Hall Ticket Number :										

R-15

Code: 5GC42

II B.Tech. II Semester Supplementary Examinations October 2020

Probability & Statistics

(Common to CE, ME, CSE & IT)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Find the probability of getting a sum of 10 if we throw two dice

   b) 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	$7K^2+K$

   (i) Find the value of K
   (ii) Evaluate p(0<X<5)
   (iii) Evaluate p(X<6)

OR

2. a) If P(A) = $\frac{1}{2}$, P(B) = $\frac{1}{3}$ and P(A∩B) = $\frac{1}{5}$ then find (i) P(AUB) (ii) $P(A^c \cap B)$ (iii) $P(A \cap B^c)$ (iv) $P(A^c \cap B^c)$

   b) Find the continuous probability function $f(x)=k\,x^2\,e^{-x}$ when x≥ 0 find (i) k (ii) mean (iii) variance

UNIT–II

3. a) A die is thrown 6 times. If getting an even number is a success, find the probabilities of (i) at least one success (ii) ≤ 3 successes (iii) 4 successes

   b) If a random variable has a poisson distribution such that P(1) = P(2) find
   (i) Mean of the distribution
   (ii) P(4)
   (iii) P(x ≥ 1)
   (iv) P(1<x<4)

OR

4. a) 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)

   b) A hospital switch board receives an average of 4 emergency calls in a 10 minute interval. What is the probability that
   (i) There are at most 2 emergency calls in a 10 minute interval
   (ii) There are exactly 3 emergency calls in a 10 minute interval

UNIT–III

5. a) A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative

   b) A random sample of size 81 taken whose variance is 20.25 and mean is 32, construct 98% confidence interval

OR

6. a) The variance of population is 2. The size of the sample collected from the population is 169. What is the standard error of mean

   b) A research worker wants to determine the average time it takes a mechanic to rotate the tires of a car and he wants to be able to assert with 95%. Confidence that the mean of his sample is of by at most 0.5 minutes. If he can presume from past experience that σ = 1.6 minutes how large a sample will have to take

UNIT–IV

7. a) In a sample of 1,000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in the state at 1% level of significance

   b) If 80 patients are treated with an antibiotic 59 got cured. Find a 99% confidence limits to the true population of cure

OR

8. The mean yield of wheat from a district A was 210 pounds with S.D 2.5 inches per acer from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D 12 pounds from a sample of 150 plots. Assuming that the S.D of yield in the entire state was 11 pounds. Test whether there is any significant difference between the mean yield of crops in the two districts

UNIT–V

9. The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal populations at 10% significant level, Test whether the two populations have the same variance

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1

OR

10. The number of automobile accidents per week in a certain community are as follows 12, 8, 20, 2, 14, 10, 15, 6, 9, and 4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period

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Hall Ticket Number :										

R-15

Code: 5G643

II B.Tech. II Semester Supplementary Examinations October 2020

Structural Analysis-I

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. A fixed beam of span 6m carries point loads 200kN and 150kN at distances 2m and 4m from the left end. Find the fixed end moments and the reactions at the support. Draw B.M and S.F diagrams. 14M

OR

2. Deduce expressions of fixing moments when one end support sinks down by δ from its original position. 14M

UNIT–II

3. A continuous beam ABC consists of spans AB and BC of lengths 3m and 4m respectively, the ends A and C being simply supported. If the span AB and BC carry uniformly distributed loads of 60kN/m and 50KN/m respectively. Determine the support moments at A, B and C. Draw S.F and B.M diagrams. The moment of inertia for the spans AB and BC are I and 2I respectively. 14M

OR

4. Derive the clayperon's theorem of three moments. 14M

UNIT–III

5. ABC is a continuous beam with constant EI throughout its length. The end supports A and C are fixed and beam is continuous over middle support B. Span BC is uniformly loaded with 8kN per metre length, while a concentrated vertical load of 80kN acts at the mid span AB. Calculate the moments by slope deflection method. 14M

OR

6. ABC is a continuous beam with constant EI throughout its length. The end supports A and C are fixed and beam is continuous over middle support B. Span BC is uniformly loaded with 14kN per metre length, while a concentrated vertical load of 140kN acts at the mid span AB. Calculate the moments by Moment distribution method. 14M

UNIT–IV

7. A uniformly distributed live load of 60kN/m of length 5m moves on a girder of span 60m. Find the maximum positive and negative shear force at a section 6m from the left end. 14M

OR

8. a) Draw the influence line diagram for a bending moment at any section of a simply supported beam. 7M

   b) A uniformly distributed load of 50kN/m and of length 4m transverse across the span of simply supported length of 18m. Compute the maximum bending moment at 5m from left support and absolute bending moment. 7M

UNIT–V

9. a) How will you obtain degree of static determinacy? Explain. 7M

   b) What are the uses of influence line diagrams? 7M

OR

10. Derive the influence diagram for reactions and bending moment at any section of a simply supported beam. Using the ILD, determine the support reactions and find bending moment at 5m, 6m and 7m for a simply supported beam of span 12m subjected to three point loads of 25kN, 35kN and 5kN placed at 1.5m, 4.5m and 6.5m respectively. 14M

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Hall Ticket Number :										

R-15

Code: 5G641

II B.Tech. II Semester Supplementary Examinations October 2020

Strength of Materials-II

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. The Maximum allowable stresses in a cylinder of 500 mm inner diameter and 100 mm thickness is 12.6MPa.Determine the maximum allowable internal & external pressure on the cylinder, when applied separately.

