1.

The base unit of pressure in the question isn't correct.

$$p = \frac{F}{A} = \frac{kgms^{-2}}{m^2} = kgm^{-1}s^{-2}$$

C is the correct option

2.

Using resolution of forces

For the first 10N,

Vertical component = 10 x sin 60 =8.66N

Horizontal component = 10 x cos 60 = 5N (this will be negative force because it is in other direction)

The second 10N is already in horizontal component

Total vertical component = 8.66N

Total horizontal component = 10-5 = 5N

Resultant force = $\sqrt{8.66^2 + 5^2}$ = 10N

B is the correct answer

3.

The area under the graph = power x time

And Energy = Power x time

The area under the graph will be the change in kinetic energy of the ion

B is the correct option

4.

Microwave is between $10^{-1}\ to\ 10^{-3}m$

Looking through the options

A 3 000 000 pm

B 30 nm

C 30 000 µm

D 3000 mm

Option A is the same as $3 \times 10^{-6} m$

Option B is the same as $3 \times 10^{-8} m$

Option C is the same as $3 \times 10^{-2} m$

Option D is the same as 3m

Out of the 4 options, it is option C that falls within the range of microwaves

5.

$$\lambda = \frac{ax}{D}$$

To calculate uncertainty in the wavelength

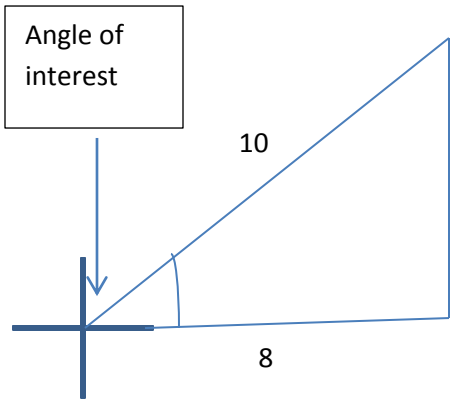
$$\frac{\Delta\lambda}{\lambda} = \frac{\Delta a}{a} + \frac{\Delta x}{x} + \frac{\Delta D}{D}$$

$$\frac{\Delta\lambda}{\lambda} = \frac{0.02}{0.5} + \frac{0.1}{1.7} + \frac{0.002}{2} = 0.101$$

Percentage uncertainty = 0.101 x 100 = 10.1%

D is the correct answer

6.



Using SOHCAHTOA

$$cos\theta = \frac{8}{10} = 0.8$$

$$\theta = 37°$$

Angle of interest = 90 – 37 = 53

The direction the bird will fly in order to travel to a destination that is due north of the bird's current location is 53° east of north

Servantboy.com (CIE PHYSICS 9702 P11 OCT/NOV 2017)

7.

Let begin from the simplest

The graph of q against times shows the horizontal component of the displacement because, the speed is uniform speed i.e acceleration is zero. And that graph show a graph of uniform speed

The graph of r against time shows the vertical component

B is the correct option

9.

What you are to calculate is the distance covered after the engine has been switched off

F = ma

$$a = \frac{F}{m}$$

$$v^2 = u^2 - 2as$$

final velocity is zero

initial velocity is u and distance covered for the first force is 100

$$u^2 = \frac{200F}{m}$$

when the resistive force is 0.8f with the same initial speed

$$\frac{200F}{m} = \frac{2 \times 0.8F \times s}{m}$$

$$s = \frac{200}{1.6} = 125m$$

B is the correct answer

11.

$$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$$

$$m_1 = m_2$$

$$6 + 0 = 2 + v_2$$

$$v_2 = 4cms^{-1}$$

B is the correct option

13.

We can calculate the torque of the couple by adding the moments of each force about the centre of the circular disc

Torque of couple = $Fr + Fr = 2Fr$

Note: to form a couple, the two forces must be:

Equal in magnitude

Parallel, but opposite in direction

Separated by a distance d

A is the correct answer

14.

Moment is about the axle

$$90 \times 400 = 600 \times x$$

X = 60 mm

The passenger must move his centre of mass to maintain balance 60 mm forward.

16.

$$efficiency = \frac{poweroutput}{powerinput} = \frac{p_o}{p_I}$$

D is the correct answer

17.

Work done by the piston = $pv = 3000 \times \frac{400}{10000} \times 0.25 = 30\,J$

A is the correct answer

18.

$$v^2 = u^2 - 2as$$

$$0 = 15^2 - 2 \times 9.81 \times s$$

$$s = \frac{225}{19.62} = 11.46m\ approximately\ 11m$$

B is the correct answer

19.

$$efficiency = \frac{poweroutput}{powerinput}$$

Power input = pressure x flow rate = $h\rho g \times flow\ rate$ =30 x $\frac{340}{60} \times 1000$ x 9.81=1667700 watt

$$\frac{90}{100} = \frac{poweroutput}{1667700}$$

Power output = 1500930 watt = 1.5 MW

B is the correct answer

20.

