International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Assessment Autumn 2020	Program: B.Sc. Engg. (EEE)
Course Code: **EEE 2303**	Course Title: **Electrical Machine I**
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-B

1(a).	Derive the emf equation of DC generator? What is the difference between lap wound and wave wound generator?	**CO2**	**U,U**	**2**
1(b).	Classify the self-excited DC generator and draw the circuit diagram of each type.	**CO2**	**An**	**2**
1(c).	A shunt generator delivers **XXX** A at **ZZZ** V and the resistance of shunt field and armature are 50Ω and 0.03 Ω respectively. Calculate the generated emf. **XXX** is the last three digit of your ID and **ZZZ** is the 1st three digits of your ID.	**CO3**	**E**	**2**
2(a).	Draw the characteristics curve of the dc generator for i) No load Characteristics ii) External Characteristics.	**CO2**	**Ap**	**2**
2(b).	Briefly describe the losses of DC generator.	**CO2**	**U**	**2**
2(c).	The open circuit characteristics of a d.c shunt generator driven at rated speed is as follow: Field Amperes: 0.5 1.0 1.5 2.0 2.5 3.0 3.5 Induced Voltage: 60 120 138 145 149 151 152 If the resistance of the field circuit is adjusted to **yy** Ω, calculate the open circuit voltage and load current when the terminal voltage is **rrr**V. Neglect armature reaction and assume an armature resistance of 0.1 Ω **yy is the 1st two digit of your ID and rrr is the last three digit of your ID.**	**CO3**	**Ap**	**2**
3(a).	A DC motor takes an armature current of XXXA at ZZZV. The armature circuit resistance is 0.2Ω. The machine has 6 pole and armature is lap connected with 864 conductors. The flux per pole is .05Wb. Calculate the i) Speed and ii) Gross torque develop by the armature. ZZZ is the 1st three digit of your ID and XXX is the last three digit of your ID.	**CO3**	**E**	**2**
3(b).	Explain the back emf of DC motor with an equation.	**CO2**	**U**	**1**
3(c).	Which factors are influencing to the speed of DC motor? Explain the armature rheostatic control methods of DC shunt motor with diagram.	**CO1**	**U**	**3**
4(a).	Differentiate between Conduction motor and Induction motor.	**CO1**	**An**	**1**
4(b).	Explain the production of rotating magnetic field in case of **three phase** supply in an induction motor.	**CO2**	**E**	**3**
4(c).	A 4-pole 3-phase induction motor operates from a supply whose frequency is 60 Hz. Calculate (i) synchronous speed of the rotor, (ii) actual speed of the rotor when slip is xx%, (iii) frequency of the rotor current when speed is ZZZ rpm. xx is the last two digit of your ID and ZZZ 1st three digit of your ID.	**CO3**	**Ap**	**2**
5(a).	Draw the equivalent circuit of an induction motor by showing mechanical load as an electrical equivalent.	**CO2**	**Ap**	**2**
5(b).	Show that the no load tests of induction motor is analogous to the open circuit test of transformer and the block rotor test is equivalent of short circuit test.	**CO1**	**Ap**	**3**
5(c).	How G_0 and B_0 can be found from induction motor?	**CO2**	**U**	**1**
6.	Viva/Viva-Quiz: The time of viva/viva-quiz will be declared in Google classroom.			**20**