****

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA**

**FACULTY OF SCIENCES**

**DEPARTMENT OF PURE AND APPLIED SCIENCE**

 **2019\_1 SEMESTER EXAMINATION**

**COURSE CODE: PHY 391**

**COURSE TITLE: PHYSICS LABORATORY II**

**CREDIT UNIT 2**

**TIME ALLOWED (2 HRS)**

**INSTRUCTION: *Answer question 1 and any other three questions***

**QUESTION 1**

**A.** Write short notes on the followings as applied to Network theorem:

(a) Passive network. **[2 Marks]**  (b) Active network **[2 Marks]**

 (c) A branch **[2 Marks]**  (d) Mesh **[2 Marks]**

 (e) Junction **[2 Marks]**  (f) Electrical Network **[2 Marks]**

**B**. (a) State the following theorems:

(i) Superposition Theorem (ii) Reciprocity Theorem (iii) Thevenin's Theorem **[3 Marks]**

 (b) State three precautions necessary for Thevenin's Theorem experiment to be carried out in the laboratory **[3 Marks]**

 (c) In an experiment to verify the Maximum Power Transfer Theorem, if the following set of readings were obtained from the table given below. Obtain the power transfer in the table **[7 Marks]**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/No** | **Load Resistance (RL) Ohms** | **Output Voltage (Vo) Volts** | **Power Transfer****(Watt)** |
| 1 | 100 | 10.0 |  |
| 2 | 150 | 9.2 |  |
| 3 | 200 | 8.3 |  |
| 4 | 260 | 7.5 |  |
| 5 | 310 | 6.5 |  |
| 6 | 380 | 5.4 |  |
| 7 | 420 | 4.0 |  |

**QUESTION 2**

 (a) List three types of examples of the following that you are familiar with:

 (i) Metals **[1.5marks]**  (ii) Semiconductors **[1.5marks]**

 (iii) Insulators **[1.5marks]**

(b) Differentiate with the aids of diagrams between metals **[3 marks]**, semiconductors **[3 marks]**

 and insulators **[3 marks]** in terms of energy gap.

(c) Calculate the image produced by placing an object 6 cm away from a convex lens of focal

 length 3 cm? **[1.5 marks]**

**QUESTION 3**

 (a) List three nature of the image of a real object formed by a diverging lens **[4.5 marks]**

(b) List three precautions necessary when determining the focal length of a convex lens in the lab

 **[4.5 marks]**

 (c) In an experiment to determine the focal length of a converging lens shown in the figure shown below where p and q are object and image distance measured from the center of the lens respectively. By using the equation, linearise this equation using the *p-q* method and obtain the focal length *f* **[6 marks]**



|  |  |  |
| --- | --- | --- |
| ***p*** | ***q*** | ***f*** |
| 2 | 6 |  |
| 3 | 7 |  |
| 5 | 8 |  |
| 6 | 9 |  |
| 7 | 10 |  |
| 8 | 12 |  |

**QUESTION 4**

 (a) In an experiment to determine the spectral analysis using a prism spectrometer, list three precautions necessary for you to have successful experiment **[3 marks]**

(b) List three uses of an Operational Amplifier **[3 marks]**

(c) Write short notes on the followings as applied to an Operational Amplifier

 (i) Single ended input single ended output inverting mode **[3 marks]**

 (ii) Single ended input single ended output non inverting mode **[3 marks]**

 (iii) Differential input differential output mode **[3 marks]**

**QUESTION 5**

 (a) Briefly describe how an Operational Amplifier can be used as a half-wave rectifier circuit

 (Circuit diagram required) **[5 marks]**

(b) List with examples four (4) types of classifications of an Operational Amplifier **[6 marks]**

(c) List and explain the data sheet Specifications which give rise to Operational Amplifier **[4 marks]**