

B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-401 / CSEC-401 / MEEC-401 / MFEC-401 CHEC-401.**PROBABILITY AND STATISTICS / ENGINEERING MATHEMATICS - III***(Common with Civil and Structural, Mechanical, Manufacturing and Chemical Engineering)*

November]

[Time : 3 Hours

Maximum : 75 Marks

*Answer any ONE FULL question from each unit.**Use of Statistical Table is permitted***UNIT - I**

1. A random variable
- x
- has the following probability distribution :

x	-2	-1	0	1	2	3
$p(x)$	0.1	K	0.2	2K	0.3	3K

- (a) Find K, (b) Evaluate $p(x < 2)$ and $p(-2 < x < 2)$
 (c) Find the c.d.f of x and (d) Evaluate the mean of x . (15)
2. The joint density function of a Rv (X, Y) is given by $f(x, y) = axy$, $1 \leq x \leq 3$, $2 \leq y \leq 4$ and $= 0$, elsewhere. Find :

- (a) The value of a . (b) The marginal and conditional densities of X and Y .
 (c) Examine whether they are independent? (15)

UNIT - II

3. (a) Show that the random process

$$x(t) = A \cos(w_0 t + \theta)$$

is wide sense stationary if A and w_0 are constants and θ is a uniformly distributed RV in $(0, 2\pi)$. (8)

- (b) Show that the process
- $x(t) = A \cos \lambda t + B \sin \lambda t$

(where A and B are RVS) is wide sense stationary. if

$$(i) E(A) = E(B) = 0. \quad (ii) E(A^2) = E(B^2) \quad \text{and} \quad (iii) E(AB) = 0 \quad (7)$$

4. (a) Given that the auto-correlation function of stationary ergodic process with no periodic components is

$$\mathfrak{R}_{xx}(\tau) = 25 + \frac{4}{1 + 6\tau^2}.$$

Find the mean and variance of the process $\{x(t)\}$. (8)

- (b) If $x(t)$ and $y(t)$ are two random processes, then prove that

$$|\mathfrak{R}_{xy}(\tau)| \leq \frac{1}{2} [\mathfrak{R}_{xx}(0) + \mathfrak{R}_{yy}(0)]. \quad (7)$$

UNIT - III

5. (a) In a large city A, 20% of a random sample of 900 school boys had a slight physical defect. In another large city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant? (7)
- (b) Sample of two types of electric bulbs were tested for length of life and the following data were obtained :

	Size	Mean	SD
Sample-1	8	1234 h	36 h
Sample-2	7	1036 h	40 h

Is the difference between the means sufficient to warrant type-I bulbs are superior to type- II bulbs? (8)

6. (a) Two samples of sizes 9 and 8 gave the sum of squares of deviations from their respective means equal to 160 and 91 respectively. Can they be regarded as drawn from the same normal population having the same variance? (8)
- (b) The following data show defective articles produced by four machines :

Machine	A	B	C	D
Production time	1	1	2	3
No.of defectives	12	30	63	98

Do the figures indicate a significant difference in the performance of the machines?

(7)

UNIT - IV

7. A car rental agency, which uses five different brands of tyres in the process of deciding the brand of tyre to purchase as standard equipment for its fleet, finds that each of five tyres of each brand last the following number of kilometers (in thousands) :

Tyre brands				
A	B	C	D	E
36	46	35	45	41
37	39	42	36	39
42	35	37	39	37
38	37	43	35	35
47	43	38	32	38

Test the hypothesis that the five brands have almost the same average life. (15)

8. Analyse the variance in the following Latin Square of yields (in kgs) of paddy where A, B, C, D denote the different methods of cultivation. Examine whether the different methods of cultivation have given significantly different yields. (15)

D122	A121	C123	B122
B124	C123	A122	D125
A120	B119	D120	C121
C122	D123	B121	A122

UNIT - V

9. The reliability of a turbine blade is given by $R(t) = \left(1 - \frac{t}{t_0}\right)^2$, $0 \leq t \leq t_0$ where t_0 is the maximum life of the blade.

