**18CHU06**

**PSG COLLEGE OF ARTS & SCIENCE**
(AUTONOMOUS)
**BSc DEGREE EXAMINATION MAY 2019**
(Second Semester)

Branch – **CHEMISTRY**

**MATHEMATICS – II**

Time: Three Hours                                        Maximum: 75 Marks

**SECTION-A (10 Marks)**
Answer **ALL** questions
**ALL** questions carry **EQUAL** marks          (10 x 1 = 10)

1 Two matrices A and B are said to be similar if there exists a ______ matrix P such that $P^{-1}AP=B$.
(i) singular  (ii) zero  (iii) non-singular  (iv) identity

2 The eigen values of $\begin{pmatrix} 1 & 0 \\ 10 & 2 \end{pmatrix}$ are
(i) 0,1  (ii) -1,12  (iii) 1,2  (iv) 2,0

3 Solution of $x+y\dfrac{\partial z}{\partial x}=0$ is z=
(i) $\dfrac{x^2}{2y}$  (ii) $\dfrac{-x^2}{2y}+\phi(y)$  (iii) $\dfrac{x^2}{2y}+\phi(x)$  (iv) $\dfrac{x^2}{2}+yf(x)$

4 The Lagrange's equation is
(i) Pp+Qq=0  (ii) Pp-Qq=R  (iii) Pp+Qq=R  (iv) $R=\dfrac{p}{q}$

5 $\int_{-a}^{a} f(x)dx = 0$ if f(x) is
(i) odd  (ii) even  (iii)$=x^2$  (iv) real valued function

6 If m and n are integers then $\int_{0}^{\pi} \cos mx \ \cos nx \ dx = 0$ if
(i) m=n  (ii) $m \neq n$  (iii) m=n=0  (iv) $\frac{m}{n}$ is finite

7 L(cos at)=
(i) $\dfrac{s}{s^2-a^2}$  (ii) $\dfrac{1}{s^2+a^2}$  (iii) $\dfrac{s}{s^2+a^2}$  (iv) $\dfrac{1}{s^2+a^2}$

8 $L(t^3+2t+3)$=
(i) $\dfrac{3}{s^3}+\dfrac{1}{s^2}+\dfrac{3}{s}$  (ii) $-\dfrac{1}{s^3}+\dfrac{4}{s^2}+\dfrac{3}{s}$  (iii) $\dfrac{2}{s^3}+\dfrac{2}{s^2}+\dfrac{3}{s}$  (iv) $\dfrac{1}{s^4}+\dfrac{2}{s^3}$

9 The rate of convergence of Gauss-Seidal method is roughly ______ times that of Gauss-Jacobi
(i) 4  (ii) 3  (iii)2  (iv) many

10 Solution of a system of simultaneous linear equations obtained by successive approximation is called ______method.
(i) direct  (ii) iterative  (iii) elimination  (iv) Jordan

**SECTION - B (25 Marks)**
Answer **ALL** questions
**ALL** questions carry **EQUAL** Marks          (5 x 5 = 25)

11 a Obtain the eigen values and eigen vectors of $A=\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

OR

12 a Find the differential equation of planes having equal x and y intercepts.

OR

b Form the PDE by eliminating $\phi$ from $\phi(x^2+y^2+z^2, x+y+z)=0$.

13 a Find the Fourier series of $f(x)=\pi^2-x^2$ in $-\pi<x<\pi$.

OR

b Expand f(x)=sinx in a cosine series of cosines in $(0, \pi)$.

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

OR

b Find $L^{-1}\left[\frac{s}{(s+3)^2+4}\right]$

15 a Solve: $5x_1+x_2+x_3+x_4=4$; $x_1+7x_2+x_3+x_4=12$; $x_1+x_2+6x_3+x_4=-5$ and $x_1+x_2+x_3+4x_4=-6$ by Gauss-Jordan method.

OR

b Using Gauss-Elimination method, solve the system:
$3.15x-1.96y+3.85z=12.95$, $2.13x+5.12y-2.89z=-8.61$, $5.92x+3.05y+2.15z=6.88$.

## SECTION -C (40 Marks)

Answer **ALL** questions

**ALL** questions carry **EQUAL** Marks (5 x 8 = 40)

16 a Verify Cayley-Hamilton theorem for $A=\begin{pmatrix}1 & 2 & 3\\ 2 & -1 & 4\\ 3 & 1 & -1\end{pmatrix}$ and hence evaluate $A^{-1}$ and $A^4$.

OR

b Verify Cayley-Hamilton theorem for $A=\begin{pmatrix}1 & 2 & -2\\ 2 & -5 & -4\\ 3 & 7 & -5\end{pmatrix}$ and hence evaluate $A^{-1}$.

17 a Solve $(y-z)p+(z-x)q=x-y$.

OR

b Solve $px+qy+\sqrt{1+p^2+q^2}$.

18 a Find the Fourier series of $f(x)=x+x^2$ in $-\pi<x<\pi$.

OR

b Find the Fourier series of $f(x)=\begin{cases}-\pi & \text{in } -\pi<x<0\\ x & \text{in } 0<x<\pi\end{cases}$ also using the fourier series of f(x) find $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots=$

19 a Solve $\frac{d^2y}{dx^2}-3\frac{dy}{dx}+2y=e^{3x}$ where y(o)=y`(0)=0.

OR

b Solve $y^{11}+5y^1+6y=2$, given y(o)=y`(0)=0.

20 a Solve by Gauss-Seidal method, the following system:
$28x+4y-z=32$, $x+3y+10z=24$, $2x+17y+4z=35$.

OR

b Solve the following system by Gauss-Jacobi method:
$10x-5y-2z=3$, $4x-10y+3z=-3$, $x+6y+10z=-3$.

Z-Z-Z

END