3.20.2 Electricity Paper 2 (448/2)

1 STATION 1

Using the components, materials and equipment provided, carry out the following tasks:

(a) Connect the circuit as shown in **figure 1**. Let the examiner check your work. (7 marks)

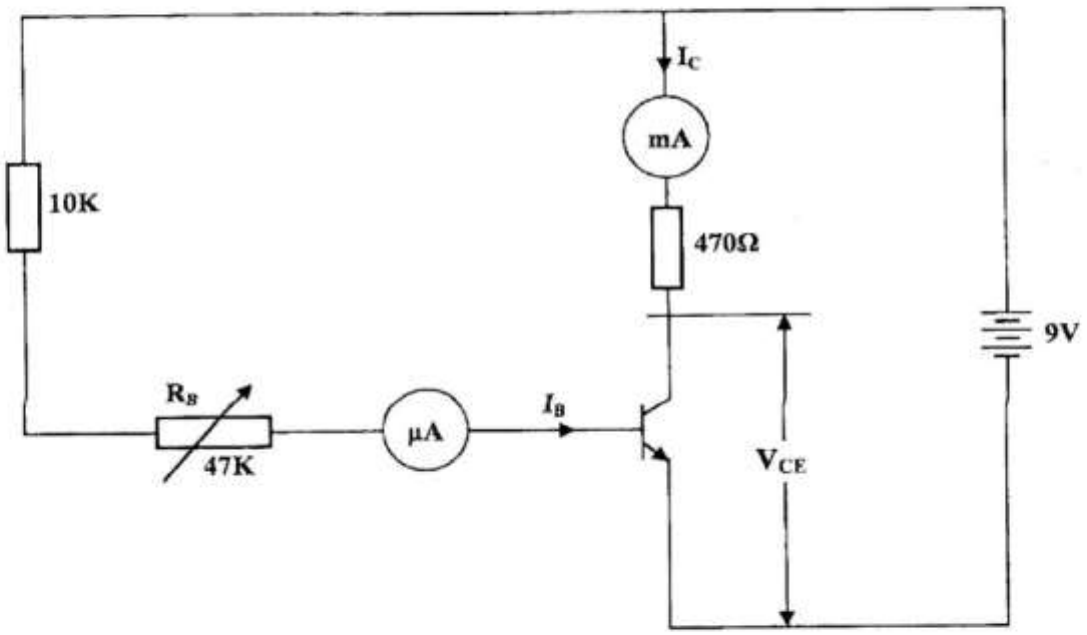

Figure 1

(b) Vary the base resistance RB to obtain each of the base current IB values shown in **table 1**. For each value of IB, measure and record in the table the corresponding values of VcE and Ic. (6 marks)

Table 1

$I_B(\mu A)$	VcE (V)	Ic (mA)
200		
220		
240		
260		
280		
300		

(c) Using the values in table 1:

(i) determine the current gain β when IB = 240 μA. (2 marks)

(ii) plot a graph of Ic against VcE. (5 marks)

2 STATION 2

Using the tools, equipment and materials provided, fabricate the saddle bracket shown in **figure 2**. (20 marks)

