

Bago University
Department of Mathematics
Second Semester Examination, September 2019

First Year (B.Sc)
(Chemistry and Physics Specializations)

Math- 1003
Mathematics II
Time Allowed: (3) hours

Answer All Questions.

1. (a) Solve the linear system

$$x + y + 2z = -1$$

$$x - 2y + z = -5 \quad \text{by Gauss- Jordan reduction method.}$$

$$3x + y + z = 3$$

(b) Find the inverse of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 3 \\ 5 & 5 & 1 \end{bmatrix}$ by using the practical method.

2.(a) Find all values of a for which the following linear system has

(i) no solution, (ii) a unique solution, and (iii) infinitely many solutions.

$$x + y - z = 2$$

$$x + 2y + z = 3$$

$$x + y + (a^2 - 5)z = a.$$

(b) If possible, solve the linear system

$$2x + 4y + 6z = 2$$

$$x + 2z = 0$$

$$2x + 3y - z = -5, \quad \text{by Cramer's rule.}$$

3.(a) Replace the following polar equations by equivalent the Cartesian and identify their graphs.

(i) $r^2 = 4r \cos \theta$; (ii) $r = \frac{4}{2 \cos \theta - \sin \theta}$.

(b) Find all the roots in rectangular coordinates of $(-8 + 8\sqrt{3}i)^{1/4}$.

4.(a) Use the Heaviside Method to evaluate $\int \frac{x+4}{x^3+3x^2-10x} dx$.

(b) Use partial fractions to evaluate $\int \frac{dx}{x(x^2+1)^2}$.

P.T.O.

Find the total area between the region and the x-axis ; $y = -x^2 - 2x, -3 \leq x \leq 2$.

Evaluate $\int \sin^3 x \cos^2 x dx$.

(i) Find a polar equation for the circle $x^2 + (y-3)^2 = 9$.

(ii) Replace the Cartesian equation $x - y = 3$ with equivalent polar equation.

Solve the differential equation $x \frac{dy}{dx} + 2y = 1 - \frac{1}{x}, x > 0$.
