PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2022
(Second Semester)

Branch – **PHYSICS**

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 If the characteristic roots are not distinct it may not be possible _____the matrix
(i) to find the inverse (ii) to find the transpose
(iii) to diagonalise (iv) to find the reciprocal

2 A solution containing as many arbitrary constants as there are independent variables is called a _____
(i) singular integral (ii) complete integral
(iii) particular integral (iv) general integral

3 If $f(x)$ is an odd function, then $\int_{-\pi}^{\pi} f(x)\cos nx dx =$ _____
(i) a_0 (ii) a_n
(iii) b_n (iv) 0

4 $L(\sinh at) =$ _____
(i) $\frac{s}{s^2-a^2}$ (ii) $\frac{a}{s^2+a^2}$
(iii) $\frac{s}{s^2+a^2}$ (iv) $\frac{a}{s^2-a^2}$

5 . For the large system of linear equations can be solved by applying _____
(i) Gramer's rule (ii) direct or iterative method
(iii) both (a) and (b) (iv) None

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

6 a Find the Eigen values of the matrix $A = \begin{bmatrix} 5 & 3 \\ 1 & 3 \end{bmatrix}$.

OR

b Calculate A^3 when $A = \begin{bmatrix} -1 & 3 \\ -1 & 4 \end{bmatrix}$.

7 a Solve $\frac{\partial^2 z}{\partial x \partial y} = 0$.

OR

b Solve the equation $p + q = x + y$.

8 a Write any three properties of odd and even functions.

OR

b Find the sine series for $f(x) = c$ in the range 0 to π.

Cont...

9 a Find $L(\sin^2 2t)$.

OR

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

10 a Write about the method of complete pivoting.

OR

b Compare the Gauss elimination and Gauss Seidal iteration methods.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11 a Find the characteristic equation of the matrix $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence obtain its inverse.

OR

b Diagonalises the matrix $\begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$.

12 a Solve $x\frac{\partial z}{\partial x} = 2x + y + 3z$.

OR

b Find the general solution of $(y+z)p + (z+x)q = x+y$.

13 a Express $f(x) = \frac{1}{2}(\pi - x)$ as a Fourier series with period 2π, to be valid in the interval $0 to 2\pi$.

OR

b If $f(x) = \begin{cases} -x & in -\pi < x < 0 \\ x & in\ 0 < x < \pi \end{cases}$ expand f(x) as a fourier series in the interval $-\pi\ to\ \pi$ and deduce that $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + ...$

14 a Find the values of (i) $L(t\sin at)$ $(ii) L(t^2\cos at)$ (iii) $L(te^{-t}\sin t)$.

OR

b Solve the equation $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 13y = 2e^{-x}$ given $y = 0, \frac{dy}{dx} = -1$ when $x = 0$.

15 a Find the Gaussian elimination, the inverse of the matrix $\begin{bmatrix} 4 & 1 & 2 \\ 2 & 3 & -1 \\ 1 & -2 & 2 \end{bmatrix}$.

OR

b Solve the equations by Gauss Seidal method of iteration
$$27x + 6y - z = 85$$
$$6x + 15y + 2z = 72$$
$$x + y + 54z = 110$$

Z-Z-Z

END