**.JAYI CROWTHER UNIVERSITY, OYO.**
**FACULTY OF NATURAL SCIENCES,**
**DEPARTMENT OF PHYSICS**

**COURSE CODE: PHY 3218 COURSE TITLE:MEASUREMENT AND ELECTRICAL INSTRUMENTATION AND CONTROL CREDIT:2 SEMESTER: SECOND SEMESTER EXAMINATION SESSION: 2021/2022 EXAMINER'S NAME: Dr. P. C. AMALU**
**DATE: /6/2022 DURATION: 2 HOURS INSTRUCTION: ANSWER ~~FOUR~~ THREE QUESTIONS ONLY**

**Question 1**

a. i. List the ways of conducting measurements and explain the term, scientific instruments?
ii. List two classes of instruments suitable for measurements of electronic quantities, (I, V & R) and four other electronic instruments that are available in the Physics / Electronic laboratories of your institution. Give the functions of the instruments.
iii. Write down four advantages of digital instruments over analogue types. Which instrument would you use to compare the Potential differences between two Cells?

b. i. list the factors that are required for the adequate design of instrumentation systems.
ii. With the aid of schematic diagram describe briefly each subsystem of the instrumentation systems.

**Question 2**

i. List three conventional D.C. sources and which of them utilizes the principle of Photoelectric effect.
ii. With the aid of a schematic diagram explain in detail how a stabilized D.C. power can be obtained from an A.C. main source.
iii. Define the term electric filter and explain two of its classes.

b i. Briefly explain a transducer and distinguish between passive and active transducer. Give two examples of each.
ii. List three factors considered in the selection of a microphone for the design of an electro- acoustic instrument systems. Explain the operation of a carbon microphone.

**Question 3**

a. i. With the aid of a diagram describe the operation of a moving-coil galvanometer.

ii. List the factors that determine the high sensitivity and efficiency of a moving-coil galvanometer.

b. i. Define the sensitivity of a voltmeter

ii. Design an ammeter that can be used for the purpose of measuring current up to 1A, if a millimeter of resistance 5 Ω and f. s. d, 15 mA is provided. Determine the sensitivity of the ammeter. How can this same meter be used to measure a voltage of 50 V?

**Question 4**

a. i. When is an instrument said to be faulty?

ii. Distinguish between two main types of fault in electronic circuit. List their causes.

iii. Discuss the process of fault-finding and troubleshooting in faulty instrument / equipment.

b. With the aid of appropriate diagram describe how signal injection can be employed for troubleshooting a faulty audio frequency instrument operating at 335 Hz - 3 kHz.

**Question 5**

a. i. List the major differences between deflection and null methods of measurement. Give their advantages and disadvantages

ii. What are the relative advantages of Hay, Maxwell and Owen bridges and for what purpose can each be used?

b. i.) Establish the conditions of balance for an a.c. bridge in which inductive impedance is balanced by a capacitor and a resistor in series in adjacent arm.

ii. In a certain measurement, the resistances on the ratio arms of a Wien bridge are 2.2 kΩ and 220 Ω respectively, the larger being adjacent to the inductance, the capacitor is set to 0.0125 μF, while the resistance in series with it is 22 Ω. Determine the inductance and resistance of the coil.

(Take f = 50 Hz).