INDIAN SCHOOL MUSCAT

FINAL TERM EXAMINATION

FEBRUARY 2019

SET B

CLASS XI

Marking Scheme – PHYSICS [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	Gravitational Force < Weak Force < Electromagnetic Force < Nuclear Force . OR 2 characteristics of strong nuclear force	1 1
2.	**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
3.	No change	1
4.	angle of friction definition	1
5.	Red light having greatest wavelength is least scattered	1
6.	S_n=u+a/2(2n-1) Getting u = 11m/s; a = 4m/s^2 S_{10}=49m	½ ½ ½ ½
7.	Checking the equation $FS = \frac{1}{2}mv^2 - \frac{1}{2}mu^2$ is dimensionally correct OR 2 differences between accuracy and precision	2 1+1
8.	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
9.	relation between the refractive index and critical angle for a given pair of optical media. conditions for total internal reflection to occur.	1 1
10.	Representing graphically the variation of extension with load in an elastic body. marking: (a) Hooke's law region and (b) Elastic limit	1 ½+½
11.	(i) the **velocity vector** is directed tangent to the **circle** (ii) two times	1 1
12.	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	1+1 1

	(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
13.	three differences between reversible process and irreversible process.	1+1+1
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**. (i) Elasticity and inertia	1 ½+½
15.	(i) schematic labelled ray diagram of a reflecting type telescope (cassegrain). (ii) any two important advantages of reflecting type telescope over refracting telescope. **OR** (i) ray diagram to show the formation of image by a concave mirror when an object is placed between its focus and the pole. (ii) Using the above ray diagram derive the mirror formula.	2 ½+½ 1 2
16.	Statement and proof of Kepler's second law of planetary motion.	1+2
17.	Potential energy $= U = -4\times\frac{Gm^2}{l} - 2\times\frac{Gm^2}{\sqrt{2}\,l} = \frac{Gm^2}{l}\times\left(-4-\sqrt{2}\right) = -5.41\frac{Gm^2}{l}$ 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) $W = mg = 63\ N$ $\frac{g_h}{g} = \frac{R^2}{(R+R/2)^2}$ $W_h = mg_h = m\times\frac{4}{9}g = \frac{4}{9}mg$	1 ½ 1 ½ ½ ½ ½ +½
18.	(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
19.	(i) Statement and proof of work energy theorem. (ii) decrease	1+1 1
20.	(i) Rocket is not a projectile (ii) Proving that the path of a projectile is a parabola.	1 2
21.	degree of freedom definition obtaining the ratio of specific heats for a monoatomic gas molecule.	1 2
22.	(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
23.	(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, $K = \frac{1}{2}mv^2$ $= \frac{1}{2} \times 1000 \times 5 \times 5\ J = 1.25 \times 10^4\ J$ ½kx^2=1.25×10^4 x=2m	1 ½ +½ ½ ½ 1 ½ +½ ½ ½
24.	(i) no change (ii) Deriving an expression for rotational kinetic energy of a rigid body.	1 2
25.	(i) proving the oscillations of a simple pendulum are simple harmonic	1 1

	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 ½ +½ 1
26.	(i) Statement and proof of law of conservation of linear momentum. (ii) $a = -\frac{u^2}{2s}$ $= -\frac{90 \times 90}{2 \times 0.6}\ \text{ms}^{-2}$ $= -6750\ \text{ms}^{-2}$ F= $= 0.04\ \text{kg} \times 6750\ \text{ms}^{-2}$ $= 270\ \text{N}$ **OR** (i)obtaining an expression for optimum speed and maximum permissible speed of a car on a banked circular track. + free body diagram (ii) $v = \sqrt{\mu r g}$ $v = \sqrt{0.1 \times 3 \times 10} = 1.732\ m/s$	1+2 1 1 1+2 ½ + ½

	But velocity of the cyclist is $18\ km/h\ =\ 5\ m/s$ *hence cyclist will get slip.*	½ + ½
27.	(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. (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.	½ +2 ½ 1 1 ½ +½ 2 1 1