International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination Spring-2020	Program: B.Sc. Engg. (EEE)
Course Code: **EEE-4807**	Course Title: **High Voltage Engineering**
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]**

Q. Set-B

1(a).	What are electronegative gases? Electronegative gases useful for practical use as insulants when compared to other gases-justify?	**CO1**	**R, Ev**	**02**
1(b).	Derive an expression for the current in the air gap $\mathbf{I = I_o e^{\alpha d}}$ considering Townsend first ionizing coefficient. [where symbols have their usual meaning.]	**CO1**	**An**	**03**
1(c).	A solid specimen of dielectric has a dielectric constant of 4.2, and $\tan\delta = 0.001$ at a frequency of 50 Hz. If it is subjected to an alternating field of 50 kV/cm, calculate the heat generated in the specimen due to the dielectric loss.	**CO1**	**Ev**	**01**
2(a).	Why is controlled triggering required in an impulse generator? Explain the operation of a trigatron gap.	**CO1**	**Cr**	**02**
2(b).	With the help of a neat diagram explain how impulse voltage can be developed in the laboratory by Marx circuit arrangement.	**CO1**	**Cr**	**03**
2(c).	A 12-stage impulse generator has 0.12μF capacitors. The wavefront and wave tail resistances connected are 800Ω and 5000Ω respectively. If the load capacitor is 1000 pF, determine, the front and tail times of the impulse wave produced.	**CO1**	**Ev**	**01**
3(a).	A generating voltmeter has to be designed so that it can have a range from *20 to 200KV DC*. If the indicating meter reads a minimum current of *2μA*and maximum current *25μA*, what should be the capacitance of the generating voltmeter be?	**CO2**	**Ev**	**02**
3(b).	Explain capacitive voltage transformer with its schematic representation, equivalent circuit, and phasor diagram.	**CO2**	**Cr**	**02**
3(c).	A peak reading voltmeter is required to measure voltage up to 150 kV. The peak voltmeter uses an RC circuit, a microammeter and a capacitance potential divider. The potential divider has a ratio of 1200 : 1 and the micrometer can read up to 10 A. Determine the value of R and C if the time constant of RC circuit is 8 secs.	**CO2**	**Cr**	**02**
4(a).	Explain the different aspects of insulation design and insulation co-ordination adopted for EHV systems.	**CO3**	**Cr**	**03**
4(b).	Explain the procedure for constructing Volt-time curves with neat sketch. Give its significance in power system studies	**CO3**	**Cr, U**	**03**

5(a).	Explain Simpson's theories of charge formation in the cloud.	**CO3**	**Cr**	**02**
5(b).	Explain the lightning mechanism including stepped leader stroke and power return stroke with the appropriate diagram.	**CO3**	**Cr**	**03**
5(c).	A transmission line of surge impedance 250 ohm is connected to a cable of surge impedance 50 ohms at the other end, if a surge of 400 kV travels along the line to the junction point; Determine, the voltage build at the junction.	**CO3**	**Ev**	**01**
6.	Viva-Quiz: The time of viva-quiz will be declared in google classroom.	**CO4**	**R**	**20**

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