- Show that the blades are experiencing wear out.
- Compute MTTF as a function of the maximum life.
- If the maximum life is 2000 operating hours, what is the design life for a reliability of 0.90? (15)

10. Compute the reliability of the system for the connection in the following figure-1 and figure-2. If the reliability of A, B, C, D are 0.95, 0.99, 0.90 and 0.96 respectively. (15)

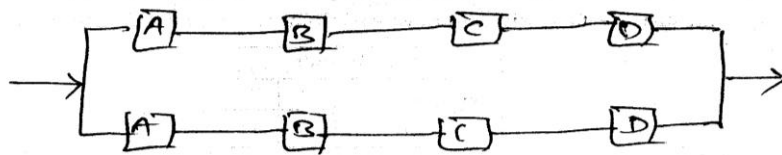


Figure-1

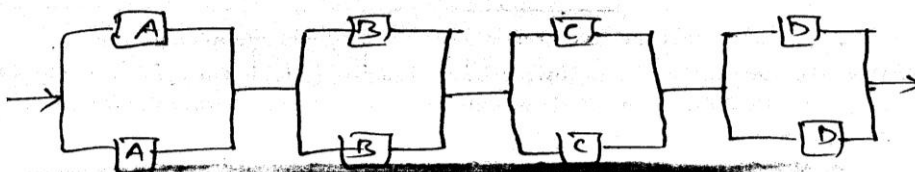


Figure-2

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-402 / PCLEC-102. SURVEYING - I

(Common with Part-Time)

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

UNIT - I

1. Write a brief note on the following :

- (a) Survey stations. (b) Perpendicular offset.
- (c) Selection of survey station.

(3 × 5 = 15)

(OR)

2. Explain in details, the procedure of field work of chain survey.

(15)

UNIT - II

3. Write a brief note on the following :

- (a) True meridian and magnetic meridian.
- (b) Whole circle bearing and reduced bearing (quadrantal).
- (c) Fore bearing and back bearing.

(3 × 5 = 15)

(OR)

4. A closed traverse is conducted with five stations A, B, C, D and E taken in anticlockwise order in the form of a regular Pentagon. If the forebearing of AB is $30^{\circ}0'$, find the fore bearing of the other sides.

(15)

UNIT - III

5. Explain in details, the common errors in plane tabling and precautions to be taken in plane table surveying.

(15)

(OR)

6. An embankment of width 10 m and side slopes $1\frac{1}{2} : 1$ is required to be made on a ground which is level in a direction transverse to the centre line. The central height at 40 m intervals are as follows :

0.90, 1.25, 2.15, 2.50, 1.85, 1.35 and 0.85.

Calculate the volume of earthwork using

- (a) Trapezoidal formula. (b) The prismoidal formula. (15)

UNIT - IV

7. Briefly describe with a neat sketch, the dumpy level. (15)

(OR)

8. The following consecutive readings were taken with a dumpy level along a chainline at a common interval of 15 m. The first reading was at a chainage of 165 m where the RL is 98.085. The instrument was shifted after the fourth and ninth readings :

3.150, 2.245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390 and 3.035 m.

Rule out a page of level book and enter on it the above readings and find the RL of all the points by Rise and Fall method. (15)

UNIT - V

9. Briefly explain the following :

(a) Repetition method. (b) Reiteration method. (2 × 7½ = 15)

(OR)

10. Describe in detail, the permanent adjustment of the theodolite. (15)

B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-403. MECHANICS OF SOLIDS - II

