**JINJA JOINT EXAMINATIONS BOARD**

**MOCK EXAMINATIONS**

**MARKING GUIDE -2019**

**PYHSICS PAPER 2 – 535/2**

1 a (i) A machine is a device by means of which a force applied at one point is used to overcome another force at another point. (Accept a device which simplifies work by magnifying the effort) (01mark)

ii) Efficiency of a machine is the ratio of work output to work input expressed as a percentage. (01mark)

E

L

b(i)

ii) VR = de/dL → 3 = 2.4/dL → dL = 0.8 m.

iii) MA = L/E → 2.4 = 960/E → E = 400 N.

ci) let 1cm represent 2 cm,

2cmI (04 marks)

ii) Real, inverted, magnified. (01 mark)

iii) Magnification, m = hI/ho = v/u = 3.5cm / 2.5cm =1.4 (01 mark)

iv) When the hole is made larger, too much light enters the camera and many images are formed. The images merge and the final image becomes blurred. (02marks)

2 a) (i) moment of a force is the product of the force and its perpendicular distance of its line of action from the fixed point. (01 mark)

(ii) The metre rule is balanced horizontally on a knife edge. The point G where the metre rule balances is noted and is the centre of gravity of the meterrule.A known mass m1 is suspended from one end of the metre rule and the metre rule is adjusted until it balances horizontally at anew point Q.The distance d1 of the mass m1 from the knife edge and the distance d2 of the knife edge from G are measured.

The mass m of the metre rule is calculated by taking moments about the pivot Q.

Thus m1gd1mgd2

From which m (06marks)

500N

R2

50N

R150cm

B

A

b)

Total force down wards = total force upwards

R1 + R2………….. (i)

50+500 =

Taking moments at A,

50 x 100 + 500 x 50 = R2 x 200 ………….(ii)

From (ii) R2 = 150N

Sub in (i) 550 = 150 + R1

From which R1 = 400N. (05 marks)

c) (i) Unstable equilibrium is when an object is slightly displaced, it moves further from its original position, it topples. When it is displaced, the center of gravity is lowered. (02 marks)

ii) Stability of a body can be increased by widening the base area and lowering the center of gravity. (0 2marks)

3 a) Equation of state of a gas is the expression which shows the relationship between, pressure, volume and absolute temperature of a fixed mass of the gas. (01mark)

b) (i)

Volume

-273 0 temperature (0 C)

from the graph above, absolute zero of temperature is the temperature at which the volume of the gas is zero. (02 marks)

(ii) From P1V1/T1 = P2V2/T2

(2500 x 730)/340 = (V2 x 760)/273

From which V2 = (2500 x 730 x 340)/ (760 x 273) = 2991 cm3

3 c

Thermometer

Stirrer

Water

Glass beaker

Rubber band

Heat

Air column

Conc. H2SO4

Capillary tube

A fixed mass of air is trapped using a drop of conc.H2SO4 . The capillary tube is then fixed to the metre rule. The capillary tube and the thermometer are placed in the water bath. The initial temperature T and the corresponding length of air column L are noted. As heat is supplied different readings of temperature and corresponding lengths of air column are recorded. A graph of length L, of the air column against temperature T, is plotted and a straight line is obtained. This shows that volume is directly proportional to temperature.(06marks)

d) From Q = mcƟ, m1c1Ɵ1 = m2 c2Ɵ2

From which c1/c2= (m2 Ɵ2)/ (m1Ɵ1) = (12x2)/ (5x3) = 8/5

or c1: c2 = 8 : 5 (03 marks)

4 a) (i) An echo is reflected sound. (01 mark)

ii) Stationary waves are formed when two waves of the same frequency, amplitude and speed; travelling in opposite directions overlap. (02marks)

b) - length of string, - tension of the string, - mass per unit length of string.(03marks)

c)



-Fill the resonance tube with water when the tap is closed,

- set the tuning fork of known frequency f, to vibrate and bring it close to the mouth of the tube,

- open the tap so that the water runs out slowly. At some stage a loud sound is heard. Close the tap and measure the length l1, of the air column. This is the first resonance and it occurs when 1 +c ……….i

- open the tap again. Another loud sound will be heard. Close the tap and measure the new length l2 . This is the second resonance and it occurs when 2 +c ………..ii

Then ii - i, = L2 -L1 →𝛌 = 2 (L2- L1)

