Remote End Semester Examination (Winter, 2020-21)
Course: EE100 Basic Electrical Engineering

Full Marks: 80 **Date: 23/08/2021**
Writing Time: 11:30 AM-12:30 PM **Scan & Upload Time: 12:30-12:45 PM**

Instructions:

1. *Attempt **ALL** the questions.*
2. *The symbols have usual meanings.*
3. *Use a common Notebook to write the answers.*
4. *All the pages in the answer Notebook should be numbered sequentially.*
5. *On each page, the top margin should contain your Institute ID, Name and Signature.*
6. *Pages without personal details and page number will not be evaluated.*
7. *Answer each question sequentially beginning on a new page.*
8. *Scan the pages and save in pdf format with file name: 202051###.pdf. (For example: 202051123.pdf)*
9. *Upload the file through Google Form shared separately.*
10. *No need to send it as an email attachment.*
11. *Preserve the Notebook and submit it as per office order.*

Q1. A 100 KVA, 1000/100-V single phase transformer has the following test results:

Open-circuit Test (HV side Open)	Short-circuit Test
$V_{OC} = 100\ V$	$V_{SC} = 50\ V$
$I_{OC} = 6.0\ A$	$I_{SC} = 100\ A$
$P_{OC} = 400\ W$	$P_{SC} = 1800\ W$

a) Determine the rated voltage and rated current for high-voltage and low-voltage sides. [10]
b) Determine the voltage regulation at full load with power factor 0.8 lagging. [10]
c) Calculate the efficiency at half load with power factor 0.6 lagging. [10]

Q2. A 240 V separately excited dc motor has an armature resistance $R_A = 0.06\ \Omega$. When connected to 240 V supply, it draws 90 A from the supply and rotates at 1200 rpm.

a) Find the torque developed by the motor at this operating condition. [10]
b) If the developed torque is 280 Nm in an another condition for the same excitation and same supply voltage, then find speed and armature current. [10]

Q3. A 3-Φ, 460 V, 1740 rpm, 60 Hz, four-pole induction motor has the following parameters per phase:

$$R_1 = 0.25\ \Omega, \qquad R'_2 = 0.2\ \Omega.$$
$$X_1 = X'_2 = 0.5\ \Omega, \qquad X_M = 30\ \Omega.$$

The rotational losses and core losses taken together are 1700 Watts.

a) Find starting current when full voltage is applied. [10]
b) Calculate maximum torque developed. [10]
c) Calculate the motor efficiency at full load. [10]