The types of deformation shown by this experiment are both elastic and plastic deformation because in the first experiment the spring returns to its original length (elastic) while in the second case he spring is longer than it was originally (plastic)

A is the correct answer

21.

Strain energy per unit volume $=\frac{1}{2} \times stress \times strain = \frac{1}{2} \times 2 \times 10^9 \times 0.01 = 1 \times 10^7 = 10 MJm^{-3}$

D is the correct answer

22.

Amplitude remains the same

Wavelength is decreasing

Period is decreasing; as period decreases, frequency increases, therefore, frequency is the quantity of the wave that is increasing

B is the answer

23.

The first loud sound (first harmonic)

$\frac{\lambda}{4} + c = x$ .....eq 1

The second loud sound (second harmonic)

$\frac{3\lambda}{4} + c = y$ .....eq 2

Note c is the end correction

Subtract equation 1 from equation 2

$$\frac{\lambda}{2} = y - x$$

$$\lambda = 2(y - x)$$

C is the answer

25.

The possible explanation is that the sun is rotating and this is why band of wavelengths ranging from less than λs to more than λs is observed on the Earth.

D is the answer

27.

Following the principle of superposition option A is the correct answer. The principle says when two waves meet they combine, with the displacements of the two waves adding together.

29.

$$n\lambda = dsin\theta$$

$$\lambda = \frac{v}{f}$$

Taking n and v to be constant

$$\frac{1}{fd} = sin\theta$$

The smaller the value of $\frac{1}{fd}$ the smaller the angle

Looking at the options

Option A gives $\frac{4}{fd}$

Option B gives $\frac{1}{fd}$

Option c gives $\frac{1}{fd}$

Option D gives $\frac{1}{4fd}$

Therefore option D will give the smallest value of $sin\theta$ and in the same vain gives the smallest angle

30.

$$n\lambda = dsin\theta$$

$$\theta = \frac{70}{2} = 35°$$

$$1 \times \lambda = 10^{-6} \times sin35 = 5.735 \times 10^{-7} = 574nm$$

C is the answer

31.

For the sphere to be in equilibrium

Tension on the thread = electric force

To calculate the tension,

The direction of the tension on the thread is upward, which is in the same direction with the weight on the other end of the pulley

$$T = (2 - 0.8)g = 0.0012 \times 9.81 = 0.011772N$$

$$electric\ force = Eq$$

$$T = Eq$$

$$q = \frac{T}{E} = \frac{0.011772}{2000} = 5.9\mu C$$

The charge on the sphere is positive, for it to be in equilibrium upward force must equal the downward force. And the charge on the second plate is negative, so there will be and attractive force which the tension on the wire must balance for it to be in equilibrium. C is the answer

32.

The direction of the electric field lines indicate that it moves from positive to negative plate. And since electron is negatively charge, and as it moves towards the negative plate, the speed will decrease because of the force of repulsion. The path of the electron is linear. C is the answer

33.

Rate of flow,

$$\frac{1}{t} = \frac{I}{q} = \frac{3.2 \times 10^{-3}}{1.6 \times 10^{-19}} = 2 \times 10^{16}$$

Charge on an electron is 1.6×10^{-19}c

Current moves from positive to negative while electron moves from negative to positive

Meaning the direction of flow in the resistor will move from Y to X

C is the answer

34.

$$power = I^2R = (500X10^{-3})^2 \times 180 = 45watt$$

A is the answer

35.

$$R = \frac{\rho L}{A}$$

$$Area = \frac{V}{L}$$

Resistivity is the same for the two wire

$$\frac{R_X A_x}{L_x} = \frac{R_y A_y}{L_y}$$

$$\frac{R_y}{R_X} = \frac{A_x L_y}{A_y L_x}$$

Since the volume is the same

$$A_x L_x = A_y L_y$$

$$\frac{A_x}{A_y} = \frac{L_y}{L_x}$$

$$\frac{R_y}{R_X} = \frac{{L_y}^2}{{L_x}^2}$$

$$L_y = 4 \times L_x$$

$$\frac{R_y}{R_X} = \frac{4^2}{1} = \frac{16}{1}$$

D is the answer

37.

From Kirchoff's second law

The sum of e.m.fs around any loop in a circuit is equal to the sum of the p.ds around the loop

For the first loop

$$E = I_1R_1 + I_2R_2$$

For the second loop

$$I_2R_2 - I_3(R_3 + R_4) = 0$$

The reason for the negative is because the current on $R_3 and R_4$ is opposite to the direction of the loop

For the third loop

$$E = I_3(R_3 + R_4) + I_1R_1$$

These are the three possible loop in this diagram

The correct option is B

39.

$^{218}As_{85}$ = β– particle($^{0}e_{-1}$) + α-particle($^{4}He_{2}$) + $^{214}Po_{84}$

Nucleon number of polonium = 214

Proton number of polonium = 84

(Bolarinwa)[1]

[1] Always check servantboy.com for educative information