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Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **ET254U - Computer Oriented Numerical Methods**

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Maximum Marks : **60**   Duration : **3 Hrs**

Edit   Print   View Answer Key   Close   **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. *All questions are compulsory.*
2. *Illustrate your answer with suitable figures/sketches wherever necessary.*
3. *Assume suitable additional data; if required.*
4. *Use of logarithmic table, drawing instruments and non programmable calculators is allowed.*
5. *Figures to the right indicate full marks.*

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1) Solve all the questins.

a) Find by iterative method, the real root of the equation $x^3 + 2x^2 + x - 1 = 0$.   [04]

b) Find x, y, z by using Cramer's rule   [05]
$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 2,\ \frac{1}{x} - \frac{2}{y} + \frac{1}{z} = 3, \frac{2}{x} - \frac{1}{y} + \frac{3}{z} = -1.$

c) Fit a straight line of the form y = a+bx to the following data by the method of group averages: [05]

x: 0   5   10   15   20   25
y: 12 15   17   22   24   30

2) Solve any three questions.

a) By using Newton-Raphson method , find the root of $x - \cos x$,correct to three decimal places.   [04]

b) Police plan to enforce speed limits by using radar traps at 4 different locations within the city   [04]
limits. The radar traps at each of these locations L1,L2,L3,L4 are operated for 40%,30%,20% and 30%
of the time. If a person who is speeding on his way to work has probabilities of 0.2,0.1, 0.5 and 0.2
respectively of passing through these locations. What is the probability that he will fined(for over speed)?

c) The following data are taken from the steam table: [04]
Temperature: ^{0}C : 140   150   160   170   180
Pressure kgf/ cm^2: 3.685   4.854   6.302   8.076   10.225
Find the pressure at temperature t = 175^0 C.

d) Find the first derivative of y at x = 15 from the table: [04]
x: 15   17   19   21   23   25
y: 3.873   4.123   4. 359   4.583   4.796   5.000

3) Solve any three questions.

a) In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60%   [04]
of the student body. If a student is selected at random and is found to be studying maths,find the probability
that the student is girl ?

b) Find the solution y(0.1) of the initial value problem $\frac{dy}{dx} = -2xy^2$ given y(0)=1 with h = 0.1,   [04]
using Taylor's series method.

c) Find the value of x when y = 0.3 by Lagrange's inversion formula   [04]
x: 0.4   0.6   0.8
y: 0.3683   0.3332   0.2897

d) Fit a second degree parabola y = a + bx + cx^2 [04]
x: 1   3   4   6
y: 0.63   2.05   4.08   10.76

4) Solve any three questions.

a) Find the mean and standard deviation of sampling distribution of variances (S.D.V.) for   [04]
the popuulation 2,3,4,5 by drawing samples of size two with replacement.

b) Using Runge -Kutta fourth order method, find y for x = 0.1, given that $\frac{dy}{dx} = xy + y^2$, y(0)=1.   [04]

c) Find the value of f(41) by applying Gauss forward formula from the following data: [04]
x: 30   35   40   45   50
f(x): 3678.2 2995.1   2400.1   1876.2   1416.3

d) Solve the equation 3x + y + 2z = 3, 2x - 3y - z= - 3, x + 2y + z = 4 by matrix method,   [04]

5) Solve any two questions.

a) By Gauss elimination method, solve   [05]
5x - y - 2z = 142, x - 3y - z = - 30, 2x - y - 3z = -50 .

b) Use the method of moments to fit the straight line y = a + bx to the data: [05]
x: 1   2   3   4
y: 0.17   0.18   0.23   0.32

c) Solve the differential equation using Euler's modified formula, given $\frac{dy}{dx} = \log\left(x + y\right),$ [05]
y(0)=1, h = 0.1. Find y(0.2).

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