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

Branch – **STATISTICS**

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 characteristic equation of the matrix A is
(i) $|A-\lambda I|=0$ (ii) $|A+\lambda I|=0$ (iii) $|A-I|=0$ (iv) $|A+I|=0$

2 Every __________ matrix satisfies its own characteristic equation.
(i) row (ii) column (iii) square (iv) none

3 The solution of $\frac{\partial z}{\partial x}=0$ is
(i) $z=f(x)$ (ii) $z=f(y)$ (iii) $z=f(z)$ (iv) $z=0$

4 The complete integral of $z=px+qy+pq$ is
(i) $z=px+qy$ (ii) $z=ax+by$ (iii) $z=ax+by+ab$ (iv) $z=\frac{x}{a}+\frac{y}{b}$

5 If f(x) is odd, then $\int_{-a}^{a} f(x)dx=$ ____________.
(i) $2\int_0^a f(x)dx$ (ii) $\int_0^a f(x)dx$ (iii) 0 (iv) $\int_0^{-a} f(x)dx$

6 Fourier series for f(x) is
(i) $a_0+\sum_{n=1}^{\infty}(a_n\cos nx+b_n\sin nx)$ (ii) $\frac{a_0}{2}+\sum_{n=1}^{\infty}(a_n\cos nx+b_n\sin nx)$
(iii) $a_0+\sum_{n=1}^{\infty}(a_n\cos nx-b_n\sin nx)$ (iv) $\frac{a_0}{2}+\sum_{n=1}^{\infty}(a_n\cos nx-b_n\sin nx)$

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

8 L(t) = ___________.
(i) $\frac{1}{s}$ (ii) $\frac{1}{s^2}$ (iii) $\frac{1}{s^3}$ (iv) 0

9 The direct method for solving simultaneous linear algebraic equation is _______.
(i) Gauss elimination (ii) Gauss Seidel (iii)Gauss Jacobi (iv) Bisection

10 The rate of convergence in Gauss – Seidel method is roughly ______ times than that of Gauss – Jacobi method.
(i) 2 (ii) 3 (iii) 4 (iv) 5

SECTION - B (25 Marks)

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

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

OR

b Calculate the eigen values of the matrix $A=\begin{bmatrix}1 & 1 & 3\\ 1 & 5 & 1\\ 3 & 1 & 1\end{bmatrix}$.

12 a Eliminate the arbitrary function f and ϕ from the relation $z=f(x+ay)+\phi(x-ay)$.

OR

13 a Express $f(x) = x$, $((-\pi < x < \pi)$ as a Fourier series with period 2π.

OR

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

14 a Show that $L(t^2 \cos at) = \dfrac{2s(s^2 - 3a^2)}{(s^2 + a^2)^3}$.

OR

b Calculate $L^{-1}\left[\dfrac{1}{s(s+1)(s+2)}\right]$.

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 Explain Gauss elimination method.

SECTION -C (40 Marks)

Answer **ALL** questions

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

16 a Examine the characteristic equation of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence obtain its inverse.

OR

b Evaluate the matrix $A^4 - 4A^3 - A^2 + 2A - 5I$, were $A = \begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$.

17 a Solve $p^2 + q^2 = npq$.

OR

b Solve $(y^2 + z^2)p - xyq = -xz$.

18 a Show that $x^2 = \dfrac{\pi^2}{3} + 4\sum_{n=1}^{\infty} (-1)^n \dfrac{\cos nx}{n^2}$ in the interval $-\pi \le x \le \pi$.

OR

b If $f(x) = \begin{cases} -x & \text{in } -\pi < x < 0 \\ x & \text{in } 0 < x < \pi \end{cases}$, then expand f(x) as a Fourier series in the interval $-\pi$ to π.

19 a (i) Find $L(t^2 + 2t + 3)$.

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

OR

b Solve the equation $\dfrac{d^2y}{dx^2} - 3\dfrac{dy}{dx} + 2y = e^{3x}$.

20 a Solve the following system of equations by using Gauss – Jacobi method to correct to 3 decimal places.

$8x - 3y + 2z = 20$

$4x + 11y - z = 33$

$6x + 3y + 12z = 35$

OR

b Solve the following system of equations by Gauss – Seidel method to correct to three decimal places :

$x + y + 54z = 110$

$27x + 6y - z = 85$

$6x + 15y + 2z = 72$