**NNAMDI AZIKIWE UNIVERSITY AWKA**

**FACULTY OF ENGINEERING**

**DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING**

**COURSE CODE: ECE 517**

**COURSE TITLE: REAL TIME COMPUTING AND PROGRAMMING**

**TIME 3HRS Date: 30th March 2016**

**SECTION A (attempt all questions from this section)**

1a.Using appropriate diagram, explain how a 4×4 matrix keyboard is interfaced to microcontroller ports

b. From the Fig above identify the key pressed for the following conditions

1. D3-D0=0111 for row, 0111 for column
2. D3-D0=1011 for row, 1101 for column
3. D3-D0=0111 for row, 1110 for column
4. D3-D0=1101 for row, 1011 for column

c. Draw the Schematics of a simple circuit that turns off when it goes dark. Use an NPN transistor as your switching device

d. Supposing that temperature varies linearly with resistance and change in resistance is equivalent to temperature change, calculate the temperature of a room if a potential difference of 10V was recorded at the output terminals after a steady current of 3A was passed through an RTD with resistance of 5ohm placed in that room (assume the temperature of the RTD to be 25oC).

**SECTION B (answer any FOUR (4) question from this section)**

Question 2

1. Distinguish diagrammatically a general purpose microprocessor from a microcontroller
2. Why is platinum the ideal metal for RTDs
3. List six criteria for choosing a microcontroller

Question 3

1. List and explain five factors to consider when choosing a processor for real-time application
2. From the software point of view state three principal techniques used to initiate and control the transfer of data through a computer I/O port.
3. List the three type of proximity sensor and four application of proximity sensors

Question 4

1. Define DMA and write two uses of DMA
2. Explain with diagram the workings of an LVDT
3. What are the two disadvantages of polled I/O technique?

Question 5

1. Define the term Block Transfer Mode and explain how it differs from cycle stealing mode
2. List and explain three types of interrupts that can cause a break during the normal execution of a program
3. What are the two signals controlling the interface between the CPU and the DMA controller.

Question 6

1. Describe using appropriate diagram, how you can calculate the distance of an object using a sensor?
2. What are the three main grouping of flow meter .List at least an example of each group
3. What is the major difference(s) between the photoemissive cells and photoconductive cells?

Question 7

1. Define an actuator and give five example of it. Outline the major difference(s) between actuators and sensors
2. Interrupts can be categorized into five. List and explain each
3. When is a strain gauge said to have metamorphosed into a load cell? Hence explain the major difference(s) between a strain gauge and a load cell?