AERO/CIVIL/EEE/EIE

JAYA GROUP OF INSTITUTION- Thiruninravur

4th sem – B.E

INTERNAL ASSESSMENT – II

Sub Name: NUMERICAL METHODS | **Date : 05 /03 /15**

Sub Code:MA6459 | **Branch : AERO, CIVIL,EEE,EIE**

Duration: 3 hrs | **Max. Marks: 100**

PART – A (10x2=20)

Answer all the Questions:

1. What are the errors of trapezoidal and simpson's rules of numerical integration.
2. Using Newton's backward difference formula write the formulae for the first and second order derivativesat the end values up to fourth order.
3. Evaluate $\int_{-2}^{2} e^{-x/2}\,dx$ by Gauss two point formula
4. Evaluate $\int_{1/2}^{1} \frac{1}{x}\,dx$ using Trapezoidal rule.
5. State three point Gaussian quadrature formula
6. Why is RungeKutta method preferred to Taylor series method.
7. Compare one-step methods and multi-step methods.
8. State Adam's Predictor Corrector formula.
9. Using Euler's method find the solution of the initial value problem
$$y' = y - x^2 + 1, y(0) = 1 \; at \; x = 0.2 \; taking \; h = 0.2$$
10. Write the merits and demerits of the Taylor method of solution.

PART – B (5 X 16 = 80) Answer As per the Choice

11. (a) Find the first, second and third derivatives of f(x) at x=3 if, (8)

X	3.0	3.2	3.4	3.6	3.8	4.0
f(x)	-14	-10.032	-5.296	-0.256	6.672	14

(b)Dividing the range into 10 equal parts, find the value of $\int_0^{\pi/2} sinx\,dx$ by (i) Trapezoidal rule

(ii) Simpson's rule (8)

(or)

(b) Evaluate using $\int_0^{1/2}\int_0^{1/2} \frac{\sin(xy)}{1+xy}\,dx\,dy$ using Simpson's rule with h =k = ¼(8)

(d) Find the y'(x) at x=0.5

x	0	1	2	3	4
Y(x)	1	1	15	40	85

12. (a) Evalute $\int_1^{1.4}\int_2^{2.4} \frac{1}{xy}\,dx\,dy$ using Simpson's rule and Trapezoidal rule. Verify your result by actual integration (16)

(or)

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(c) Evaluate $\int_1^2 \frac{1}{1+x^3} dx$ by Gauss three point formula (8)

(d) Evaluate $\int_1^2 \int_1^2 \frac{xy}{x+y} dxdy$ using Simpson's rule with h=k=0.25 (8)

13. (a) The velocity v of a particle at a distance S from a point on its path is given by the table below. (8)

S in metre	0	10	20	30	40	50	60
V m / sec	47	58	64	65	61	52	38

Estimate the time taken to travel 60 metres by using simpson's one – third rule

(b) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ by using Romberg's method correct to 4 decimal places, deduce an approximate value of π (8)

(or)

(c) Determine the value of y(0.4) using Milne's mehod given $\frac{dy}{dx} = y^2 + xy, y(0) = 1,$ use Taylor series to get the value of y(0.1), y(0.2) and y(0.3) (16)

14. (a) By means of Taylor's series expansion, find y at x = 0.1, 0.2 correct to three significant digits given $\frac{dy}{dx} - 2y = 3e^x, y(0) = 0$ (8)

(b)Using Euler's method find $y(0.2)$ and $y(0.4)$ $from$ $\frac{dy}{dx} = x + y, y(0) = 1$ $with$ $h = 0.2$ (8)

(or)

(c)using Milne's method find y(4.4) given $5xy' + y^2 - 2 = 0$ $given$ $y(4) = 1, y(4.1) = 1.0049,$ $y(4.2) = 1.0097$ and $y(4.3) = 1.0143$ (8)

(d) using R-K method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0.2$ (8)

15. (a) Consider the initial value problem $\frac{dy}{dx} = y - x^2 + 1, y(0) = 0.5$ (i)using the modified Euler's method. Find y(0.2). (ii) Using 4th order R-K method find y(0.4) and y(0.6) (iii)Using Adams Bash-forth predictor-corrector find y(0.8) (16)

(or)

(c) Given $\frac{dy}{dx} = x^2 (y + 1), y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979$ .evaluate y(1.4) by Adams –Bashforth method. (8)

(d) Given $y'' + xy' + y = 0, y(0) = 1, y'(0) = 0$ find the value of y(0.1) by using Runge Kutta method of Fourth order. (8)