CHRISTIAN SOCIAL SERVICES COMMISSION
An Ecumenical Body of Tanzania Episcopal Conference and Christian Council of Tanzania
P.O. Box 9433, Dar es Salaam, Tanzania

CSSC-SOUTHERN ZONE FORM TWO JOINT EXAMINATION

Time 2:30 hours **031 PHYSICS** **AUGUST 2024**

MARKING SCHEME 01

1.

I	Ii	iii	iv	V	vi	vii	viii	ix	x
C	D	A	A	B	B	A	C	D	C

2.

I	Ii	Iii	Iv	V
G	E	A	B	D

3. (a) Data: W= 200N, Wk=80N, ge= 10N/kg, gk =? (0.5mark)
Lets first find the mass of a body while on earth; W = mg, 200 = mx 10, mass= 20kg. (1mark)
Since the mass of a body doesn't change, therefore the mass of a body at planet k, mk=20kg. (1mark)
The gravitational acceleration at planet k: Wk = mg, 80=20 x gk, gk= 4N/kg. (1mark)
Therefore, the gravitational acceleration at planet k is 4N/kg. (0.5mark)

b) Let the cross-sectional area be A
When floating in water: mass of hydrometer =mass of water displaced, 42 = V x 1.0, V= 42 (1mark)
When in the liquid of RD 1.2: m of hydrometer =m of displaced liquid, 42=V – decrease in V) x 1.2 (1mark)
35 = V- 4A, but V = 42 (1.5mark)
35 = 42 – 4A (0.5mark)
4A = 7 (0.5mark)
A = 1.75 cm^2. (0.5mark)
Therefore, the cross-sectional area of the uniform stem is 1.75 cm^2. (1mark

4. (a)The force that enabled the dry wood to float is called upthrust. The factors that affecting upthrust are;-

- ✓ The volume of the immersed object

The large volume of the object immersed in liquid, the larger the upthrust excited on the body 01.5 Marks

- ✓ Density of the fluids in which the object is immersed.

As the density of the fluid increase also the upthrust excited on the body by fluids also increases. 01.5 Marks

(b) From, upthrust = Density of fluid × volume of object × force of gravity
But, volume of object (iron) = mass of iron / density of iron
= 360g/7.8g/cm^3
V_o = 46.15cm^3

But, its immersed partially

$V_o = 46.15cm^3/2$

$V_o = 23.077cm^3$

Now, $u = S_f \times v_o \times g$

$= 0.9g/cm^3 \times 23.077cm^3 \times 10N/kg$

Upthrust, $u = 0.21N$

Tension = mg – u

$= (0.36 \times 10 - 0.21)N$

Therefore, tension = 3.39N 04 marks

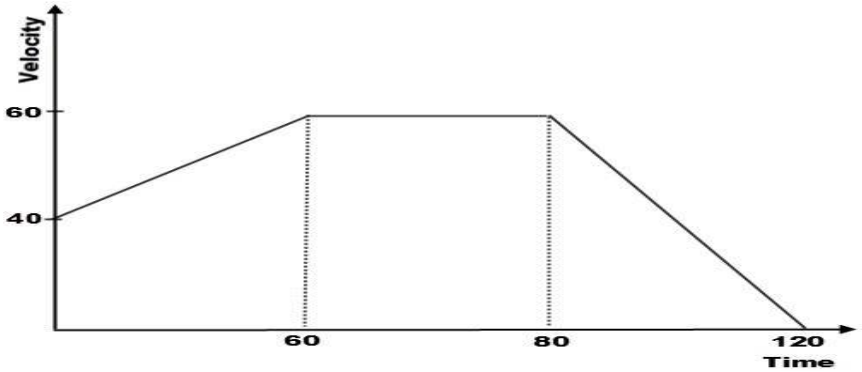
(c) $200cm^3$

Since volume of solid = volume of water displaced 03 marks

5. a) i) To prevent the mercury thread to flow back into the bulb so that the doctor can read the temperature accurately at his convenience. (2marks)

ii) Fahrenheit scale, Kelvin scale, Celsius scale. (3marks)

b) i) Velocity – time graph



(2.5marks)

ii) Area 1 = ½ x 60 x(40+60) = 3000m (0.5mark)

Area 2 = 20 x 60 = 1200m (0.5mark)

Area 3 = ½ x 40 x 60 = 1200m (0.5mark)

Total area = 5400m (0.5mark)

Therefore, the total distance covered is 5400m. (0.5mark)

6. (a)The phenomenon governing the process is called DIFFUSION. Diffusion is the movement of particles from a region of high concentration to a region of low concentration.03 Marks

(b) The phenomenon governing the process is called OSMOSIS .03 marks

Is the movement of solvent molecules from a region of low concentration to a region of high concentration through semi permeable membrane.

(c) By following laboratory rules @04Marks

- ✓ By following laboratory safety precaution
- ✓ By using protection wears before beginning any experiments
- ✓ Proper arrangement of laboratory instruments and chemicals

7. (a) soln

(i) $Q = cv$

But , $1pF = 10^{-12}$ F

$= 15 \times 10^{-12}$ F $\times$ 18v 02 marks

$Q = 2.7 \times 10^{-10}$C

(ii) $Q = cv$

$= 240 \times 10^{-12}$ F $\times$ 18V 02 marks

Now, charge, $Q = 4.05 \times 10^{-12}$ C

b. When you cut a magnet in half, each half retains its own magnetic field. The newly created ends of each half will become the new poles. 03 marks

c. (i) Its renewable energy source

(ii) Low greenhouse gas emission

(iii) Reliable and flexible 03 marks

(iv) Low operating cost

8. (a) soln.

