

(8 Pages)

Reg. No. :

Code No. : 30348 E Sub. Code : SMMA 65

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2022

Sixth Semester

Mathematics — Core

NUMERICAL METHODS

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. Order of convergence of Newton's method is
(a) 2 (b) 3
(c) 4 (d) 1
2. In Gauss - Elimination method the coefficient matrix is converted to a _____
(a) Triangular matrix
(b) Upper triangular matrix
(c) Lower triangular matrix
(d) None of these

3. $\Delta =$ _____

- (a) $E - 1$ (b) $1 - E$
(c) $1 + E$ (d) $E^{-1} + 1$

4. $\Delta y_0 =$

- (a) $y_0 - y_1$ (b) $y_1 - y_0$
(c) $y_2 - y_0$ (d) $y_0 - y_2$

5. In the Gauss forward interpolation formula the value of u is

- (a) $\frac{x - x_0}{h!}$ (b) $\frac{x - x_0}{h}$
(c) $\frac{x_0 - x}{h}$ (d) $\frac{x + x_0}{h}$

6. The Gauss backward formula involves odd differences _____ the central line.

- (a) above (b) on
(c) below or above (d) below

Page 2 Code No. : 30348 E



7. The accuracy of the trapezoidal rule can be improved by _____

- (a) increasing the number of intervals
- (b) increasing the value of h
- (c) decreasing the number of intervals
- (d) none of these

8. The error in Simpson's one third rule is of order

- (a) h^4
- (b) h^5
- (c) h^2
- (d) linear

9. The order of $\Delta^2 u_x - 5\Delta u_x - 7u_x = 0$ is _____

- (a) 3
- (b) 2
- (c) 1
- (d) 0

10. The degree of $y_x y_{x+1}^2 - y_{x+2} y_x + 5y_x = x^2 + 7$ is _____

- (a) 2
- (b) 1
- (c) 3
- (d) none of these

Page 3 Code No. : 30348 E

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Solve the following system of equations by Gauss Jacobi method.

$$\begin{aligned} 8x - 3y + 2z &= 20, & 4x + 11y - z &= 33, \\ 6x + 3y + 12z &= 35. \end{aligned}$$

Or

(b) Find an iterative formula to find $\sqrt{N}$ where N is a +ve.

12. (a) Find the sixth term of the sequence 8, 12, 19, 29, 42,...

Or

(b) Evaluate $\Delta^n(e^{ax} + b)$.

13. (a) Using the following table, apply Gauss's forward formula to get $f(3.75)$.

$x:$	2.5	3.0	3.5	4.0	4.5	5.0
$f(x)$	24.145	22.043	20.225	18.644	17.264	16.047

Or

Page 4 Code No. : 30348 E

[P.T.O]



- (b) The following table gives some relation between steam pressure and temperature. Find the pressure at temperature 372.1.

T: 361° 367° 378° 387° 399°

P: 154.9 167.9 191.0 212.5 244.2

14. (a) Find $\frac{dy}{dx}$ at the midpoint of

x: 0 300 600 900 1200 1500 1800

y: 135 149 157 183 201 205 193

Or

- (b) Evaluate the integral $I = \int_4^{5.2} \log_e x dx$ using Simpson's rule.

15. (a) Form the difference equation given by $y_n(An + B)3^n$.

Or

- (b) Solve $y_{n+1} = \sqrt{y_n}$.

Page 5 Code No. : 30348 E

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

16. (a) Find the approximate root of $x \log_{10} x - 1.2 = 0$ by False position method.

Or

- (b) Find the positive root of $f(x) = 2x^3 - 3x - 6 = 0$ by Newton Raphson method correct to 5 decimal places.

17. (a) Prove that

(i) $E\nabla = \Delta = \nabla E$

(ii) $E^{1/2} = \mu + 1/2\delta$

(iii) $\nabla\Delta = \Delta - \nabla = \delta^2$

(iv) $\delta E^{1/2} = \Delta$.

Or

- (b) Estimate the production for 1964 and 1966 from the following data.

Year:	1961	1962	1963	1964
Production:	200	220	260	—
Year:	1965	1966	1967	
Production:	350	—	430	

Page 6 Code No. : 30348 E



18. (a) From the following table estimate $e^{0.644}$ correct to five decimals using Bessel's formulate. Also find e^x at $x = 0.638$.

x:	0.61	0.62	0.63	0.64
y:	1.840431	1.858928	1.877610	1.896481
x:	0.65	0.66	0.67	
y:	1.915541	1.934792	1.954237	

Or

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

x:	-1	0	2	3
y:	-8	3	1	12

and hence find $y(x=1)$.

19. (a) Given the following data, find $y'(6)$ and the maximum value of y .

x:	0	2	3	4	7	9
y:	4	26	58	112	466	922

Or

- (b) By dividing the range into ten equal parts evaluate $\int_0^{\pi} \sin x dx$ by Trapezoidal and Simpson's rule. Verify your answer with integration.

Page 7 Code No. : 30348 E

20. (a) Form the Fibanacci difference equation and solve it.

Or

- (b) Solve $y_{x+2} - 5y_{x+1} + 6y_x = x^2 + x + 1$.

Page 8 Code No. : 30348 E

