

Register Number :

Name of the Candidate :

0 1 6 9

B.E. DEGREE EXAMINATION, 2016

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

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

ENGINEERING MATHEMATICS - III / PROBABILITY AND STATISTICS

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

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

USE of Statistical Table is permitted.

ALL questions carry EQUAL marks.

UNIT - I

1. (a) A random variable x has the following probability function :

$x:$	0	1	2	3	4	5	6	7
$P(x):$	0	K	$2K$	$2K$	$3K$	K^2	$2K^2$	$7K^2 + K$

- (i) Find K . (ii) Evaluate $P(x < 6)$. (iii) Find the mean and variance. (8)

- (b) A random variable 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 probability density function of two random variables (x, y) is

$$f(x, y) = \frac{1}{8} (6 - x - y), 0 < x < 2, 2 < y < 4.$$

Find :

- (a) $P(x > 1)$. (b) $P(y < 3)$. (c) $P(x < y)$. (d) $P(x < 1 / y < 3)$.
(e) $P(x + y < 3)$. (15)

UNIT - II

- 3 (a) The process $\{x(t)\}$ whose probability distribution under certain condition is given by

$$P\{x(t) = n\} = \begin{cases} \frac{(at)^{n-1}}{(1+at)^{n-1}}, & n=1, 2, \dots \\ \frac{at}{1+at}, & n=0 \end{cases}$$

Show that it is not stationary. (8)

- (b) If the random process $z(t) = x(t) + y(t)$ where $x(t)$ and $y(t)$ are random process, then prove that

$$\mathfrak{R}_{zz}(\tau) = \mathfrak{R}_{xx}(\tau) + \mathfrak{R}_{yy}(\tau) + \mathfrak{R}_{xy}(\tau) + \mathfrak{R}_{yx}(\tau). \quad (7)$$

4. (a) A stationary random process has an auto correlation function $\mathfrak{R}_{xx}(\tau) = 25 + \frac{4}{1+6\tau^2}$.

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

- (b) Show that : $\mathfrak{R}_{xy}(\tau) = \mathfrak{R}_{yx}(-\tau)$. (7)

UNIT - III

5. (a) A machine produced 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 been improved? (8)
- (b) The following table gives the lengths of 12 samples of Egyptian Cotton taken from a large consignment :

48, 46, 49, 46, 52, 45, 43, 47, 47, 46, 47, 50.

Test if the mean length of the consignment be taken as 46. (7)

6. (a) In a certain sample of 2000 families 1400 families are consumers of tea. Out of 1800 Hindu families 1236 families consume tea. Use χ^2 -test and state whether there is any significant difference between consumption of tea among Hindu and non-Hindu families. (8)

- (b) Two samples are drawn from the two normal populations. From the following data test whether the two samples have the same variance at 5% level : (7)

Sample - I	60	65	71	74	76	82	85	87
Sample - II	61	66	67	85	78	63	85	86

UNIT - IV

7. A company appoints four salesmen A, B, C and D and observes their sales in three seasons: summer, winter and monsoon. The figures (in lakhs of ₹) are given in the following table :

		Salesman			
		A	B	C	D
Seasons	Summer	45	40	38	37
	Winter	43	41	45	38
	Monsoon	39	39	41	41

Carry out analysis of variance. (15)

8. The data given below are the number of defectives in 10 samples of 100 times each. Construct a P-chart and an np-chart and comment on the result : (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. In a hospital, the security uses an automatic light 8 hours per night, 7 nights per week. The supervisor found that the light is turned on about 20 minutes per 8 hour shift. The light is assumed to have a constant failure rate of 0.08 per hour if it is switched on and 0.005 per hour if it switched off.

