35538/E380/42538

Reg. No. | | | | | | | | |

V Semester B.Sc 3/4 Degree Examination, Nov./Dec. - 2019
MATHEMATICS (Optional)
(Regular)
Paper : II - Numerical Analysis

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates:

1. **Answer all questions.**
2. **Students are allowed to use scientific calculators.**

PART - A

1. Answer any **TEN** of the following questions: **(10×2=20)**

a) Find the real root of $x^3 - 7x + 5 = 0$ in [2, 3] by bisection method in two stages.

b) Explain briefly Iteration method to find the real root of $f(x) = 0$.

c) With usual notation, Prove that $\Delta = E - S$.

d) If $u_0 = 3, u_1 = 12, u_2 = 81, u_3 = 200, u_4 = 100, u_5 = 8$ find $\Delta^5 u_0$.

e) Evaluate $\Delta^{10}(1-ax)(1-bx^2)(1-cx^3)(1-dx^4)$ where h=1.

f) Write the formula to find the first derivative using forward difference.

g) State Trapezoidal rule to evaluate $\int_a^b f(x)dx$.

h) From the Taylor's series for $y(x)$, find 'y' at x = 0.2. If $y(x)$ satisfies $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0$.

i) Explain Euler's method to solve $\frac{dy}{dx} = f(xy)$ with intial condition $y(x_0) = y_0$.

j) Find the order and degree of the differential equation $y_{n+3} - 8y_{n+1} - 15y_n = 5x - 2$.

k) From the differential equation eliminating a and b from the relation $y_n = a.2^n + b(-2)^n$.

l) Write the formula for second order Runge-kutta method.

P.T.O.

PART - B

Answer any **FOUR** of the following: **(4×5=20)**

2. Explain the Gauss-Seidal method to solve the equations $a_1x+b_1y+c_1z=d_1$, $a_2x+b_2y+c_2z=d_2$, $a_3x+b_3y+c_3z=d_3$.

3. Express $f(x)=11x^4+5x^3+2x^2+x-15$ and its successive differences in a factorial notations, h=1.

4. Evaluate $\int_0^4 e^x dx$ by Simpson's $\left(\frac{1}{3}\right)^{rd}$ Rule.

5. State and prove Newton-Gregory Forward interpolation formula.

6. Determine the value of y when x = 0.1 given that $y(0)=1$ and $\frac{dy}{dx}=\frac{y-x}{y+x}$ using Euler modified method.

7. Solve $y_{x+2}-3y_{x+1}-4y_x=3^x$.

PART - C

Answer any **FOUR** of the following: **(4×10=40)**

8. a) Derive the Newton-Raphson formula $x_{i+1}=x_i-\frac{f(x_i)}{f^1(x_i)}$.

b) Find the cube root of 15 correct to four decimal figures by Iteration method.

9. a) State and prove Lagrange's interpolation formula for un equal intervals.

b) From the following table, half yearly premium for policies maturing at different ages the premium for policy maturing at the age 63.

Age	:	45	50	55	60	65
Premium	:	114.84	96.16	83.32	74.48	68.48

10. a) Derive the 'General Quadrature Formula' for equidistant ordinates and hence deduce Simpson's $\left(\frac{3}{8}\right)^{th}$ rule from it.

b) Find $f'(0.4)$ and $f''(0.4)$ from the following table.

x :	0.1	0.2	0.3	0.4
f(x) :	1.10517	1.22140	1.34986	1.49182

11. a) Explain Picards method to solve the equation $\frac{dy}{dx} = f(xy)$ with initial condition $y(x_0) = y_0$.

b) Using Runge-Kutta method of order 2, Find $y(0.2)$, given that $\frac{dy}{dx} = \frac{y^2 + x^2}{10}$, $y(0) = 1$ take h=0.1.

12. a) Solve $y_{x+2} + 4y_x = (Sinx)2^x$

b) Solve $y_{x+2} - 7y_{x+1} + 10y_x = 12.4^x$