

Register Number :

Name of the Candidate :

8 6 1 1

B.E. DEGREE EXAMINATION, 2012

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

(FOURTH SEMESTER)

**CLEC / CSEC / MEEC / MFEC / CHEC -401
ENGINEERING MATHEMATICS - III /
PROBABILITY AND STATISTICS**

(New Regulations)

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

May]

[Time : 3 Hours

Maximum : 60 Marks

Answer ONE full question from each unit.

Use of statistical Tables is permitted.

ALL questions carry equal marks.

Turn Over

UNIT - I

1. (a) A continuous random variable X has a p.d.f. $f(x) = 3x^2$, $0 \leq x \leq 1$, Find 'a' and 'b' such that

$$(i) P(x \leq a) = P(x > a)$$

$$\text{and } (ii) P(x > b) = 0.05$$

- (b) Show that the function

$$f(x,y) = \begin{cases} \frac{2}{5}(2x+3y) & 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

is a joint distribution function.

(OR)

2. (a) If a random variable X has the p.d.f

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

find the mean and variance of X.

- (b) If X and Y are independent random variables having density functions.

$$f(x) = \begin{cases} 2e^{-2x} & 0 \geq 0 \\ 0 & x < 0 \end{cases}$$

$$\text{and } g(y) = \begin{cases} 3e^{-3y} & y \geq 0 \\ 0 & y < 0 \end{cases}$$

find the density function of their sum
 $U = X + Y$.

UNIT - II

3. (a) Classify the types of random process based on the values taken by time t and the state space $\{x_i\}$.
- (b) If $\{X(t)\}$ and $\{Y(t)\}$ are two random processes, show that

$$|R_{XY}(t)| \leq \frac{1}{2} [R_{XX}(0) + R_{YY}(0)].$$

(OR)

Turn Over

4. (a) Show that the random process
 $X(t) = A \sin(\omega t + \phi)$, where A and ω are constants, ϕ is a random variable uniformly distributed in $(0, 2\pi)$ is first order stationary.
- (b) Define cross-correlation function and state its properties.

UNIT – III

5. (a) Before an increase in excise duty on tea, 800 persons out of a sample of 1000 persons were found to be tea drinkers. After an increase in duty, 800 people were tea drinkers in a sample of 1200 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea after the increase in excise duty.
- (b) Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins show the sample S.D's of their weights 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test hypothesis that the true variances are equal.

(OR)

6. (a) The mean weekly sale of a particular brand of chocolate was 145 bars per store, Data of 49 stores was studied in all. After an advertising campaign, it was seen that the mean weekly sale rose to 152 and showed a s.d. of 15. Has the advertising campaign been successful?
- (b) The nicotine content in milligram of two samples of tobacco were found to be as follows:

Sample-A	24	27	26	21	25	
Sample-B	27	30	28	31	22	36

Can it be said that these samples come from normal populations with the same mean?

Turn Over

UNIT – IV

7. It is claimed that the following four sample data of equal size are drawn from a common population. Test the validity of the claim.

Sample-I	Sample-II	Sample-III	Sample-IV
5	4	8	7
6	7	4	5
4	5	2	5
3	2	6	6
2	3	3	9

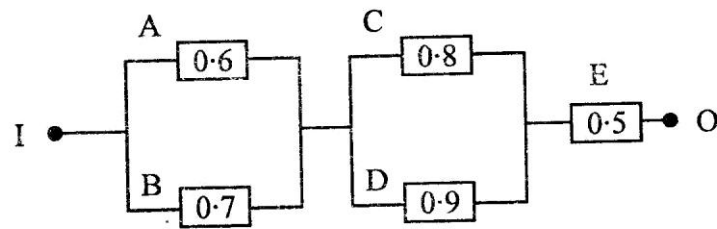
(OR)

8. Three breed of Cattle A, B and C were fed by 4 different rations P, Q, R and S. The following table gives the gains in weight. Test whether there is any significant difference between breeds and rations at 5% level of significance.

	P	O	R	S
A	6	3	2	9
B	1	3	8	7
C	7	3	5	2

UNIT - V

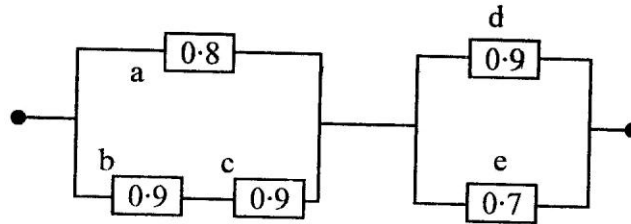
9. (a) What are the two major types of arrangements in reliability? For each case, derive the system reliability.
- (b) Find the unreliability of the system, whose block diagram is given below :



(OR)

Turn Over

10. (a) A system is composed of five identical independent elements in parallel. What should be the reliability of each element to achieve a system reliability of 0.96?
- (b) Calculate the reliability of the system, whose block diagram is given below :



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B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC- 406.

