Answers to June 06 Paper

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Please email me or sms me asap if you spot any mistakes.

Paper 2

1 (a) $kgms^{-2}$

(b) $Kgm^{-1}s^{-1}$

(c) (i) 9.40

(ii) a = 9.81 ms^{-1}. Since $a = g$ up to 3 s.f., the assumption made in (i) is justified.

2 (a) Refer to notes

(b) So that when moment is taken about point P, the total moments is zero.

(c) (i) $F\cos\alpha = T\cos\beta$

(ii) $F\sin\alpha + T\sin\beta = W$

(iii) $\frac{2}{3}W = T\sin\beta$

3 (a) Notes

(b) (i) T drops, PE same, KE drops therefore U drops.

(ii) Remaining water: U same.
Water vapour: PE increases, U increases.

4 (a) Notes

(b) (i) Mercury level on both sides same indicating that the pressure is the same on both sides.

(ii) 746

5 (a) Elastic because F is proportional to x.

(c) 9.20

6 (b) 332

(c) 0.5 cm on top of the mouth of the tube.

7 (a) S_3, fused

(b) To avoid short-circuit and getting electric shock

(c) 15

(d) (i) 30

(ii) 1.2

(e) At the instance when current is passed through the bulb, its resistance is 15 ohms. It will not light up to its full brightness. After some time (due to heating), its resistance will reach 30 ohms and it will operate at normal brightness.

8 Notes

Paper 4

1 (b) (i) $\frac{1}{2}\frac{GMm}{r}$

(ii) $-\frac{GMm}{r}$

(iii) $-\frac{1}{2}\frac{GMm}{r}$

(c) (i) r decreases (since the expression is negative, a decrease in total energy means that it becomes more negative i.e. the magnitude of the expression increases)

(ii) From the expression obtained in (a), if r decreases, v increases.

2 (a) Notes

(b) (i) 415

(ii) 746

3 (a) As temperature increases, resistance decreases by a measurable amount. For every temperature, there is a unique resistance.

(b) 288.0

4 (a) (i) 1

(ii) 40

(b) (i) 10.6

(ii) 2650

5 (a) Notes

(b) (i) 2.72×10^{-5}

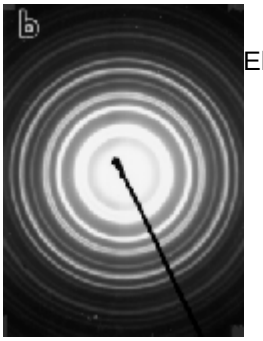
(ii) 7.0×10^{5}

(c) The sphere will discharge and ionize the atom

6 (b) (ii) Towards Q

(c) Say current = 10 A, distance between the conductors is 1 cm, length of conductor is 1 m, calculated F = 2×10^{-3} N. This is too small to cause any significant movements on the wires.

7 (a) Scattering pattern

(b)  Electron Diffraction Pattern

(c) v increases, f remains the same, from $\sin\theta = \frac{n\lambda}{d}$, θ increases. Pattern becomes

larger / more spread out.

8 (b) (i) twice the charge → force due to B.field is doubled but force due to E.field is also doubled. Hence no deviation from the original path.

(ii) with 2v, force due to B.field is doubled → alpha particle will deflect upwards.

[Note that you have to write out the equation $Bqv = qE$ for both parts to explain)

Paper 6

6 (a) As water is forced through the nozzle at high speed, the movement of water causes the air particles around it to move as well. According to Bernoulli principle, the faster moving air will have a lower pressure compared to the still air which is at atmospheric pressure. Hence the pressure at tube T is lower than atmospheric pressure.

(b) (i) v increases, P drops → pressure difference higher

(ii) mass increases, larger momentum transferred to the air particles causing them to move faster → higher pressure difference.

7 (a) Presence of drag force → to maintain at constant speed, engine has to deliver a higher power

(b) (ii) 63.0

(iii) 1.14