



Bangladesh Army University of Engineering & Technology (BAUET)

Department of Computer Science and Engineering

Second Year Fourth Semester (16th Batch), Summer-2024

Course Code: MATH - 2247

Course Title: Complex Variable and Laplace Transformation

Class Test-02

Full Marks: 15

Time: 30 Minutes

N.B.: 1. Figures shown in the right margin indicate full marks. 2. Answer any **Three** questions **including Q.1 & Q.3.**

- Q.1** What do you understand by analytic function? 2
- Q.2** Analyze the nature of the function $v = 3xy^2 + 4y^2 - x^3$ as it is harmonic or not. If at all possible, determine its harmonic conjugate u such that $f(z) = u + iv$ is analytic and hence find the corresponding analytic function $f(z)$ in terms of z . 2+2+2
- Q.3** If possible, verify that the function $f(z) = u + iv$, where $f(z) = \begin{cases} \frac{x^3 y^4 (x + iy)}{x^6 + y^8}, & z \neq 0 \\ 0, & z = 0 \end{cases}$ is continuous and that Cauchy-Riemann equations are satisfied at the origin, yet $f'(z)$ does not exist there. 2+3+2
- Q.4** If possible, prove that, $u = x^2 - xy^2$ and $v = x^2 y - y^2$ both u and v satisfy Laplace's equation but $u + iv$ is not analytic function of z . 2+2+2