TRANSPORTATION ENGINEERING - I

(New Regulations)

(For those who joined during 2007-08 and after)

May]

[Time : 3 Hours

Maximum : 60 Marks.

Answer ANY ONE FULL question from each unit.

ALL questions carry equal marks.

UNIT - I

1. What are the surveys to be carried out for locating a highway? Explain final location or detailed survey in brief. (12)

(OR)

Turn Over

2. What are the geometric design parameters of a highway? Explain them with sketches. (12)

UNIT - II

3. Explain the significance of various physical tests on bitumen. Give the procedure for ductility test. (12)

(OR)

4. Give brief description of construction procedure of water bound Macadam roads. (12)

UNIT - III

5. What are the various methods of carrying out speed and delay study and explain in detail any one of the methods. (12)

(OR)

6. Classify the various road traffic signs, giving their objectives. Illustrate with sketches. (12)

UNIT - IV

7. Mention the various evaluation procedure. Explain any one in detail. (12)

(OR)

8. Discuss the nature of traffic problems in developing cities. (12)

UNIT - V

9. Sketch the layout of a typical airport and indicate the components. (12)

(OR)

10. What are the passenger facilities required in a terminal building? (12)

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B.E. DEGREE EXAMINATION, 2012**(CIVIL, STRUCTURAL, MECHANICAL AND MANUFACTURING ENGINEERING)****(FOURTH SEMESTER)****CLEC/CSEC/MEEC/MFEC-401: PROBABILITY & STATISTICS****(Old Regulation)****(For the students joined during 2006-07 and before)**

May]

[Time : 3 Hours

Maximum : 60 Marks

*Answer One Full Question from each Unit.**All questions carry equal marks**(5 × 12 = 60)***UNIT - I**

1. (a) Calculate the first four moments of the following distribution about the mean and hence find β_1 and β_2 . (6)

x:	0	1	2	3	4	5	6	7	8
f:	1	8	28	56	70	56	28	8	1

- (b) The chance that a doctor A will diagnose a disease x correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 75%. A patient of doctor A, who has disease x died. What is the chance that his disease was diagnosed correctly? (6)
2. (a) The first four moments of a distribution about the value 4 of the variable are -1.5, 17, 30 and 108 find β_1 and β_2 . (6)
- (b) A and B throw alternately with a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, show that his chance of winning is $\frac{30}{61}$. (6)

UNIT - II

3. (a) Obtain the characteristic function of the normal distribution. Deduce its first four central moments. (6)
- (b) A random variable x has mean $\mu = 12$ and variance $\sigma^2 = 9$ and an unknown probability distribution. Using Tchebycheff's inequality, compute $P(6 < x < 18)$. (6)
4. (a) Find the correlation coefficient between x and y
- | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|
| x | 75 | 30 | 60 | 80 | 53 | 35 | 15 | 40 | 38 | 48 |
| y | 85 | 45 | 54 | 91 | 58 | 63 | 35 | 43 | 45 | 44 |
- (b) If x is a continuous random variable in $(0, \infty)$ prove that $E(x) = \int_0^{\infty} [1-F(x)] dx$. (6)

UNIT - III

5. (a) Prove that the binomial distribution tends to normal distribution as $n \rightarrow \infty$ under certain conditions which is to be stated. (6)
- (b) Obtain the characteristic function of a Cauchy distribution. Show also that $E(x)$ does not exist for Cauchy distribution. (6)

6. (a) The moment generating function of a random variable X is $e^{4(e^x-1)}$. Show that $P(\mu-2\sigma < x < \mu + 2\sigma) = 0.93$. (6)
- (b) Suppose the duration x in minutes of long distance calls from your home follows exponential distribution with pdf $f(x) = \frac{1}{5}e^{-x/5}, x > 0$. Find $P(3 \leq x \leq 6)$, mean and variance. (6)

