

International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Assessment of Autumn-2020	Program: B.Sc. Engg. (EEE)
Course Code: EEE- 4843	Course Title: Renewable Energy System
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 15101**5**; St. last digit of ID= $1=x$; 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).	Consider that PBDP want to install a 2 MW solar power plant. Which area you will select to get maximum power and why? What type of technique you will apply to get maximum power from this power plant? Give a proper clarification regarding your choice.	CO2	An	03
1(b).	Design a PV system including WP rating and battery Ah capacity for a Solar Home System (SHS) in Chittagong city. Data given are as follows: Five 15 W fluorescent lamp for 7 hours per day, two 25 W LED TV for 4 hours per day, one microwave oven of 1 kW for 1 hour per day, one computer of 250 W for 3 hours per day, two Refrigerators of 100 W for 12 hours per day, Deep discharge (75%) battery is used, Continuous cloud for 5 days. Also, Consider PV module (80 Wp) efficiency is E% and terminal voltage is 12 V. Here, the value of 'E' is 10 times of the summation of last two digits of your roll number.	CO2	E	03
2(a).	"Electrical Energy Storage (EES) will reduce the energy cost and increase the security of power"- Justify the statement with logical argument.	CO2	An	03
2(b).	What type of EES can be selected for the designing of 1(b)? Give proper clarification.	CO2	An	01
2(c).	A solar cell at 280k has $V_{oc} = 0.60V$, Isc A, $n = 1.3$. Calculate Form Factor (F.F) under following conditions: (i) $R_s = 0.085\Omega$, $R_{sh} = \text{large}$, (ii) $R_s = 0\Omega$, $R_{sh} = 1.1\Omega$, (iii) $R_s = 0.085\Omega$, $R_{sh} = 2\Omega$, (iv) $R_s = 0.02\Omega$, $R_{sh} = 1\Omega$. Here, the value of 'Isc' is the summation of last two digits of your roll number.	CO3	E	02

3(a).	Suppose that you are working as a PDB engineer. You have given an assignment to setup a 1MW wind farm. What parameters you should consider and what type of wind turbine(WT) you will select ? Give and narrate some specific logics for WT selection.	CO3	An	03
3(b).	A 30-m, three bladed wind turbine produces P kW at a wind speed of 14 m/s. Air density is the standard 1.225 kg/m ³ . Under these conditions: i. At what rpm does the rotor turn when it operates with a TSR of 4.0? ii. What is the tip speed of the rotor? iii. If the generator needs to turn at 1500 rpm, what gear ratio is needed to match the rotor speed to the generator speed? iv. What is the efficiency of the complete wind turbine (blades, gear box, generator) under these conditions? <i>Here, the value of 'P' is 100 times of the summation of last two digits of your roll number.</i>	CO3	E	03
4(a).	Is there any possibility to harness energy in Bangladesh from OTEC? Suggest a suitable technology and describe with net sketch.	CO3	Ap	03
4(b).	Suppose that a NEG Micon 700/48 (700-kW generator, 48-m rotor) wind turbine is mounted on a 50-m tower in an area with v -m/s average winds at 10m height. Assuming standard air density, Rayleigh statistics, Class 1 surface roughness, and an overall efficiency of 35%, estimate the annual energy (kWh/yr) delivered. <i>Here, the value of 'v' is the summation of last two digits of your roll number.</i>	CO3	E	03
5(a).	Describe the Geo-Thermal Energy scenario in Bangladesh and select a suitable place for geo thermal power plant. Suggest and describe an appropriate types of geo thermal power plant for your suggested area with net sketch.	CO1	R,An	04
5(b).	How ocean tied generate the electrical power? Derive a mathematical relation for tidal generator.	CO1	An	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