

Numerical Methods and Algebra
PUSAS201

Note:

1. The candidate has option to either attempt question 4A or question 4B. Rest all questions are mandatory.
2. Numbers to the right indicate full marks.
3. The candidates will be provided with the formula sheet and graph papers (if required) for the examination.
4. Use of approved scientific calculator is allowed.

Q1 a) Find the absolute error, proportionate error, and percentage error in the approximation of the following: [5]
True Value: 2.71828182, Approximate Value: 2.7182

b) Find the value of y at $x = 4$, given set of values as $(2, 4), (6, 7)$? [5]

c) Find one approximate root of the equation $x^3 - 4x - 9 = 0$ in $[2, 3]$ [5]

Q2 a) Solve $\frac{x-4}{3} < 12$ [5]

b) Solve $|2x - 5| < 15$ [5]

c) Find determinant of $\begin{bmatrix} 5 & -2 & 3 \\ 3 & 4 & 2 \\ 1 & 1 & 1 \end{bmatrix}$ [5]

Q3 a) Find A^2 if $A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & -4 & 1 \\ 3 & -5 & 0 \end{bmatrix}$ [5]

b) Find Inverse of the Matrix, $A = \begin{bmatrix} 2 & -3 & 4 \\ 1 & 4 & 3 \\ 3 & 1 & 5 \end{bmatrix}$, if possible [5]

c) A piece of equipment cost a certain factory Rs. 600,000. If it depreciates in value, 15% the first year, 13.5 % the next year, 12% the third year, and so on, what will be its value at the end of 10 years, all percentages applying to the original cost? [5]

Q4 A) Given $A = \begin{bmatrix} 17 & -1 & 2 \\ 7 & 0 & -4 \\ 3 & -3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 2 \\ 3 & 0 & -4 \\ 2 & -3 & 1 \end{bmatrix}$ [15]
Find i) $\det(A)/\det(B)$, ii) AB , if possible

Or

Q4 B) i) Evaluate $\sum_{k=1}^{k=10} \frac{5}{1.06^k}$ [15]

ii) Find 6th term of 2, 4, 8, 16,... using formula for Geometric Progression