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



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

25FYBS12002 – Applied Mathematics-II

(Common to All except Biotech branch)

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. Find the radius of convergence of $\sum_{n=0}^{\infty} (-1)^n (x)^{4n}$ | CO1 | K2 |
| b. Find the curl of vector function $\vec{V} = 2x\hat{i} + 4y\hat{j} + 8z\hat{k}$ | CO2 | K2 |
| c. What is a bilinear transformation? Write it's general form | CO3 | K1 |
| d. State Cauchy's Integral Formula | CO4 | K1 |
| e. What is half-range cosine series? | CO5 | K1 |

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

- | | Marks | CO # | Blooms
Level |
|---|-------|------|-----------------|
| 2. a. Solve the Differential Equation $y'' + 9y = 0$ by Power Series Method | 5 | CO1 | K3 |
| b. Test the convergence of the series $\sum_{n=0}^{\infty} \frac{1.3.5...(2n-1)}{2.4.6.....2n} (x)^n (x > 0)$ | 5 | CO1 | K3 |
| (OR) | | | |
| c. Solve the Differential Equation $y'' - 2xy = 0$ by Power Series Method | 5 | CO1 | K3 |
| d. Verify the Series is Convergent or Divergent $\sum_{n=0}^{\infty} \frac{(20+30i)^n}{n!}$ | 5 | CO1 | K3 |
| 3.a. Evaluate $\oint_C \vec{F} \cdot d\mathbf{r}$ where the $\vec{F} = [y^2, -x^2]$ and the curve C is $y = 4x^2$ from (0,0) to (1,4) | 5 | CO2 | K3 |
| b. Prove that Curl grad f=0 | 5 | CO2 | K3 |
| (OR) | | | |
| c. Find the Directional derivative of f at point P in the direction of vector $\vec{a}$ where $f = x^2 + 3y^2 + 4z^2$ P: (1,0,1) $\vec{a} = -i - j + k$ | 5 | CO2 | K3 |
| d. Evaluate $\oint_C \vec{F} \cdot d\mathbf{r}$ by Green's theorem where $\vec{F} = \frac{e^y}{x}i + (e^y \ln x + 2x)j$ | 5 | CO2 | K3 |
| where R: $1 + x^4 \leq y \leq 2$ & $-1 \leq x \leq 1$ | | | |
| 4.a. Find an Analytic function whose Real part is $e^x \cos y$ | 5 | CO3 | K3 |
| b. Find the image of the curve $x^2 + y^2 = 16$ under the mapping $w = \frac{1}{z}$ | 5 | CO3 | K3 |
| (OR) | | | |
| c. Find the Linear Fractional Transformation (LFT) which maps the points i,-i,0 onto 0, ∞ , -1 respectively . | 5 | CO3 | K3 |
| d. Find the image of the infinite strip $\frac{1}{4} \leq y \leq \frac{1}{2}$ under the mapping $w = \frac{1}{z}$ | 5 | CO3 | K3 |
| 5.a. Find the Laurent series of $\frac{1}{(z-1)(z-3)}$, in the region $1 \leq z \leq 3$ | 5 | CO4 | K3 |
| b. State and prove Cauchy's Integral theorem. | 5 | CO4 | K3 |

(OR)

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|------|--|---|-----|----|
| c. | Evaluate $\oint \frac{e^z+z}{z^3-z} dz$ where $C: z = \frac{\pi}{2}$ by residue theorem. | 5 | CO4 | K3 |
| d. | Expand $f(z) = e^{2z}$ at $z = 1$ by using Taylor series | 5 | CO4 | K3 |
| 6.a. | Obtain the Fourier series for $f(x) = x^3$ in the interval $-\pi < x < \pi$. | 5 | CO5 | K3 |
| b. | Find the Half range cosine Series of $f(x) = x^2$ in the interval $0 < x < \pi$ | 5 | CO6 | K3 |

(OR)

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|----|--|---|-----|----|
| c. | Evaluate $\oint_C \operatorname{Re} z^2 dz$, where C is a boundary of square with vertices $0, 1, 1+i, i$ (ccw) | 5 | CO5 | K3 |
| d. | Find the Half range sine Series of $f(x) = x^3$ in $0 < x < 1$ | 5 | CO6 | K3 |

--- End of Paper ---