

**Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)**

B. Tech (Second Semester - Regular) Examinations, May 2026

25FYBS12002 -Applied Mathematics – II

(Aeronautical Engineering)



Time: 3 hrs

Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. Define Power series	CO1	K1
b. State Green's theorem in a plane.	CO2	K1
c. Define Cauchy's Integral Formula.	CO3	K1
d. What is order and pole of $\oint_C \frac{dz}{(z+i)^3}$ at $C : z = 2$?	CO4	K1
e. Define Fourier series of even function.	CO5	K1

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

	Marks	CO #	Blooms Level
2. a. Test the convergence of the series $\sum_{n=0}^{\infty} \frac{1.3.5...(2n-1)}{2.4.6.....2n} \frac{1}{n}$	5	CO1	K2
b. Solve the differential equation $y' - 2xy = 0$ by power series method	5	CO1	K3
(OR)			
c. Test the convergence of the series $\sum_{n=1}^{\infty} \frac{(3i)^n n!}{n^n}$	5	CO1	K2
d. Solve the differential equation $y' - 4y = 0$ by power series method	5	CO1	K3
3.a. Find the Directional derivative of f at point P in the direction of vector a , where $f = xy + yz + zx$ $P: (1, 2, 0)$ $\vec{a} = i + 2j + 2k$	5	CO2	K2
b. Determine the value of $f(x, y, z)$ when the vector function $\nabla f = yx i + 2xy j$	5	CO2	K3
(OR)			
c. Prove that $\text{div}(f \times g) = g \cdot \text{curl} f - f \cdot \text{curl} g$	5	CO2	K2
d. Verify Greens theorem in the plane $\int (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the boundary of the region bounded by $x \geq 0, y \leq 0$ and $2x - 3y = 6$.	5	CO2	K3
4.a. Verify that the function $v(x, y) = e^x \sin y$ harmonic. If harmonic then find analytic function $f(z) = u(x, y) + iv(x, y)$.	5	CO3	K2
b. Find and graph the images of the given curves under the given mapping $w = z^2$ at $x = 3, y = 3$	5	CO3	K2
(OR)			
c. Verify that the function $U(x, y) = x^3 - 3xy^2$ harmonic. If harmonic then find analytic function $f(z) = u(x, y) + iv(x, y)$.	5	CO3	K2
d. Find the linear fractional transformation that maps $-2, 0, 2$ onto $\infty, \frac{1}{4}, \frac{3}{8}$	5	CO3	K2

- 5.a. Verify Cauchy's integral theorem $\oint_C z^2 dz$ where C is a boundary of square with vertices (1, 1), (-1, 1), (-1, -1) & (1, -1) in counter-clockwise direction 5 CO4 K3
- b. Expand $f(z) = \sin z$ at $z = 0$ by using Taylor series 5 CO4 K2
- (OR)
- c. Find the Maclaurin series of $\int_0^t e^{-t^2} dt$ 5 CO4 K3
- d. Evaluate $\oint_C \frac{2z^3 + z^2 + 4}{(z+3)^2}$, $C: |z-1| = 5$ by residue theorem. 5 CO4 K2
- 6.a. Find the Fourier series of $f(x) = x^2$, $0 < x < 2\pi$ 5 CO5 K2
- b. Find the Fourier series of $f(x) = \sin x$, $-\pi < x < \pi$ 5 CO5 K3
- (OR)
- c. Find the Fourier series of $f(x) = \begin{cases} 0, & \text{if } -\pi < x < 0 \\ x, & \text{if } 0 < x < \pi \end{cases}$ 5 CO5 K2
- d. Find the Fourier series $f(x) = \frac{x^2}{2}$ in $-\pi < x < \pi$ 5 CO5 K3

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