Code: 1GC42

II B.Tech. II Semester Supplementary Examinations May 2019
Probability & Stastics
(Common to CE, ME & IT)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)
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1. a) Find the mean, median and mode for the following distribution.

x	15	20	25	30	35	40	45	50	55
y	2	22	19	14	3	4	6	1	1

6M

   b) Find the rank correlation coefficient for the following data

x	5	2	8	1	4	6	3	7
y	4	5	7	3	2	8	1	6

8M

2. a) Box A contain 5 red and 3 white marbles and box B contains 2 red and 6 white marbles. If marble is drawn from each box, what is the probability that they are both of same colour.   7M

   b) State and prove Baye's theorem.   7M

3. a) A random variable X has the following probability distribution

X	1	2	3	4	5	6	7	8
P(X)	K	2K	3K	4K	5K	6K	7K	8K

   Find K and $P(2 \leq X \leq 5)$.   7M

   b) If a random variable has the probability density function

$$f(x) = \begin{cases} k(x^2 - 1), & -1 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases} \quad \text{find } k \text{ and } P\left(\frac{1}{2} \leq x \leq \frac{5}{2}\right).$$

7M

4. a) If a Poisson distribution is such that $P(X = 1).\frac{3}{2} = P(X = 3)$, find $P(X \geq 1)$ and $P(X \leq 3)$.   7M

   b) In a Normal Distribution, 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution.   7M

5. A population consists of five numbers 2, 3, 6, 8, 11. Consider all samples of size two which can be drawn without replacement from this population.
    Find   (a) Population mean
           (b) Population Standard deviation
           (c) Mean of the sampling distribution of means
           (d) Standard deviation of the sampling distribution of means.   14M

6. a) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence?   7M

   b) A sample of 11 rats from a central population had an average blood viscosity of 3.92 with a standard deviation of 0.61. Estimate the 95% confidence limits for the mean blood viscosity of the population.   7M

7. a) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance. 7M

   b) An average breaking strength of steel rods is specified to be 18.5 thousand pounds. To test this sample of 14 rods were tested. The mean and standard deviations obtained were 17.85 and 1.955 respectively. Is the result of experiment significant? 7M

8. From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees.

	Employees		
Soft Drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

14M

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Strength of Materials-II
(Civil Engineering)

Max. Marks: 70   Time: 3 Hours

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1. A closed cylindrical vessel made of steel plates 5 mm thick with plate ends, carries fluid under pressure of 6 N/mm2.The diameter of the cylinder is 35 cm and length is 85 cm. Calculate the longitudinal and hoop stress in the cylinder wall and determine the change in diameter, length and Volume of the cylinder. Take E=2x10^5 N/mm2 and 1/m=0.3

2. a) Derive Lame's equations to find out the stresses in a thick cylindrical shell.

    b) A hollow cylinder has an external diameter of 250 mm and thickness of the wall is 50 mm. The cylinder is subjected to an internal fluid pressure = 35Mpa and external pressure =3.5Mpa. Calculate the maximum and minimum circumferential stresses and plot the variation of the same across the wall thickness.

3. A hollow steel shaft of external diameter equal to twice the internal diameter, 5 m long is to transmit 160 KW of power at 120r.p.m. The total angle of twist is not to exceed 2 degree in this length and the allowable shear stress is 50 N/mm2. Calculate diameter of the shaft.

4. A laminated steel spring simply supported at ends with span of 0.75 m is centrally loaded with a load of 10KN.The central deflection under the above load is not to exceed 50 mm and the maximum stresses is to be 400Mpa, determine; (i) width of plate (ii) thickness of plate (iii) number of plates (iv) the radius to which plates should be that the spring become straight under the given 7.5 KN load. Assume width = 12xthickness and W =200Gpa.

5. a) Derive an expression for crippling load when one end of the column is fixed and the other end is free.

    b) Calculate the Euler's critical load for a strut of T-section. The flange width being 10 cm, overall depth 8 cm and both flange and stem 1 cm thick, the strut is 3 m long and is built in at both ends. Take E=2x10^5 N/mm2.

6. A load of 75 KN is carried by a column made of cast iron. The external and internal diameters are 200 mm and 180 mm respectively. If the eccentricity of the load is 35 mm, find the max & min stress intensities

7. Find the centroidal principal moments of inertia of a equal angle section 30 x 30 x 8 mm

8. Find the bending moment at mid span of the semicircular beam of diameter 9 m loaded at the mid span with a concentrated load of 60 KN. The beam is fixed at both supports. Find the maximum bending moment and maximum torque in the beam

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