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MTH603 Final Term Papers By Waqar (File 1)

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Question No : 1 of 52 Marks: 1 (Budgeted Time 1 Min)

To apply Simpson's 1/3 rule, the number of intervals in the following must be

Answer (Please select your correct option)

- 6
- 7
- 9
- 11

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Question No : 2 of 52 Marks: 1 (Budgeted Time 1 Min)

In integrating $\int_0^2 x^2 dx$, by dividing the interval into eight equal parts, width of the interval should be

Answer (Please select your correct option)

- 0.125
- 0.250
- 0.500
- 0.625

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Question No : 3 of 52 Marks: 1 (Budgeted Time 1 Min)

The minimum interval in which the root of the equation $x^2 - 3x + 1 = 0$ lie is

Answer (Please select your correct option)

- (0, 1)
- (1, 2)
- (2, 4)
- (0, 2)

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Question No : 4 of 52 Marks: 1 (Budgeted Time 1 Min)

.....lies in the category of iterative method.

Answer (Please select your correct option)

- None of the given choices
- Bracketing Method
- Regula Falsi Method
- Muller's Method

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Question No : 5 of 52 Marks: 1 (Budgeted Time 1 Min)

For the equation $x^3 + 3x - 1 = 0$, the root of the equation lies in the interval.....

Answer (Please select your correct option)

- (0, 1)
- (1, 2)
- (1, 3)
- (1, 2)

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Question No : 6 of 52 Marks: 1 (Budgeted Time 1 Min)

The quantity of error which is present in the statement of the problem itself ,before finding its solution is called

Answer (Please select your correct option)

- Inherent error
- Local round off error
- Local Truncation error
- Typing error

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Question No : 7 of 52 Marks: 1 (Budgeted Time 1 Min)

In Regula Falsi Method two points x_n and x_{n+1} are chosen such that $f(x_n)$ and $f(x_{n+1})$ have -----signs

Answer (Please select your correct option)

- +ve
- ve
- Opposite
- Same

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Question No : 8 of 52 Marks: 1 (Budgeted Time 1 Min)

Regula Falsi Method lies in the category of -----

Answer (Please select your correct option)

- Iterative method
- Bracketing method
- Random method
- Graphical method

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Question No : 9 of 52 Marks: 1 (Budgeted Time 1 Min)

Secant method converges -----than bisection.

Answer (Please select your correct option)

- Faster
- Slower
- Equally
- None of the given choices

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Question No : 10 of 52 Marks: 1 (Budgeted Time 1 Min)

Muller's method is a generalization of

Answer (Please select your correct option)

- Bisection method
- Iteration method
- Secant method
- Regula Falsi method

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Question No : 11 of 52 Marks: 1 (Budgeted Time 1 Min)

Diagonal dominance of a coefficient matrix is strictly checked in

Answer (Please select your correct option)

- Muller's method.
- Bisection method
- Jacobi's method
- Newton-Raphson method

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Question No : 12 of 52 Marks: 1 (Budgeted Time 1 Min)

It can be verified that for matrix $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

Answer (Please select your correct option)

- $AA^{-1} = I$, $I =$ identity matrix
- $AA^{-1} = D$, $D =$ diagonal matrix
- $AA^{-1} = S$, $S =$ symmetric matrix
- $AA^{-1} = Z$, $Z =$ orthogonal matrix

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Question No : 13 of 52 Marks: 1 (Budgeted Time 1 Min)

If $[A]$ is an $n \times n$ real symmetric matrix, its eigen values are real, and there exists an orthogonal matrix $[S]$ such that the diagonal matrix $[D]$ is given by

Answer (Please select your correct option)

- $[D] = [S]^{-1}[A][S]$
- $[D] = [S]^T[S][A]$
- $[D] = [S]^T[A][S]$
- None of the above

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Question No : 14 of 52 Marks: 1 (Budgeted Time 1 Min)

The symbol used for average operator is

Answer (Please select your correct option)

- Δ
- μ
- ∇
- δ

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Question No : 15 of 52 Marks: 1 (Budgeted Time 1 Min)

P in Newton's backward difference formula is defined as

Answer (Please select your correct option)

- $p = \left(\frac{x - x_0}{h}\right)$
- $p = \left(\frac{x + x_0}{h}\right)$
- $p = \left(\frac{x + x_n}{h}\right)$
- $p = \left(\frac{x - x_n}{h}\right)$

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Question No : 16 of 52 Marks: 1 (Budgeted Time 1 Min)

Given the following data

x	1	2	-4
f(x)	3	-5	-4

Which formula is useful in finding the interpolating polynomial?

