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Reg. No. : .....

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

. (CBCS) DEGREE EXAMINATION, APRIL 2022

Sixth Semester

Mathematics — Core

NUMERICAL METHODS

(For those who joined in July 2017 onwards)

e : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

Order of convergence of Newton's method is

(a) 2 (b) 3

(c) 4 (d) 1

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

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

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

(a) h^4 (b) h^5

(c) h^2 (d) linear

The order of $\Delta^2 u_x - 5\Delta u_x - 7u_x = 0$ is ————

(a) 3 (b) 2

(c) 1 (d) 0

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

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.

$8x - 3y + 2z = 20$, $4x + 11y - z = 33$,

$6x + 3y + 12z = 35$.

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

(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 $y_{n+1} = \sqrt{y_n}$.

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	

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.

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

Or

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

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