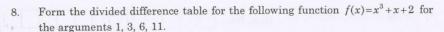
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	Reg. No. :						
19	Question Paper Code: 90820						
	B.E/B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.						
	Fourth Semester						
	Automobile Engineering						
	MA 8452 — STATISTICS AND NUMERICAL METHODS						
	(Common to Mechanical Engineering/Mechatronics Engineering/Production Engineering/Robotics and Automation)						
	(Regulations 2017)						
	Time: Three hours Maximum: 100 marks						
	 Use the method of testing of hypothesis for solving practical problems. 						
W	3. Use different numerical methods for solving system of linear and nonlinear equations. 4. Able to use interpolation, numerical differentiation and integration for real life problems.						
	 Able to apply different methods to arrive numerical solutions for ODE, of dynamical systems. 						
	Answer ALL questions.						
	PART A — $(10 \times 2 = 20 \text{ marks})$						
	 Explain the critical region and acceptance region in testing of hypothesis. 						
-	2. What is the condition for a large and small samples in testing of hypothesis?						
	3. What is an extraneous variable in the design of experiments?						
	4. Construct the ANOVA table for two way classification.						
	5. Write down iterative formula for finding the value of $\frac{1}{N}$ using Newton's method.						
	6. How do you obtain the solution of a given simultaneous equations by using Gauss elimination method?						
	7. Write down the Newton's forward and backward interpolation formulae for equal intervals.						

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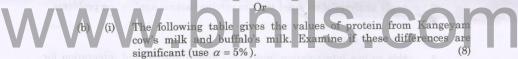


- 9. Find y(0.1) by Euler's method, given that y'+y=0 with y(0)=1.
- 10. Write down the Milne's predictor and corrector formulae to solve first order ordinary differential equations numerically.

PART B —
$$(5 \times 16 = 80 \text{ marks})$$

- 11. (a) (i) A sample of heights of 6400 Englishmen has a mean of 67.85 inches and a S.D of 2.56 inches, while a sample of heights of 1600 Australians has a mean of 68.55 inches and a S.D of 2.52 inches. Do the data indicate that Australians are on the average taller than Englishmen (use $\alpha = 5\%$)
 - (ii) Time taken by workers in performing a job are given below Method I: 18 13 12 15 12 14 16 14 15 Method II: 16 19 13 16 18 13 15

Do the estimates of the population variance differ significantly at 5% level. (8)



Cow's milk: 1.90 1.95 2.00 2.02 1.85 1.80 Buffalo's milk: 2.12 2.00 2.20 2.45 2.20 2.10

- (ii) A sample analysis of examination results of 1000 students were made and it was found that 260 failed, 110 first class, 420 second class and rest obtained third class. By applying Chi square test whether the general examination result is in the ratio 2:1:4:3 (use $\alpha=5\%$).
- 12. (a) A company appoints 4 salesmen A B, C, D and observed their sales in 3 seasons namely summer, winter and monsoon. The figures (in Iakhs of Rupees) are given in the following table (16)

Salesman D B C 41 39 Seasons Summer 38 40 36 49 Winter 45 42 Monsoon 40 38 42 42

Perform the two-way analysis of variance at 5% level of significance.

Or

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37 Analyze the variance in the Latin square of yields (in Kgs) of paddy (b) where A, B, C and D denote the different methods of cultivation. (16) A 18 C 21 D 25 B 11 D 22 B 12 A 15 C 19 B 15 A 20 C 23 D 24 C 22 D 21 B 10 A 17 Examine whether the different methods of cultivation have given significantly different yields (use $\alpha = 5\%$). Find a root of $x \log_{10} x = 1.2$ correct to two decimal places by using 13. (a) Newton-Raphson method Solve by Gauss elimination method, for the given system of equations 3x+4y+5z=182x - y + 8z = 13(8)5x - 2y + 7z = 20Or Solve the following system of equations by using Gauss seidel (b) (i) method upto 5 iterations 10x - 5y - 2z = 34x-10y+3z = -3-6y + 10z = -3and the largest eigenvalue and the corresponding eigenvector for 1 1 3 the given matrix $A = \begin{bmatrix} 1 & 5 & 1 \end{bmatrix}$ by using power method. Assume 3 1 1 (8)initial vector is Fit a Lagrangian interpolation polynomial y=f(x) and hence (a) (i) evaluate f(2) for the following data 0 1 3 4 y=f(x): -12 0 6 12 Find f(6) for the following data using Newton's divided difference formula 0 1 2 4 5 f(x): 0 0 -12 0 600 7308 Or 3 90820

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(b)	(i)	Find the	e va	lue of sin	38° using	Newton's	interpolation formula	(8)
		xº	0	10	20	30	40	
		$\sin x$:	0	0.17365	0.34202	0.50000	0.64279	

(ii) Evaluate
$$\int_{0.5}^{0.7} [\sqrt{x} e^{-x}] dx$$
 by taking 5 ordinates using Simpson's 1/3 rule. (8)

15. (a) Using Runge – Kutta method of fourth order solve
$$\frac{dy}{dx} = x^2 + y^2$$
 given that $y(0)=1$, and find $y(0.1)$ and $y(0.2)$ by taking $h=0.1$. (16)

Or

(b) Solve $\frac{dy}{dx} = x(x^2 + y^2)e^{-x}$ by using Milne's method at x = 0.4 given that y(0) = 1. The values of y at x = 0.1, 0.2 and 0.3 are to be computed by using Taylor's series methods. (16)

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