International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Assignment Test Autumn-2020	Program: B.Sc. Engg. (EEE)
Course Code: **MATH-2309**	Course Title: **Math-III**
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 following: Figures in the right margin indicate full marks.**]**

SET-A

1(a).	The square matrix is defined $\mathcal{K} = \begin{pmatrix} -b & (a+1)-3i & 3+i \\ (a+1)-3i & 3 & 3-2i \\ 3-i & 3+2i & 5 \end{pmatrix}$. Then justify that it is a Skew-Hermitian Matrix. Where a is the last digit, and bs is the second last of your metric ID.	**CO1**	**E**	**02**
1(b).	The matrix is labeled $\mathcal{A} = \begin{pmatrix} \frac{1}{2} & 1 & l+m \\ \frac{2}{3} & 1 & -1 \\ 1/5 & 1 & 2 \end{pmatrix}$.Then establish its Inverse matrix by applying the Gauss-Jordan method. Where l is the last digit, and ms is the second smallest digit of your metric ID.	**CO2**	**Ap**	**04**
2(a).	The provided matrix is $\mathcal{B} = \begin{pmatrix} \frac{3}{2} & r & \frac{1}{3} \\ -\frac{1}{3} & 1 & -1 \\ 5 & -1 & \frac{1}{3} \end{pmatrix}$. Verify the Callely Hamilton theorem, then determine the inverse matrix of $\mathcal{B}$. Where r is the second odd digit of your metric ID, if there is no odd digit in your ID, then r will be the total number of your metric ID.	**CO1**	**Ap**	**04**
2(b).	If $\mathcal{A} = \begin{pmatrix} \frac{1}{4} & m \\ -2 & \frac{1}{3} \end{pmatrix}$ find out its Eigenvalues and Eigenvectors. Where m is the second even digit of your metric ID, if there is no even digit in your ID, then m will be the largest digit of your metric ID.	**CO1**	**E**	**02**
3(a).	Obtain the parallelepiped volume if $a = -\boldsymbol{i} + 7\boldsymbol{j} + \boldsymbol{mk}, \boldsymbol{b} = -\boldsymbol{i} + 7\boldsymbol{j} - \boldsymbol{nk}$ and $\boldsymbol{c} = \boldsymbol{7i} - \boldsymbol{5j} - \boldsymbol{pk}$ are the three co-terminus edges the parallelepiped. Where m is the last digit of your metric ID, n is the greatest digit of your ID, and p is the second digit of your ID.	**CO1**	**R**	**02**
3(b).	If $\vec{r} = a(\sin\omega t)\hat{\imath} + b(\sin\omega t)\hat{\jmath} + \frac{ct}{\omega^2}(\sin\omega t)\hat{k}$, then prove that $\overrightarrow{\frac{d^2r}{dt^2}} + \omega^2\,\vec{r} = \frac{2c}{\omega}(\cos\omega t)\hat{k}$	**CO2**	**E**	**04**
4(a).	If $\vec{\mathcal{A}} = x^2z^4\,\hat{\imath} - ly^3z^2\,\hat{\jmath} + xy^2z\,\hat{k}$, prove that,	**CO2**	**Ap**	**03**

	$\nabla \times \left(\nabla \times \vec{\mathcal{A}}\right) = \nabla\left(\nabla \cdot \vec{\mathcal{A}}\right) - \nabla^2 \vec{\mathcal{A}}$, at the point $(l, -2, 2)$ Where l is the largest digit of your metric ID.			
4(b).	If $\vec{F} = (x^2 + y^2)\hat{\imath} - 2xy\hat{\jmath}$, and C is the rectangle defined in the xy plane with the boundary $y = 0, x = a, and\ x = 0\ to\ y = 4 - b, hence$ Evaluate $\int_C \vec{F} \cdot \overrightarrow{dr}$. Where a is the last digit, and b is the first digit of your ID.	**CO2**	**E**	**03**
5(a).	Verify Green's theorem for $\oint_C [(x - y)dx + (a + 1)xydy]$, where C is the boundary, and it is defined by $x^2 = 4y$ and the line $y^2 = 4x$. Where a is the last digit of your metric ID.	**CO2**	**E**	**05**
5(b).	Explain the Divergence theorem.	**CO2**	**U**	**01**
6.	Viva/Viva-Quiz: Time of viva/viva-quiz will announce later in google classroom.			**20**