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

UNIT - I

1. A truss of span 5 m is loaded as shown in figure-1. Find the reactions and forces in the members of truss. (15)

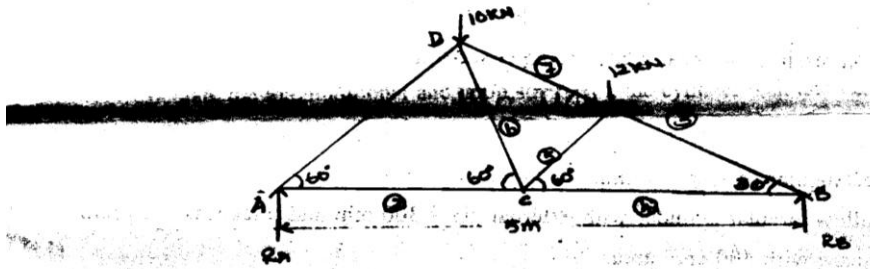


Figure-1

(OR)

2. Determine the support reactions and nature and magnitude of forces in the members of truss as shown in figure-2. (15)

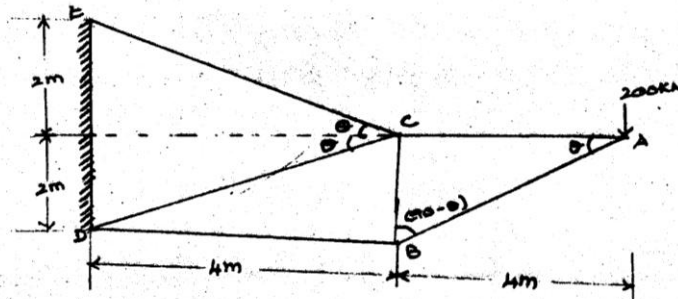


Figure -2

UNIT - II

3. An unequal angle of dimensions 100 mm by 60 mm and 10 mm thick for the figure -3 shown below. Determine :

- (a) Position of the principal axes and
(b) Magnitude of the principal moments of inertia for the given angle. (15)

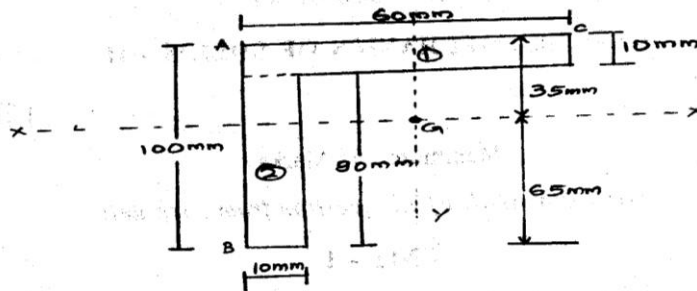


Figure-3

(OR)

4. Derive the expression for shear centre of an I-section. (15)

UNIT - III

5. Draw neat sketches of Kernel of the following cross-section (figure-4) :

- (a) Rectangular section 200 mm \times 300 mm.
(b) Hollow circular cylinder with external dia = 300 mm and thickness = 50 mm.
(c) Square with 400 cm² area. (15)

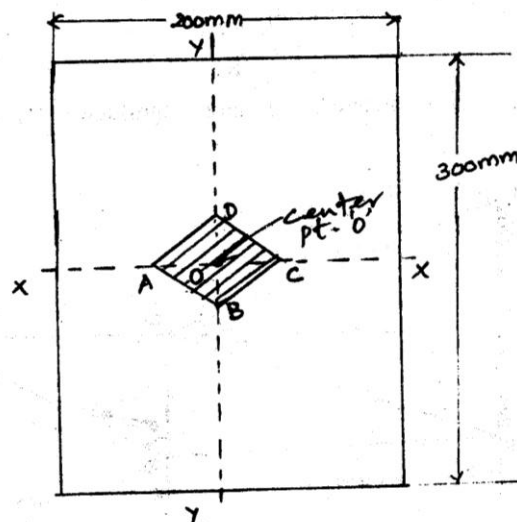


Figure-4

(OR)

