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Code No: 6835 Sub Code: PMAM15

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021
FIRST SEMESTER
MATHEMTICS
NUMERICAL ANALYSIS
(for those who joined in July 2017 onwards)

Time 3 hrs **Max: 75 Marks**

PART – A (10 X 1 = 10 Marks)

Answer all questions choose the correct answer

1. _____is the processes of finding the most appropriate estimate for missing data .

a) Extrapolation b) Numerical c) Integration d) Interpolation

2. _____ difference interpolation formula is used to find the missing value near the central value of the table.

a) Divided b) mean value c) Central d) backward

3. The maxima and minima of f(x) can be obtained by equating the first derivative to _____

a) 1 b) 0 c) 2 d) -1

4. Given $u_0 = 5$; $u_1 = 15$; $u_2 = 57$; and $du/dx = 4$ at $x = 0$ and 72 at $x = 2$ then $\Delta^3(u_0) =$ _____.

a) 48 b) 44 c) 40 d) 38

5. The process of evaluating a definite integral from a set of the integrand f(x), is called _____

a) numerical integration b) numerical differentiation

c) divided difference d) transposition

6. The error in trapezoidal rule is of order _____

a) H b) h^2 c) h^3 d) h^{-1}

7. _____ method is the Runge-kutta method of first order.

a) Trapezoidal b) Simpson's c) Euler's d) sylow

8. $y_{n+1} = y_n + hf(x_n,y_n)$ is _____formula.

a) Trpezoidal's b) Simpson's c) R-K method d) Euler's

9. The technique of refining an initially crude estimate is called _____.

a) Euler b) Modified Euler

c) R-K method d) Predictor-Correctorr

10. To apply a predictor corrector method we need_____ starting values of y.

a) 1 b) 2 c) 4 d) -1.

PART – B (5 X 5 = 25 Marks)

Answer All questions choosing either 'a' or 'b'

11.a) If y(75) = 246, y(80) = 202, y(85) = 118, y(90) = 40 then find y(79).

(OR)

b) Form the central difference table for the data given below choosing=35 as origin.

x	20	25	30	35	40	45
y	12	15	20	27	39	52

12.a) Find y'(x) using the given table and also find y'(x) at x =0 .5

x	0	1	2	3	4
y	1	1	15	40	85

(OR)

b) Derive the first and second derivatives using the Newton's forward difference formula.

13.a) Derive the formula for Simpson's one third rule. **(OR)**

b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$. Using trapezoidal rule with h = 0.2.

14.a) Using Euler's method solve $\frac{dy}{dx}$ = 1- y y(0) = 0 Find y at x=0.1 and 0.2. Compare the numerical solution with the exact solution. **(OR)**

b) Derive the formula for the second order R-K method .

15. a) Given $\frac{dy}{dx} = \frac{1}{x+y}$; y(0) = 2. If y(0.2) =2.09, y(0.4) = 2.17, y(0.6)= 2.24 find y(0.8) using Milne's method. **(OR)**

b) Using Adam's Bashforth method find y(0.4) given that y' = 1 + xy, y(0) = 2.

PART – C (5 X 8= 40 Marks)

Answer all Questions choosing either 'a or 'b'

16.a) Derive Bessel's formula. **(OR)**

b) Use Lagrange's interpolation formula to fit a polynomial to the data.

x	0	1	3	4
y	-12	0	6	12

17. a) A rod is rotating in a plane. The following table gives the angle θ (radians) through which the rod has turned for various values of time t (sec). Calculate the angular velocity and the angular acceleration of the rod when t= 0.6 sec

t	0	0.2	0.4	0.6	0.8	1.0
θ	0	0.12	0.49	1.12	2.02	3.20

(OR)

b) Find the maximum and minimum value of y from the following table

x	0	1	2	3	4	5
y	0	0.25	0	9/4	16	225/4

18.a) A curve passes through the points as given in the table. i) Find the area bounded by the curve, the x-axis, x=1 and x=9. ii) the volume of the solid generated by revolving this area about the x-axis.

x	1	2	3	4	5	6	7	8	9
y	0.2	0.7	1	1.3	1.5	1.7	1.9	2.1	2.3

(OR)

b) Derive Newton's quadrature formula.

19.a) Using Taylor's method find y(0.1) correct to 3 decimal places from $\frac{dy}{dx} + 2xy = 1, y_0 = 0.$ **(OR)**

b) Using picard's method solve $\frac{dy}{dx} = 1+ xy$, y(0) = 2. Find y(0.1), y(0.2) and y(0.3)

20.a) Using Adams Bashforth method, determine y(1.4) given that $y' - x^2y = x^2$, $y(1) = 1$. Obtain the starting values from Euler method.

(OR)

b) Find y(0.8) by Milne's method for the equation $y' = y - x^2$, $y(0) = 1$ obtaining the starting values by Taylor's series method.

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