From v = f 𝛌, v = 2f (L2 – L1). (05 marks)

d)

d1cm

d2 cm

From v = d/t, v = 2d1/t1→ d1 =vt1/2 = (330 x 4.0)/2 = 660m

Also v = 2d2/ t2 → d2 = vt2/2 = (330 x6.0)/2 = 990m

Hence distance between the cliffs = 990 - 660 = 330 m (05 marks)

5 a) the joule is the work done when a force of 1 newton moves its point of application through a distance of one meter in its direction. (01mark)

b) (i) linear momentum of an object is the product of its mass and its velocity. (01 mark)

ii) The law of conservation of linear momentum states that if no external act on a system of colliding bodies, total momentum before collision is equal to total momentum after collision.(01 mark)

c)(i)Let velocity of bullet be v, then momentum of bullet before collision =(20/1000) x v

After collision, total mass =400 +20 = 420 g = (420/1000)kg

And momentum after collision (420/1000) x20

By the law of conservation of linear momentum, (20/1000) x v = (420/1000) x 20

V = 420ms (04 marks)

ii) Kinetic energy of bullet before collision = mv2/2 = 20 x (420)2/ (2 x 1000) = 1764 J

Kinetic- energy of block with bullet = 420 x (20)2/ (2 x 1000) = 84 J

Loss in KE = 1764 - 84 = 1680 J (06 marks)

d) Kinetic energy of bullet → kineticenergy of wood + heat energy + sound (03 marks)

6 a



(05 marks)

6 b) (i) -A hot filament heats the cathode which emits electrons that are accelerated as cathode rays by the anodes.

* When the cathode rays reach the deflecting system, the X plates deflect the electron beam horizontally and the Y plates deflect the electron beam vertically.
* When the electron beam strikes the fluorescent screen, a bright light is produced. (04 marks)

ii) When the electron beam strikes the screen, the kinetic energy of the electrons is converted into light and the beam is rendered visible. (02 marks)

c) (i) Bright spot at centre

(ii) Horizontal line across the screen

(iii) Vertical line is formed on the screen

6 d) - for measuring potential difference,

* For displaying wave forms,
* For detecting phase differences,
* For measuring frequency of the wave.
* Measure time interval ( 03 marks)

7 a)

V

E, r

E,r

V

A

R

The emf E of the cell is first measured on open circuit. Then the Pd V across the terminals of the cell is measured when the cell is driving current I through a standard resistor R. Then if r is the internal resistance of the cell, from which (04 marks)

b) (i) R1 and R3 are in parallel, there effective resistance = = 2.4Ω

R and R3 are in series,

Total resistance of the circuit = R3 + R = 2.4 + 2.6 = 5 Ω (03 marks)

ii) CurrentI through R3 = = 2A

H = I2 R = 22 x 2.6 = 10.4 J (03 marks)

c) (i) –eddy currents which can be minimized by laminating the core.

-hysteresis loss which can be minimized by using a core of low hysteresis loss.

- flux leakage which is minimized by winding the coils such that there are no air gaps,

- Ohmic loss which is minimized by using thick copper wires. (03 marks)

d) From P = I V, P = Power, I = current and V = Pd.

If R is total resistance of the cables, power converted into unwanted energy = I2 R. This loss is minimized when I is as low as possible. Then V must be as high as possible. Hence power loss is minimized when I is low and V very high. (03 marks)

8 a) (i) A region around a magnet where a magnetic force is experienced. (01 mark)

ii) Like pole repel, unlike pole attract. (01mark)

b)

N

S

N

S

path

Steel bar

The steel bar is stroked from end to end repeatedly with one pole of a bar magnet. At the end of the bar, the magnet is lifted off high to come and repeat the stroking from starting point along the path shown by the arrows. The domains in the bar are attracted to face same direction hence magnetized.(04marks)

8c



When the coil is rotated in a clockwise direction, side ab moves upwards while cd moves downwards. The sidesab and cd cut magnetic field lines between the N- and S- poles. As a result an emf is induced in the coil. Current flows from ato b and from c to d. When the coil reaches the vertical position, no emfs induced instantaneously, but due to momentum, the coil moves on, the sides interchange directions of movement. The direction of the current reverses. The current produced is alternating and can be picked up from the slip rings using carbon brushes. (06 marks)