

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

Branch - **PHYSICS**

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 The roots of the characteristic equation are called _____
(i) values (ii) eigen values (iii) eigen vectors (iv) roots
- 2 Every square matrix satisfies its own characteristic _____
(i) roots (ii) equation (iii) values (iv) vector
- 3 If we estimate the arbitrary function from $Z = F(x^2 + y^2)$ then
(i) $P_y = q_x$ (ii) $p_x = q_y$ (iii) $pq = xy$ (iv) $p = q$
- 4 The general solution of the partial differential equation $P_p + Q_q = R$ is
(i) $F(u, v) = u$ (ii) $F(u, v) = v$ (iii) $F(u, v) = 0$ (iv) none
- 5 $\int f(x) dx = \text{_____}$ if $f(x)$ is odd
-a
(i) 1 (ii) $f(x)$ (iii) a (iv) 0
- 6 If m and n are integers and $\int_0^{2\pi} f \cos mx \cos nx dx = 0$.
(i) $m = n$ (ii) $m \neq n$ (iii) $m^2 = n$ (iv) $n^2 = m$
- 7 If $s + a > 0$ then $L(e^{at}) = \text{_____}$
(i) 1 (ii) $-\frac{L}{s-a}$ (iii) $-\frac{L}{s+a}$ (iv) 0
- 8 $L(1) = \text{_____}$
(i) s (ii) 1 (iii) $\frac{1}{s}$ (iv) $\frac{4}{s}$
- 9 Gauss Elimination is a _____ method to solve simultaneous linear equations
(i) Direct (ii) indirect (iii) iterative (iv) induction
- 10 the convergence in gauss seidal method is roughly twice that of _____ method.
(i) Gauss elimination (ii) Gauss jordan
(iii) Gauss jacobi (iv) direct method

SECTION - B (25 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 5)

11 a Verify Cayley-Hamilton theorem for the matrix

$$\begin{vmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ & -1 & 1 \end{vmatrix}$$

OR

b Find the eigen values of A^{10} for the matrix $\begin{vmatrix} 3 & 4 \\ 2 & 5 \end{vmatrix}$

- 12 a Solve $\frac{d^2y}{dx^2} = ax^2$
- OR
- b Solve $p^2+q^2=4$.
- 13 a Obtain the half-range sine series of the function $f(x)=kx(x-1)$ in $0 < x < 1$.
- OR
- b Obtain the Fourier series to represent the function $f(x)=|x|$ in $-\pi < x < \pi$
- 14 a Find $L[t e^{-t} \sin t]$.
- OR
- b Find $L^{-1} \log \frac{1+w^2}{1-w^2}$
- 15 a Solve the system of equations by Gauss-elimination method,
 $x+2y+z=3$
 $2x+3y+3z=10$
 $3x-y+2z=13$
- OR
- b Apply Gauss-Jordan method to find the solution of the following system
 $10x+y+z=12$
 $2x+10y+z=13$
 $x+y+5z=7$

SECTION -C (40 Marks)

Answer **ALL** questions

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

- 16 a Find the eigen value and eigen vectors of $\begin{vmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ 1 & -2 & 0 \end{vmatrix}$.
- OR
- b By using Cayley-Hamilton theorem, find A^{-1} $\begin{vmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 2 & 2 & -1 \end{vmatrix}$
- 17 a Solve: $y^2zp+zx^2q=xy^2$.
- OR
- b Solve: $(y-z)p+(z-x)q=x-y$.
- 18 a Find the Fourier series for $f(x)$ if $f(x) = \begin{cases} -7i & \text{in } -\pi < x < 0 \\ x & \text{in } 0 < x < \pi \end{cases}$
- OR
- b Find the Fourier series expansion for $f(x)=x^2, -2 < x < 2$.
- 19 a Solve $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 5y = 5$ given that $y(0)=0, y'(0)=2$.
- OR
- b Find $L(\sin t \sin 2t \sin 3t)$.
- 20 a Solve by Gauss-Jacobi method for the following systems of equations,
 $27x+6y-z=85$
 $6x+15y+2z=72$
 $x+y+5z=110$