} \end{cases}$$

find the mean and variance. (6)

**Turn Over**

2

(b) Find the m.g.f of

$$f(x) = \begin{cases} ke^{-kx} & : x > 0 \\ 0 & : \text{otherwise} \end{cases}$$

and hence find

(i) Mean.

(ii) Variance. (6)

(OR)

2. The joint p.d.f of two r.v  $x, y$  is :

$$f(x, y) = \begin{cases} \frac{1}{8}(6-x-y) & : 0 < x < 2; 2 < y < 4 \\ 0 & : \text{otherwise} \end{cases}$$

Find

(i)  $P(X < 1 \cap Y < 3)$

(ii)  $P(X < 1 | Y < 3)$

(iii)  $P(X + Y < 3)$ . (12)

## UNIT - II

3. (a) Show that the R.P  $X(t) = y \sin \omega t$ ,  $y$  is uniformly distributed in  $(-1, 1)$  is not WSS. (6)
- (b) Show that  $R_{XX}(\tau) \leq R_{XX}(0)$  (6)

(OR)

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

$$R_{XX}(\tau) = 9 + 2^{-|\tau|}. \quad (6)$$

- (b) If  $X(t)$  and  $Y(t)$  are two WSS processes, then (6)

$$|R_{XY}(\tau)| \leq \sqrt{R_{XX}(0) \cdot R_{YY}(0)}$$

## UNIT - III

5. (a) In a city, a sample of 1000 people were taken and out of them, 540 are vegetarians and the rest are non-vegetarians. Can we say that both habits of eating are equally popular in the city. (6)

Turn Over

- (b) A random sample of 10 boys had the following I.Q.'s : 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean I.Q. of 100? (6)

(OR)

6. (a) The mean of two large samples of sizes 2000 and 1000 are 68.0 and 67.5 gm. respectively. Can the sample be regarded as drawn from the same population of S.D. 2.25 gm. ? (6)

- (b) Two random sample drawn from two normal population are :

Sample-I : 20, 16, 26, 27, 23, 22, 18, 24, 25, 19

Sample-II : 27, 33, 42, 35, 32, 34, 38, 28, 41, 43, 30, 37.

Obtain the estimates of the variances of the population and test whether the two populations have the same variance. (6)

## UNIT - IV

7. The following data give the yields of 12 plots of land in 3 samples, each of 4 plots, under 3 varieties of fertilizers; A, B and C.

A : 25 22 24 21

B: 20 17 16 19

C: 24 26 30 20. (12)

Is there any significant difference in the average yields of land under the 3 varieties of fertilizers?

(OR)

- (i) What is the design life, if there is no wear-in-period?
- (ii) What is the design life, if there is a wear-in-period of 1 month in the beginning?

(OR)

10. Determine the reliability of the system whose component reliabilities are as shown in figure-1. (12)

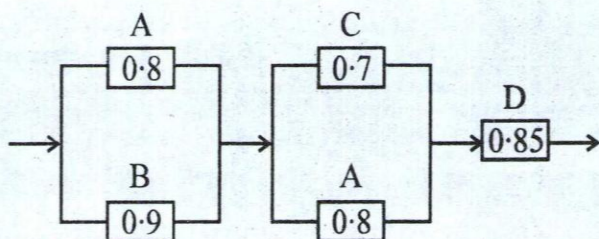


Figure - 1

8. The following table gives the sample means and ranges for 10 samples, each of size 6, in the production of certain component. Construct the control charts for mean and range and comment on the nature of control. (12)

Sample No:	1	2	3	4	5
Mean $\bar{x}$	37.3	49.8	51.5	59.2	54.7
Range R	9.5	12.8	10	9.1	7.8

6	7	8	9	10
34.7	51.4	61.4	70.7	75
5.8	14.5	2.8	3.1	8.0

(12)

## UNIT - V

9. A device has a decreasing failure rate characterized by a two-parameter Weibull distribution with  $\alpha = 180$  years and  $\beta = 0.5$ . The device is required to have a design life reliability of 0.90.

## UNIT - V

9. Discuss the various methods of theodolite traversing.

(OR)

10. Explain the temporary adjustments of a transit theodolite.

- (b) What are the instruments used in chain survey?

