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B.Tech
PEI5H001

5th Semester Regular / Back Examination 2018-19
NUMERICAL METHODS
BRANCH : AEIE, EIE, IEE
Time : 3 Hours
Max Marks : 100
Q.CODE : E220
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1   **Short Answer Type Questions (Answer All-10)**   **(2 x 10)**
  a) What is the rate of convergence of fixed point iteration to solve two nonlinear equations?
  b) Define relative error and percentage error.
  c) Explain the Gauss Quadrature formula.
  d) What is a multistep method?
  e) If 0.8333 is taken be an approximate value of 5/6then find percentage error?
  f) Write the advantages of newton divided difference method over langrage's method.
  g) Find $\Delta^{10}(1+x)(1+2x^2)(1+3x^3)(1+4x^4)$ using $h=1$.
  h) Using Trapezoidal rule, taking n=2,find the value of $\int_1^3 \frac{dx}{x^3}$.
  i) State the condition of the convergences for solving linear system of equation by Gauss-Seidel method.
  j) What is the difference between LU decomposition method and Gauss Jacobi method?

Part- II

Q2   **Focused-Short Answer Type Questions- (Answer Any EIGHT out of TWELVE)**   **(6 x 8)**
  a) Find the real root of the equation x.e^x = 2 correct to three decimal place by using Newton Raphson Method.
  b) Solve the equation x^3+x^2-1=0 and find a positive root by method of iterations.
  c) Solve the following system of equation by using LU decomposition method.
    x +y+3z=6
    x +3y +z=8
    2x+y+z=5
  d) Find a cubic polynomial by using any suitable interpolation formula, which takes these following values.

x	0	1	2	3
F(x)	1	2	1	10

  e) Evaluate $\int_0^{\pi/2} \sin x dx$ by Gaussian two-point formula.

f) From the following data estimate number of persons earning weekly wages between 60 and 70 rupees, by using any suitable interpolation formulae.

Wages in Rs. :	0-40	40-60	60-80	80-100	100-120
No. of Persons :	250	120	100	70	50

g) Find an approximate value of $\log_e 5$ by calculating four decimal places by Simpsons 1/3rd rule $\int_0^5 \frac{dx}{4x+5}$ dividing the range into 10 equal parts and compare it with by Trapezoidal rule.

h) Apply Runge-Kutta method to find approximate value of y for x=0.2 in steps of 0.1 if $\frac{dy}{dx} = x + y^2$ given that y=1 when x=0.

i) Given that $\log_{10} 654 = 2.8156$, $\log_{10} 658 = 2.8182$, $\log_{10} 659 = 2.8189$, $\log_{10} 661 = 2.8202$, find by using Lagrange's formula the value of $\log_{10} 656$.

j) Find a cubic spline approximation for the function defined by following values.

x	0	1	2	3
Y=F(x)	1	2	33	244

k) Find the function f(x) from the following table using Newton's divided difference formula

x	0	1	2	3	4	5
Y=F(x)	3	5	8	10	13	16

l) Using Shooting method, solve $y'' - yy' = e^x$, with boundary conditions y(0)=1 and y(1)=-1.

Part-III

Long Answer Type Questions (Answer Any Two out of Four)

Q3 Apply Newton-Raphsonmethod to determine a root of the equation f(x)=cosx – xe^x=0 and also so that Newton Raphson method has second order convergence. **(16)**

Q4 Solve by using Gauss-Jacobi method and Gauss Seidel method correct to 5 decimal places and compare which method is better: **(16)**
10x+y+z=1
x+10y+z=1
x +y+10z=1

Q5 Use Euler's method and Modified Euler's method with one step to find the value of y at x = 0.1 to five significant figures, where $\frac{dy}{dx} = x^2 + y$ and y=0.94 when x=0. **(16)**

Q6 Use Adams Predictor –corrector method to estimate y(0.4) for the given y = 1 at x=0 and $\frac{dy}{dx} = xy + y^2$. **(16)**