# International Islamic University Chittagong
## Department of Electrical and Electronic Engineering

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| 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-A**

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| **1(a).** | Which type of DC generator produce constant voltage? What is the condition for voltage buildup of that 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.<br>**XXX** is the 1st three digit of your ID and **ZZZ** is the last three digits of your ID. | **CO3** | **E** | **2** |
| **2(a).** | Draw the characteristics curve of the DC generator for<br>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 DC shunt generator driven at rated speed is as follow:<br>Field Amperes: 0.5 1.0 1.5 2.0 2.5 3.0 3.5<br>Induced Voltage: 60 120 138 145 149 151 152<br>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<br>**yy is the last two digit of your ID and rrr is the 1st three digit of your ID.** | **CO3** | **Ap** | **2** |
| **3(a).** | A **xxx** V-shunt motor has armature resistance of 0.8Ω and field resistance of **zzz** Ω. Determine the back emf when given an output of 7.46kW at 85% efficiency.<br>**xxx is the last three digit of your ID and zzz is the 1st three digit of your ID.** | **CO3** | **E** | **1.5** |
| **3(b).** | How does back emf produce in a DC motor? | **CO2** | **U** | **1.5** |
| **3(c).** | Which factors are influencing to the speed of DC motor? Explain the flux 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.<br>**XX** is the 1st two digit of your ID and **ZZZ** is the last three digits 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** |