International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Assessment of 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.

Q. Set-A

1(a).	Why an isolated magnetic pole is not possible? What is the inconsistency in Ampere's Law? How it is rectified by Maxwell?	**CO1**	**An, U**	**02**
1(b).	Explain the equation of electromotive force when motional induction and transformer induction both are present. What is the magnetic field at the center of the conductor when the conductor is subjected to a current of 9A and with infinite radius?	**CO2**	**Ap, An**	**02**
1(c).	A 3-cm long solenoid carries a current of 390 mA. If the solenoid is to produce a magnetic flux density of 5 mWb/m^2, how many turns of wire are needed?	**CO3**	**E**	**02**
2(a).	A TEM is propagating along $z-axis$. If the electric and magnetic fields are E and H, respectively; find $E(x,y,z)\ and\ H(x,y,z)$.	**CO2**	**An**	**02**
2(b).	Derive the expression for the attenuation constant, phase constant, and intrinsic impedance for a uniform plane wave in a good conductor.	**CO2**	**An**	**02**
2(c).	In free space, $H = 0.1\ \cos(2\times10^8 t - kx)a_y\ A/m$. Calculate- a. $k, \lambda\ and\ T$ b. The time it takes the wave to travel $\lambda/8$	**CO3**	**E**	**02**
3(a).	A wave incidents normally from medium A to medium B. Derive the reflection $co-efficient$, Γ for electric field from incident, reflected and transmitted wave.	**CO1**	**Ap**	**02**
3(b).	Derive Snell's Law from oblique incidence of wave.	**CO2**	**Ap**	**02**
3(c).	Find the reflection $co-efficient$, Γ for a normally incidental (air to glass surface in z=0 plane) light with a wavelength of 600 nm. The relative permittivity of glass is 2.25.	**CO3**	**E**	**02**
4(a).	What is a distortion-less transmission line? Is every loss less line is a distortion less line? Explain your opinion.	**CO1**	**An**	**01**
4(b).	Derive time-harmonic transmission line equations.	**CO2**	**An**	**02**
4(c).	A transmission line of length 0.4λ has a characteristic impedance of 100 and is terminated by a load impedance of 200+j180 ohm, by using smith chart Determine, i. voltage reflection coefficient ii. Input impedance of the line iii. VSWR	**CO3**	**E**	**03**

5(a).	What do you understand by guided media in case of wave propagation? Why TEM wave does not exist in rectangular waveguide?	**CO1**	**R**	**02**
5(b).	For Transverse electric waves, show that the fundamental mode is TE_{10} for rectangular waveguide media.	**CO2**	**An**	**02**
5(c).	A 2-cm by 3-cm waveguide is filled with a dielectric material with $\varepsilon_r = 4$. If the waveguide operates at 20 GHz with TE_{10} mode, find the cutoff frequency.	**CO2**	**Ap**	**02**
6.	Viva/Viva-Quiz: The time of viva/viva-quiz will be declared in Google classroom.	**CO4**	**R**	**20**