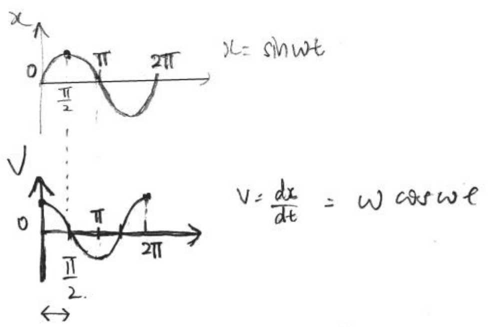
H2 Physics P1

Qn	Ans Key	Discussions
1	**D**	random errors is ±0.02 + systematic error is ±0.02
2	**B**	estimate average speed. apply ½ mv^2.
3	**C**	
4	**C**	Solving $\frac{1}{2}gt^2 - \frac{1}{2}g(t-1)^2 = 10$ gives t = 1.52 s
5	**A**	The 2 slopes have the same gradient since same magnitude of acceleration. The time taken to travel back to slope is longer after collision since speed after rebound is lower.
6	**C**	Area under F-t graph gives change in momentum
7	**C**	Use Conservation of momentum to get ratio of speed, hence KE
8	**A**	No resultant force 3 forces in equilibrium must be concurrent
9	**B**	When floating, U = W Hence $\rho_1 h_1 Ag = \rho_2 h_2 Ag$
10	**C**	The additional clockwise moment of spring on board = additional anti-clockwise moments when man steps on board.
11	**C**	Recall the nature of *KE* and *EPE* graphs in SHM. *GPE* depends on reference point.
12	**C**	Power = $Fv = kv^3$
13	**B**	**9702/June 2013 P1 Q18** Power i/p = ½ ρAv^3
14	**D**	Since $F_C = \frac{mv^2}{r}$, therefore the force will be 4 times.
15	**B**	At the point where gravitational force on mass m is zero the gravitational force on the mass m exerted by earth is equal and opposite to that exerted by moon on mass m . Applying Newton's law of gravitation to determine magnitude of these two forces
16	**A**	Work done by external agent on mass = change in GPE of the 100g mass $\Delta U = m(\phi f - \phi i)$ = 0.100(-2000-(-2500)) = 50 J
17	**C**	Definition of SHM
18	**C**	Use $a_{max} = \omega^2 x_o$
19	**B**	
20	**B**	For no damping, the maximum amplitude is infinity.
21	**B**	The Avogadro number is a constant.
22	**B**	As can be seen from the area under the graph, there is more work done on the gas than by the gas when expanding, hence, there is net heat loss by the gas each cycle.

23	**C**	By considering $Q = mc\Delta\theta$
24	**C**	1λ=2 cm, hence 2.5 cm is 1.25 λ; 0.25 x 2π = 0.5 π
25	**A**	The standard double slit interference pattern is shown in A
26	**A**	Path difference of 1 cm, destructive interference results.
27	**A**	Electric field strength is the –ve of the electric potential gradient which is the change in electric potential per unit distance hence $E_X > E_Y$ Direction of field always in direction of decreasing potentials.
28	**B**	Resultant field strength $\mathbf{E} = \mathbf{E_A} + \mathbf{E_B}$ Calculate $\mathbf{E_A}$ by applying $E = \frac{Q}{4\pi\varepsilon_0 r^2}$ = 0.72 x10^3 Vm^{-1} From the graph at x = 5 cm = 5.0 x 10^{-2} m the magnitude of resultant field is 1.8 x10^3 Vm^{-1} hence $\mathbf{E_B}$ = 1.08 x10^3 Vm^{-1}; and Q_B is a negative charge as its direction is towards +ve x direction; so the resultant field is greater than that due to Q_A. if candidate gave $\mathbf{E_B}$ = 1.76 x10^3 Vm^{-1}, they must have use $V = \frac{Q}{4\pi\varepsilon_0 r}$ instead
29	**C**	From the IV graphs determine R when current is 6.0 A; R=1.2 Ω When current is 5.0 A; R= R1 =1.6 Ω Using equation E=IR+Ir Substituting corresponding values of I and R Determine E and r OR E=IR+Ir = E=V+Ir Substituting corresponding values of V and I Determine E and r
30	**C**	Let the potential difference across the supply be V Before W is removed the potential drop across each resistor is the same Hence power dissipated in each is the same and is the current through each resistor is equal to $\frac{V}{2R}$ as the total resistance the circuit is R When W is removed, total resistance in circuit increases 1.5 R Hence the total current in the circuit is $\frac{2V}{3R}$ The current through X is $\frac{2V}{3R}$ and that through each of Y and Z is $\frac{V}{3R}$ Thus the potential drop across X increases and that across each of Y and Z decreases, hence the power dissipated in X will increase and that in each of Y and Z will decrease.
31	**C**	$weight = F_B$ $mg = BIL$ $B = \frac{mg}{IL}$ $= \frac{0.030 \times 9.81}{1.2 \times 0.04}$ $= 6.1\,T$

32	**A**	Since magnetic flux $\phi = BA$ magnetic flux density, $B = \dfrac{\phi}{A}$ Magnetic flux ϕ is the same throughout the core assuming no leakage. Since section (A) has the biggest cross-sectional area, it has the smallest magnetic flux density B. Note that as N is the smallest for A, it also has the smallest flux linkage, hence A is the region with the least variation of magnetic flux density.
33	**D**	$V_s/V_p = N_s/N_p$ V = IR $P_{mean} = I_{rms}V_{rms}$
34	**D**	
35	**B**	
36	**B**	P and N-type semiconductors are neutral. You simply doped with valency V or III elements.
37	**A**	Apply $\Delta p \Delta x \geq h/4\pi$
38	**D**	Know the idea behind finding the probability of locating a particle with its wave function
39	**B**	Find k and apply T α e^{-2kd} $\dfrac{T'}{T} = e^{-2k(d'-d)}$ $\ln(\dfrac{T'}{T}) = -2k(d'-d)$
40	**A**	Apply $I = I_o e^{-\lambda t}$ when t = 3 and t = 6