- Compute the MTTF of the light in working hours.
- Find the probability of the light fails during one 8 hour shifts?
- Determine the probability of its failure during 30 days of hours shift. (15)

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

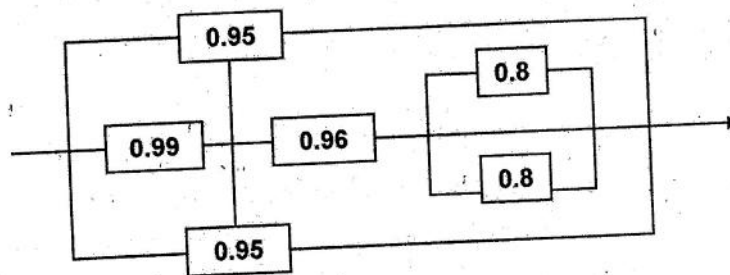


Figure-1

Register Number :

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0 1 7 0

B.E. DEGREE EXAMINATION, 2016

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-402 / PCLEC-102. SURVEYING - I

(Common with Part-Time)

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT - I

1. Explain briefly the various instruments used in chain surveying. (15)

(OR)

2. What are the conventional signs used to denote the following ?

- (a) Road. (b) Railway double line. (c) Cemetery
(d) Railway bridge. (e) Canal with rock. (15)

UNIT - II

3. Determine the values of included angle in a closed compass traverse ABCD conducted in clockwise direction, given the following forebearings and their respective lines :

Line	Fore bearings
AB	40°
BC	70°
CD	210°
DA	280°

(15)

(OR)

4. Convert the following whole circle bearings into reduced bearings :

Line	WCB
OA	25° - 30'
OB	120° - 30'
OC	240° - 30'
OD	320°

(15)

UNIT - III

5. Briefly explain the following methods of plane tabling : (15)

(a) Radiation method. (b) Intersection method. (c) Traversing method.

(OR)

6. A series of offsets were taken from a chain line to a curved boundary line at intervals of 15 metres in the following order : (15)

0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m.

Compute the area between the chain line, the curved boundary line and the end offset by :

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

UNIT - IV

7. Discuss the height of instrument and rise and fall methods of computing the levels. Describe the merits and demerits also. (15)

(OR)

8. The following staff readings were taken with level, the instrument having been moved after second, fourth and eighth readings :

0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030, 3.765 meters.

The first staff reading was taken with the staff held at bench mark of elevation 132.135.

Enter the readings in level book and reduce the levels. (15)

UNIT - V

9. Define the terms :

(a) Face right and face left observations. (b) Swinging of telescope.

(c) Transiting the telescope. (15)

(OR)

10. Describe briefly about the measurement of vertical angles and magnetic bearing of a line using a theodolite. (15)

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0171

B.E. DEGREE EXAMINATION, 2016

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-403. MECHANICS OF SOLIDS - II

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT - I

1. Determine the forces developed in king post truss shown in figure-1.

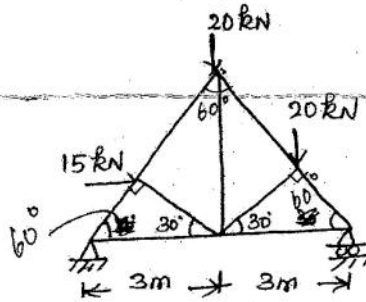


Figure-1

(OR)

2. Determine the vertical deflection of point C in the frame shown in figure-2. Given $E = 200 \text{ kN/mm}^2$ and $I = 30 \times 10^6 \text{ mm}^4$.

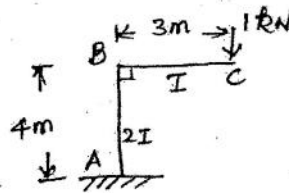


Figure-2

UNIT - II

3. A rectangular section beam $80 \text{ mm} \times 50 \text{ mm}$ is arranged as a cantilever 1.3 m long and loaded at its free end with a load of 5 kN inclined at an angle of 30° to the vertical as shown in figure-3. Determine the position and magnitude of greatest tensile stress in the section. What will be the vertical deflection at the end? $E = 210 \text{ GN/mm}^2$.