6. A 1.5 m column has a circular cross-section of 50 cm diameter. One of the ends of the column is fixed in direction and position and other end is free. Taking factor safety as 3, calculate the safe load using

- (a) Rankine's formula, take yield stress, $\sigma_c = 560 \text{ N/mm}^2$ and $a = \frac{1}{1600}$ for pinned ends.
 (b) Euler's formula, Young's modulus for C.I. = $1.2 \times 10^5 \text{ N/mm}^2$. (15)

UNIT - IV

7. (a) Calculate :

- (i) The change in diameter. (ii) The change in length and
 (iii) Change in volume

of a thin cylindrical shell 100 cm diameter, 1 cm thick and 5m long when subjected to internal pressure of 3 N/mm^2 . Take the value of $E = 2 \times 10^5 \text{ N/mm}^2$ and Poission's ratio, $\mu = 0.3$. (5)

- (b) A closed cylindrical vessel made of steel plates 4 mm thick with plane ends, carries fluid under a pressure of 3 N/mm^2 . The diameter of cylinder is 25 cm and length is 75 cm, calculate the longitudinal and hoop stresses in the cylinder wall and determine the change in diameter, length and volume of cylinder.

Take $E = 2.1 \times 10^5 \text{ N/mm}^2$ and $\mu = 0.28$. (10)

(OR)

8. A compound cylinder is made by shrinking a cylinder of external diameter 300 mm and internal diameter of 250 mm over another cylinder of external diameter 250 mm and internal diameter 200mm. The radial pressure at the junction after shrinking is 8 N/mm^2 , find the final stresses set up across the section, when the compound cylinder is subjected to an internal fluid pressure of 84.5 N/mm^2 . (15)

UNIT - V

9. A Cantilever of length 4 m carries a uniformly distributed load of 1 kN/m run over the whole length. The cantilever is propped rigidly at the free end. If the value of $E = 2 \times 10^5 \text{ N/mm}^2$ and I of the cantilever = 10^8 mm^4 , then determine :

- (a) Reaction at the rigid prop. (b) The deflection at the centre of the cantilever.
 (c) Magnitude and position of maximum deflection. (15)

(OR)

10. A continuous beam ABCD of length 15 m rests on four supports covering 3 equal spans and carries a uniformly distributed load of 1.5 kN/m throughout the length. Calculate the moments and reactions at the supports. Draw the B.M diagram. (15)

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(FOURTH SEMESTER)

CLEC-404 / PCLEC-204. STRUCTURAL ENGINEERING - I*(Common with Part-Time)*

November]

[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 are permitted.***UNIT - I**

1. Determine the reinforcement for a T beam with
flange width = 1500mm, Web width = 300 mm Thickness of slab = 100 mm,
Effective depth = 735 mm, to carry a moment of 380 KN.m due to characteristic loads.
Use M-25 concrete and Fe-415 steel. Use Working Stress Design.

(OR)

2. A singly reinforced concrete beam is of width 400 mm and effective depth of 615 mm. It is reinforced with 8 nos. 20 mm mild steel bars. Assuming M-25 concrete, determine its moment of resistance according to the working stress method. Determine also, the stress in steel when the beam is subjected to the above moment.

UNIT - II

3. Design a roof slab for an interior panel of size 5 m × 6 m. Live load is 5.0 KN/m². Use M-30 concrete and Fe-415 steel.

(OR)

4. Design a simply supported R.C.C. slab for a roof of hall 4 m × 10 m (inside dimensions) with 230 mm walls all around. Assume a live load of 4kN/m² and finish 1 kN/m². Use grade 25 concrete and Fe-415 steel.

UNIT - III

5. Design a circular column with helical reinforcement of 400 mm diameter and 4 m in length to carry factored load of 1000 KN. The column is hinged at both ends. Use concrete M-25 and steel Fe-415.

