

2018

35. An electric lamp bulb of a motor car is labelled 12 V, 0.5 A. Consider the following statements about those values.
- A* - When an electrical supply of 12 V is given across the bulb, the current flowing through it is 0.5 A
- B* - When the bulb operates normally, its power is 12 x 0.5 W.
- C* - The resistance of the bulb is  $\frac{12}{0.5} \Omega$ .
- Of the above, the correct statements are,
- (1) only *A* and *B*.                      (2) only *B* and *C*.                      (3) only *A* and *C*.                      (4) all *A*, *B* and *C*.

2017 Part B 8

(B) Several electric appliances used in a house are given below.

Television, Fluorescent lamp, Microwave oven, Immersion heater, Hot plate, Electric iron

- (i) When some appliances mentioned above are used, it is necessary to use three pin plugs.
- (a) From these appliances, name one appliance with which a three pin plug must be used.
- (b) What is the importance of using a three pin plug for the appliance you mentioned in (a) above?
- (ii) Write down a main energy form that the electric energy converts into, when the television operates.
- (iii) Television is operated by a remote control.
- (a) As what type of waves are the signals sent to the television by the remote control?
- (b) Write **two** characteristics of the wave type that you have mentioned in (a) above.
- (iv) The power of some appliances mentioned above are given in the following table.

Appliance	Power/W
A - Television	125
B - Fluorescent lamp	18
C - Microwave oven	1500
D - Electric iron	1200

In a certain day all these **four** appliances were operated during 1 hour and 30 minutes period.

- (a) Arrange *A*, *B*, *C* and *D* in the ascending order of the electric energy consumption during the time of operation. (Calculations are not expected)
- (b) Calculate the electric energy consumed by *A* during that time.

2015-Part B 10 (ii)

- (c) Sujith has activated a 0.1 kW electric fan for  $\frac{1}{2}$  an hour since the house was warm. Calculate the electrical energy consumed by the electric fan.

2014-Part B

10. In Sri Lanka, the basic electric power supplied to houses from the national electric grid system is 230 V. This is an alternating current supply. One wire which provides electricity to a house is called live wire ( $L$ ) and the other wire is called neutral wire ( $N$ ).

- To which wire is the service fuse connected ( $L/N$ )?
- The two wires ( $L$ ) and ( $N$ ) are first connected to the electric meter. Write down the order in which the **three** basic components of the domestic electric circuit are connected after the electric meter.
- Are the lamp circuits in a domestic electric circuit connected to one another in series or parallel?
- Ten filament bulbs, a fan, a television, a radio, a refrigerator, an immersion heater and an electric iron are the electric appliances used in a certain house.

(a) According to the domestic electric circuit of this house, one electric bulb fixed at the stairs can be operated from the top and bottom of the stairs. Draw the relevant switching circuit for this.

(b) A transformer used to obtain 9 V from the 230 V alternating current for the rectifying circuit used in the radio in this house is given in the figure 1.

I. Which category does this transformer belong to?

II. The number of turns in the primary coil of the transformer is 230. Find the number of turns in the secondary coil.

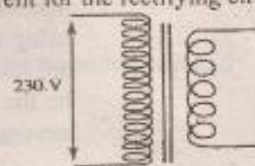


Figure 1

(c) Every morning water is heated using the immersion heater.

I. Calculate the heat gained by water, when 2 kg of water at temperature  $29^{\circ}\text{C}$  was kept in a container and raised to the temperature of  $99^{\circ}\text{C}$  using the immersion heater.

(Take the specific heat capacity of water as  $4\,200\text{ J kg}^{-1}\text{ K}^{-1}$ )

II. Taking the heat gained by the container and the heat loss to the surroundings as  $7\,000\text{ J}$  in the (I) above, calculate the electrical energy that has been converted to heat energy by the heater.

(d) A circuit which is used in this house to light up an electric bulb  $B$  automatically when there is a power failure at night is given in the figure 2.

I. Explain how the bulb  $B$  lights up as soon as power failure occurs.

II. Explain how the bulb  $B$  is put off as soon as the power returns.

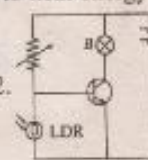


Figure 2

(e) The data obtained monthly by the people in this house who followed a procedure to reduce the cost of electricity is given in the table.

