

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2018
(First Semester)

Branch - ELECTRONICS

MATHEMATICS-I

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks!)

Answer ALL questions

ALL questions carry EQUAL marks

(10x1 = 10)

A square matrix $A=[a_{ij}]$ is said to be symmetric, if

- (i) $a_{ij}=a_{ji}$ (ii) $a_{jj}=a_{ii}$ (iii) $a^t=a$ (iv) $a_{ij}=-a_{ji}$

If A is orthogonal matrix then

- (i) $|A|=0$ (ii) A is singular (iii) $A^2=I$ (iv) $A^t=A^{-1}$

3 $(\cos 60^\circ + i \sin 60^\circ)^6$ is

- (i) $\cos 60^\circ + i \sin 60^\circ$ (ii) $\cos 60^\circ - i \sin 60^\circ$ (iii) $\cos 60^\circ + i \sin 60^\circ$ (iv) $\cos 60^\circ - i \sin 60^\circ$

4 $\sin ix$ is

- (i) $i \sin x$ (ii) $\cos hx$ (iii) $i \sinh x$ (iv) $\sinh hx$

The value of $\int_0^1 \cos^n x dx$ when $n=0$.

- (i) 0 (ii) $\frac{1}{2}$ (iii) $\frac{1}{2}$ (iv) $\frac{1}{2}$

$\int f(x) dx$

- (i) $\int f(x) dx$ (ii) $\int f(a-x) dx$ (iii) $-\int f(a-x) dx$ (iv) None of these

The value of $\int_0^1 \int_0^1 \sin(x+y) dx dy$ is

- (i) 1 (ii) 0 (iii) $\frac{1}{2}$ (iv) $\frac{1}{2}$

8 In the double integral $\int_a^b \int_c^d f(x,y) dy dx$ the outer integral is with respect to

- (i) y (ii) x (iii) a (iv) b

9 For solving the system of linear equations by Gauss elimination method are use

- (i) Substitution method (ii) Forward substitution
(iii) backward substitution (iv) None of these

10 In Gauss-Seidal method the system of equations must be

- (i) equal (ii) not equal (iii) diagonally dominant (iv) dominant

SECTION - B (25 Marks!)

Answer ALL questions

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

11 a If A and B are Hermitian, show that $AB+BA$ is Hermitian.

OR

"1 2 3"

b Calculate Eigen values of $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 3 \\ 0 & 0 & 2 \end{bmatrix}$

"1 2 3"

12 a Develop $\cos 60^\circ$ in terms of $\sin 0^\circ$.

OR

b If $\tan^{-1} \frac{1}{\sqrt{3}} = \frac{\pi}{6}$ show that $\sinh v = \tan x$.

13 a Calculate $\int e^{ax} \cdot x^3 dx$.

OR

b Calculate $\int_0^{\pi} \sin^2 x dx$.

14 a Calculate $\int_{x=1}^{x=2} \int_{y=x}^{y=3} xy dy dx$.

OR

b Calculate the following integral by change of order of integration $\int_0^1 \int_x^1 \frac{e^{-y}}{y} dy dx$.

15 a Solve the system of equations by Gauss-Jordan method,
 $x+2y+z=3$; $2x+3y+3z=10$; $3x-y+2z=13$.

OR

b Solve the following system of equations by Gauss-Jacobi method.
 $x+y+5z=110$; $27x+6y-z=85$; $6x+15y+2z=72$.

SECTION -C (40 Marks!)

Answer ALL questions

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

16 a Show that the matrix $\frac{1}{3} \begin{pmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{pmatrix}$ is orthogonal.

OR

b If $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ then find A^{-1} .

17 a Expand $\sin^3 \theta \cos^4 \theta$ in terms of sines of multiples of θ .

OR

b If $\tan(a + ip) = x + iy$ prove that $x^2 + y^2 + 2x \cot 2a = 1$.

18 a Derive the reduction formula for $\int x^n \sin x dx$.

OR

b Evaluate $\int \frac{a \sin x + b \cos x}{\sin x + \cos x} dx$.

19 a Evaluate $\int_0^1 \int_0^{1+x^2} \frac{1}{-y + x^2 + y^2} dy dx$

OR

b Evaluate $\int_0^a \int_0^y \int_0^x J e^{x+y+z} dz dy dx$.

20 a Apply Gauss-Jordan method to find the solution of the following system:
 $10x+y+z=12$; $2x+10y+z=13$; $x+y+5z=7$.

OR

b Solve the following system by Gauss-Jacobi methods: