**WISDOM PRE-MOCK**

MARKING SCHEME

**1 a) Procedure of connecting an ammeter to take measurements in a circuit**

- Turn - off the power

- Ammeter should be connected in series with the load current.

- Observe polarity.

- Select the range starting from the highest.

**b) (i) Nominal resistance**

Orange Black

30

Brown

x 101 = 300

Nominal = 300Ω

**(ii) Maximum resistance**

300 ± 5% = 315Ω

**2. a) Circuit diagram**

- Shows connection of every component.

- Shows values of components.

- Shows the position of the components.

- Shows functionality of the circuit.

**b) Bills of materials**

- Materials/parts.

- Quantity.

- Size.

- Estimate costs.

**3. a)**

(i) Forward bias reduces the PN-junction (depletion layer) and hence the diode conducts

(ii) Reverse bias increases the PN-junction (depletion layer) hence the diode does not conduct.

**b)**

i) IF(max) is the maximum forward current that the diode can pass without burning out.

ii) VF (typ) is the forward voltage across the diode at the typical operating current.

 4.

a)
$$I=\frac{V}{R}=\frac{100}{1000}=0.1A$$

**b)**

5.



**6. (a) (i)**

$$E=5+\left(1.2mAx2000\right)=7.4V$$

**(ii) R2=**$\frac{5-1}{1.2mA}=3,333.33Ω$

(iii) R3=$\frac{1}{1.2mA}=833.33Ω$

**b) (i) Energy consumed**

Lights$\frac{5x6x4}{1000}=1.2kwh$

Kettle$1x2x0.5=1.0kwh$

Total energy = 2.2kwh

(ii) Cost of energy

= 2.2 x80 = 1.76 sh

**7. Safety precautions to be observed**

a) - Ensure that the equipment is properly earthed.

- Do not use it in damp areas.

- Always remove the plug from the socket when the equipment is not in use.

- When using extensions, ensure the joints are firm and insulated using the electricians insulation tape.

- Hold it ﬁrmly.

- Avoid loose clothing like ties.

**b) Communication service providers in Kenya**

- Telkom Kenya

- Safaricom

- Airtel

- Yu

or any other existing ones

**8. a) Insulating materials used in electrical circuits**

- PVC .

- Porcelain

- Magnesium oxide

- Paper

- Rubber

- Air

- Formica

**b) Advantages of PVC**

- Ease of erection.

- It is cheap.

- It is resistant to corrosion.

- It is light.

- There is no risk to earth leaks.

**9. a) Inductance required**

$$L=\frac{1}{4x∏x∏xfxfxC}=\frac{1}{4x∏x∏x150000x150000x1.0pF}=1.12579H$$

**b) (i) Apparent power**

P=IV=2.5x240=600 VA

(ii) True power

= apparent power X power factor

=600 X 0.6=360W

**10.**





**12. a) Name of waveforms**

A - sine wave

B - saw tooth

**b) Number of cycles**

A - 2 cycles (1)

B - 3 cycles (1)

**(c)**

**(i) Frequency of waveform A**

Where T=period

T= 50µsx4

=200µs

$$f=\frac{1}{T}=\frac{1}{\frac{200}{1000000}}=5000Hz=5kHz$$

**(ii) Amplitude**

A=Vpeak=200mVx3=600mV=0.6V

B=Vpeak=0.5V X 2=1V

**(iii) RMS value of A**

=0.707xVp=0.707x0.6=0.424V

13.



Correct drawing (6 marks)

Each subcircuit correctly labelled (½x6=3 marks)

**14 a) Type of transistor**

NPN (1)

Function of capacitor C

To block D.C (1)

**Type of biasing**

Fixed bias (1)

**b)**

**(i)** VR=VCC-VBE =60-0.6=5.4V

**(ii)**

IB=$\frac{5.4}{10000}=0.54A$

**(iii)**

IC=$βxIB=54μAx50=2.7mA$

**(iv)**

RCIC= 2.7mAx1 x 103=2.7V

VCE=VCC-VR2

= 6-2.7V

=3.3V

15. a) XL=2∏fL

=2x∏x50x50x10-3

=15.708Ω (2 marks)

XC=$\frac{1}{2∏fC}$

=$\frac{1}{2x∏x50x2x10-6}$

=1591.5494Ω (2 marks)

= 1866.36Ω (3 marks)

b) $I=\frac{E}{Z}=\frac{240}{1866.36}=0.1286A$ (3 marks)

c)