(OR)

2. (a) What are the conventional signs used to denote the following :
- Road.
  - Railway double line.
  - Cemetery.
  - Railway bridge.
  - Canal with lock.
  - Rough pastures.
- (b) Explain clearly the methods of booking.

## UNIT - II

3. (a) What is back bearing and what are the advantages of observing it in a traverse?
- (b) Explain the description, setting and uses of prismatic compass.

(OR)

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## B. E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

## CLEC-402. SURVEYING - I

November]

[Time : 3 Hours

Maximum : 60 Marks

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

## UNIT - I

1. (a) A survey line EAC crosses a river, A and C being on the near and distant banks respectively standing at D, a point 50 metres measured perpendicularly to AE from A the bearings of C and B are  $320^\circ$  and  $230^\circ$  respectively. AE being 25 metres. Find the width of the river.

Turn over

4. (a) Find the magnetic declination at a place if the magnetic bearing of the sun at moon is
- $184^\circ$ .
  - $350^\circ 20'$ .
- (b) Distinguish between closed traverse and open traverse.

## UNIT - III

5. What is meant by three point problem? How is it solved by
- Bessel's method.
  - Triangle of error method.
  - Tracing paper method.

(OR)

Turn over

5. (a) The following perpendicular offsets were taken from a chain line to a hedge :

Chainage(M)	Offsets(M)
0	7.60
15	8.5
30	10.7
45	12.8
60	10.6
70	9.5
80	8.3
100	7.9
120	6.4
140	4.4

Calculate the area between the survey line, the hedge and the end offsets by

- (i) Trapezoidal rule.
  - (ii) Simpson's rule.
- (b) Write a short note on contouring.

UNIT - IV

7. (a) Explain in detail with neat sketches, the construction and working of a substance bar.

- (b) Derive the formula for curvature correction.

(OR)

8. The following staff readings were observed successively with level, the instrument have been moved forward after the second, fourth and eighth readings :

0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 6.120, 1.875, 2.030, 3.765

The first reading was taken with the staff held upon a benchmark of elevation 132.135. Enter the readings in level book-form and reduce the levels. Apply the usual checks. Find also, the difference in level between the first and the last points.

UNIT - I

1. Analyse the cantilever truss shown in figure and determine the forces in all the members

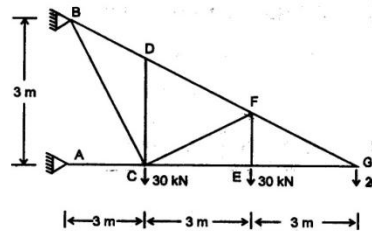


Figure - 1  
(OR)

beam ABCDE supports a uniform load  $q$  (figure - 2). The moment of inertia of the beam (BCD) is  $2I$  and the moment of inertia in the end parts (AB) and (DE) is  $I$ . Find the deflection at the point C of the beam.

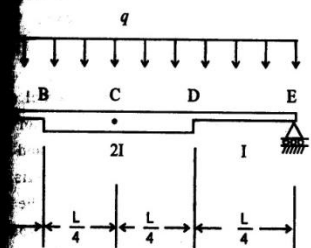


Figure - 2

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B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-403. MECHANICS OF SOLIDS - II

November ]

[ Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

## UNIT - II

3. A rectangular beam of 15 cm wide and 20 cm deep. It is used as simply supported beam on a span of 6 m. Two loads of 5 kN each are applied to the beam, each load being 2 m from a support. The plane of the loads make of an angle of  $30^\circ$  with the vertical plane of symmetry. Find the direction of neutral axis and the bending stress at the C.G. of the beam.

(OR)

4. A cast iron column of external and internal diameters as 100 mm and 80 mm respectively carries central load of 150 kN and an eccentric load  $W$  at 160 mm from the axis. Determine the maximum value of  $W$  if the permissible stresses are 140 Mpa and 35 Mpa in Tension for cast iron. Also, find the tensile stress value for this load.

## UNIT - IV

7. A thin spherical shell 50 cm in diameter with a thickness 3 mm is full of water at atmospheric pressure (0.1 MPa). Find the intensity of radial pressure exerted on the wall of the shell if 30 c.c. of water at atmospheric pressure is pumped into the shell. Calculate the resulting hoop stress and the change in volume of sphere if modulus of elasticity of shell is  $E = 210$  GPa, Poisson ratio = 0.33 and bulk modulus of water is 2.361 GPa.

