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JAYA GROUP OF INSTITUTION- Thiruninravur

6th sem – B.E

INTERNAL ASSESSMENT – II

Sub Name: NUMERICAL METHODS **Date :09.03.15**

Sub Code:MA2264 **Branch : ECE**

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

PART – A (10x2=20)

Answer all the Questions:

1. When does Simpson's rule give exact result
2. What is the order of error in Trapezoidal and Simpson's formula.
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. What is a Predictor Corrector method of solving a differential equation.
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=1.5 if, (8)

X	1.5	2	2.5	3	3.5	4
f(x)	3.375	7	13.625	24	38.875	59

(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)

(c) 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) The population of a certain town is given below. find the rate of growth of the population in 1931, 1971, (8)

Year x	1931	1941	1951	1961	1971
Population in Thousands y)	40.62	60.80	79.95	103.56	132.65

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)

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

(d) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ (i) Trapezoidal rule (ii) Simpson's rule.
Also check up the results by actual integration (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)

Sin 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 method 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 $\frac{dy}{dx} = y - x^2 + 1, y(0) = 0.5$ using the modified Euler's method. Find y(0.2). (8)

(b) Using Taylor's series expansion, find y at x = 0.1, $\frac{dy}{dx} = yx^2 - 1, y(0) = 1$ (8)

(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)