

International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Assessment of 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 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]**

Question SET Selection Process:

****Please show the **Calculation of Question SET Selection** at the 1st page of answer sheet. ****

LDI= x =Last digit of student ID

[For Question **SET** Selection: (Last digit of Student ID= x)+(the Digit before last digit of Student ID= y)= Z . If Z is **even** your Question **SET-A** and If Z is **odd** your Question **SET-B** If the value of $Z=0$, answer **Question SET-B**.

Example: for St. ID =ET 201015; St. last digit of ID= x ; and the digit before last digit of ID is $=5=y$; So, $Z=(x+y)=(1+5)=6$. Here, 6 is an **even** number. So you have to Answer **Question SET-A**.]

Q. SET-A

SL.	Question	Course Outcome	Bloom's Level	Marks																
1(a).	A d.c. motor also can operate as d.c. generator-how?- Explain with necessary diagrams.	CO2	An	02																
1(b).	“The shunt generator will build up voltage only if field circuit resistance is less than critical field resistance”- Justify the statement.	CO2	An	02																
1(b).	In a 120 V compound generator, the resistance of the armature, shunt and series windings are 0.06 Ω , 25 Ω and 0.04 Ω respectively. If the load current is I_A , find the induced e.m.f. and the armature current when the machine is connected as (i) long shunt and as (ii) short shunt. Neglect brush contact drop and armature reaction. Here, the value of ‘I’ is 100 times of the summation of last two digits of your roll number.	CO2	E	02																
2(a).	Suppose, our whole power supplied from a DC grid. If the load increased substantially then how you will connect a new DC generator with existing system? Illustrate with suitable example and net sketch.	CO3	Ap	03																
2(b).	The open circuit characteristics of a DC shunt generator driven at rated speed is as follow: <table border="1" style="width: 100%; border-collapse: collapse; margin: 5px 0;"> <tr> <td style="width: 15%;">Field amperes:</td> <td>0.5</td> <td>1.0</td> <td>1.5</td> <td>2.0</td> <td>2.5</td> <td>3.0</td> <td>3.5</td> </tr> <tr> <td>Induced Voltage:</td> <td>60</td> <td>120</td> <td>138</td> <td>145</td> <td>149</td> <td>151</td> <td>152</td> </tr> </table> If the resistance of the field circuit is adjusted to 50 Ω , calculate the open circuit voltage and load current when the terminal voltages is V Volt. Neglect armature reaction and assume an armature resistance of 0.1 Ω . Please use proper scaling for drawing graph. Here, the value of ‘V’ is 20 times of the summation of last two digits of your roll number"	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	CO3	E	03
Field amperes:	0.5	1.0	1.5	2.0	2.5	3.0	3.5													
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3(a).	“The presence of back e.m.f makes the d.c. motor a self-regulating machine”- Justify the statement with proper sketch.	CO3	An	02
3(b).	If you need a constant speed d.c. motor, then what type of motor you will use and why? Illustrate with suitable figures.	CO3	R,An	02
3(c).	A shunt generator has a full load current of 195 A at 220 V. The stray losses are 700 W and the shunt field coil resistance is R Ω . If it has a full load efficiency of 80%, find the armature resistance. Also find the load current corresponding to maximum efficiency. <i>Here, the value of ‘R’ is 10 times of the summation of last two digits of your roll number.</i>	CO3	E	02
4(a).	Why a DC motor is called a conduction motor and AC motor is called an Induction Motor (IM)? Describe with suitable diagram.	CO3	An	02
4(b).	Why single phase IM is not self-starting? Clarify with double field revolving theory.	CO3	An	03
4(c).	A 3-phase induction motor is wound for 4-poles and is supplied from 50 Hz system. Calculate the synchronous speed.	CO3	E	01
5(a).	“The transfer of energy from stator to rotor in an Induction motor is similar to transfer of energy from primary to secondary coil of a transformer” – Justify the statement with suitable diagram.	CO2	An	02
5(b).	What is the other name of short circuit test? Discuss shortly with diagram.	CO2	R,An	02
5(c).	In a no-load test, an induction motor took I A and 900 watts with a line voltage of 220V. If stator resistance/phase is 0.05 Ω and friction and windage losses amount to 150 watts, calculate the exciting conductance and susceptance/phase. <i>Here, the value of ‘I’ is 10 times of the summation of last two digits of your roll number.</i>	CO2	E	02
6.	Viva/Viva-Quiz: The time of viva/viva-quiz will be declared in google classroom and other online platform.	CO1	R,U, An	20