(OR)

8. A thick cylinder of 200 mm outside diameter and 140 mm inside diameter is subjected to internal pressure of 40 MPa and external pressure of 24 MPa. Determine the maximum shear stress in the material of the cylinder at the inside diameter.

## UNIT - III

5. A short column of rectangular section  $160 \text{ mm} \times 120 \text{ mm}$  carries a load of 200 kN. The load point is at a point 40 mm from the longer side and 70 mm from the shorter side. Determine the maximum tensile and compressive stress in the section.

(OR)

6. A hollow cylindrical column, with both ends hinged, is 6 m long and has an outer diameter of 120 mm and an inner diameter of 80 mm. Compare the crippling load obtained by Euler's and Rankine's formulae,

$$E = 80,000 \text{ N/mm}^2 \text{ and}$$

$$\text{Yield stress} = 550 \text{ N/mm}^2.$$

$$\text{The Rankine constant} = 1,600.$$

What is the length of the column if both crippling loads are equal?

## UNIT - V

9. A helical spring in which the mean diameter of the coils is 8 times the wire diameter, is to be designed to absorb 200 N.m of energy with an extension of 10 cm. The maximum shear stress is not to exceed  $125 \text{ N/mm}^2$ . Determine the mean diameter of the helix, diameter of the wire and the turns. Also, find the load with which an extension of 4 cm could be produced in the spring  $G = 84 \times 10^3 \text{ N/mm}^2$ .

(OR)

10. Determine the stiffness

(a) If the longitudinal stiffness of a beam of length 1 m, area of cross section of  $3 \times 10^{-4} \text{ m}^2$ , Young modulus of elasticity of  $200 \times 10^9 \text{ N/m}^2$ .

(b) The transverse stiffness of a steel cantilever beam of length 1 m, moment of inertia of  $7 \times 10^{-9} \text{ m}^4$ , and Young modulus of elasticity of  $200 \times 10^9 \text{ N/m}^2$ .

## UNIT - V

9. Design a tension member of 3 m length made of equal angle placed on either side of gusset plate of 12 mm thick, to carry an axial tensile force of 120 KN, if
- Tack riveted all along the length.
  - No tack rivets are used.

(OR)

10. Determine the load carrying capacity of a column section made of ISMB 400 with a cover plate of  $300 \times 20$  mm on each flange. The length of the column is 5 m with one end fixed and other end hinged.

2. Design an interior panel of roof slab for a hall of size  $6 \text{ m} \times 15 \text{ m}$ . The roof beams are placed at 3.0 m centre to centre. Take roof finish as  $1.2 \text{ KN/m}^2$  and live load on roof as  $3 \text{ KN/m}^2$ . Use M20 and Fe 415. Adopt limit state method.

## UNIT - II

3. Design the longitudinal and transverse reinforcements needed for a circular column with following data :

Dia of the column = 345 mm.

Effective = 6.3 m.

Axial load = 800 KN.

Moment at bottom = 60 KN/m.

Moment at top = 80 KN/m.

Use M 30 and Fe 415.

(OR)

4. Design a suitable R.C. footing for a masonry wall of 645 mm wide carrying 480 KN/m including its self weight. The safe bearing capacity of soil may be taken as  $200 \text{ KN/m}^2$ . Use M 20 and Fe 415.

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## B.E. DEGREE EXAMINATION, 2012

(CIVIL AND STRUCTURAL ENGINEERING)

(FOURTH SEMESTER)

CLEC-404/PCLEC-204.

## STRUCTURAL ENGINEERING - I

November]

[ Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.  
Use of IS 456, IS 800, SP 16 and Steel Tables are permitted

ALL questions carry EQUAL marks.

## UNIT - I

1. Design a cantilever beam of span 3.2 m carrying an all inclusive superimposed load of 18 KN/m including its self weight. Assume width of beam as 345 mm. Use M20 and Fe 415.