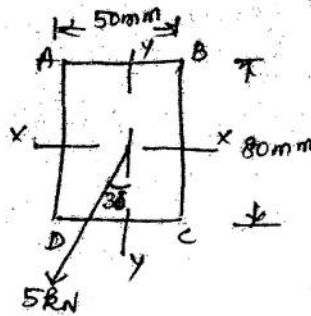


Figure-3

(OR)

4. Locate the shear centre of the channel section shown in figure-4.

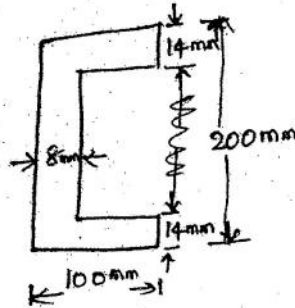


Figure-4.

UNIT - III

5. Determine the section of a cast iron hollow cylindrical column 3 m long with both ends firmly built-in, if it carries an axial load of 800 kN . The ratio of internal to external diameter is $\frac{5}{8}$.

Use F-S. = 4, Rankine's constant $a = \frac{1}{1600}$ and $\sigma_c = 550 \text{ N/mm}^2$.

(OR)

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B.E. DEGREE EXAMINATION, 2016

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(FOURTH SEMESTER)

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

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

IS-456, IS-800 and SP-16 codes are permitted.

Assume suitable data where necessary.

ALL questions carry EQUAL marks.

UNIT - I

1. A RC beam 300 mm wide \times 600 mm total depth has a span of 6.5 m. Find the necessary tension reinforcement at the mid section to enable the beam to carry a load of 9.5 kN/m in addition to its own weight. Concrete cover below the steel centre is equal to 35 mm. Allowable stress in steel = 230 N/mm². Allowable stress in concrete = 7 N/mm².

(OR)

2. A flanged beam with flange width 960 mm, rib breadth 200 mm, thickness of flange 125 mm, overall depth of beam 375 mm and effective depth 315 mm, is to support a factored moment of 240 kN·m. Determine the moment of resistance of section and also, the amount of reinforcement if $f_{ck} = 20 \text{ N/mm}^2$ and $f_y = 415 \text{ N/mm}^2$.

UNIT - II

3. Design a roof slab over a passage of size 10 m \times 2.77 m provided at the entrance of a public building. The slab is supported by 230 mm wide beams and carries superimposed load of 3.1 kN/m². M-20 concrete and Fe-415 steel are used.

(OR)

4. Design a R.C. slab for a room measuring 6.5 m \times 5 m. The slab is to be cast monolithically over the beams with corners held down. The width of the supporting beams is 250 mm. The slab carries superimposed load of 3 kN/m². M-20 concrete and Fe-250 steel are used.

UNIT - III

5. A R.C. column 3.5 m effective length is required to resist an axial ultimate load of 1750 kN. Design the column using M-20 concrete and Fe-250 steel.

(OR)

6. Design a combined footing, two columns A and B, 4 m centre to centre, carrying an ultimate axial load of 1000 kN and 1400 kN respectively. The boundary line of the property is 400 mm from the outer face of the column-A. Column-A is 360 mm × 360 mm and column-B is 420 mm × 420 mm. The bearing capacity of the soil is 106 kN/m^2 . Use M-20 concrete and Fe-415 steel.

UNIT - IV

7. A single riveted double cover butt joint is used to connect two plates 12 mm thick. The rivets used are power driven 13 mm in diameter at a pitch of 60 mm. Find the safe load per pitch length and the efficiency of the joint.

(OR)

8. ISA 100 mm × 100 mm × 10 mm angle is to be welded in shop to 12 mm gusset plate. The angle carries an ultimate pull of 350 kN applied along its centroidal axis which is 28.2 mm from the back of the angle. Determine the length of side fillet weld required at the heel and toe of the angle.

UNIT - V

9. A tension member is made of ISA 90 × 90 × 10 mm connected to 10 mm gusset plate with 5 numbers of 20 mm diameter bolts with 65 mm pitch and 45 mm edge distances. Calculate the load carrying capacity of the member in tension.