OR

2. Derive the Lame's equations for thick cylindrical shells with necessary assumptions.

UNIT–II

3. Derive the expression for equivalent torque when shaft is subjected to combined bending & torsion

OR

4. A closely coiled helical spring of round steel wire 8 mm in diameter having 10 complete turns with a mean diameter of 10cm is subjected to an axial load of 250N. Determine (**i**) the deflection of the spring (**ii**) maximum shear stress in the wire and (**iii**) stiffness of the spring. Take C= 8×10^4 N/mm^2.

UNIT–III

5. Calculate the Euler's critical load for a strut of T-section, the flange width being 10cm, overall depth 8cm and both flange and stem 1cm thick. The strut is 3m long and is built in at both ends. Take E= $2x10^5$ N/mm^2.

OR

6. A hollow cylindrical cast iron column is 4m long with both ends fixed. Determine the minimum diameter of the column if it has to carry a safe load of 250KN with a factor of safety of 5. Take the internal diameter as 0.8 times the external diameter. Take Crushing stress = 550 N/mm^2 and value of a = 1/1600 Rankine's formula.

UNIT–IV

7. A short cast iron column is of hollow section of uniform thickness, the external diameter being 250mm and the internal diameter 150mm. A vertical compressive load acts at an eccentricity of 50mm from the axis of the column. If the maximum permissible stress is 90N/mm2 in compression, calculate the greatest allowable load?

OR

8. a) Define core of a section. Find the core of rectangular and circular sections?

   b) How will you find the maximum and minimum stresses at the base of a symmetrical column, when it is subjected to load which is eccentric to both axis?

UNIT–V

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

OR

10. a) How do you determine the total deflection and angle of deflection when a beam is subjected to Unsymmetrical bending?

    b) Describe the Mohr's Circle method to locate the principal axis and determine the principal moment of Inertia of the section.

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Hall Ticket Number :										

R-15

Code: 5G642

II B.Tech. II Semester Supplementary Examinations October 2020

Hudraulics and Hydraulic Machinery

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) What are the characteristics of boundary layer formation aver a flat plate? 7M

   b) What do you mean by boundary layer separation? How will you prevent the boundary layer separation? 7M

OR

2. a) Find the ratios of displacement thickness to momentum thickness and momentum thickness to energy thickness for the velocity distribution in the boundary layer given by $(v/V)=(3/2)\eta-(1/2)\eta^2$, in which $\eta=(y/\delta)$. Compute (δ^*/δ) and (θ/δ). 7M

   b) Obtain Vonkarman momentum integral equation. 7M

UNIT–II

3. a) Derive an expression for the discharge through a channel by Chezy's formula. 7M

   b) Find the velocity of flow and rate of flow of water through a rectangular channel of 6 m wide and 3 m deep, when it is running full. The channel is having bed slope as 1 in 2000.Take Chezy's constant C = 55. 7M

OR

4. a) Define Hydraulic jump and specific energy and draw the specific energy diagram. 7M

   b) The discharge of water through a rectangular channel of width 8 m, is 15 m^3/s when depth of flow of water is 1.2 m. Calculate:
      i) Specific energy of the flowing water,
      ii) Critical depth and critical velocity,
      iii) Value of minimum specific energy. 7M

UNIT–III

5. a) Show that the force exerted by a jet of water on an inclined fixed plate in the direction of the jet is given by, $F_x = \rho a V^2 \sin^2\theta$. 7M

   b) A jet of water of diameter 75 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that angle between the jet and plate is 60^0. Find the force exerted by the jet on the plate.
      i) in the direction normal to the plate, ii) in the direction of the jet. 7M

OR

6. a) Show that the force exerted by a jet of water on the vertical plate moving in the direction of jet is given by , $F_x = \rho a (v-u)^2$. 7M

   b) A jet of water of diameter 10 cm strikes a flat plate normally with a velocity of 15 m/s. The plate is moving with a velocity of 6 m/s in the direction of the jet and away from the jet. Find: i) the force exerted by the jet on the plate, ii) work done by the jet on the plate per second. 7M

UNIT–IV

7. a) Obtain an expression for the work done by water on the runner of a Pelton wheel. Hence, derive an expression for maximum efficiency of the Pelton wheel. 7M

   b) A Pelton wheel has mean bucket speed of 10m/sec with a jet of water flowing at the rate of 70lit/sec under a head of 30m. The bucket deflects the jet through an angle of 1600. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Co-efficient of velocity as 0.98 7M

OR

8. a) Derive the expression for specific speed and unit speed. 7M

   b) A turbine is operated under a head of 25m at 200rpm. The discharge is 9 m^3/sec. if the efficiency is 90%, Determine the performance of the turbine under a head of 20m. 7M

UNIT–V

9. a) Explain about the operating characteristics of centrifugal pump. 7M

   b) A centrifugal pump is to discharge 0.118m3/sec at a speed of 1450rpm against a head of 25m. The impeller diameter is 25mm, its width at outlet is 50mm and at outer manometric efficiency is 75%. Determine the vane angle at outer periphery of the impeller. 7M

OR

10. a) Explain how hydropower plants are classified. 7M

    b) Define the terms load factor, utilization factor and capacity factor. 7M

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