

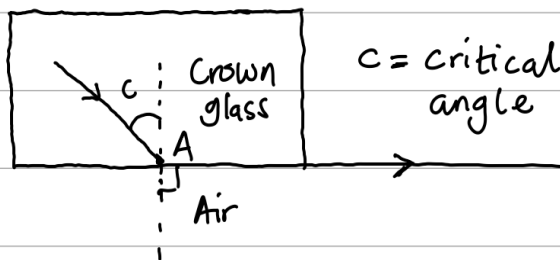
JJEB MOCK EXAMS 2023 535/1 PHY GUIDE

Number	Solution	Remarks	Mark
Section A (Qn 1-40)	<u>SECTION A (40 MARKS)</u> 1. A 9. A 17. B 25. C 33. 1060 2. D 10. D 18. A 26. D 34. C 3. D 11. A 19. D 27. A 35. C 4. D 12. A 20. <u>3.75</u> 28. A 36. A 5. C 13. C 21. A 29. D 37. D 6. B 14. A 22. C 30. D 38. A 7. B 15. C 23. C 31. A 39. A 8. B 16. A 24. A 32. A 40. A		@01mark
Section B (Qn 41-50)	<u>SECTION B (40 MARKS)</u>		@)04mrks
Qn 41 (a)(i)	Every body remains in its state of rest or uniform motion in a straight line, unless it is acted upon by an external force.	✓	01
(b)	* A parachutist who jumps from an aeroplane. * Car airbags. * Motion of a ball falling in the atmosphere. * The lift-off of a rocket from the launch pad * A kite flying through the air.	✓	01
(c)	$m_a u_a = (m_a + m_b) v$ $\Rightarrow 2 \times 20 = (2 + m_b) 8$ $\therefore m_b = 3 \text{ kg}.$	✓ ✓ ✓	02
Qn 42 (a)(i)	A wave is a disturbance that transfers energy from one point of a medium to another point without the permanent displacement of the medium.	✓	01
(ii)	During night, air near the ground is cold (more dense) and air above the ground is warm (less dense). The sound waves move from a more dense medium to a less dense medium hence they are refracted towards the ground after undergoing through total internal reflection	✓ ✓ ✓ ✓ ✓	02

Number	Solution	Remarks	Mark
(b)	* Refraction. * Reflection. * Diffraction. * Interference.	✓ ✓	01
Qn 43 (a)	A volt is a p.d between two points if the work done to move 1C of charge from one of the points to the other is 1J.	✓	01
(b)	<u>Case I:</u> $I = 0.5A$, $R = 2+2 = 4\Omega$ $E = I(R+r) \Rightarrow E = 0.5(4+r)$ $\Rightarrow r = \frac{E}{0.5} - 4 \rightarrow (i)$ <u>Case II:</u> $I = 2A$, $R = \frac{2 \times 2}{2+2} = 1\Omega$ $\Rightarrow E = 2(1+r)$ $\Rightarrow r = \frac{E}{2} - 1 \rightarrow (ii)$ Equating (i) to (ii) gives: $\frac{E}{0.5} - 4 = \frac{E}{2} - 1$ $\Rightarrow 4E - E = 6 \therefore E = 2V$ internal resistance, r is: $r = \frac{2}{2} - 1 \therefore r = 0.5\Omega$	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	03
Qn 44 (a)(i)	The tube is evacuated to prevent cathode rays from colliding with air particles, which would reduce their kinetic energy and fail to reach the fluorescent screen, hence free movement of cathode rays.	✓ ✓	01
(ii)	The cooling fins absorb heat from the anode system and emit it to the surrounding. This keeps the anode system at a temperature lower than the melting point of tungsten.	✓ ✓	01