(OR)

6. A column $300 \text{ mm} \times 400 \text{ mm}$ has an unsupported length of 4 m and fixed at both ends. It is subjected to a factored load of 1000 KN and an ultimate moment of 200 KN.m about the major axis. Determine the longitudinal reinforcement and lateral ties. Use concrete M-25 and steel Fe-415, $d = 60 \text{ mm}$.

UNIT - IV

7. Two plates $200 \times 80 \text{ mm}$ of grade FE 410 are connected by 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.

(OR)

8. An ISA $100 \times 100 \times 10 \text{ mm}$ angle is to be welded in shop to 12 mm thick gusset plate. The angle carries an ultimate pull of 300 KN applied along the central axis. Determine the length of the side fillet weld required at the heel and toe of the angle.

UNIT - V

9. A tension member consists of 2 ISA $90 \times 90 \times 8 \text{ mm}$ bolted to 10 mm gusset plate one on each side using single row of bolts and tack bolted. Determine the maximum load that the member can carry. What will the load carrying capacity if the angles are connected on the same side of the gusset?

Take gauge distance = 50 mm and diameter of the bolt = 20 mm.

(OR)

10. Explain in detail the steps involved in the design of plate girder.

B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-405. ESTIMATION AND VALUATION

November]

[Time : 3 Hours

Maximum : 75 Marks

*Answer any ONE FULL question from each unit.**ALL questions carry EQUAL marks.***UNIT - I**

1. List out the points that justify the purpose of estimating and differentiate revised estimate and supplementary estimate.

(OR)

2. Prepare an approximate estimate of the quantities of various materials and the number of labourers required to construct a single storied residential building having a plinth area of 150 m^2 .

UNIT - II

3. It is proposed to construct a school building for 500 students particulars collected are :

Carpet area required / student = 1.2 m^2 .

Area of corridor, verandha and lavatories = 20% of plinth area.

Wall = 15% of plinth area.

Assess the amount of fund required, assuming other contingencies.

(OR)

4. Explain with an example the different methods of estimating building works.

UNIT - III

5. Mention the various points that enumerate the necessity of specifications and give the merits and demerits of open specification.

(OR)

6. Explain the term tender and the various conditions of contract to be formulated while inviting tender.

UNIT - IV

7. Explain in detail the essentials of various contracts.

(OR)

8. Discuss the merits and demerits of

(a) Item rate contract. (b) Percentage rate contract.

UNIT - V

9. Explain in detail the various purposes of valuation of a property.

(OR)

10. A building fetches a gross rent of ₹.2,000/- per month. Assuming 25% outgoing for taxes, 20% for repairs and maintenance and 3% to set aside to accumulate the cost of buildings, determine its capitalised value @ 6% interest per annum. Also, calculate its depreciated value after 50 years assuming a depreciation of 1% per annum on its value at beginning of every year.

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(FOURTH SEMESTER)

CLEC-406. TRANSPORTATION ENGINEERING - I

November]

[Time : 3 Hours

Maximum : 75 Marks

UNIT - I

1. Explain the cross-sectional elements of a highway with neat diagrams.

(OR)

2. Derive an expression for over-taking sight distance.

UNIT - II

3. Write down the construction steps for water bound macadam road with neat sketch.

(OR)

4. Describe the construction steps for surface dressing of bituminous concrete road with sketch.

UNIT - III

5. Explain briefly how you would organize and conduct road side interview for studying the origin and destination of vehicles entering and leaving a study area.

(OR)

6. With a neat sketch, explain how you would establish the speed limits of a road section with the observed spot speed data collected.

UNIT - IV

7. Explain how failure of human aspects would lead to road accidents.

(OR)

8. Write in detail the major reasons for noise pollution due to vehicles on the road and the methods of reducing the noise levels in the adjoining areas.

UNIT - V

9. List the factors to be considered for the selection of site for a commercial airport.

(OR)

10. Summarize briefly the various runway geometrics as recommended by ICAO.