

Code: 4GC42

II B.Tech. II Semester Supplementary Examinations August 2021

Probability & Statistics

(Common to CE, ME and IT)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

UNIT-I

1. a) Define the following (i) Sample Space (ii) event (iii) Outcome (iv) Probability 8M
b) Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each drawing. Find the probability that (i) both are white (ii) first is red and second is white. 6M

OR

2. a) State and prove Addition theorem on probability for two events. 8M
b) If two dice are throw , Find the probability of getting a sum is 10 6M

UNIT-II

3. A random variable X has the following probability function

X	0	1	3	4	5	6	7
P(X)	0	K	2K	2K	3K	K ²	7K ² +K

Find the value of K , (ii) Evaluate $p(0 < x < 5)$, (iii) Evaluate $p(x < 5)$ 14M

OR

4. The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Find $P(x = 1)$ and $P(x > 2)$ 14M

UNIT-III

5. A population consists of the four numbers 3, 7, 11, 15. Consider all possible samples of size 2 which can be drawn with replacement from this population. Find the population mean and standard deviation, and mean and standard deviation of the sampling distribution of means. 14M

OR

6. It is desired to estimate the mean number of hours of continuous use until a certain computer will first require repairs. If it can be assumed that $\mu = 48$ hours, how large a sample is needed so that one will be able to assert with 90% confidence that the sample mean is off by at most 10 hours. 14M

UNIT-IV

7. a) A sample of 64 students has a mean weight of 70 kg. can this be regarded as a sample from a population with mean weight 56kg. and standard deviation is 25 kg. 7M
b) In a big city, 325 men out of 600 men were found to be smokers. Thus this information supports the conclusion that the majority of men in the city are smokers. 7M

OR

8. According to the norms established for a mechanical aptitude test, persons who are 18 years old have an average height 73.2 ($\mu = 73.2$) with standard deviation of 8.6 ($\sigma = 8.6$). If 45 ($n = 45$) members randomly selected of that age average 76.7 ($\bar{x} = 76.7$). Test the null hypothesis $\mu = 73.2$, against the alternative hypothesis $\mu > 73.2$ at the 0.01 level of significance. 14M

UNIT-V

9. In an investigation on the machine performance, the following results are obtained

	No. of units inspected	No. of defectives
Machine I	375	17
Machine II	450	22

Test whether there is any significant performance of two machines at $\alpha = 0.05$ 14M

OR

10. 4 coins were tossed 160 times and the following results were obtained,

No, of Heads	0	1	2	3	4
Frequency	17	52	54	31	6

Under the assumption that coins are unbiased, find the expected frequencies of 0,1,2,3,4 heads and test the goodness of fit for $\alpha = 0.05$ 14M

Code: 4G643

II B.Tech. II Semester Supplementary Examinations August 2021

Structural Analysis-I

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

UNIT-I

1. Derive the equation for a Fixed beam carrying UDL over the entire span with neat sketch. 14M

OR

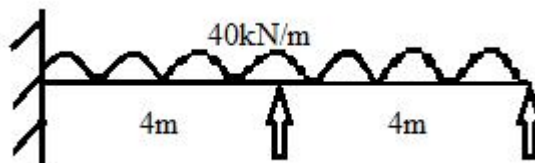
2. A fixed beam AB of length 6m carries a point loads of 160kN and 120kN at a distance of 2m and 4m from the left end of A. Find the Fixed end moments and the reactions at the supports. Draw B.M and S.F diagrams. 14M

UNIT-II

3. A Continuous beam ABC covers two consecutive span AB and BC of lengths 4m and 6m , carrying UDL of 6kN/m and 10kN/m respectively. If the ends A & C are simply supported, find the supports moments at A, B & C. 14M

OR

4. A continuous beam ABC consists of a two consecutive spans AB and BC 4m each and carrying a distributed load of 40kN/m. the end A is fixed and the end C simply supported. Find the support moments and reactions.



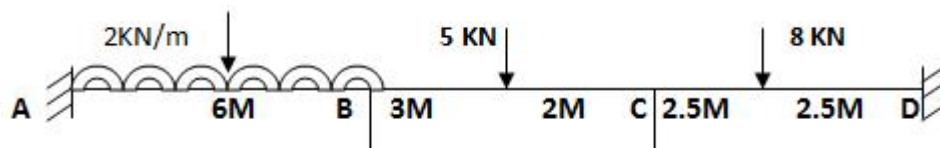
14M

UNIT-III

5. Explain step by step procedure of Moment Distribution method with suitable example. 14M

OR

6. A continuous beam ABCD consists of three span, and loaded as shown in figure. End A & D are fixed. Determine the bending moments at the supports.



