

Register Number:

4079

Name of the Candidate:

B.E. DEGREE EXAMINATION, 2017
(CIVIL, CIVIL AND STRUCTURAL, MECHANICAL (MANUFACTURING)
AND CHEMICAL ENGINEERING)
(FOURTH SEMESTER)
CLEC-401/CSEC-401/CHEC-401. ENGINEERING MATHEMATICS-III
MEEC-401/MFEC-401/. PROBABILITY AND STATISTICS

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each UNIT (5 × 15 = 75)
Use of statistical table is permitted

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	$2k^2$	$7k^2+k$

Find k and $p(x < 5)$.

- 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.
2. a) A continuous random variable x has the pdf $f(x) = \begin{cases} k(x+1), & -1 < x < 1 \\ 0, & \text{otherwise} \end{cases}$

Find k , mean and variance of x .

- b) The joint probability mass function of (x, y) is given by $P(x, y) = k(2x+3y); x=0, 1, 2. Y=1, 2, 3$. Find the marginal and conditional probability distribution.

UNIT-II

3. a) Show that the random process $x(t) = A \sin(\omega t + \theta)$ is WSS where A and ω are constants and θ is uniformly distributed in $(0, 2\pi)$.
- b) Find the mean and variance of the process $x(t)$ whose auto-correlation function is $R_{xx}(T) = 25 + \frac{4}{1+6T^2}$.

4. a) The process $\{x(t)\}$ whose probability distribution is
- $$P\{x(t) = n\} = \begin{cases} (at)^{n-1}, & n=1, 2, \dots \\ \frac{at}{1+at}, & n=0 \end{cases}$$

Show that it is not stationary.

- b) Prove that $R_{xx}(T)$ is an even function.

UNIT-III

5. a) The following table gives the lengths of 12 samples of a large consignment. 48, 46, 49, 46, 52, 45, 43, 47, 47, 46, 47, 50. Test if the mean length of consignment be taken as 46.

- b) The theory predicts the proportion of beans in the four groups should be 9:3:3:1. In an experiment with 1600 beans the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory?
6. Two samples are drawn from the two normal populations, from the following data test whether the two samples have the same variance.
 Sample-I: 60, 65, 71, 74, 76, 82, 85, 87
 Sample-II: 61, 66, 67, 85, 78, 63, 85, 86, 88, 91

UNIT-IV

7. The following table gives monthly sales (in thousand rupees) of a certain firm in three states by its four salesmen.

States	Salesmen			
	I	II	III	IV
A	6	5	3	8
B	8	9	6	5
C	10	7	8	7

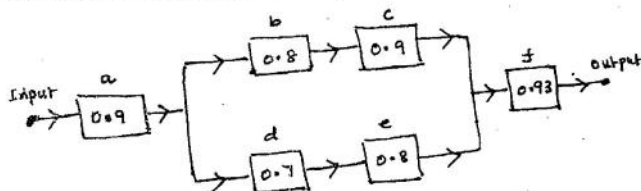
setup the analysis of variance table and test whether there is any significant difference (i) between sales by the firm salesmen and (ii) between sales in the three states.

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 the different methods of cultivation have given significantly different yields.

	F ₁	F ₂	F ₃	F ₄
L ₁	D122	A121	C123	B122
L ₂	B124	C123	A122	D125
L ₃	A120	B119	D120	C121
L ₄	C122	D123	B121	A122

UNIT-V

9. A certain type of engine seal is found to have its life exponentially distributed with a constant failure rate 0.03×10^{-4} failures per hour.
 (i) What is the probability that a given seal will last beyond ten thousand hours? (ii) What is the MTTF seal? (iii) What is the reliability of MTTF?
10. Calculate the system reliability for the units as shown.



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B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-402 / PCLEC-102. SURVEYING - I

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL Marks.

UNIT - I

1. (a) Explain the principle on which chain survey is based. (8)
- (b) Explain with neat diagram, the construction and working of cross staff. (7)
2. Explain how will you continue chaining past the following obstacles : (15)
(a) Pond. (b) River.

UNIT - II

3. With neat sketch, describe the graduations and parts of prismatic compass. (15)
4. The following angles were observed in clockwise direction in an open traverse :
 $\angle ABC = 124^\circ 15'$; $\angle BCD = 156^\circ 30'$; $\angle CDE = 102^\circ 0'$; $\angle DEF = 95^\circ 15'$; $\angle EFG = 215^\circ 45'$
Magnetic bearing of the line AB was $241^\circ 30'$. What would be the bearing of line FG ? (15)

UNIT - III

5. (a) What are the advantages and disadvantages of plane table surveying over other methods? (8)
- (b) Describe briefly the use of various accessories of a plane table. (7)
6. Calculate the volume of earthwork in an embankment of 50 m length if the heights at 10 m intervals are 3 m, 2 m, 4 m, 3 m, 4 m, 2 m and 3 m and is 10 m wide with side slopes $1\frac{1}{2} : 1$.