Number	Solution	Remarks	Mark
(b)	<div>Time base : 0.005 s cm^{-1}</div> <hr/> <div>$\Rightarrow 0.005 \text{ s} \rightarrow 1 \text{ cm}$</div> <hr/> <div>Period, $T \rightarrow 4 \text{ cm}$</div> <hr/> <div>$\Rightarrow T = 0.005 \times 4 = 0.02 \text{ s}$</div> <hr/> <div>Frequency, $f = \frac{1}{T} = \frac{1}{0.02}$</div> <hr/> <div>$\therefore f = 50 \text{ Hz.}$</div>	<div>✓</div> <hr/> <div>✓</div> <hr/> <div>✓</div> <hr/> <div>✓</div>	02
Qn 45 (a)(i)	Radioactivity is the spontaneous disintegration of an unstable element by emission of alpha particles, beta particles and gamma rays.	✓	01
(ii)	<p>* Radioactivity is spontaneous because it is not affected by external agents such as temperature, pressure, electric and magnetic fields, e.t.c</p> <p>* It is random because it is unpredictable, i.e, it occurs any time.</p>	<div>✓</div> <hr/> <div>✓</div>	02
(b)	<p>* They both have high penetration power.</p> <p>* They are both electrically neutral and so, not affected by both electric and magnetic fields.</p> <p>* They both have no mass.</p> <p>* They are both bands of electromagnetic spectrum.</p> <p>* The both move at a speed equal to $3.0 \times 10^8 \text{ ms}^{-1}$, e.t.c</p>	✓	01
Qn 46 (a)	Weight refers to the force of attraction on a body due to gravity.	✓	01

Number	Solution	Remarks	Mark
(b)	$\text{Gain in K.E} = \text{Loss in P.E}$ $= mg(h_2 - h_1)$ <p>But: $h_2 = 42\text{ m}$, $h_1 = \frac{3}{4} \times 42 = 31.5\text{ m}$</p> $\Rightarrow \text{Gain in K.E} = 3.6 \times 10 \times (42 - 31.5)$ $= 378\text{ J}$	 ✓ ✓ ✓ ✓	03
Qn 47 (a)	Magnetic field refers to the area around a magnet where magnetic forces are felt.	✓	01
(b)(i)	When the wire is moved vertically, the galvanometer does not deflect but when it is moved horizontally, the galvanometer deflects.	✓ ✓	01
(i)	When the wire is moved vertically, it does not cut the magnetic flux (field lines) between the poles and so, no emf is induced in the circuit, hence no deflection on G. However, when the wire is moved horizontally, it cuts the magnetic flux between the poles and an emf is induced, resulting into an induced current that flows in the circuit containing G, and so, G deflects.	✓ ✓ ✓ ✓	02
Qn 48 (a)	* Diffuse (irregular) reflection. * Specular (regular) reflection.	✓ ✓	01
(b)(i)	Critical angle is the angle of incidence in a more optically dense medium for which the angle of refraction is zero. OR , It is the angle of incidence that produces an angle of refraction of 90° , for light moving from a more optically dense medium to a less optically dense medium.	✓	01

Number	Solution	Remarks	Mark
(ii)	 <p>Applying Snell's law at A</p> $\sin c = \frac{1}{n} ; n = 1.54$ $\Rightarrow c = \sin^{-1}\left(\frac{1}{1.54}\right) ;$ $\therefore c = 40.5^\circ$	<p>✓</p> <p>✓</p> <p>✓</p>	02
Qn 49 (a)	The statement means that 1kg of substance W requires heat energy of 2260000J to change from solid state to liquid state at a constant temperature.	✓	01
(ii)	During vaporization, the latent heat absorbed is used to break the intermolecular forces of attraction for the liquid state of a substance to turn into a gas and some more heat energy is absorbed to do work against air pressure. During fusion (melting), the latent heat absorbed is only used to break down the intermolecular forces for the solid state of the same substance to turn into a liquid.	<p>✓</p> <p>✓</p> <p>✓</p>	03
Qn 50 (a)	It states that pressure applied at a point in a fluid at rest is transmitted equally to all parts of the fluid.	✓	01
(b)	<p>Air pressure, $P = Hg f_m + h g f_m$</p> $\Rightarrow P = \frac{(76+66)}{100} \times 10 \times 13600$ $\therefore P = 193120 \text{ Nm}^{-2}$	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	03