International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination Spring 2020 | Program: B.Sc. Engg. (EEE)
Course Code: **Math-2409** | Course Title: **Mathematics IV**
Time: **5 hours** (Writing - **4 hours 30 minutes** + **30 minutes** submission time) | Full Marks: **50** (**Written** 30 + **Viva**/**Viva-Quiz**-20)

[Answer each of the questions **(1-5)** from the followings; Figures in the right margin indicate full marks.**]**

SET-E

1(a).	Determine the poles and residue of $(z) = \frac{z^3}{(z-A)^4(z-B)(z-C)}$ $at\ z = A$, where A is the any even number from your ID number,B is the fourth digits of your ID number, C is the sum of last two digits of your ID number.	**CO2**	**E**	**3**
1(b).	Evaluate $\int_0^{2\pi} \frac{d\theta}{P-Qcos\theta}$ by contour integration in the complex plane, where P the sum of all digits of your ID number is,Q is any even number from your ID number.	**CO1**	**E**	**3**
2(a).	Applying the Laplace transforms, determine the solution of the initial value problem : $Y'' - 4Y' + 4Y = PsinQt,\ Y(0) = 0, Y'(0) = R$,where P is the reverse order of last two digits of your ID number, Q is the sum of all digits of your ID number, R is the square of fourth digits of your ID number .	**CO1**	**Ap**	**3**
2(b).	Evaluate the Laplace transform of $\{t^P sinhQt\}$ where P is the square root of last digit of course code, Q is the sum of last two digits of your ID number. Explain the physical impact of Laplace transform in EEE.	**CO2**	**E, Cr**	**3**
3(a).	Using the convolution theorem to evaluate$L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}, a \neq b$, where b is the sum of all digits of your ID number, a is the any even number which is perfect square. Also explain the similarity of Convolution theorem in EEE.	**CO1**	**E, Cr**	**3**
3(b).	Express the following function in terms of unit step function and find its Laplace transform: $f(t) = \begin{cases} X\ when\ t < D \\ -Y\ when\ t > D \end{cases}$,where D is the fourth digits of your ID number, Y is the sum of all digits of your ID number, X is any odd number. Explain the physical impact of unit step function in EEE.	**CO2**	**U, Cr**	**3**
4(a).	If $f(x) = A + Bx^2 - Cx^3$ for $-\pi < x < \pi$,determine the Fourier expression of f(x) and sketch the graph Where A is the sum of last two digits, B is sum of all digits of your ID number and C is the sum of A, B. Also. Explain the Physical significance of Fourier series in EEE.	**CO2**	**E, Cr**	**3**
4(b).	(i) Develop the complex form of Fourier series from the trigonometry form of Fourier series. (ii)Evaluate the Fourier series of the function defined as: $f(x) = \begin{cases} -\ Q\ for -\ \pi < x < -\frac{\pi}{2} \\ 0\ \ for\ -\frac{\pi}{2} < x < \frac{\pi}{2} \\ P\ \ for\ \ \frac{\pi}{2} < x < \pi \end{cases}$, where P is the sum of all digits of your ID number, Q is the any even number.	**CO1**	**Cr, E**	**3**
5(a).	Evaluate the Fourier sine and cosine transform of : $f(x) = \frac{1}{Ax} + e^{Bx}$,where B is any number which is not perfect square, A is the sum of last two digits of your ID number.	**CO2**	**E**	**2**
5(b).	Compute the Fourier transform of $f(x) = \begin{cases} 1 + \frac{x}{m} x for -m < x < 0 \\ 1 - \frac{x}{m}\ \ for\ 0 < x < m \\ 0 \qquad otherwise \end{cases}$,where m is the sum of all digits of your ID number.	**CO1**	**Ap**	**2**

5(c).	Evaluate the Z-transform of $\left\{\frac{1}{2^k}\right\}, -C \leq k \leq C$,where C is the sum of all digits of your ID number. Explain the Physical significance of Z-transform in EEE.	**CO1**	**E, Cr**	**2**
6.	Viva/Viva-Quiz: The time of viva/viva-quiz will be declared in Google classroom.			**20**