(OR)

Turn over

## UNIT - III

5. Design a slabless stairs for a residential building with floor height of 3.15 m. Width of stair is 0.90 m with rise of 150 mm and 230 mm tread. Use M 20 and Fe 415.

(OR)

6. Plan and design an open well staircase for an office building with floor height of 4.50 m. Also, find the minimum size of staircase room needed if rise = 150 mm, tread = 300 mm and waist width is 1,500 mm. Adopt M 25 and Fe 415.

## UNIT - IV

7. Determine the maximum uniformly distributed load that can be applied on a simply supported beam of effective span 6 m and made of ISMC 300 at 351 N/m placed back to back with no gap between the webs and welded all along the span.

(OR)

8. Design the midspan section of a riveted plate girder simply supported over a span of 16 m and carrying a live load of 60 KN/m over the entire span.

Turn over

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**B.E. DEGREE EXAMINATION, 2012**

(CIVIL AND STRUCTURAL ENGINEERING)

(FOURTH SEMESTER)

**CLEC-405. ESTIMATION AND VALUATION**

November]

[ Time : 3 Hours

Maximum : 60 Marks

*Questions in Units- I & II are compulsory.  
Answer any ONE question from each unit  
III, IV & V.  
Assume any other data, if necessary.  
ALL questions carry EQUAL marks.*

**UNIT - I**

Estimate the quantities of the following items of work of the building as shown in figure-1 : (enclosed)

- (a) 1st class brick in 1 : 6 cement mortar in superstructure including parapet.
- (b) R.C.C. work in roof slabs, lintels, sunshade etc.,
- (c) Steel reinforcement bars in R.C.C. work at 1 %.

(12)

**Turn over**

2

**UNIT - II**

2. Prepare the detailed data for the following items and calculate the rates :

1st class brickwork in superstructure with  $20 \times 10 \times 10$  cm brick with 1 : 6 cement sand mortar - Unit - 1 cu.m. Take  $10m^3$ . (12)

**UNIT - III**

3. What are the items to be included in tender documents and explain with tender procedure. (12)
4. Briefly discuss the technical specifications of lime concrete in foundation. (12)

**UNIT - IV**

5. Briefly explain the measurement books are very important account records. (12)
6. Write down the step by step procedure of cash book maintenance in public works accounts. (12)

**UNIT - V**

7. Explain in detail the valuation of the building. (12)

3

3. In a plot of land costing ₹ 20,000 a building has been newly constructed at a total cost of ₹ 80,000 including sanitary and water supply works, electrical installation etc. The building consists of four flats for four tenants. The owner expects 8 % return on the cost of construction and 5 % return on the cost of land. Calculate the standard rent for each flat of the building assuming:

- (a) The life of the building as 60 years and sinking fund will be created on 4 % interest basis.
- (b) Annual repairs cost at 17 % of the cost of construction.
- (c) Other outgoings including taxes at 30 % of the net return on the building. (12)



