



SCHOOL OF COMPUTING AND ENGINEERING SCIENCES
BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONICS ENGINEERING
1ST SEMESTER 2022/2023 - UNIVERSITY EXAMINATION
BEE 2302: PCB Design and Fabrication

DATE: 26th JULY, 2023

Time: 15:30Hrs – 17.30Hrs

Instructions

Answer **ALL QUESTIONS**.

Answers to questions must be based on the traffic light subsystem PCB designed and fabricated by your group as listed below.

PCB Design and Fabrication.

Pedestrian Crossing Traffic Light Design and Fabrication.

From Subsystems Concept, Subsystem Schematic to Subsystem PCB Design and Fabrication.

1. Group_1 LED Traffic Light, Two Colour Red/Green with 12V input MOSFET LEDs Driver and Camera Sensor.
2. Group_2 LED Two Digit, Two Colour Wait-Red/Go-Green Count Down with 12V input MOSFET LEDs Driver.
3. Group_3 LED Pedestrian, Two Colour Green/Red Animation with 12V input MOSFET LEDs Driver and Buzzer.
4. Group_4 WALK/WAIT, Two Colour, WALK-Green/Red-WAIT with 12V input MOSFET LEDs driver, Push Button for Crossing Request, Microphone, Speaker and Air Pollution Sensor.
5. Group_5 MCU (Atmega328) with wireless communication using LoRa to Back end and local Zigbee with Master Node or Slave Node Configuration.
6. Group_6 Power (From Solar Panel) Battery Charger/Controller, 12V Output, Regulated 5V and 8V to power onboard GSM and GPS modules.

Question 1 (20 Marks)

Draw the schematic of your group design and explain the function of each device.

Question 2 (12 Marks)

Explain the following terms used in PCB Design and Fabrication

- (i) Components footprints
- (ii) Assembly drawing
- (iii) Gerber files

Question 3 (18 Marks)

Explain briefly the following PCB Manufacturing processes

- (i) Film generation
- (ii) Etching
- (iii) Solder Mask
- (iv) Silkscreen
- (v) Surface finish
- (vi) Assembly