

CHRISTIAN SOCIAL SERVICES COMMISSION- (CSSC)
NORTHERN ZONE JOINT EXAMINATION SYNDICATE(NZJES)



FORM TWO PRE-NATIONAL EXAMINATION AUGUST 2024
ELECTRICAL ENGINEERING
MARKING SCHEME

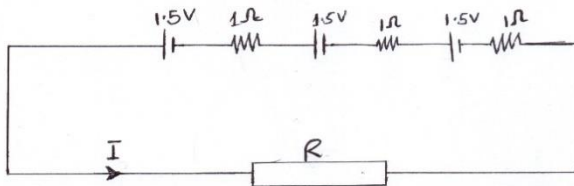
1. Multiple choices @ 01mark = 10

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
B	D	A	D	B	C	B	D	D	B

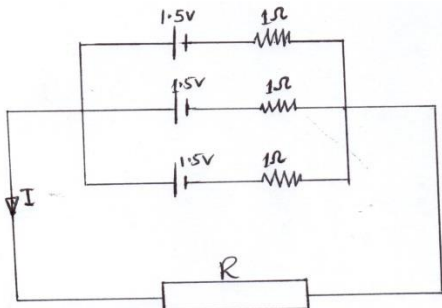
2. Matching Items @ 01mark = 05

LIST A	(i)	(ii)	(iii)	(iv)	(v)
LIST B	D	A	B	C	E

3. (a) (i) It is Series Circuit (3Marks)



(ii.) It is Parallel circuit (3marks)



(b) (i) $r_T = r_1 + r_2 + r_3$

$$r_T = 1\Omega + 1\Omega + 1\Omega \quad (2\text{Marks})$$

$$r_T = 3\Omega$$

(b) (ii) $\frac{1}{r_T} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$

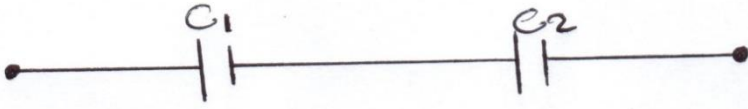
$$\frac{1}{r_T} = \frac{1}{1} + \frac{1}{1} + \frac{1}{1}$$

$$\frac{1}{r_T} = \frac{1+1+1}{1} \quad (2\text{marks})$$

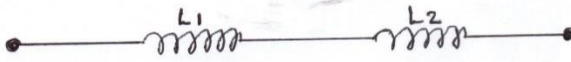
$$\frac{1}{rT} = \frac{3}{1}$$

$$rT = \frac{3}{1}$$

4. (a) (i) Capacitors in series (2marks)



- ii) Inductance in series (2marks)



(b) $\frac{1}{cT} = \frac{1}{c1} + \frac{1}{c2}$. c1 $10\mu f$, C2 = $20\mu f$

$$\frac{1}{G} = \frac{1}{10} + \frac{1}{20} = \frac{2+1}{3} = \frac{3}{20}$$
 (3marks)

$$\frac{1}{G} = \frac{3}{20} \cdot G = \frac{20}{3} = 6.67\mu f$$

The total capacitance is $6.67\mu f$

(c) $LT = L1 + L2$. $L1 = 17.6H$, $L2 = 13.4H$

$$LT = 17.6H + 13.4H$$
 (3marks)

31H

The total inductance is 31h

5. (a) (i) Continuous thin line with zigzag (1mark)



It is used to an outline of incomplete figure or object (1mark)

- ii) The free hand continuous line (1mark)



It is used to show outline of object or figure in free hand or sketching (1mark)

- iii) Continuous thick line (1mark)



Used to show a fill visibility of an object or figure, border line (1mark)

- b) (i) Grid paper: -Is a sheet used for drawing normally it has a grid line used for location

-used in construction free hand geometry

- solving mathematical problem (1mark)

ii) Pencil: Is the basic instrument used for drawing and writing (1mark)

They are three types: hard type, medium pencil, soft pencil

iii) Tee square: Is a T-Shaped instrument used to construct vertical, horizontal and sloping line (1mark)

iv) Drawing board: is a favors right angles board where the sheet or paper used for drawing is placed. (1mark)