14M

UNIT-IV

7. a) What are influence lines? 4M
b) Derive the influence line diagram for an simply supported beam with neat sketch 10M

OR

8. In a simply supported beam AB of span 20m, determine the maximum bending moment and shear forces at a section 5m from A, due to the passage of a UDL of intensity 20kN/m, longer than the span. 14M

UNIT-V

9. Derive Castigliano's first theorem with neat sketch. 14M

OR

10. Find the deflection at the free end of a cantilever of length L carrying a uniform distributed load of W per unit run over the whole span. Assume uniform flexural rigidity. 14M

Code: 4G641

II B.Tech. II Semester Supplementary Examinations August 2021

Strength of Materials – II

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

UNIT-I

1. a) A boiler shell is to be made of 20 mm thick plate having a limiting tensile stress of 135 N/mm^2 . If the efficiency of the longitudinal joints and circumferential joints are 80 % and 40 % respectively, determine the maximum permissible diameter of the shell for an internal pressure of 3 N/mm^2 7M
- b) A thin cylindrical shell of 90 cm diameter, 1 cm thick and 4 m long is subjected to an internal pressure of 3 N/mm^2 . Determine the change in length, diameter and volume of the shell. $E=2 \times 10^5 \text{ N/mm}^2$, Poisson's ratio, $\mu = 0.3$. 7M

OR

2. A compound cylinder is formed by shrinking one cylinder on to another. The final dimensions are: Internal diameter = 15 cm, External diameter = 30 cm, and diameter at junction = 25 cm. The shrinkage pressure is 10 MPa. Calculate the shrinkage allowance. What is the minimum temperature to which the outer cylinder must be heated so that it can be slipped on? Take for material of outer cylinder = $0.6 \times 10^{-5} / ^\circ\text{C}$. 14M

UNIT-II

3. a) What are the assumptions made in the theory of pure torsion 7M
- b) Hollow shaft transmits 200 kW of power at 150 rpm. The total angle of twist in a length of 5m of the shaft is 3° . Find the inner and outer diameters of the shaft if the permissible shear stress is 60 MPa. Take $G = 80 \text{ GPa}$. 7M

OR

4. A leaf spring carries a central load of 2.5 kN. The leaf spring is to be made of 10 steel plates 6cm wide and 5 mm thick. If the bending stress is limited to 100 N/mm^2 , determine length of the spring and deflection at the centre of the spring. Take $E=2 \times 10^5 \text{ N/mm}^2$. 14M

UNIT-III

5. A 2 m long column has a circular cross-section of 7 cm diameter. One of the ends of the column is fixed in direction and position and other end is free. Taking factor of safety as 4, calculate the safe load using Rankine's formula. Take $c = 550 \text{ N/mm}^2$ and $a = 1/1600$ for pinned ends 14M

OR

6. A simply supported beam of length 4.5 m is subjected to a uniformly distributed load of 35 kN/m over the hollow span and deflects 18 mm at the centre. Determine the crippling loads when this beam is used as a column with one end fixed and other end hinged. 14M

UNIT-IV

7. a) Find an expression for the maximum and minimum stresses when a rectangular column is subjected to a load, which is eccentric to Y-Y axis. 7M
- b) What is Core of a section? Derive the expression for a rectangular hollow section. 7M

OR

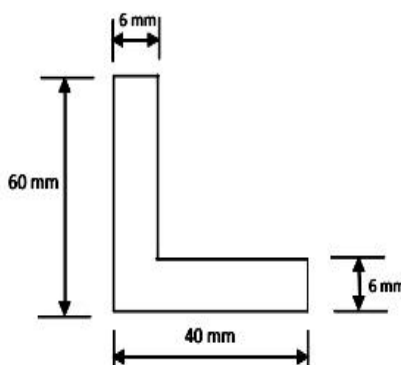
8. A hollow circular cast iron column of 25cm external diameter and 2cm thickness carries a load of 100 KN in the vertical plane at an eccentricity of 8cm. Determine the maximum and minimum stresses developed in the material. 14M

UNIT-V

9. Derive the expression of bending stress and inclination of neutral axis for a beam subjected to unsymmetrical bending 14M

OR

10. Determine the principal moment of inertia for unequal angle section $60 \times 40 \times 6 \text{ mm}$ shown in figure below.



14M