INDIAN SCHOOL MUSCAT

FINAL TERM EXAMINATION

FEBRUARY 2019

SET A

CLASS XI

Marking Scheme – PHYSICS [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	The **blue**(or violet) light due to its short wavelength is scattered more as compared to the red light of long wavelength	1
2.	(i) No change (ii) become 4 times	½ +1/2
3.	**Wheels** of **automobiles** are **made circular** to reduce the frictional force. Rolling friction is less than sliding friction and that is **why wheels** are **circular** in shape.	1
4.	**Shockers** are **used in cars**, **scooters and motorcycles** so that the time interval of the jerk increases. so, the rate of momentum decreases. Hence, comparatively a lesser force is exerted on the passengers during the jerk. OR No change	1 1
5.	Gravitational Force < Weak Force < Electromagnetic Force < Nuclear Force . OR 2 characteristics of strong nuclear force	1 1
6.	Getting answer x = 0 OR any four limitations of dimensional analysis.	2 ½ ×4=2
7.	$\upsilon_A = +54\ \text{km h}^{-1} = 15\ \text{m s}^{-1}$ $\upsilon_B = -90\ \text{km h}^{-1} = -25\ \text{m s}^{-1}$ Relative velocity of B with respect to $A = \upsilon_B - \upsilon_A = -40\ \text{m s}^{-1}$ Relative velocity of ground with respect to $B = 0 - \upsilon_B = 25\ \text{m s}^{-1}$.	1 1
8.	(i) the **velocity vector** is directed tangent to the **circle** (ii) two times	1 1
9.	Law of conservation of angular momentum Statement and proof OR (i) by bringing his arms and legs closer to the body in order to conserve angular momentum (ii) The **spokes** to the cycle **wheel** increases the moment of inertia due to the increase in the distribution of mass. This opposes the change in the rotary motion of the **wheel**. Thus **spokes fitted** to the cycle**wheel** gives a steady motion.	1+1 1 1
10	(i) For ease in manufacture,flexibility and strength. (ii) If the bridge is used for a long time, due to alternate cycles of stress and strain the bridge gradually loses its elastic property and finally reaches to a condition called elastic fatigue. Hence, at this stage, the strain produced for a given	1 1

	stress will be very large and a permanent change occurs in it's structure. This permanent change leads to it's collapse.	
11	(i) TIR (ii) 2 condition for TIR	1+1
12	Angle of refraction in medium 2 is less than angle of incidence in medium 1. That is, the ray is bending towards the normal. Therefore, medium 2 is optically denser than medium 1. (ii) The refractive index of glass varies with the wavelength or color of the **light** used	1 1
13	Ray diagram of reflecting type telescope Advantages of reflecting type OR Ray diagram showing the formation of image formed by a concave mirror when an object is placed between its focus and pole Mirror formula derivation	2+1 1+2
14	(i)π/2 radian (ii) Presence of moisture in air decreases the density of air. Hence velocity of **sound** increases on a **rainy day**. (iii) Elasticity and inertia	1 1 ½+½
15	(i) Law of equipartition of energy (ii) Proving C_{rms}= $\sqrt{3RT/M}$	1 2
16	Any three differences between isothermal process and adiabatic process.	1+1+1
17	(i) Thermal conductivity of **copper** is greater as compared to the conductivity of **steel**. With **copper bottom**, more heat is conducted inside which helps in the preparation of meals quickly. (ii) **Wien's displacement law** states that the black body radiation curve for different temperature peaks at a wavelength is inversely proportional to the temperature. ... b is a constant of proportionality called **Wien's displacement** constant (iii) **High specific heat** capacity **is** required because the **heat** absorbed by a substance**is** directly proportional to the **specific heat** of the substance. **OR** (i) When birds swell their feathers, they trap air in the feather. Air being a poor conductor prevents loss of heat and keeps the bird warm. (ii) The total radiant heat energy emitted from a surface is proportional to the fourth power of its absolute temperature (iii) So that there is enough margin for the **tracks** to expand and contract due to the temperature changes. If that **gap** is not **left** then the **tracks** might have enormous stress in them while expanding due to heat.	1 1 1 1 1 1
18	(i) Deriving an expression for the variation of acceleration due to gravity with height. (ii) Acceleration due to gravity decreases with depth by a factor (1-2h/R)	2 1
19	Potential energy $= U = -4\times\frac{Gm^2}{l} - 2\times\frac{Gm^2}{\sqrt{2}\,l} = \frac{Gm^2}{l}\times\left(-4-\sqrt{2}\right) = -5.41\frac{Gm^2}{l}$	1 ½ 1 ½