UNIT - IV

7. What are the different types of levelling staff? State the merits and demerits of each. (15)
8. The following notes refer to reciprocal levels taken with one level :

Instrument Near	Staff reading on		Remarks
	P	Q	
P	1.824	2.748	Distance PQ = 1010 m. RL of P = 126.38 m.
Q	0.928	1.606	

Find :

- (a) True RL of Q. (b) Combined correction for curvature and refraction. (15)

UNIT - V

9. Explain the temporary adjustments of a transit theodolite. (15)
10. What are the different errors in theodolite work? How are they eliminated? (15)

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B.E. DEGREE EXAMINATION, 2017

(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.

ALL questions carry EQUAL Marks.

UNIT - I

1. Determine the forces developed in the member of the truss shown in figure - 1.

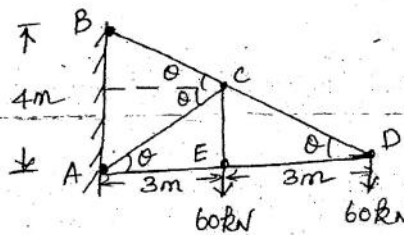


Figure - 1.

2. Determine the horizontal displacement at the free end D in the frame shown in figure - 2.
Take $EI = 12 \times 10^{13} \text{ Nmm}^2$.

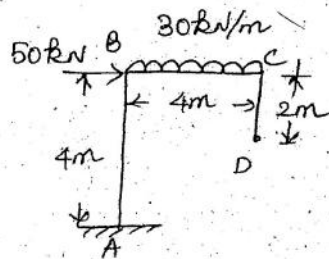


Figure - 2.

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B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

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

(Common with Part-Time)

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

IS-456, IS-800, SP -26 Codes and Steel Tables are permitted.

Assume suitable data wherever necessary and mention it clearly.

ALL questions carry EQUAL Marks.

UNIT - I

1. Design a rectangular beam for an effective span of 6 m. The superimposed load is 80 kN/m and size of the beam is limited to 300 mm × 600 mm overall. Use M20 grade concrete and Fe415 grade steel. Use limit state design.
2. Design a cantilever beam with a clear span of 2.5 m which carries a superimposed load of 20 kN/m run. Use M15 mix and Fe250 steel. Calculate the development length and also, check for shear criteria as per limit state design.

UNIT - II

3. Design a two-way slab for a room 5.5 m × 4.0 m clear in size with edges simply supported and corners held down. The superimposed load is 5 kN/m². Use M20 concrete and Fe415 steel.
4. Design a cantilever slab having an overhang of 1.25 m. Consider live load intensity of 1.0 kN/m² on the cantilever and the weight of finishing on the top of slab as 0.50 kN/m². Use M20 concrete and Fe250 steel

UNIT - III

5. Design a short column under biaxial bending with the following data :
Size of column = 450 mm × 450 mm. Grade of concrete = M20.
Grade of steel = Fe415. Factored load = 1000 kN.
Factored moment in X-direction = 75 KN-m
Factored moment in Y-direction = 60 KN-m.

6. Design a rectangular isolated footing of uniform thickness for RC column bearing a vertical load of 600 kN and having a base size of 400 mm × 600 mm. The safe bearing capacity of soil may be taken as 120 kN/m². Use M-20 concrete and Fe-415 steel.

UNIT - IV

7. Design a single bolted double cover butt joint to connect plates of Fy410 grade having thickness 16 mm. Use M16 bolts of grade 4.6. Find the efficiency of the joint.
8. A tie member of a roof truss consists of 2 ISA 90 mm × 60 mm × 10 mm. The angles are connected on either side of 12 mm gusset plate and the member is subjected to a pull of 450 kN. Design the welded connection.

UNIT - V

9. Compute the tensile strength of section ISMB 300 with gusset plate connected to the flange. The section is connected to end gusset plate by using 4 rows of 18 mm bolts and a connection length of 150 mm is provided.
 10. Design a column with single lacing system to carry a factored axial load of 1600 kN. The effective height of the column is 4.2 m. Use two channels placed toe-to-toe.
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