6. (a) (i) $V = 100V$

$R = 250\Omega$

$$\text{From } V = \frac{V}{R} = \frac{100}{250} = 0.4A \quad (2marks)$$

The current taken by the lamp is 0.4A

ii) $V = 100V, R = 250\Omega, I = 0.4A$

$$P = VI$$

$$P = 100V \times 0.4A = 40W \quad (2marks)$$

The total power of the lamp = 40W

iii) $V = 100V, R = 250\Omega, I = 0.4A, P = 40W. 1t - 27 \text{ hours}$

Electrical energy = Power x time

$$40 \times 24 \times 60 \times 60$$

$$3456000J \quad (2marks)$$

The daily electrical energy consumed is 3456000J

b) Power rating is the rate at which the appliance dissipated electrical energy is the product of power consumed by an appliance. (4marks)

7. (a) (i) Moving iron instrument:

Are the measuring Instrument which require a simple construction using a piece of iron

- It can be either attraction type or repulsion type (2marks)
- It has a non-uniform scale not very accurate. not very sensitive and require much power.

ii) Moving coil instrument:

Are the measuring instruments which require a delicate construction using a moving coil.

- It can be temporary magnet or permanent magnet (2marks)
- It has a uniform scale, it is very accurate, it is very sensitive and it uses a little power

b) (i) Sensitivity – it has high sensitivity

- (ii) Accuracy – it is very accurate
- (iii) Scale – It has a uniform scale (@1mark = 6)
- (iv) Power consumption – It has less power consumption
- (v) Application: It is good like wattmeter
- (vi) Versatility: It is very versatile

8. Data given

Efficiency = 85%

Power = 2KW

Change of temperature (46- 4c) 1%

Mass = 10litres = 10 kg 1%

$$\text{Heat} = \frac{\text{mass} \times \text{specific heat capacity} \times \text{change in temperature}}{\text{Efficiency}} \times 100\%$$

1%

$$\text{heat} = 10 \times \frac{4200 \times 42 \times 100}{85}$$

Heat = 2075294 joules 2%

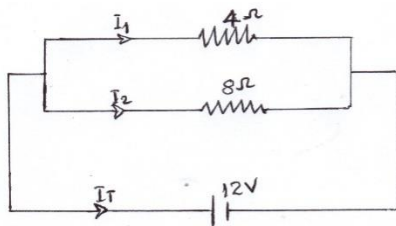
Power = $\frac{\text{heat}}{\text{Times}}$ 1% power = 2kw = 2000w 1%

Time = heat / power 1% time = 1038 seconds 2%

9(a) (@2 = 6)

Series Circuit	Parallel circuit
(i) Current is the same through each resistor	(i) Voltage is the same across each resistance
(ii) $V_T = V_1 + V_2 + V_3 + \dots$	(ii) $I_T = I_1 + I_2 + I_3 = \dots$
(iii) $R_T = R_1 + R_2 + R_3 + \dots$	(iii) $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$

b)(i)(1mark)



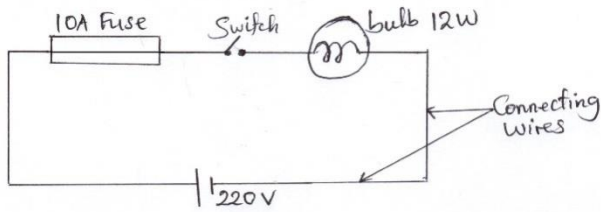
ii) $I_1 = \frac{V}{R_1} = \frac{12V}{4} = 3A$ and $I_2 = \frac{V}{R_2} = \frac{12}{8} = 1.5A$
 $P_1 = I_1^2 R_1 = (3)^2 \times 4 = 36W$
 $P_2 = I_2^2 R_2 = (1.5)^2 \times 8 = 18W$ (3marks)

SECTION C. (15 Marks)

10. (a) (i) One way two gang switch

To put off and on two different lamps

- ii) Wires connection
It is used where two or more wires are connected together
 - iii) Floscescent lamp
It is used for emitting light (@1=5marks)
 - iv) Socket outlet
It provide electricity from the source to the electrical appliance
- V two way one gang switches
It used to control a circuit on and off with two ways
(b) (i) Circuit diagram (5marks)



ii) Wiring diagram

(5marks)