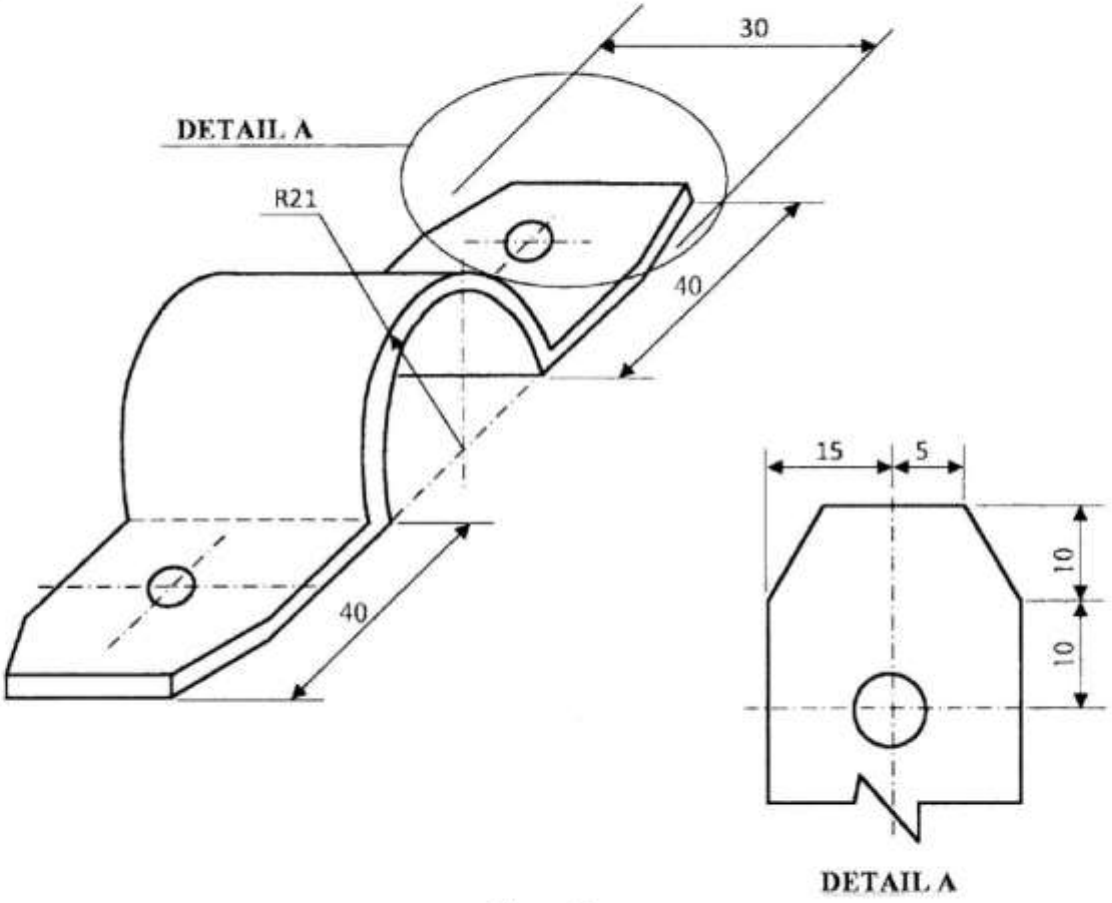

Figure 2

3 STATION 3

Using materials, components and equipment provided, perform the following tasks:

(a) Connect the circuit shown in **figure 3**. Let the examiner check your work.

(5 marks)

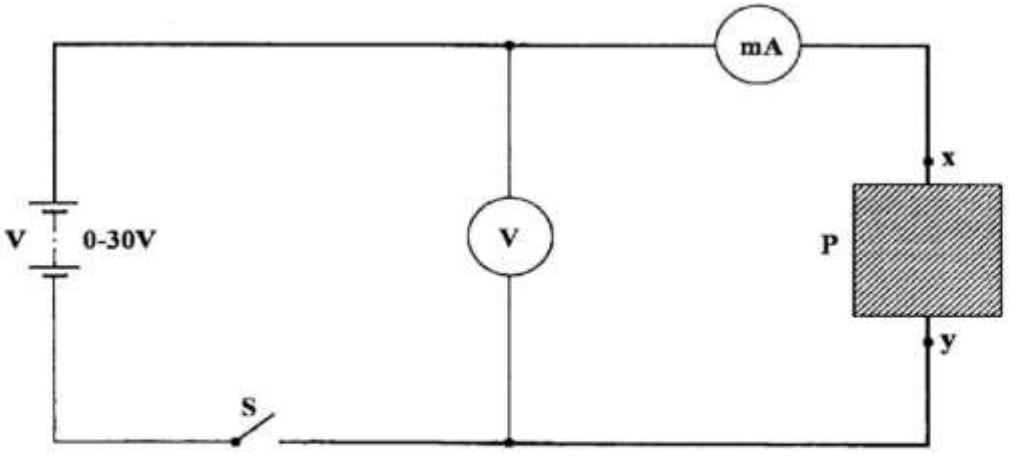

Figure 3

(b) Close the switch S and adjust the power supply to obtain voltage values shown in **table 2**. For each voltage obtained, measure and record in the table the corresponding value of current.

Table 2

Voltage, V (V)	2.0	5.0	8.0	12.0	16.0	22.0
Current, I (mA)						

(6 marks)

(c) Using the values in **table 2**, draw the graph of current I against voltage V. (5 marks)

(d) Determine the slope of the graph. (3 marks)

(e) Name the electrical quantity expressed by the slope of the graph and name its unit. (1 mark)

4 STATION 4

Figure 4 shows the block diagram of the electronic circuit.

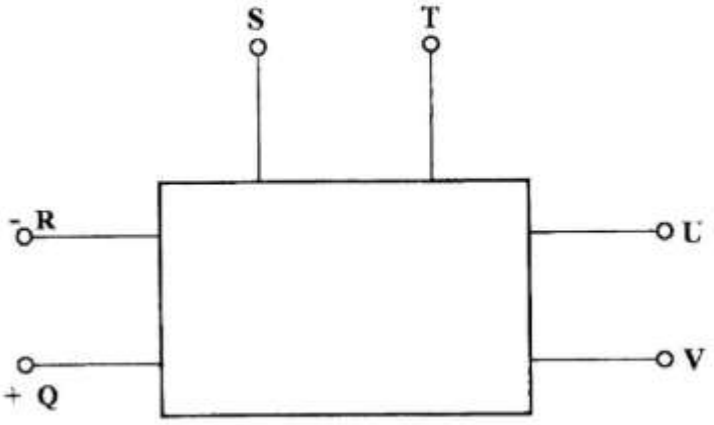

Figure 4

Use the equipment and accessories provided to perform the following tasks.