	The gravitational potential at the center of the square $V_{center} = -\frac{Gm}{\left(\frac{l}{\sqrt{2}}\right)} - \frac{Gm}{\left(\frac{l}{\sqrt{2}}\right)} - \frac{Gm}{\left(\frac{l}{\sqrt{2}}\right)} - \frac{Gm}{\left(\frac{l}{\sqrt{2}}\right)} = -4\frac{Gm}{\left(\frac{l}{\sqrt{2}}\right)} = -4\sqrt{2}\frac{Gm}{l}$ OR (i) No (ii) $W = mg = 63\ N$ $\frac{g_h}{g} = \frac{R^2}{(R+R/2)^2}$ $W_h = mg_h = m \times \frac{4}{9}g = \frac{4}{9}mg$	½ ½ ½ +½
20	(i) Magnitude will decrease, direction remains the same (ii) Deriving an expression for the position vector of the centre of mass of a two particle system.	½ +½ 2
21	(i) Work energy theorem (ii) decrease	2 1
22	(i) Any two difference between elastic and inelastic collision (ii) initial kinetic energy of bullet = 1/2 mv^2 = ½ (0.05)(200×200) = 1000J final KE is ½ mv^2 = 10% of ½ mu^2 = ½ mv^2 = (10/100) x 1000 = v^2 = 100 x 2/0.05 = v = 63.24 m/s OR (i)Any 2 difference between conservative and non conservative force (ii) Kinetic energy of moving car, $K = \frac{1}{2}mv^2$ $= \frac{1}{2} \times 1000 \times 5 \times 5\ J = 1.25 \times 10^4\ J$ $\frac{1}{2}kx^2 = 1.25\times10^4$ x=2m	1 ½ +½ ½ ½ 1 ½ +½ ½ ½
23	(i) Rocket is not a projectile (ii) Proving that the path of a projectile is a parabola.	1 2

24	(i) Drawing position-time graph of two objects moving along a straight line when their relative velocity is non-zero. (ii) Yes, uniform circular motion (iii)zero	1 ½ +½ 1
25	(i) Statement and proof of law of conservation of linear momentum. (ii) $a = -\frac{u^2}{2s}$ $= -\frac{90\times 90}{2\times 0.6}\ ms^{-2}$ $= -6750\ ms^{-2}$ F= $= 0.04\ kg \times 6750\ ms^{-2}$ $= 270\ N$ **OR** (i)obtaining an expression for optimum speed and maximum permissible speed of a car on a banked circular track. + free body diagram (ii) $v = \sqrt{\mu r g}$ $v = \sqrt{0.1\times 3\times 10} = 1.732\ m/s$ $But\ velocity\ of\ the\ cyclist\ is\ 18\ km/h = 5\ m/s$ $hence\ cyclist\ will\ get\ slip.$	1+2 1 1 1+2 ½ + ½ ½ + ½
26	(i) Statement and proof of Bernoulli's theorem. +diagram (ii) *Oil* when poured over water spreads over the surface of water because of surface tension. Oil calms the sea waves because the surface film of oil prevents the generation of ripples on the exposed crests of the waves. (iii)Reason To keep a piece of paper horizontal, you should blow over, not under it.(give explanation based on Bernoulli's theorem) **OR** (i) Defining terminal velocity , diagram and obtaining an expression for the terminal velocity of a sphere falling through a highly viscous fluid in a jar.	½ +2 ½ 1 1 ½ +½

	(ii) By equation of continuity when we close the water tap with our fingers, the area at that point, from where water flows out, decreases and hence velocity of water increases. (iii) The blood pressure in humans is greater at the feet than the brain.Therefore, pressure of liquid column increases with depth. The height of blood column inhuman body is more at feet than at the brain.	2 1 1
27	(i) proving the oscillations of a simple pendulum are simple harmonic deriving an expression for frequency of oscillations of simple pendulum. diagram (ii) At a certain point, the bridge would start oscillating to the same rhythm as that of the marching steps. This oscillation would reach a maximum peak when the bridge can no longer sustain its own strength and hence collapses. Therefore, soldiers are ordered to break their steps while crossing a bridge. (iii) graph showing the variation of energy with respect to time for a harmonic oscillator executing damped oscillations. **OR** (i) Explanation about the harmonics formed in an closed organ pipe with necessary diagram and proving that the harmonics are in the ratio 1:3:5:…….. (ii) two differences between stationary waves and progressive waves. (iii) infinity	1 1 1 1 1 1+1+1 ½ +½ 1