Answer (Please select your correct option)

- Newton's backward difference formula
- Lagrange's interpolation formula
- None of the given choices
- Newton's forward difference formula

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Question No : 17 of 52 Marks: 1 (Budgeted Time 1 Min)

Newton's divided difference interpolation formula is used when the values of the independent variable are

Answer (Please select your correct option)

- Equally spaced
- Not equally spaced
- Constant
- None of the above

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Question No : 18 of 52 Marks: 1 (Budgeted Time 1 Min)

Given the following data

x	4	5	7	10
$f(x)$	48	100	294	900

Answer (Please select your correct option)

- 94
- 97
- 194
- 52

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Question No : 19 of 52 Marks: 1 (Budgeted Time 1 Min)

Given the following data

x	1	3	7
$f(x)$	2	4	10

Answer (Please select your correct option)

- Newton's forward difference interpolation formula
- Newton's backward difference interpolation formula
- Lagrange's interpolation formula
- None of the given choices

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Question No : 20 of 52 Marks: 1 (Budgeted Time 1 Min)

For the given table of values

x	0.1	0.2	0.3	0.4	0.5	0.6
$f(x)$	0.425	0.475	0.400	0.452	0.525	0.575

using two-point equation the value of $f'(0.2)$ is.....?

Answer (Please select your correct option)

- 0.75
- 0.75
- 0.5
- 0.5

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Question No : 21 of 52 Marks: 1 (Budgeted Time 1 Min)

If $y(x)$ is approximated by a polynomial $P_n(x)$ of degree n then the error is given by

Answer (Please select your correct option)

- $e(x) = y(x) + P_n(x)$
- $e(x) = y(x) - P_n(x)$
- $e(x) = P_n(x) - y(x)$
- $e(x) = y(x) \times P_n(x)$

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Question No : 22 of 52 Marks: 1 (Budgeted Time 1 Min)

Let I denotes the closed interval spanned by $x_0, x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8$. Then $F(x)$ vanishes -----times in the interval I .

Answer (Please select your correct option)

- 6
- 9
- 7
- 8

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Question No : 23 of 52 Marks: 1 (Budgeted Time 1 Min)

If $f(x) = 5x^6 + 6x^5 - 7x^3 - 9x^2 + 4x - 3$, then its-----derivative is zero for all x .

Answer (Please select your correct option)

- 4th
- 7th
- 6th
- 5th

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Question No : 24 of 52 Marks: 1 (Budgeted Time 1 Min)

From the following table of values:

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
y	1.0000	1.0247	1.0488	1.0724	1.0954	1.1180	1.1402

Answer (Please select your correct option)

- Forward difference operator
- Backward difference operator
- Central difference operator
- None of the given choices

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Question No : 25 of 52 Marks: 1 (Budgeted Time 1 Min)

In Richardson's extrapolation method, the extrapolation process is repeated until accuracy is achieved, this is called extrapolation to the

Answer (Please select your correct option)

- limit
- function
- arbitrary value of 'h'
- none of given choices

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Question No : 26 of 52 Marks: 1 (Budgeted Time 1 Min)

While deriving Simpson's 3/8 rule, we approximate $f(x)$ in the form

Answer (Please select your correct option)

- $ax + b$
- $ax^2 + bx + c$
- $ax^3 + bx^2 + cx + d$
- $ax^4 + bx^3 + cx^2 + dx + e$

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Question No : 27 of 52 Marks: 1 (Budgeted Time 1 Min)

When we apply Simpson's $\frac{3}{8}$ rule, the number of intervals n must be:

Answer (Please select your correct option)

- Even
- Odd
- Multiple of 3
- Multiple of 8

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Question No : 28 of 52 Marks: 1 (Budgeted Time 1 Min)

To apply Simpson's $\frac{1}{3}$ rule, valid number of intervals are.....