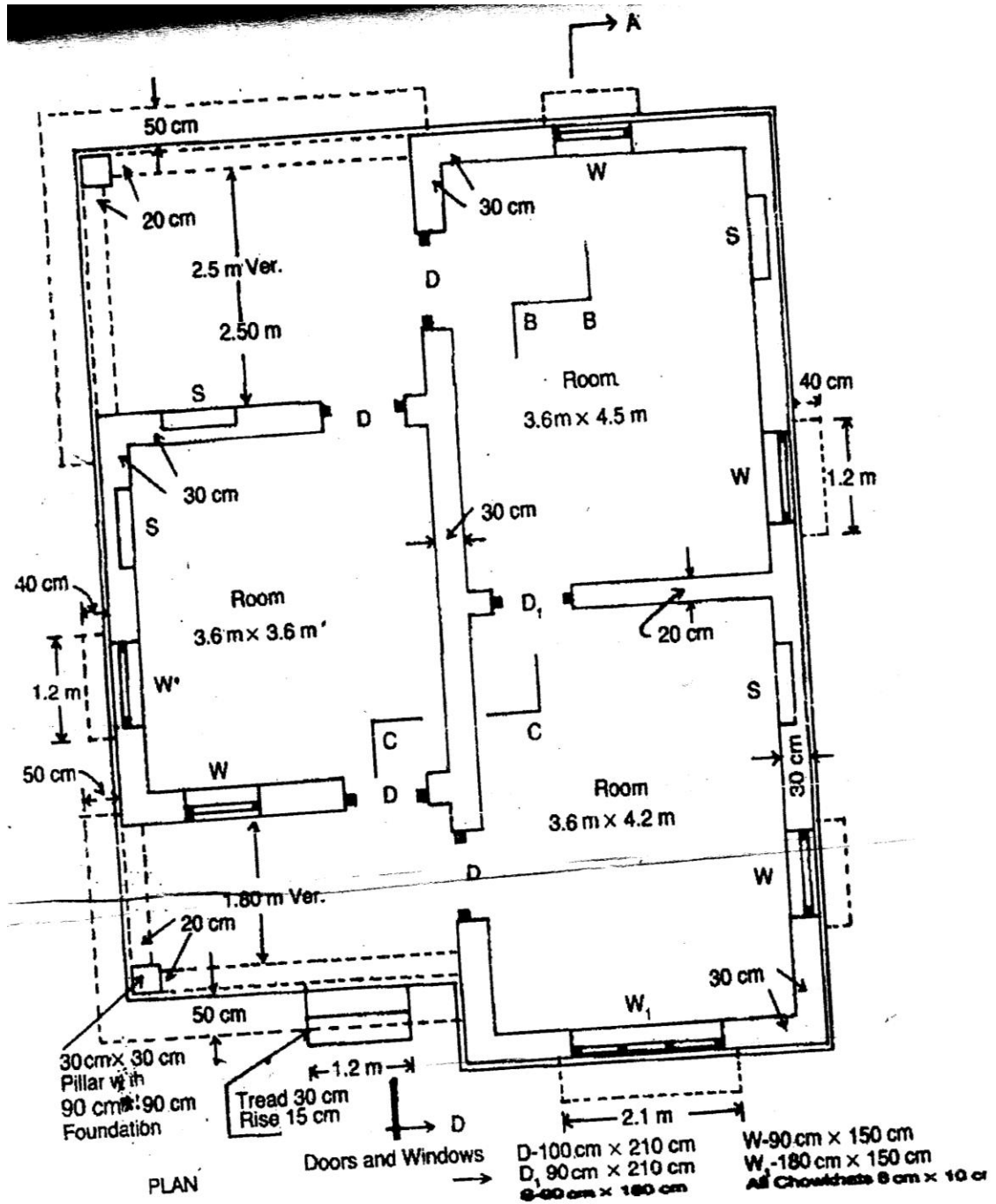


Figure - 1

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**B.E. DEGREE EXAMINATION, 2012**

**(CIVIL ENGINEERING)**

**(FOURTH SEMESTER)**

**CLEC-406.**

**TRANSPORTATION ENGINEERING - I**

November]

[ Time : 3 Hours

Maximum : 60 Marks

*Answer any ONE FULL question from each unit.*

*ALL questions carry EQUAL marks.*

**UNIT - I**

1. (a) What are the obligatory points of highway alignment? Explain with sketches. (8)
- (b) How rural roads are classified? Explain. (4)

(OR)

**Turn over**

2. (a) Derive an expression for super elevation keeping in view the mixed traffic situation in India. (6)
- (b) Calculate the stopping sight distance on a highway whose design speed is 100 kmph, if the highway is on a 3% down grade. Assume any relevant data needed. (6)

### UNIT - II

3. Name the usual tests employed for evaluating road aggregates. Explain how abrasion test is carried out on aggregate sample. (12)

(OR)

4. What are the various types of bituminous construction in use? Discuss the advantages and limitations of each. (12)

### UNIT - III

5. Mention the various methods of carrying out speed and delay study and explain in detail floating car method. (12)

(OR)

6. Discuss briefly the various design elements that are to be considered in rotary intersection design. (12)

**UNIT - IV**

7. Comment on the adverse effects of traffic on the environment. (12)

(OR)

8. Brief simulation, traffic planning and computer applications in Indian context. (12)

**UNIT - V**

9. Sketch the layout of a single runway airport, showing the locations of terminal building, apron, taxi-way and runway. (12)

(OR)

10. Describe the importance of runway lighting. Explain threshold lighting with the help of sketches. (12)