Roll No. .... Total Pages : 3

BT-2/M-20 **32045**

APPLIED MATHS–II

Paper : BS-132A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) Determine the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$. 7½

(b) Using the Gauss-Jordan method, find the inverse of the matrix $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$. 7½

2. (a) Find the Adjoint of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{bmatrix}$. 7½

(b) Test for consistency and slove :

$$5x + 3y + 7z = 4$$
$$3x + 26y + 2z = 9$$
$$7x + 2y + 10z = 5.$$
7½

UNIT–II

3. (a) Solve the equation $4x^4 + 8x^3 + 13x^2 + 2x + 3 = 0$, it being given that sum of two of its roots is zero. 7½

(b) Find the equation whose roots exceed by 2 the roots of the equation $4x^4 + 32x^3 + 83x^2 + 76x + 21 = 0$. Hence solve the equation. 7½

4. (a) Fit a straight line to the following data : 7½

x	6	7	7	8	8	8	9	9	10
y	5	5	4	5	4	3	4	3	3

(b) Solve the equation $4x^3 + 16x^2 - 9x - 36 = 0$, the sum of two of the roots being zero. 7½

UNIT–III

5. (a) Solve $\frac{dy}{dx} \quad \frac{x(2 \log x \quad 1)}{\sin y \quad y \cos y}$. 7½

(b) Solve $(1 + xy)y\,dx + (1 - xy)x\,dy = 0$. 7½

6. (a) Solve $(x \quad 1)\frac{dy}{dx} \quad y \quad e^{3x}(x \quad 1)^2$. 7½

(b) Solve $x\frac{dy}{dx} \quad y \quad x^3 y^6$. 7½

UNIT–IV

7. (a) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that

$$\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}.$$ 7½

(b) If $u = \cos^{-1}\frac{x+y}{\sqrt{x}+\sqrt{y}}$, prove that

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = -\frac{1}{2}\cot u.$$ 7½

8. (a) Discuss the maxima and minima of

$$f(x, y) = x^3 y^2 (1 - x - y).$$ 7½

(b) Find the volume of the greatest rectangular parallelopiped that can be inscribed in the ellipsoid

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1.$$ 7½
