

10. (a) What is Euler's method?

(OR)

(b) What is the use of Milne's predictor-corrector method?

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 6 = 30)

11. (a) Write the steps to find the positive root of Newton-Raphson method correct to five decimal places.

(OR)

(b) Write the steps to find the positive root of correct to two decimal places by Horner's method.

12. (a) Prove that the operators are all linear operators.

(OR)

(b) Find the value of $f(x)$, using the Lagrange's formula from the following table.

X	2	5	6	14
Y	94.8	87.9	81.3	68.7

13. (a) Apply Gauss's forward central difference formula and estimate $f(32)$ from the following table.

x	25	30	35	40
y	0.2707	0.3027	0.3386	0.3794

(OR)

(b) Highlight the advantages of central difference interpolation formulae.

14. (a) Derive the formula for Trapezoidal rule and Simpson's rule.

(OR)

(b) Explain Simpson's three-eighth rule.

15. (a) Calculate the value of $y(0.1)$ correct to 4 decimal from $\frac{dy}{dx} = 1 - 2xy$ given that $y(0) = 0$ using Taylor series method.

(OR)

(b) Using Euler's method, solve $\frac{dy}{dx} f(x, y)$ with initial condition $y(x_0) = y_0$.

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2022

(First Semester)

Branch – STATISTICS

MATHEMATICS - I

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Identify a rational cubic equation whose roots are 2, $3 + \sqrt{-2}$.
- (i) $x^3 + 8x^2 + 23x - 22 = 0$ (ii) $x^3 - 8x^2 - 23x + 22 = 0$
 (iii) $x^3 + 8x^2 - 23x + 22 = 0$ (iv) $x^3 - 8x^2 + 23x - 22 = 0$
- 2 A square matrix A is said to be orthogonal if
- (i) $A' = A$ (ii) $A' = A^{-1}$
 (iii) $A' = -A$ (iv) $A' = \overline{A}$
- 3 What is the differentiation of $(x)^{2/3}$ with respect to x ?
- (i) $x^{2/3}$ (ii) $\frac{2}{3}x^{2/3}$
 (iii) $\frac{2}{3}x^{-1/3}$ (iv) $\frac{2}{3}x^{1/3}$
- 4 If $y = e^{ax}$, then $\frac{d^n y}{dx^n} = \underline{\hspace{2cm}}$.
- (i) e^{ax} (ii) e^{na}
 (iii) $a^n e^x$ (iv) $a^n e^{ax}$
- 5 $\int \frac{dx}{1+x^2} = \underline{\hspace{2cm}}$.
- (i) $\tan^{-1} x$ (ii) $\cot^{-1} x$
 (iii) $\sin^{-1} x$ (iv) $\sec^{-1} x$

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Solve the equation $x^3 - 12x^2 + 39x - 28 = 0$, whose roots are in arithmetical progression.
- OR
- b If α, β, γ are the roots of the equation $x^3 + px^2 + qx + r = 0$, form the equation whose roots are $\alpha + \frac{1}{\beta\gamma}, \beta + \frac{1}{\alpha\gamma}, \gamma + \frac{1}{\alpha\beta}$.
- 7 a If $A = \begin{bmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{bmatrix}$, show that A satisfies the equation $A^2 - 3A + 2I = 0$.
- OR
- b Find the rank of $A = \begin{bmatrix} -2 & -1 & -1 \\ 12 & 8 & 6 \\ 10 & 5 & 6 \end{bmatrix}$.

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