18CHU06

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2022
(Second Semester)

Branch – **CHEMISTRY**

MATHEMATICS - II

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. Find the sum of the eigen values of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

   (i) 18 (ii) 10

   (iii) 12 (iv) 20

2. The solution of $\frac{\partial z}{\partial x} = 0$ if z is ______.

   (i) z = a constant (ii) z = a function of y alone

   (iii) z = a function of x alone (iv) z = a constant + a function of x + a function of y.

3. Pick out the odd functions:

   (i) $\sin x$ (ii) $\cos x$

   (iii) $\sin x, x \cos x$ (iv) $\cos hx$.

4. The value of $L[te^t]$= _______.

   (i) $\frac{1}{s-1}$ (ii) $\frac{1}{s+1}$

   (iii) $\frac{1}{(s+1)^2}$ (iv) $\frac{1}{(s-1)^2}$.

5. As soon as a new value for a variable is found by iteration it is used immediately in the following equations. This is called _______.

   (i) Gauss-seidal (ii) Gauss Jacobi's

   (iii) Gauss-Jordan (iv) Relaxation.

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. (a) Calculate A^4 when $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$.

   (OR)

   (b) Find the eigen values of the matrix $\begin{bmatrix} 1 & 2 & 0 \\ 4 & 3 & 0 \\ 5 & 6 & 7 \end{bmatrix}$

7. (a) Solve $pq = x$.

   (OR)

   (b) Solve $\frac{\partial^2 z}{\partial x^2} = xy$.

8. (a) Find the Fourier series for $f(x) = x(-\pi < x < \pi)$

   (OR)

   (b) Expand $f(x) = e^x$ as a Fourier series in 0 to 2π.

Cont...

9. (a) Find $L(t\cos at)$.

(OR)

(b) Find $L^{-1}\left[\frac{2}{(s+3)^3}\right]$.

10. (a) Solve by Gauss elimination method.

$x+2y+z=3$
$2x+3y+3z=10$
$3x-y+2z=13.$

(OR)

(b) Solve by Gauss- Seidal method.

$10x-5y-2z=3$
$4x-10y+3z=-3$
$x+6y+10z=-3$

SECTION -C (30 Marks)

Answer **ALL** questions

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

11. (a) Diagonalise the matrix $\begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$.

(OR)

(b) Find the characteristic equation of the matrix $A=\begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$ and hence determine its inverse.

12. (a) Solve $p^2z^2+q^2=1$.

(OR)

(b) Solve $x(y^2-z^2)p+y(z^2-x^2)q=z(x^2-y^2)$.

13. (a) Show that the Fourier series of $x^2=\frac{\pi^2}{3}+4\sum_{n=i}^{\infty}\frac{(-1)^n\cos nx}{n^2}$ in the interval $(-\pi\le x\le\pi)$.

(OR)

(b) A function $f(x)$ is defined with the range $(0,2\pi)$ by the relations

$$f(x)=\begin{cases} x, & 0<x<\pi \\ 2\pi-x, & \pi<x<2\pi \end{cases}$$

14. (a) Find $L^{-1}\left[\frac{1}{s(s+1)(s+2)}\right]$.

(OR)

(b) Solve the equation

$$\frac{d^2y}{dt^2}+2\frac{dy}{dt}-3y=\sin t \text{ given } y(0)=0=y'(0).$$

15. (a) Solve the following system of equations using Gauss-Jacobi method

$8x-3y+2z=20$
$4x+11y-z=33$
$6x+3y+12z=35.$

(OR)

(b) Apply Gauss-Jordan method to find the solution of the following system

$10x+y+z=12$
$2x+10y+z=13$
$x+y+5z=7.$

Z-Z-Z END