Avinashilingam Institute for Home Science and Higher Education for Women
Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test I – August 2025

Semester I

Class : I UG **Time : 2 Hours**
Major : Physics **Max. Marks : 60**

23BMAGE1 – Mathematics for Physics

Course Outcomes:

CO1: apply matrices for solving simultaneous equations.

CO2 : expand trigonometric functions.

CO3 : express periodic function as a Fourier series.

CO4 : compute Laplace transforms and inverse Laplace transforms for a given function.

CO5: evaluate differentiation, integration, double and triple integrals.

PART A **6 x 1 = 6**
Choose the Correct Answer

1. A square matrix A is said to be Hermitian if _____. CO1K2
a. $A = A'$ b. $A=\bar{A}$ c. $A' = \bar{A}$ d. $A = \bar{A}'$

2. If r(A,B) = r(A)< n, the number of unknowns, then CO1K2
a. the equations are consisten b. the equations are consistent and have unique solution
c. the equations are inconsistent d. the equations are consistent and have infinite solution

3. Co efficient of $\cos^n \theta$ in the expansion of cos nθ is CO2K1
a. 2^{n-1} b. 2^n c. 2n d. 2(n-1)

4. Cos θ = CO2K1
a . $1-\frac{\theta^2}{2!}-\frac{\theta^4}{4!}-...$ b. $1+\frac{\theta^2}{2!}+\frac{\theta^4}{4!}+...$ c. $1-\frac{\theta^2}{2!}+\frac{\theta^4}{4!}-...$ d. $1+\frac{\theta^2}{2!}-\frac{\theta^4}{4!}+...$

5. If f(x) is an odd function then f(x) = CO3K1
a. f(-x) b. -f(-x) c. -f(x) d. $f(x^2)$

6. The constant term in the Fourier series is CO3K1
a . a_0 b. 0 c. b_0 d. $a_0/2$

Part B **3 x 6 = 18**
Answer ALL questions

7. a .Evaluate $2\begin{bmatrix}1 & 2 & 3\\ -1 & -3 & 2\end{bmatrix}+3\begin{bmatrix}1 & 0 & 2\\ 3 & 4 & 5\end{bmatrix}$ CO1K3

(or)

7. b. Find the rank of the matrix A=$\begin{bmatrix}3 & 1 & -5 & -1\\ 1 & -2 & 1 & -5\\ 1 & 5 & -7 & 2\end{bmatrix}$ CO1K3

8. a. Expand cos8θ in terms of sin θ. CO2K4

(or)

8. b. Express $\cos^6\theta$ and $\cos^5\theta$ in series of cosines of multiples of θ. CO2K4

9. a. Determine the Fourier expansion of the functions $f(x) = x, -\pi \le x \le \pi$ CO3K3

(or)

9. b. If $\frac{\sin\theta}{\theta} = \frac{5045}{5046}$ show that $\theta = 1^\circ\ 58'$ approximately. CO2K3

Part C **3 x 12 = 36**

Answer ALL questions

10 a. Explain the types of matrices with example. CO1K4

(or)

10. b. Diagonalise the matrix $\begin{bmatrix} 7 & -2 & 2 \\ -2 & 1 & 4 \\ -2 & 4 & 1 \end{bmatrix}$ CO1K4

11. a. Evaluate $\lim_{x\to\pi/2} \frac{\sin x + \cos 2x}{\cos^2 x}$ CO2K3

(or)

11. b. Prove that $2^6\cos^7\theta = \cos 7\theta + 7\cos 5\theta + 21\cos 3\theta + 35\cos\theta$ CO2K4

12. a. Show that $x^2 = \frac{\pi^2}{3} + 4\sum_{n=1}^{\infty}(-1)^n \frac{\cos nx}{n^2}$ in the interval $(-\pi \le x \le \pi)$. CO3 K4

(or)

12. b. If $f(x) = \begin{cases} -k & when\ -\pi < x < 0 \\ k & when\ 0 < x < \pi \end{cases}$

Express *f(x)* as a Fourier series in the range (-π,π) CO3K4

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