Answer (Please select your correct option)

- 7
- 8
- 5
- 3

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Question No : 29 of 52 Marks: 1 (Budgeted Time 1 Min)

In integrating $\int_0^1 e^{2x} dx$ by dividing into eight equal parts, width of the interval should be

Answer (Please select your correct option)

- 0.250
- 0.500
- 0.125
- 0.625

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Question No : 30 of 52 Marks: 1 (Budgeted Time 1 Min)

Romberg's integration method is than Trapezoidal and Simpson's rule.

Answer (Please select your correct option)

- none of the given choices
- more accurate
- less accurate
- equally accurate

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Question No : 31 of 52 Marks: 1 (Budgeted Time 1 Min)

A fourth order ordinary differential equation can be reduced to a system of four ----- order ordinary differential equations.

Answer (Please select your correct option)

- First
- Second
- Third
- Fourth

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Question No : 32 of 52 Marks: 1 (Budgeted Time 1 Min)

Given $\frac{dy}{dt} = y - t$ with the initial condition $y=1.02$ at $t=0.02$. Using Euler's method, y at $t=0.04$, $h=0.02$ is

Answer (Please select your correct option)

- 3.0392
- 2.0392
- 1.0392
- 0.0392

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Question No : 33 of 52 Marks: 1 (Budgeted Time 1 Min)

In solving the differential equation
 $y' = x + y$; $y(0.1) = 1.1$
 $h = 0.1$, By Euler's method $y(0.2)$ is calculated as

Answer (Please select your correct option)

- 1.44
- 1.11
- 1.22
- 1.33

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Question No : 34 of 52 Marks: 1 (Budgeted Time 1 Min)

To solve the ordinary differential equation
 $3 \frac{dy}{dx} + xy^2 = \sin x, y(0) = 5$,
by Runge-Kutta 2nd order method, you need to rewrite the equation as

Answer (Please select your correct option)

- $\frac{dy}{dx} = \sin x - xy^2, y(0) = 5$
- $\frac{dy}{dx} = \frac{1}{3}(\sin x - xy^2), y(0) = 5$
- $\frac{dy}{dx} = \frac{1}{3}(-\cos x - \frac{xy^3}{3}), y(0) = 5$
- $\frac{dy}{dx} = \frac{1}{3} \sin x, y(0) = 5$

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Question No : 35 of 52 Marks: 1 (Budgeted Time 1 Min)

In second order Runge-Kutta method k_1 is given by

Answer (Please select your correct option)

- $k_1 = hf(x_n, y_n)$
- $k_1 = 2hf(x_n, y_n)$
- $k_1 = 3hf(x_n, y_n)$
- None of the given choices

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Question No : 36 of 52 Marks: 1 (Budgeted Time 1 Min)

In fourth order Runge-Kutta method, k_3 is given by

Answer (Please select your correct option)

- $k_3 = hf(x_n + \frac{h}{3}, y_n + \frac{k_2}{3})$
- $k_3 = hf(x_n - \frac{h}{2}, y_n - \frac{k_2}{2})$
- $k_3 = hf(x_n - \frac{h}{3}, y_n - \frac{k_2}{3})$
- $k_3 = hf(x_n + \frac{h}{2}, y_n + \frac{k_2}{2})$

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Question No : 37 of 52 Marks: 1 (Budgeted Time 1 Min)

In fourth order Runge-Kutta method, k_4 is given by

Answer (Please select your correct option)

- $k_4 = hf(x_n + 2h, y_n + 2k_3)$
- $k_4 = hf(x_n - h, y_n - k_3)$
- $k_4 = hf(x_n + h, y_n + k_3)$
- None of the given choices

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Question No : 38 of 52 Marks: 1 (Budgeted Time 1 Min)