(i) VR = circumference/ pitch

Circumference = $2\prod R$

$= 2 \times 3.14 \times 40$cm

$= 251.2$cm

Pitch = 1/5cm

= 0.2cm 02 mark

VR = 251.2cm/0.2cm

VR = 1256

(ii) Efficiency = MA/VR

90% = MA/1256 02 marks

The MA of screw jack = 1130.4

(iii) MA = load/ effort

1130.4 = 20000N/ effort 02 marks

= 17.7N

The minimum effort =17.7N

(b) If an object is not moving, it doesn't necessarily mean that there is no force acting on it. According to Newton's first law of motion, an object at rest will remain at rest, and an object in motion will remain in motion unless acted upon by an external force.

Therefore, if an object is at rest, it could be because the net force acting on it is zero, resulting in no acceleration. However, there could still be forces acting on the object that cancel each other out. In this case, the object would remain stationary due to the balance of these opposing forces.

For example, if you push a box with a force of 10 Newtons to the right, but someone else pushes it with a force of 10 Newtons to the left, the box will not move because the forces cancel each other out, resulting in a net force of zero.

So, while the absence of motion might suggest that there is no net force acting on an object, it doesn't necessarily mean that there are no forces present. 04 marks

9. a) Data: L = 700N, E = 350N, VR = $1/\sin 10^0$, ɛ =? (0.5marks)

MA = L/E, MA = 700N/350N, MA = 2 (2marks)

Efficiency = (MA/VR)x100%, E = (2/1/sin10)x100%, E = 34.73% (2marks)

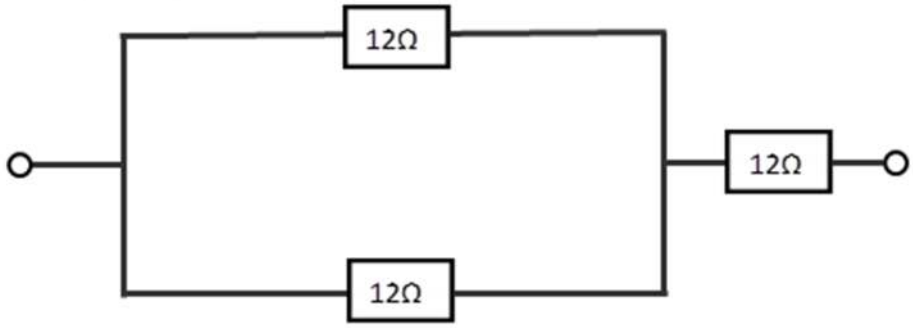
Therefore, the efficiency is 34.73%. (0.5mark)

b) Data: m = 100kg, F1=1000N,d =2m, r = 1m, L2 =1 -0.4=0.6m, L1 = 0.8m (by Pythagoras), F2 =? (0.5marks)

Sum of clockwise moments = sum of anticlockwise moment (1mark)
F2 x L2 = F1 x L1 (0.5mark)
F2 x 0.6 = 1000 x 0.8 (0.5mark)
F2 = 1000 x 0.8/0.6 (1mark)
F2 = 1333.33N (1mark)
Therefore, the minimum force required to just turn the drum is 1333.33N (0.5mark)

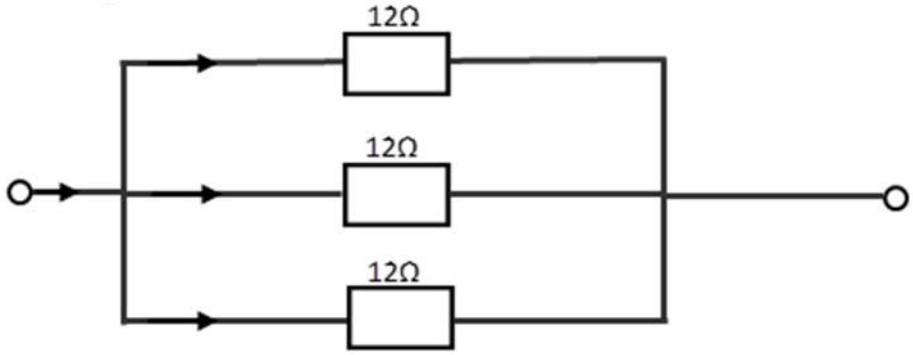
10. a) Parallel resistors: Rt = (15 x 10)/(15+10) = 6 ohms (1.5marks)
Series resistors: Rtt = 6 + 4 + 2 = 12 ohms (1.5marks)
Current, I = V/Rtt, 24/12, I = 2A (1.5marks)
Therefore the total current is 2A. (0.5marks)

b) i) To create a circuit with combined resistance of 18 ohms by using three 12 ohm resistors I will connect two 12 ohm resistors in parallel and then connect them in series with one 12 ohm resistor. (2marks)



(3marks)

ii) To create a 4-ohm resistor by using three 12 ohm resistors I will connect all the three resistors in parallel. (2marks)



(3marks