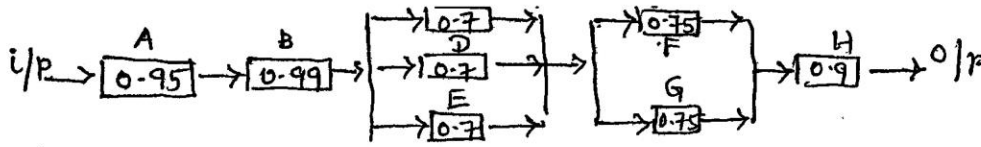
UNIT - IV

7. (a) The average marks scored by 32 boys is 72 with variance 16 while that for 36 girls is 70 with variance 6 test at 5% level of significance whether the boys perform better than girls. (6)
- (b) Two independent samples of eight and seven items had the following values: (6)
- Sample I 9 11 13 11 15 9 12 14
- Sample II 10 12 10 14 9 8 10
- Do the two estimates of population variance differ significantly at 5% level of significance? (6)

8. (a) 15.5 per cent of a random sample of 1600 undergraduates were smokers, whereas 20% of a random sample of 900 postgraduates were smokers in a state. Can we conclude that less number of undergraduates are smokers than the postgraduates? (6)
- (b) In a pre-poll survey/out of 1000 rural voters 620 favoured A and the rest B. Out of 1000 urban voters, 450 favoured B and the rest A. Examine if the nature of the area is related to voting preference. (6)

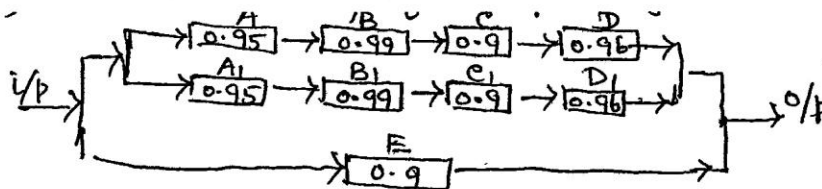
UNIT - V

9. (a) If $R(t) = e^{-\sqrt{0.005t}}, t \geq 0$
- (i) Find the reliability for 50 hours.
- (ii) Show that the hazard rate is decreasing.
- (iii) Given 20 hour wear in period, find the reliability for 50 hours. (6)
- (b) Find the reliability of the system given below:



(6)

10. (a) If $f(t) = \frac{32}{(t+4)^3}$ ($t > 0$ in years) is the density function of the time to failure of an appliance, then (i) find $R(t)$ (ii) find the failure rate $\lambda(t)$ (iii) find MTTF. (6)
- (b) Find the reliability of the system given below:



(6)

%%%%%%%%%

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B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-403. MECHANICS OF SOLIDS - II

(New Regulations)

(For students joined during 2007-08 and after)

May]

[Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each unit.

ALL questions carry equal marks.

Turn Over

UNIT - I

1. Determine the forces in all the members of the truss shown in Figure - 1 by method of joints and indicate the magnitude and nature of forces on the diagram of the truss.

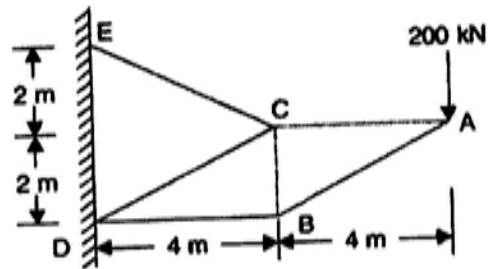


Figure - 1

2. Determine the forces in the members of the truss shown in Figure - 2 by tension coefficient method.

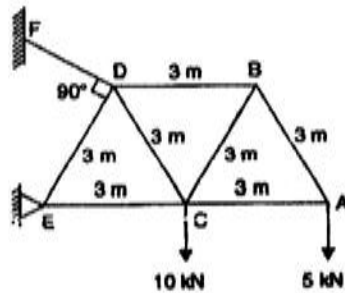


Figure - 2

UNIT-II

3. An I-section girder 1.3 m long is rigidly built in at one end and loaded at the other with a load of 1.5 kN inclined at 30° to the web. If the load passes through the centroid of the section and the girder dimensions are: flanges 100 mm \times 20 mm. Web 200 mm \times 12 mm, determine the maximum stress set up in the cross-section.

Turn Over

4. The unequal-leg angle section shown in Figure - 3 is used as a cantilever with the 130 mm leg vertical. The length of the cantilever is 1.3m. A vertical point load of 4.5 kN is applied at the free end, its line of action passing through the shear centre. Find the stress set up in the section at points A, B and C.

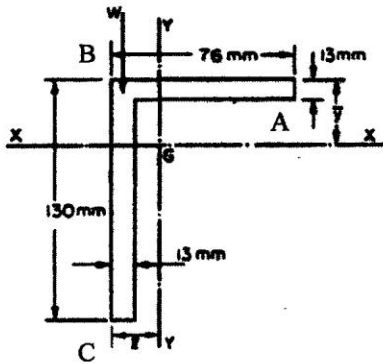


Figure - 3

UNIT - III

5. Find the maximum and minimum stress intensities at the weaker section of a flat bar 150 mm wide and 20 mm thick carrying axial load of 150 kN if it is punched at a distance of 50 mm from the axis of the bar with 20 mm wide hole.