The truncation error in Adam's predictor formula is

Answer (Please select your correct option)

- $\frac{251}{720} h^4 y_n^4$
- $\frac{251}{720} h^4 y_{n+1}^4$
- $\frac{19}{720} h^4 y_{n+1}^4$
- $\frac{19}{720} h^4 y_n^4$

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Question No : 39 of 52 Marks: 1 (Budgeted Time 1 Min)

In solving the differential equation
 $y' = x^2 + 2xy$; $y(0) = 1$
 $h = 0.1$, By Euler's method $y(0.1)$ is calculated as

Answer (Please select your correct option)

1
2
3
4

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Question No : 40 of 52 Marks: 1 (Budgeted Time 1 Min)

In solving the differential equation
 $y' = x^2 + 2y$; $y(1) = 3$
 $h = 1$, By Euler's method $y(2)$ is calculated as

Answer (Please select your correct option)

4
6
8
10

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Question No : 41 of 52 Marks: 2 (Budgeted Time 4 Min)

State the sufficient condition of convergence of the iterative solution to the exact solution

Answer (Please click here to Add Answer)

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Question No : 42 of 52 Marks: 2 (Budgeted Time 4 Min)

Evaluate the integral

$$\int_3^5 (\log x + 1) dx$$

Using Trapezoidal rule
Take h=1

Answer (Please click here to Add Answer)

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Question No : 43 of 52 Marks: 2 (Budgeted Time 4 Min)

Write a formula for finding the value of k_1 in Fourth-order R-K method.

Answer ([Please click here to Add Answer](#))

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Question No : 44 of 52 Marks: 2 (Budgeted Time 4 Min)

Write Adam-Moulton's Predictor formula for finding the solution of a differential equation.

Answer ([Please click here to Add Answer](#))

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Question No : 45 of 52 Marks: 3 (Budgeted Time 6 Min)

Obtain numerically the solution of

$$y' = x^2 + 2x + y^2, y(0) = 1$$

Using Euler's method to find y at $x=1, h=1$

Answer ([Please click here to Add Answer](#))

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Question No : 46 of 52 Marks: 3 (Budgeted Time 6 Min)

If $f(2) = -2.6146$ and $f(3) = 4.7610$, then find the first approximation using the Regula-Falsi method

Answer ([Please click here to Add Answer](#))

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Question No : 47 of 52 Marks: 3 (Budgeted Time 6 Min)

If, in solving a given differential equation, $y_0 = 1, y_1' = 1.1, y_2' = 1.2, y_3' = 1.3, h = 1$
Then find y_4 by Milne's Predictor formula.

Answer ([Please click here to Add Answer](#))

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Question No : 48 of 52 Marks: 3 (Budgeted Time 6 Min)

Find $P(h)$, using Richardson's extrapolation limit, while finding $y'(0.01)$ to the function $y = 1/x$ with $h = 0.005$.

Answer ([Please click here to Add Answer](#))

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Question No : 49 of 52 Marks: 5 (Budgeted Time 10 Min)

Evaluate the integral

$$\int_0^3 (x^2 + x) dx$$

Using Simpson's 3/8 rule

Answer ([Please click here to Add Answer](#))

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Question No : 50 of 52 Marks: 5 (Budgeted Time 10 Min)

Construct a backward difference table from the following values of x and y.

x	-1	0	1	2	3
y=f(x)	10	2	10	62	80

Answer ([Please click here to Add Answer](#))

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Question No : 51 of 52 Marks: 5 (Budgeted Time 10 Min)

From the following table of values, construct forward difference table.

x	1.00	1.05	1.10	1.15	1.20
y	1.0000	1.0247	1.0488	1.0724	1.0954

Answer ([Please click here to Add Answer](#))

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Question No : 52 of 52 Marks: 5 (Budgeted Time 10 Min)

Use Runge-Kutta Method of order four to find the values of k_1, k_2, k_3 and k_4 for the initial value problem

$$y' = \frac{1}{2}(2x^3 + y), y(1) = 2 \text{ taking } h = 0.1$$

Answer ([Please click here to Add Answer](#))

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