



THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

**DEPARTMENT OF ELECTRICAL AND COMMUNICATIONS
ENGINEERING**

SECOND SEMESTER EXAMINATION (2021)

EE434 ELECTRICAL ENERGY UTILIZATION

BEEP 4

TIME ALLOWED: 2 HOURS

INFORMATION FOR STUDENTS:

- You have TEN (10) minutes to read the paper. You must NOT begin writing during this time.
- All answers must be written in the ANSWER BOOK supplied. COMPLETE THE DETAILS REQUIRED ON THE FRONT COVER OF YOUR ANSWER BOOK. DO THIS NOW.
- Drawing instruments and calculators are permitted.
- Answer ALL FOUR (4) questions.
- If you are found cheating in the examination, the penalties specified by the University shall apply.
- Switch OFF all mobile phones.

QUESTION ONE [12+4+4 Marks]

- A. Sketch the block diagram of an electric drive system. Describe each block in terms of its function.

- B. The choice of motor selection is very critical in an electric drive system. State any four (4) criteria that must be considered in selecting the most appropriate motor for an electric drive system.

- C. State two (2) advantages and two (2) disadvantages of electric drives.

QUESTION TWO [10+4+6 Marks]

- A. Draw the circuit diagram of the Shunt Armature Control DC Series Motor and explain step by step the method of speed control of the DC motor.

- B. State four (4) causes of failure of heating elements.

- C. State the difference between *resistance welding* and *arc welding* and name two examples of each type.

QUESTION THREE [6+2+8+4 Marks]

- A. State *Lambert's Cosine Law* and *Inverse Square Law* of illumination.
- B. Define *photometry*
- C. The following are methods used to control light. Explain each one.
- I. reflection
 - II. refraction
 - III. diffusion
 - IV. absorption.
- D. While designing a lighting scheme, what are the three (3) main factors that should be taken into consideration?

QUESTION FOUR [10 Marks]

- A. A room 30×10 m is illuminated by 60 W incandescent lamps of lumen output of 1,600 lumens. The average illumination required at the workplace is 300 lux. Calculate the number of lamps required to be fitted in the room. Assume utilization and depreciation factors as 0.5 and 1, respectively.