I. Comparing with the first month, calculate the electrical energy that they were able to save from 26.08.2014 to 26.09.2014.

II. Write **two** strategies you think, they would have followed to reduce the cost of electricity fulfilling all their requirements at the same time.

Date	Reading of the electric meter (kWh)
2014.07.26	25786
2014.08.26	25872
2014.09.26	25940



## 2013 Part B 10

- (iii) An electric oven consists of a nichrome coil of resistance  $46\Omega$ . The oven was connected to a supply of  $230\text{ V}$  for 10 minutes.
- (a) If  $R$  is the resistance of the nichrome coil,  $V$  is the supplied voltage, and  $t$  is the time that the coil is connected to the supply, write down an expression for the electrical energy (H) transmitted through the coil in terms of  $R$ ,  $V$  and  $t$ .
- (b) Using the above expression calculate the heat energy generated by the oven.  
(Consider that the transmitted electrical energy is totally converted to heat energy).

## 2011-Part B

10. (A) The diagram shows an electrical circuit constructed to find the value of an unknown resistor. The resistor is indicated by  $R$  and a  $6\text{ V}$  battery, a variable resistor / rheostat ( $Z$ ) and a switch ( $S$ ) are used in the circuit.

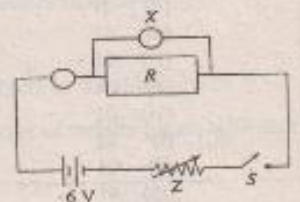
(i) Name the equipment  $X$ .

(ii) When the switch  $S$  was closed (switched on) the ammeter reading was  $2.5\text{ A}$ . In order to decrease this reading to  $2\text{ A}$ , what change in the resistance should be made in the variable resistor  $Z$ ?

(iii) When the ammeter read  $2\text{ A}$ , the voltmeter reading was  $5\text{ V}$ .

(a) Name the law you use to find the value of resistor  $R$ .

(b) Find the value  $R$ .



(iv) When the ammeter reading was  $2\text{ A}$  and the voltmeter reading was  $5\text{ V}$ , the switch  $S$  was kept closed (switched on) for 4 minutes. How much electrical energy is spent in the resistor during this time?

- (B) One of the main methods of producing electricity in Sri Lanka is the conversion of water's potential energy to kinetic energy and generation of electricity using that kinetic energy.

(i) What is the name of the equipment used to convert water's kinetic energy to electrical energy?

(ii) The alternating current (AC) so generated is stepped up to a high voltage and connected to the main electrical grid in the country. What is the equipment used to step up the potential?

(iii) Of the alternating electrical supply to a house, one wire is called the live wire ( $L$ ) whereas the other is called the neutral wire ( $N$ ).

You are provided with two switches ( $\text{---} \bullet \text{---}$ ) and two bulbs ( $\text{---} \otimes \text{---}$ ). Indicating as  $L$  and  $N$  the two wires supplying electricity to the house, draw a circuit diagram to show how the bulbs and switches can be connected in the same circuit so that the two bulbs can be lit independently.

(iv) In a domestic electrical circuit, a  $100\text{ W}$  bulb lights 4 hours a day. Calculate the electrical energy spent for this per day.

(v) What is the safety ensured by fixing mini circuit breakers (MCB) in the domestic electrical circuits?

2009

31. Consider the statements given below regarding the electrical accessories used in a household electrical circuit.
- A - the electricity supply to the house can be disconnected when necessary by the service fuse.
  - B - the trip switch is placed at a point before the service fuse.
  - C - electricity is distributed to various parts of the house by the fuse box.
  - D - the electricity supplied to the house is controlled by the electric meter.
- Out of these the correct ones are
- (1) A, B and C only      (2) A and C only      (3) A and D only      (4) B and D only

2008-Part B 10

- (vii) If the immersion heater on which 1200 W is marked by the manufacturer is used twice a day each of 30 minutes, calculate the number of units contributed to the total electricity consumption of the house by it at the end of 30 days.
- (viii) It is safer to use three-pin plugs rather than using two-pin plugs with the immersion heater. State the main reason for it.
- (ix) Mention two features that should be present in a metal, for it be selected to make a heating coil.
- (x) What is the name of the accessory which should compulsorily included in an electric circuit of a house for security purposes?