6. Derive the Euler formula for strut hinged at both ends. State clearly what you regard as the three most important assumptions made in deriving this formula.

UNIT - IV

7. A compound cylinder is to be made by shrinking on outer tube of 3000 m external diameter on to an inner tube of 150 mm internal diameter. Determine the common diameter at the junction if the greatest circumferential stress on the inner tube is to be two-thirds of the greatest circumferential stress in the outer tube.
8. A thin cylinder of 100 mm internal diameter and wall thickness 2 mm has its ends closed by rigid plates and is then filled with water. When an external pull of 20 kN is applied to the ends, the water pressure, read by the gauge is observed to fall by 0.075 N/mm^2 . Neglecting any end effects due to plates, determine the value of Poisson's ratio for the metal. Take E as $2.1 \times 10^5 \text{ N/mm}^2$ and bulk modulus as $2.17 \times 10^3 \text{ N/mm}^2$.

Turn Over

UNIT-V

9. A horizontal cantilever of length L is clamped at one end carries a load W at the other. Derive an expression for the time period of vibration of the cantilever when the load is given a small vertical displacement. Neglect the weight of the cantilever.
10. A uniform steel beam 2 m long, is simply supported at its ends and carries loads 1000 N at distance of 500 mm from each support. Determine the lowest natural frequency for the system if the mass of the beam itself may be neglected. The moment of inertia of the beam section is $2 \times 10^5 \text{ mm}^4$. Take Young's modulus as $2 \times 10^5 \text{ N/mm}^2$.

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B.E. DEGREE EXAMINATION, 2012

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-402. SURVEYING - I

(New Regulations)

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

May]

[Time : 3 Hours

Maximum : 60 Marks

Answer any ONE FULL question from each Unit.

ALL questions carry equal marks.

UNIT - I

1. (a) Explain with a neat sketch, the construction and working of optical square and cross staff.

(8)

Turn over

- (b) Explain clearly the principles of chain survey.
(4)

(OR)

2. A survey line cuts the banks of a river @ B and C and to determine the distance BC, a line BE 62 m long was set out roughly parallel to the river. A point D was then found in CE produced and middle point F of DB determined. EF was then produced to G, making FG equal to EF and DG produced to cut the survey line in H. GH and HB were found to be 42 and 82 metres long respectively. Find the distance from B to C.(12)

UNIT - II

3. (a) What is local attraction? How is it detected and eliminated? (6)
- (b) Define the terms : (6)
- (i) True and magnetic bearings.
 - (ii) Back bearings and magnetic declination.

(OR)

4. Two distances of 60 and 90 m were accurately measured out and the intercepts on the staff between the outer stadia webs were 0.496 at the former distance and 0.896 at the latter. Calculate the tachometric constants. (12)

UNIT - III

5. (a) Discuss the advantages and disadvantages of plane table surveying over other methods. (6)
- (b) Enumerate the uses of various accessories of a plane table. (6)

(OR)

6. The following perpendicular offsets were taken at 10 metres intervals from a survey line to an irregular boundary line.

3.25, 5.60, 4.20, 6.65, 8.75, 6.20, 3.25,
4.20, 5.65.

Calculate the area enclosed between the survey line, the irregular boundary line and the first and last offsets by the application of

Turn over

- (a) Average ordinate rule.
- (b) Trapezoidal rule.
- (c) Simpson's rule. (12)

UNIT - IV

7. (a) Explain the description, setting and uses of dumpy level. (10)
- (b) Define sensitiveness of bubble tube. (2)

(OR)

8. The following consecutive readings were taken with a level and 3 metre levelling staff on continuously sloping ground at a common interval of 20 metres.

0.602, 1.234, 1.860, 2.574, 0.238, 0.914, 1.936, 2.872, 0.568, 1.824, 2.722.

The reduced level of the first point was 192.122. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points and also, the gradient of the line of joining the first and the last points. (12)

UNIT - V

9. State what errors are eliminated by repetition method. How will you set out a horizontal angle by method of repetition? (12)

(OR)

10. A closed traverse was conducted round an obstacle and the following observations were made. Work out the missing quantities. (12)

Side	Length in m	Bearings
AB	---	33°45'
BC	224	86°23'
CD	---	169°23'
DE	450	243°54'
EA	236	317°30'

