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21BSC6C15MAL

B.Sc. VI Semester Degree Examination, Sept./Oct. - 2024

MATHEMATICS

DSC-8 : Numerical Analysis

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *(i) Answer **all** sections.*

(ii) Non-programmable calculator may be used.

SECTION - A

Answer **all** questions. **10x1=10**

1. (a) Round of 5^{th} digit in the number 0.56355.

(b) Define Relative Error.

(c) What is Iteration method ?

(d) Write Secant method formula.

(e) When we apply Seidal method on the system ?

(f) What we mean by diagonally dominated matrix ?

(g) Prove that $\nabla = \Delta E^{-1}$.

(h) Show that $\Delta - \nabla = \Delta \cdot \nabla$.

(i) Write the formula of Simpson's $\frac{3}{8}^{th}$ rule.

(j) Write the formula of Weddle's rule.

P.T.O.

SECTION - B

Answer **any four**. **4x5=20**

2. If 0.182 is the approximate value of $\frac{2}{11}$, find the absolute Relative and percentage errors.

3. The equation $x^4 - x - 10 = 0$ has one root between 1.8 and 2. Find the root correct to 3 places of decimal by the method of false position.

4. Apply Gauss-Fordon method to solve.
$10x + y + z = 12$
$x + 10y + z = 12$
$x + y + 10z = 12$

5. Find the number of students from the following data who secured marks not more than 45 marks.

Marks	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of students	35	48	70	40	22

6. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's $\frac{1}{3}^{rd}$ rule.

7. Using Newton-Rapson method, find the root near 2.9 of the equation $x + \log_{10} x = 3.375$ correct to four significant figures.

SECTION - C

Answer **any three** of the following questions. **3x10=30**

8. (a) Find the number of trustworthy figures in $(0.274)^3$ assuming that the number 0.274 is correct to the last figure. **4**

(b) Evaluate $\tan^{-1}\left[\frac{1}{2}\right]$ correct to six decimal places by using Taylor's expression. Find the number of terms to be retained in the series for this purpose. **6**

9. (a) Find the cube root of 15, correct to 4 significant figures by Iterative method.

(b) Find a real positive root of the equation $x^3 - 7x + 5 = 0$ by Bisection method upto fourth approximation.

10. (a) Solve by Gauss Elimination method of $2x+y+z=10$, $3x+2y+3z=18$; $x+4y+9z=16$.

(b) Apply Jacobi iteration method, to solve $10x+y+z=12$; $2x+10y+z=13$; $2x+2y+10z=14$.

11. (a) Using Newton's divided difference formula. Find the value of $f(18)$ and $f(15)$ from the table.

x	4	5	7	10	11	13
$f(x)$	48	100	294	900	1210	2028

(b) Apply Lagrange's formula to find $f(5)$ given that $f(1)=2$, $f(2)=4$, $f(3)=8$, $f(7)=128$.

12. (a) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x=54$ from the following table.

x	50	51	52	53	54
y	3.684	3.7084	3.7325	3.7563	3.7798

(b) Use Weddle's rule to evaluate $\int_4^{5.2} y_x \, dx$ given that :

x	4.0	4.2	4.4	4.6	4.8	5.0	5.2
y	1.386	1.435	1.482	1.526	1.569	1.6	1.649

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