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B.E. IT SEM-IV **YEAR 2019**

ASSIGNMENT -2

SUBJECT & SUBJECT CODE: Statistical and Numerical Technique (MA244)

POINT TO REMEMBER:

BEFORE STARTING THE CALCULTION FOR THE SOLUTION OF EQUATION INVOLVING TRIGONOMETRIC FUNCTION MODE OF CALCALUTOR MUST BE IN RADIAN.

CHAPTERS INCLUDED

- **NUMERICAL SOLUTION OF NON-LINEAR EQUATIONS.**
- **SOLUTION OF LINEAR SYSTEM.**
- **NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS.**
- **NUMERICAL INTEGRATION.**

CHAPTER: NUMERICAL SOLUTION OF NON-LINEAR EQUATIONS.

BISECTION METHOD

1. Use bisection method of find a root of the equation $x^3+4x^2-10=0$ in the interval at [1 2].Find the relative percentage error at each iteration. Use four iterations.
2. Find the negative root $x^3-7x+3=0$ of by bisection method up to three decimal places.

FALSE POSITION METHOD

3. Find a real root of the equation $xe^x=\cos x$ using Regula–Falsi method, correct to three decimal places**.**

NEWTON RAPHSON METHOD OR NR METHOD

4. Find $(701)^{\frac{1}{3}}$ correct up to 3 decimal places by Newton Raphson Method.
5. Find a real root of the equation $x^3+x-1=0$ correct up to six places of decimals.
6. Find a zero of the function $f(x)=x^3-\cos x$, with starting point $x_0=1$, by Newton Raphson Method. **Could $x_0=0$ be used for this problem?**

CHAPTER: SOLUTION OF LINEAR SYSTEM.

GAUSS JORDAN METHOD

Solve the following system of equation using Gauss Jordan Method

7. $3x-2y+5z=2$ **(ans x=-13/4, 41/6,61/12)**
   $4x+y+2z=4$

$2x - y + 4z = 7$

8. $2x - 6y + 8z = 24$ **(Ans x= 1, 3 ,5)**

   $5x + 4y - 3z = 2$

   $3x + y + 2z = 16$

GAUSS SEIDEL METHOD

Solve the following system of equation using Gauss Seidel Method

9. $25x + 2y - 3z = 48$

   $3x + 27y - 2z = 56$

   $x + 2y + 23z = 52$ Starting with (1, 1,0) **(Ans x=2, y=2,z=2)**

10. $3x - 0.1y - 0.2z = 7.85$

    $0.1x + 7y - 0.3z = -19.3$

    $0.3x - 0.2y + 10z = 71.4$ **(Ans x=3, y=-2.5,z=7)**

CHAPTER: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS.

RUNGE KUTTA METHOD 4th ORDER

11. Apply the Ruge Kutta method of fourth order to find an approximate value of y at x=0.6

    $\frac{dy}{dx} = \sqrt{x+y}, y(0.4) = 0.41$ in two step. **(Ans 0.5052, 0.6104)**

EULER MODIFIED METHOD

12. Use Euler's modified method to find the value of y satisfying the equation $\frac{dy}{dx} = \log(x+y)$, for x=1.2 and x=1.4 correct up to four decimal places by taking h =0.2 .Given that y(1)=2. **(Ans 2.2332, 2.4924)**

13. Using Euler's modified method, solve $\frac{dy}{dx} = 1 - y$ with the initial condition y(0)=0 at x=0.1,0.2**.(Ans 0.0952,0.1814)**

TAYLOR'S SERIES METHOD

14. Use the Taylor's series method to solve $\frac{dy}{dx} = x^2 y - 1$, y(0)=1.Also find y(0.03) **(Remark step size i.e., h is not given so select h according to initial and final value of x or apply the formula $h = \frac{x - x_0}{n}$; where n is number of sub interval) (ANS 0.970009)**

15. Using the Taylors series method ,find y(1.1) correct up to four decimal places given that $\frac{dy}{dx} = xy^{\frac{1}{3}}$, y(1)=1,h=0.1 , **(Ans 1.1068)**

CHAPTER: NUMERICAL INTEGRATION.

TRAPEZOIDAL RULE , SIMPSON 1/3RD RULE, SIMPSON 3/8TH RULE

16. A rocket is launched from the ground .Its acceleration is registered during the first 80 seconds and is given as follows:

T(s)	0	10	20	30	40	50	60	70	80

a(m/s^2)	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

By Simpson's 1/3rd, find the velocity at t=80 s**.(Ans 3086.1)**

17. Evaluate the integral $\int_0^5 \frac{1}{4x+5}dx$ by Simpson's 1/3rd rule with taking 10equal parts. Hence ,find the approximate value of $\log_e 5$**.(Ans 0.4026, 1.6104)**
18. Evaluate the integral $\int_0^{\frac{\pi}{2}} \sqrt{1-\frac{1}{2}\sin^2 t}\,dt$ by Simpson's 1/3rd rule with taking 6 sub-interval**.(Ans 1.3496)**
19. Given data below , find the isothermal work done on the gas if it is compressed from $v_1 = 22\ L \quad to\, v_2 = 2L$ .Use $W = -\int_{v_1}^{v_2} p\,dv$ using Trapezoidal rule. **(Ans 68.17)**

v, L	2	7	12	17	22
P, atm	12.20	3.49	2.049	1.44	1.11