(OR)

10. A built-up column made of two ISMC 350 @ 42.1 kg/m placed back to back separated by a distance of 185 mm between their webs. Effective length is 7.5 m to carry a load of 1160 kN. Design a suitable battened system with connections.

Register Number:

0173

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(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-405. ESTIMATION AND VALUATION

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any **ONE FULL** question from each UNIT

(5 × 15= 75)

UNIT-I

1. What are the purpose of the estimate and briefly explain the different types of estimate?
2. Prepare the detailed estimate of corner steps at shown in drawing No. 1.
 - a) Foundation concrete is P.C.C. 1: 5: 10
 - b) Brick work in Cement Mortar 1:5
 - c) Treads and rises of steps are to be finished with 15 mm thick Cement Mortar 1:4

UNIT-II

3. Define the term rate analysis and describe the factors affecting the rate analysis of an item.
4.
 - a) What are the essential necessary for the person carrying out the rate analysis?
 - b) Write a critical note on the schedule of rates.

UNIT-III

5. What is the necessary for detailed specification and briefly explain types of specifications?
6. Describe the mode of submission of tender and the process of opening of tenders in case of big specialized projects.

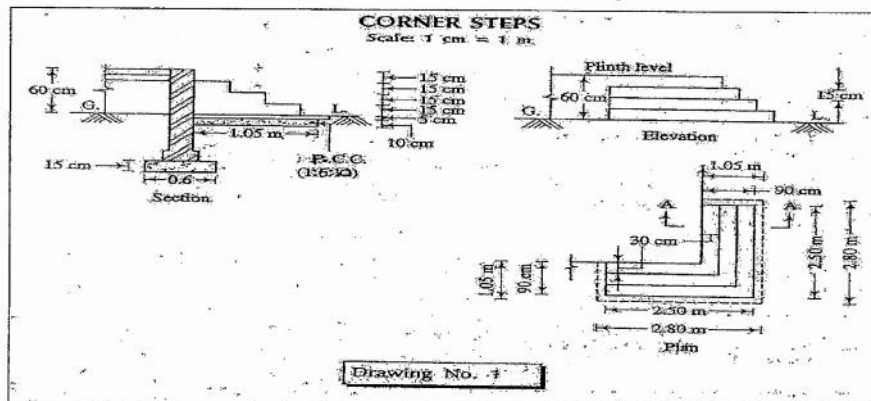
UNIT-IV

7.
 - a) What are the types of contracts and briefly explain in detail?
 - b) What are the essential requirements of valid contract?
8.
 - a) Write advantages and disadvantages of contract system.
 - b) What are objects of making provision for earnest money (EMD) and security deposit?

UNIT-V

9. Write the purpose of valuation and briefly explain the types of valuation.

10. In a plot of land costing Rs.20,00,000 a building has been newly constructed at a total cost of Rs.80,00,000 including sanitary and water supply works, electrical installation, etc. The building consists of four flats for four tenants. The owner expects 8 percent return on the cost of construction and 5 percent 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 repair cost at 1% of the cost of construction. (c) Other outgoings including taxes at 30% of the net return on the building.



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(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC - 406. TRANSPORTATION ENGINEERING - I

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

UNIT - I

1. Explain the various factors to be considered during highway alignment.

(OR)

2. Derive an expression for the Stopping Sight Distance (SSD) at plain and slopes in high way.

UNIT - II

3. List the various tests conducted on road aggregates and explain any two tests with neat sketches.

(OR)

4. Explain the construction procedure of Water Bound Macadam roads.

UNIT - III

5. (a) Explain about the traffic volume study and delay studies. (8)

- (b) Explain about the parking and accident studies (8)

(OR)

6. Discuss about the design vehicles and types of design vehicles.

UNIT - IV

7. Explain the nature of various traffic problems in India and various measures to meet the problems.

(OR)

8. Explain the various computer applications in traffic engineering.

UNIT - V

9. With a neat diagram, explain the various facilities provided in an terminal building of an airport.

(OR)

10. Explain in detail about the runway lighting and repair yards.