

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(Second Semester)

Branch - ELECTRONICS

MATHEMATICS – II FOR ELECTRONICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	F(x) is the periodic with period _____ a) π b) 2π c) $-\pi$ d) $(\pi, -\pi)$	K1	CO1
	2	If f(x) is an odd function, then the fourier expansion contains only _____ terms. a) Cos b) Sin c) Tan d) none	K2	CO2
2	3	Solve: $\frac{\partial z}{\partial x} = \sin x$ a) $z = \cos x + f(y)$ b) $z = \sin x + f(y)$ c) $z = -\cos x + f(y)$ d) $z = -\sin x + f(y)$	K1	CO1
	4	Let $f(x,y,z,p,q)=0$ be a pde whose complete integral is a) $\phi(x, y, z) = 0$ b) $\phi(x, y, z, a) = 0$ c) $\phi(x, y, z, a, b) = 0$ d) $\phi(x, y) = 0$	K1	CO2
3	5	Solve : $L[e^{2t}] = ?$ a) $\frac{1}{s}$ b) $\frac{1}{s+2}$ c) $\frac{1}{s-2}$ d) none	K1	CO1
	6	Find $L(\cos^2 3t)$ _____ a) $\frac{1}{2} \left[\frac{1}{s} + \frac{s}{s^2 + 36} \right]$ b) $\frac{1}{2} \left[\frac{1}{s} + \frac{s}{s^2 - 36} \right]$ c) $\frac{1}{2} \left[\frac{s}{s^2 + 36} \right]$ d) $\frac{1}{2} \left[\frac{1}{s} - \frac{s}{s^2 + 36} \right]$	K2	CO2
4	7	If f and g are two scalar point functions then $\nabla(fg) =$ a) $\nabla g + \nabla f$ b) $f\nabla g + g\nabla f$ c) $g\nabla g + f\nabla f$ d) ∇fg	K1	CO2

Cont...

4	8	The unit vector \hat{n} is denoted by____ a) $\frac{dr}{ds}$ b) $\frac{d\vec{r}}{ds}$ c) $\frac{dr}{d\vec{s}}$ d) $\frac{ds}{dr}$	K2	CO2
5	9	If $\int_C \vec{F} \cdot d\vec{r}$ is independent of the path then curl \vec{F} is _____ a) 0 b) 1 c) 0 & 1 d) none	K1	CO1
	10	Gauss divergence is given by_____ a) $\iint_S \vec{F} \cdot \hat{n} ds = \iiint_V \nabla \cdot \vec{F} dv$ b) $\iint_S \vec{F} ds = \iiint_V \nabla \cdot \vec{F} dv$ c) $\iint_S \vec{F} \cdot \hat{n} ds = \iiint_V \vec{F} dv$ d) $\iint_S \vec{F} \cdot \hat{n} ds = \iint_V \vec{F} dv$	K2	CO2

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Prove that $-\pi < x < \pi, \frac{x(\pi^2 - x^2)}{12} = \frac{\sin x}{1^3} - \frac{\sin 2x}{2^3} + \frac{\sin 3x}{3^3} - \dots$	K2	CO1
		(OR)		
	11.b.	Express $f(x) = x \sin x$ as a Fourier series in $0 \leq x \leq 2\pi$.	K3	CO1
2	12.a.	Find the singular integral of $z = px + qy + pq$.	K2	CO2
		(OR)		
	12.b.	Solve : $p^2 + pq = z^2$.		
3	13.a.	Find $L(\sin 8t \cos 4t + \cos^3 4t + 5)$.	K4	CO3
		(OR)		
	13.b.	Find $L[t \cos^3 t]$.		
4	14.a.	If $u = x^2 - y^2$, prove that $\nabla^2 u = 0$.	K3	CO4
		(OR)		
	14.b.	Show that the vector $2xy\vec{i} + (x^2 + 2yz)\vec{j} + (y^2 + 1)\vec{k}$ is irrotational.		
5	15.a.	If $\vec{F} = x^2\vec{i} + y^2\vec{j}$ evaluate $\int \vec{F} \cdot d\vec{r}$ along the line $y=x$ from (0,0) to (1,1).	K5	CO4
		(OR)		
	15.b.	Obtain the cartesian form of Gauss divergence theorem.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Find the half range sine series which represents $f(x) = \sin px$ for p not an integer on the interval $0 < x < \pi$.	K3	CO1
2	17	Solve : $q^2 y^2 = z(z - px)$.	K5	CO2
3	18	Find $L^{-1} \left[\log \frac{s^2 + a^2}{s^2 - b^2} \right]$.	K3	CO3
4	19	Find $\nabla \cdot \vec{F}$ and $\nabla_x \vec{F}$ of the vector point function $\vec{F} = xz^3 \vec{i} - 2x^2 yz \vec{j} + 2yz^4 \vec{k}$ at the point (1,-1,1).	K3	CO4
5	20	Evaluate $\iint_S \vec{F} \cdot \hat{n} ds$ where $\vec{F} = yz \vec{i} + zx \vec{j} + xy \vec{k}$ and S is that part of the surface of the sphere $x^2 + y^2 + z^2 = 1$ which lies in the first octant.	K5	CO4

Z-Z-Z

END