PVP 20

Code: 20BS1301

II B.Tech - I Semester – Regular / Supplementary Examinations
DECEMBER - 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.

<table>
<tr><th></th><th></th><th></th><th>BL</th><th>CO</th><th>Max. Marks</th></tr>
<tr><td colspan="6">UNIT-I</td></tr>
<tr><td rowspan="2">1</td><td>a)</td><td>Find a real root of the equation $x \log_{10} x = 1.2$ by regula falsi method correct to three decimal places.</td><td>L3</td><td>CO2</td><td>7 M</td></tr>
<tr><td>b)</td><td>From the following table, estimate the number of students who obtained marks between 40 and 45.
<table>
<tr><td>Marks</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td></tr>
<tr><td>No. of Students</td><td>31</td><td>42</td><td>51</td><td>35</td><td>31</td></tr>
</table></td><td>L4</td><td>CO4</td><td>7 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">2</td><td>a)</td><td>Apply Newton-Raphson's method, find a real root of the equation $3x = \cos x + 1$ correct to two decimal places.</td><td>L3</td><td>CO2</td><td>7 M</td></tr>
<tr><td>b)</td><td>Estimate f(3) for the following data:
<table>
<tr><td>x:</td><td>0</td><td>1</td><td>2</td><td>5</td></tr>
<tr><td>f(x):</td><td>2</td><td>3</td><td>12</td><td>147</td></tr>
</table></td><td>L4</td><td>CO4</td><td>7 M</td></tr>
</table>

UNIT-II

3	a)	Find the first and second derivatives of the function tabulated below, at the point x=1 x: 1 | 1.2 | 1.4 | 1.6 | 1.8 | 2 y: 0 | 0.128 | 0.544 | 1.296 | 2.432 | 4	L3	CO2	7 M
	b)	Estimate the value of y at x=0.2, by using modified Euler's method given that $\frac{dy}{dx} = y + e^x, \quad y(0) = 0.$	L4	CO4	7 M
		OR			
4	a)	Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx} = x + y$ with y(0)=1 at x=0.2 .	L3	CO2	7 M
	b)	Evaluate the integral $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $3/8$ rule.	L4	CO4	7 M
		UNIT-III			
5	a)	The probability density function of a random variate X is X: 0 | 1 | 2 | 3 | 4 | 5 | 6 P(X): k | 3k | 5k | 7k | 9k | 11k | 13k (i) Find the value k, (ii) Find $P(X < 4), \quad P(X \geq 5), \quad P(3 < X \leq 6).$	L3	CO3	7 M
	b)	In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10, use Poisson distribution to calculate the approximate number of packets containing no defective, one defective blades respectively in a consignment of 10,000 packets.	L4	CO5	7 M

		OR			
6	a)	Let X is a continuous random variable with probability density function given by $f(x) = kx \quad (0 \le x < 2)$ $= 2k \quad (2 \le x < 4)$ $= -kx + 6k \quad (4 \le x < 6).$ Find k and mean, variance of X.	L3	CO3	7 M
	b)	In a normal distribution 31% of the item are under 45 and 8% are over 64. Find mean and standard deviation of the distribution.	L4	CO5	7 M
		UNIT-IV			
7	a)	A sample of 900 members is found to have a mean of 3.4*cm*. Can it be reasonably regarded as a truly random sample from a large population with mean 3.25*cm* and S.D. 1.61*cm*?	L3	CO3	7 M
	b)	A sample of height of 6400 soldiers has a mean of 67.85 inches and standard deviation of 2.56 inches while a simple sample of heights of 1600 sailors has a mean of 68.55 inches and a standard deviation of 2.52 inches. Do the data indicate that the sailors are on the average taller than soldiers?	L4	CO5	7 M
		OR			
8	a)	A sample of 400 items is taken from a population whose standard deviation is 10.The mean of sample is 40.Test whether the sample has come from a population with mean 38 also calculate 95% confidence interval for the population.	L3	CO3	7 M
	b)	Random sample of 400 men and 600 women were asked whether they would like to have	L4	CO5	7 M

		flyover near their residence 200 men and 325 women were in flyover of proposal. Test the hypothesis that the proportion of men and women in flyover of proposal are same at 5% level.			
		UNIT-V			
9	a)	A machinist is making engine parts with axle diameter of 0.7inch. A random sample of 10 parts shows mean diameter 0.742 inch with a standard deviation 0.04 inch. On the basis of this sample, would you say that the work is inferior?	L3	CO3	7 M
	b)	The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level.	L4	CO5	7 M
		OR			
10	a)	Two horses A and B were tested according to the time(in seconds) to run a particular race with the following results: HorseA: 28 30 32 33 33 29 34 HorseB: 29 30 30 24 27 29 ----- Test whether you can discriminate between two horses at the means 0.05 level?	L3	CO3	7 M
	b)	Two samples of sizes 9 and 8 give the sum of squares of deviations from their respective means equal to 160 inches^2 and 91 inches^2 respectively. Can these be regarded as drawn from the same normal population?	L4	CO5	7 M