CHRISTIAN SOCIAL SERVICES COMMISSION (CSSC0
NOTHERN ZONE JOINT EXAMINATIONS SYNDICATE (NZJES)
FORM TWO PRENATIONAL EXAMINATIONS 2024

CODE: 035 ENGINEERING SCIENCE

MARKING SCHEME

SECTION A (15 MARKS)

1. 10 MARKS

I	ii	iii	iv	v	vi	vii	viii	ix	X
D	C	V	A	A	B	D	B	A	C

2. 5 MARKS

I	ii	iii	iv	v
F	D	A	B	C

SECTION B

3. (a) 4 Marks
   i. It enable us to answer many questions concerned with physical properties of matter
   ii. It enables different people to acquire skills that required in different professions for example engineering, teaching and architecture
   iii. It enables us to design and manufactures different items e.g. generators
   iv. It enables us to enjoy since we study practically

   (b) 6 Marks
   i. mass (Kg) ii. Length (m) iii. Time (Second)

4. (a)Prepare the following instruments
   i. Measuring cylinder ii. Beam balance iii. Eureka can iv. Beaker
   v. Irregular object (stone) vi. String viii. Water
   (b) Measure the mass of the irregular object
   ©Put some water in the Eureka can
   (d)Tie the irregular object with string tightly
   (e)Slowly immerse the solid in the Eureka can and ensure that the water displaced is tapped in a beaker
   (f)Take the liquid (water) that is collected in the beaker and measure volume the volume using a measuring cylinder and then record its volume. Marks 10

5. Friction force depends on the nature of material in contact

(b) i. Force of gravity ii. Electromagnetic force iii. Strong force iv. Weak force

© i. Elastic forces ii. Frictional forces

6. (a) i. Force of gravity : Is the force of attraction between objects which have mass
ii. Weight: Is the attractive force towards the earth's centre exerted by the earth on object

(b) (i)It is always attractive

(ii)It is the weakest force among the four fundamental forces

(iii)It is a central force (gravitational force) between two objects act along the line joining the centre of the objects

(iv)It operates over very long distances

(v)It decreases as the distances between the mass and the earth increases

(8 Marks)

For mechanical advantages

7. L= 5000 N E= 50N

M.A $= \frac{L}{E} = \frac{5000N}{50N} = 100$

For Velocity ratio

i. For length 5m

V.R= $\frac{Ed}{Ld} = \frac{5m}{2m} = 2.5$

For Length 7m

V.R = $\frac{Ed}{Ld} = \frac{7m}{2m} = 3.5$

Efficiency for 5 M

Eff= $\frac{M.A}{V.R}$X100/= $\frac{100}{2.5}$X 100% = 4000%

Efficiency for 7m

Eff= $\frac{M.A}{V.R}$ X 100% = $\frac{100}{3.5}$ X 100%= 2875%

Therefore the students are advised to use the inclined place with the length 5m

8. (a)Astronauts merely feel weightless in international space station because there is no external contact for force pushing or pulling upon their body. They are in a state of free fall. The normal force does not come into play, giving the felling of being weightless **(4 Marks)**

(b) Data given

Weight of rocket at the earth = 10000N

Weight of rocket on other planet= 3000N

Acceleration due to gravity on the earth = 10 N/KG

Soln : From mass of the rocket at the earth = Mass of the rocket to the other planet

But Weight - M X g

Which implies that M = $\frac{w}{g}$

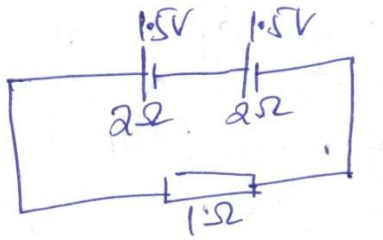
$\frac{We}{ge} = \frac{Wp}{gp}$

$\frac{10000}{10} = \frac{300}{g}$

G = $\frac{10x300}{10000}$= 0.3N/kg

Therefore the acceleration due to gravity on the planet is 0.3 N/Kg

9. (a) (i) Series connection



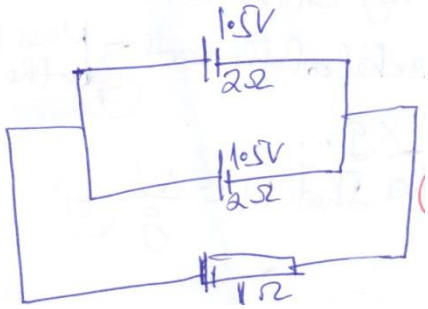
Total emf= 1.5V + 1.5v= 3V

Total Internal resistance = 2Ω +2Ω= 4Ω

R=1Ω

I= $\frac{Emf}{R+VT}$ = $\frac{3V}{1+4}$ = $\frac{3V}{1+4}$ = $\frac{3}{5}$= 0.6A

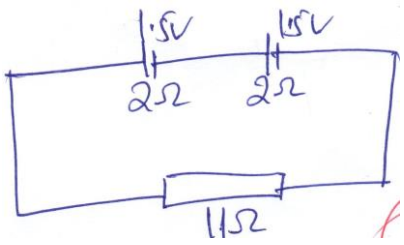
(ii)Parallel Connection



Emf= 1.5V

$\frac{I}{VT}$ = $\frac{Emf}{R+VT}$= $\frac{1.5}{1+1}$=$\frac{1.5}{2}$ = 0.75A

(b) (i) Series connection



Total emf= 1.x5 x2= 3v

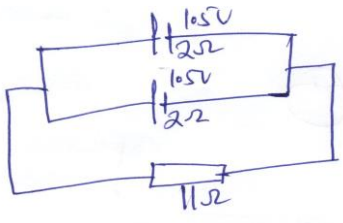
Total VT= 2+2= 4Ω

R=11Ω

I= $\frac{Emf}{R+VT}$

= $\frac{3}{11+4}$ = $\frac{3}{15}$= 0.2A

(ii)Parallel connection



Emf= 1.5V

VT= $\frac{1}{VT} = \frac{1}{2} + \frac{1}{2}$

VT= 1Ω

I= $\frac{1Emf}{R+r}$

$\frac{1.5}{11+1}=\frac{1.5}{12}$

$I = 0.125A$

©A better connection for 1Ωand 1Ω resistors is in parallel connection in order to avoid high resistance to the fellow of electric current in the circuit.

SECTION C

10. Data collection

Mass (M)= 15g

SPEED (V) 50m/s

Depth (h)=5cm

Conversion

1kg= 1000kg

? = 15g

15g=$\frac{15}{1000}$= 0.015kg

1m= 100CM

? = 5CM

5CM= $\frac{5}{100}$= 0.05m

From second equation of motion

$V^2= U^2+2as$

But V= Om/s, U=50m/s

$O2= (50)^2 +2Xax0.05$

O= 2500 +0.1a

0.1a= -2500

a= $\frac{=2500}{0.1}$= -25000m/S^2

Again from V= u+at

V= OM/S, U=50m/s, a= -2500m/S^2

o= 50 +-25000xt

2500 t= 50

t= $\frac{50}{25000}$= 0.002 second

from K.E = ½MV^2

= ½ x 0.015kg x (50 m/s)^2

=18.75J

Then P= $\frac{K.E}{t}$

P= $\frac{18.75J}{0.002}$= 9375w

Therefore the power of the arrow is 9375W