

Code: 20BS1301

**II B.Tech - I Semester – Regular Examinations - FEBRUARY 2022****NUMERICAL AND STATISTICAL METHODS****(Common for CIVIL, ME)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.  
2. All parts of Question must be answered in one place.

**UNIT – I**

1. a) Find a real root of the equation  $x^3 - 4x - 9 = 0$  7 M  
correct to three decimal places by using the method of false position.
- b) Find the value of  $f(2.5)$  from the following table by 7 M  
using Newton's forward interpolation formula.

x	0	1	2	3	4
f(x)	1	2	1	10	16

OR

2. a) Find a real root of the equation  $x \log_{10} x = 1.2$  correct 7 M  
to three decimal places by using Newton – Raphson's method.
- b) Find the value of  $f(8)$  from the following table. 7 M

x	5	6	9	11
f(x)	12	13	14	16

**UNIT – II**

3. a) Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at  $x = 1$  from the following table. 7 M

x	0	1	2	3	4	5
y	4	8	15	7	6	2

- b) Find an approximate value of  $y(0.2)$  correct to three decimal places by using Euler's method, given that  $\frac{dy}{dx} = x^2 + y^2$ ,  $y(0) = 1$ , choose step length  $h = 0.1$ . 7 M

OR

4. a) Evaluate the integral  $\int_0^6 \frac{e^x}{1+x} dx$  by using Simpson's  $\frac{1}{3}$  rule. Take  $h = 1$ . 7 M

- b) Find an approximate value of  $y(0.2)$  correct to three decimal places by using Runge – Kutta method of fourth order, given that

$$\frac{dy}{dx} = x + y, y(0) = 1.$$

### UNIT-III

5. a) A random variable  $X$  has the following probability distribution. 7 M

X	-2	-1	0	1	2	3
P(X)	0.1	k	0.2	2k	0.3	k

Find (i) k (ii) Mean and (iii) Variance of the distribution.

- b) If  $X$  is a normal variate with mean 30 and standard deviation 5, then find the probabilities of (i)  $26 \leq X \leq 40$  and (ii)  $X \geq 45$ . 7 M

OR

6. a) For a continuous probability density function 7 M

$$f(x) = \begin{cases} k(1 - x^2), & \text{if } 0 < x < 1 \\ 0, & \text{otherwise.} \end{cases}$$

Find (i) k (ii) Mean and (iii) Variance of the distribution .

- b) 20% items produced from a factory are defective. Find 7 M  
the probability that in a sample of 5 chosen at random  
(i) none is defective,  
(ii) one is defective, and  
(iii)  $P(1 < X < 4)$ .

#### UNIT – IV

7. a) It is claimed that a random sample of 49 tyres has a 7 M  
mean life of 15200 km. This sample was drawn from a  
population whose mean is 15150 kms and a standard  
deviation of 1200 km. Test the significance at 0.05  
level.
- b) A social worker believes that fewer than 25% of the 7 M  
couples in a certain area have ever used any form of  
birth control. A random sample of 120 couples was  
contacted, 20 of them said that they have used. Test the  
belief of the social worker at 0.05 level of significance.

OR

8. a) A sample of 400 items is taken from a population 7 M  
whose standard deviation is 10. The mean of the  
sample is 40. Test whether the sample has come from a  
population with mean 38. Also, calculate 95%  
confidence interval for the population.
- b) In two large populations, there are 30% and 25% 7 M  
respectively of fair haired people. Is this difference  
likely to be hidden in samples of 1200 and 900  
respectively from the two populations?

#### UNIT – V

9. a) A sample of 26 bulbs gives a mean life of 990 hours 7 M  
with standard deviation of 20 hours. The manufacture

claims that the mean life of bulbs is 1000 hours. Is the sample up to the standard or not? (Take 0.05 level of significance)

- b) In one sample of 8 observations from a normal population, the sum of the squares of deviations of the sample values from the sample mean is 84.4 and in another sample of 10 observations it was 102.6. Test at 5% level whether the populations have the same variance. 7 M

OR

10. a) The average breaking strength of the 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? 7 M
- b) Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results. 7 M

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	--

Test whether the two horses have the same running capacity. (Take 0.05 level of significance)