

B. Sc. Engg.(EE) 2nd Sem.
B. Sc. TE(2-Yr) 2nd Sem.

Date: January 20, 2021 (Morning)

ISLAMIC UNIVERSITY OF TECHNOLOGY(IUT)
ORGANISATION OF ISLAMIC COOPERATION(OIC)

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Semester Final Examination
Course No. Math 4221/Math 4629
Course Title: Mathematics III

Summer Semester A. Y. 2019-2020
Time : 90 minutes
Full marks : 75

There are **4(four)** questions. Answer **any 3(three)** questions. All questions carry equal marks. Programmable calculators are not allowed.

1. a) Find all the roots of $(4 + 4\sqrt{3} i)^{\frac{1}{7}}$ and locate them in the complex plane.
b) Determine the region of the w-plane into which the region bounded by $x=1$, $y=1$ and $x+y=1$ is mapped by the transformation $w=3z$.
2. a) Derive Cauchy–Riemann equations $u_x = v_y$ $u_y = -v_x$. Find Laplace's equations for u and v from these equations.
b) For the harmonic function $u = 3x^2y + 2x^2 - y^3 - 2y^2$ find its harmonic conjugate v and express $u+iv$ as an analytic function of z . Is the function $e^{-2xy} \cos(x^2 - y^2)$ harmonic?
3. a) State Cauchy's residue theorem.
Evaluate $\int_C \frac{1}{(z^2 + 9)^6} dz$ over the circular path $|z + 4i| = 2$.
b) The following data regarding the heights (Y) and weights (X) of 100 students are given.
 $\sum X = 15000$ $\sum Y = 6800$ $\sum X^2 = 2272500$ $\sum XY = 1022250$ $\sum Y^2 = 463025$
Find (i) the regression line of weight on height (ii) Correlation coefficient between X and Y.
4. a) Twenty percent of the tools produced in a certain manufacturing process turn out to be defective. Find the probability that in a sample of 12 tools chosen at random (i) more than ten (ii) at least one will be defective

by using binomial distribution and Poisson's distribution.

- b) The mean breaking strength of a ropes manufactured by a company is 1300N and a standard deviation 100N. The company applied a new manufacturing process and claimed that the breaking strength has been increased. For this a sample of 35 ropes is tested and mean breaking strength is found to be 1325N. Can we support the claim at the 0.05 significance level ?