MAR ATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM – 686 666.
(GOVERNMENT AIDED AUTONOMOUS ENGINEERING COLLEGE)

DEPARTMENT OF MATHEMATICS

SECOND SESSIONAL EXAMINATION, OCTOBER 2026

B24MA2T03A - COMPLEX VARIABLES & APPLICATIONS OF PDE
SEMESTER III (ME-A, EE-A)

Time : 1.5 Hours **Maximum marks: 40**

PART-A

Answer All Questions

1.	Find the steady state temperature distribution in a rod of length 30 cm if the ends are kept at 10^0C and 100^oC.	**CO3**	**3 Marks**
2.	Prove that $f(z) = e^z$ is analytic and find its derivative $f'(z)$.	**CO3**	**3 Marks**
3.	Find the real and imaginary part of the function $f(z) = \frac{1}{1+z}$ and hence find the image of $1 - i$.	**CO4**	**3 Marks**
4.	Check the continuity of the complex function $f(z)$ at $z = 0$ where $f(z) = \begin{cases} \lvert z\rvert^2 Im\left(\frac{1}{z}\right) & if \quad z \neq 0 \\ 0 & if \quad z = 0 \end{cases}$	**CO4**	**3 Marks**

PART–B

Answer All Questions.

5.(a)	Find the temperature $u(x,t)$ in a homogeneous rod of length 2 m where ends are kept at 0^oC and its initial temperature is given by $f(x) = 2x - x^2;\ 0 \leq x \leq 2$.	**CO3**	**7 Marks**
(b)	Solve $u_t = c^2 u_{xx}$ with the conditions $u(0,t) = 0$ and $\frac{\partial u}{\partial x}(l,t) = 0$ and $u(x,0) = x$.	**CO3**	**7 Marks**
6.(a)	Verify whether the function $u = x^3 - 3xy^2$ is harmonic and find its harmonic conjugate v.	**CO4**	**7 Marks**
(b)	Show that the analytic function $f(z) = u + iv$ is constant if $\lvert f(z)\rvert$ is constant.	**CO4**	**7 Marks**

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Excellence in education through resource integration.

Mission

The institution is committed to transform itself into a centre of excellence in Technical Education upholding the motto"Knowledge is Power". This is to be achieved by imparting quality education to mould technically competent professionals with moral integrity, ethical values and social commitment, and by promoting innovative activities in the thrust areas emerging from time to time.

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