(a) With the power supply off and output knob at minimum, connect the equipment to the terminals on circuit P as follows:-

(i) Q and R, a voltmeter;
(ii) S and T, a voltmeter;
(iii) U and V, a milliameter;
(iv) Q and R, power supply.

(Let the examiner check your work) (4 marks)

(b) Turn the power supply ON. Adjust the power supply voltage to obtain the voltage values, Es shown in **Table 3**.

In each case, measure and record in table 3 the corresponding values of Load Voltage VL and load current IL.

Table 3

ES	V_{LOAD}	I_{LOAD}
1		
3		
6		
7		
10		
12		

(9 marks)

(c) Plot a graph of load voltage V_L against power source voltage E_s. (5 marks)

(d) State **one** application of the circuit P and give the reason for your answer. (2 marks)

5 STATION 5

Using PVC sheated wiring, complete the installation shown in **figure 5**, such that the bell is operated from either A or B. (20 marks)

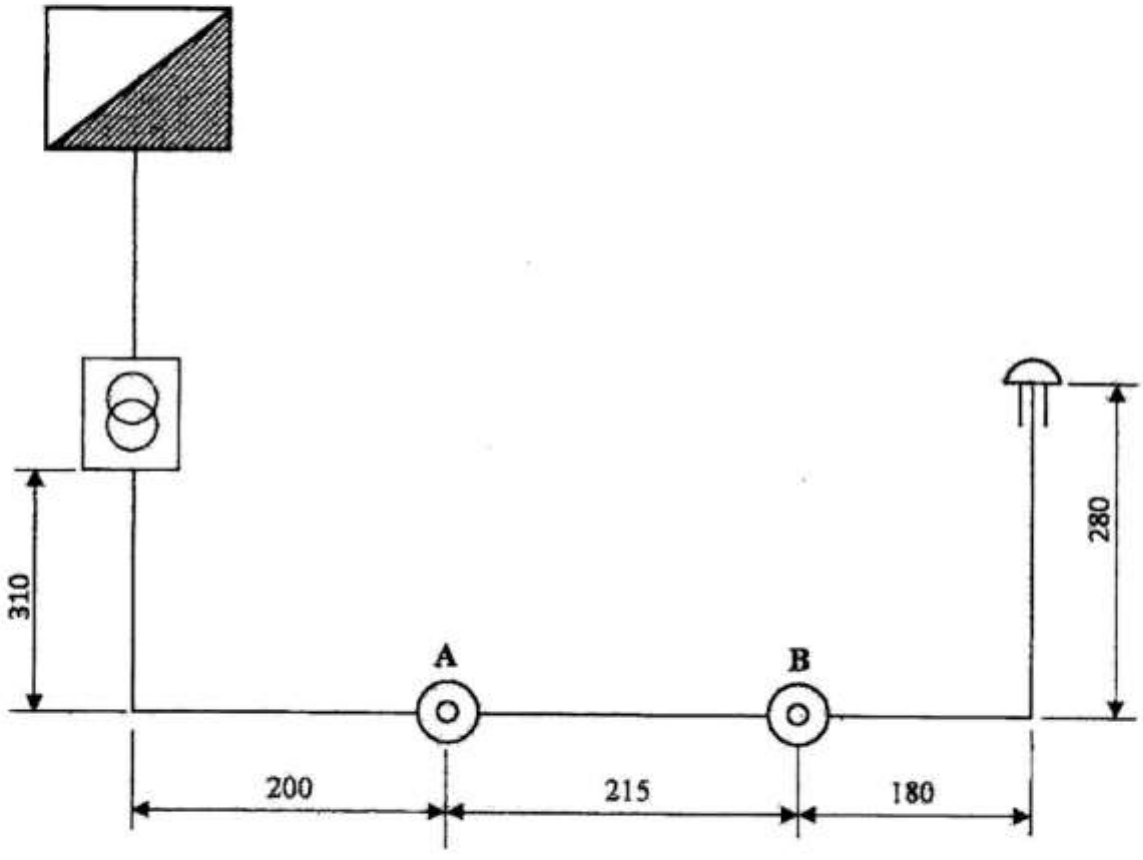

Figure 5