KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2016/2017 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER
SUPPLEMENTARY/SPECIAL EXAMINATIONS

FOR THE BACHELOR OF RENEWABLE ENERGY AND BIOFUELS TECHNOLOGY

COURSE CODE: **SUT 262**

COURSE TITLE: **ELECTRICAL TECHNOLOGY**

DURATION: 2 HOURS

DATE: 21ST SEPTEMBER 2017 TIME: 3 – 5PM

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of **4** printed pages. Please Turn Over

Question 1

Using diagram explain the difference between a load curve and a load duration curve and why they are important to system operators.

5 *Marks*

a. Explain the working process of a thermal power plant

10 *Marks*

b. Briefly, explain why the efficiency of Thermal Power Plant is Low?

5 *Marks*

Question 2

a. Explain the three ways in which the efficiency of Thermal Plant can be improved based on an ideal reheat Rankine cycle.

10 *Marks*

b. What are the Advantages and Disadvantages of Thermal Power Plant?

6 *Marks*

c. Explain ash disposal section in steam power plant

4 *Marks*

Question 3

a. A coil of resistance R ohms and inductance L henrys is connected in series with a 50μF capacitor. If the supply voltage is 225 V at 50 Hz and the current flowing in the circuit is $1.5\angle -30^{\circ}$A, determine the values of R and L. Determine also the voltage across the coil and the voltage across the capacitor.

10 *Marks*

Question 3

a. A 30 μF capacitor is connected in parallel with an 80 Q resistor across a 240 V, 50 Hz supply. Calculate

(i) the current in each branch,
(ii) the supply current,
(iii) the circuit phase angle,
(iv) the circuit impedance,
(v) the power dissipated and
(vi) the apparent power.

14 *Marks*

b. Determine developed torque and shaft torque of 220-V, 4-pole series motor with 800 conductors wave-connected supplying a load of 8.2 kW by taking 45 A from the mains. The flux per pole is 25 mWb and its armature circuit resistance is 0.6 Ω.

6 *Marks*

Question 4

a. List the five Disadvantages of Diesel Power Plants

4 *Marks*

b. What is meant by load factor and diversity factor?

4 *Marks*

c. The maximum (peak) load on a thermal power plant of 120 MW capacity is 80 MW at an annual load factor of 65%. The loads having maximum demands of 25MW, 20 MW, 8 MW and, 5MW are connected to the power station. Determine (i) Average load on power station (ii) Energy generated per year (iii) Demand factor (iv) Diversity factor.

12 *Marks*

Question 5

a. Use a diagram to describe the working principle of Internal Combustion and Spark Ignition engine.

10 *Marks*

b. A diesel engine develops 300 H.P. to overcome friction and delivers 1200 BHP. Air consumption is 120 kg per minute. The air-fuel ratio is 12 to 1. Find the following:

(i) IHP, (ii) Mechanical efficiency, (iii) Specific fuel consumption.

10 *Marks*

Question 6

a. What are the major components of a Hydroelectric Power Plant?

6 Marks

b. What is the purpose of surge tank in a hydroelectric power plant?

4 *Marks*

c. State and explain the factors to be considered for the selection of a site for the hydro power plant.

10 *Marks*