International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Assignment Test Autumn-2020   **Program: B.Sc. Engg. (EEE)**

Course Code: **EEE-3621**   Course Title: Engineering Electromagnetism

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 from the followings; Figures in the right margin indicate full marks. **Answer script must be submitted through online method within 5 hours from starting time. Also, write down the Q. Set on the front page of your answer script]**

Don't blindly copy any answer from book/internet/friend. There is serious penalty for plagiarism. A straight zero will be given for the cause. Please write from your own understanding.

Question Distribution Procedure	
Last digit of Student ID	**SET Number**
Even	**SET-A**
Odd	**SET-B**

Q. Set-B

1(a).	What is the inconsistency in Ampere's Law? How it is rectified by Maxwell?	CO1	U	02
1(b).	Derive the expression for the magnetic field intensity inside and outside a coaxial conductor of inner radius "a", outer radius "b", and carrying a current of "I" amperes in the inner and outer conductors.	CO2	An	02
1(c).	A medium like copper conductor which is characterized by the parameters $\sigma = 5.8 \times 10^7$ mho/m, $\mu_r = 1$, $\varepsilon_r = 1$ supports a uniform plane wave of frequency 60 Hz. Determine, attenuation constant, propagation constant, Intrinsic impedance, wavelength and phase velocity of wave.	CO3	Ev	02
2(a).	Show that the total power flow along a coaxial cable will be given by the surface integration of the pointing vector over any closed surface.	CO1	Ap	02
2(b).	Derive the Maxwell's equations in both point and integral forms from Farday's law of electromagnetic induction.	CO2	An	02
2(c).	Calculate the depth of penetration in copper at 2MHz, given the conductivity of copper $\sigma = 5.8 \times 10^7$ *S/m* and its permeability $= 1.26$,*uH/m.*	CO3	Ev	02

3(a).	Define phase velocity and group velocity.	**CO1**	**R**	**01**
3(b).	The electric field in the free space is given by, $E = 50\cos(108t+\beta x)\,\mathbf{a_y}$ V/m. Determine i. the direction of propagation ii. β and time it takes to travel a distance of $\lambda/2$.	**CO3**	**Ev**	**02**
3(c).	Analyze the wave behavior at boundaries under oblique incidence and derive the Brewster's angle.	**CO2**	**An**	**03**
4(a).	What is a distortion less transmission line? Is every loss less line is a distortion less line? Justify.	**CO1**	**Ev**	**01**
4(b).	Starting from the equivalent circuit, derive the transmission line equations for V and I, in terms of the source parameters.	**CO2**	**An**	**02**
4(c).	A transmission line of length 0.4λ has a characteristic impedance of 75Ω and is terminated by a load impedance of $100+j150$ ohm , by using smith chart Determine, i. voltage reflection coefficient ii. VSWR iii. Input impedance of the line	**CO3**	**Ev**	**03**
5(a).	Why TEM wave cannot be propagated in Rectangular waveguides?	**CO1**	**U**	**01**
5(b).	What is wave impedance? Derive the expression for wave impedance for TM waves.	**CO2**	**U, An**	**03**
5(c).	Derive the expression for wave impedance for TE waves propagating between rectangular waveguide.	**CO2**	**An**	**02**
6.	Viva/Viva-Quiz: The time of viva/viva-quiz will be declared in Google classroom.	**CO1**	**R**	**20**