INDIAN SCHOOL MUSCAT

FIRST TERM EXAMINATION

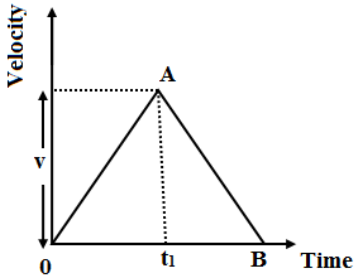
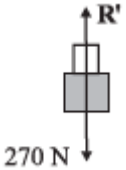
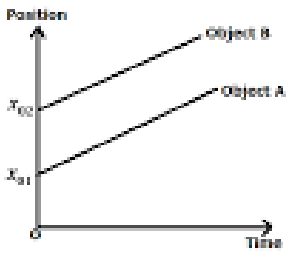
SEPTEMBER 2018

CLASS XI

Marking Scheme – PHYSICS

SET C

Q.NO.	Answers	Marks
	SECTION A	
1	The limiting value of average acceleration when time interval is infinite simely small	1
2	No Light year-distance travelled by light in vacuum in one year.	½ ½
3	Statement of Newton's second law of motion	1
4	7%	1
5	$\frac{t_1}{t_2} = \left(\frac{h_1}{h_2}\right)^{1/2}$	1
	SECTION B	
6	(i) any two limitations of dimensional analysis (ii) yes, angle	½ + ½ ½ + ½
7	(i) Yes it is under the influence of gravity (ii) 1:1	½ + ½ 1
8	(i)No, This is because a particle can never have two values of velocity at the same instant of time. (ii)No, This is because the total path length travelled by the particle cannot decrease with time.	1 1
9	$a = \frac{v-u}{t} = -2m/s^2$ $s = st + 1/2at^2 = 125m$	½ + ½ ½ + ½
10	$T_1 \cos\theta = T_2 = 60\ \text{N}$ $T_1 \sin\theta = 50\ \text{N}$ Tanθ=5/6 θ=40^0	½ ½ ½ ½
11	Proving $S_{nth} = u + a/2(2n-1)$	2
12	(i) No (ii)coefficient of friction between rubber tyres and road is much smaller than coefficient of friction between iron wheels and road.	2
	SECTION C	
13	(i) Cesium atomic clock	1 2

	(ii)checking the correctness of equation $F = \frac{mv^2}{r}$ by dimensional method		
14		$\alpha = \frac{v}{t_1}$ or $t_1 = \frac{v}{\alpha}$ .. $\beta = \frac{v}{t - t_1}$ or $t - t_1 = \frac{v}{\beta}$ .. $t = v\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ $\rightarrow v = \left(\frac{\alpha\beta}{\alpha+\beta}\right)t$ $S = \left(\frac{\alpha\beta}{\alpha+\beta}\right)t^2$	½ ½ 1 1
	OR	V_A=10m/s V_B=V_C=15m/s V_{BA}=5m/s V_{CA}=25m/s AB=AC=1000m t=1000/25=40s a=1m/s^2	½ ½ ½+1/2 ½+1/2
15	(a) **The quantity** should have magnitude as well as direction. **The quantity** should obey **vector** algebra for **the** operations like addition and multiplication. *(b)* $R^2 = P^2 + Q^2 + 2PQ\cos\theta$ Substituting R=P=Q=x Cosθ=-1/2 Θ=120^0		1 ½ ½ ½ ½
16	(i) Shockers increase the time interval of jerk. So rate of change in linear momentum decreases, thereby decreasing force (ii)Large force acting for a short interval of time producing greater change in momentum Impulse=force×time =m(v-u)/t × t = m(v-u)=change in linear momentum		1 1 ½ ½
17	(a) 20N (b)  $270 - R' = 27 \times 0.1$ R' =270-2.7=267.3N (ii) Forces acting simultaneously at a point are called concurrent forces		1 ½ ½ 1
18	(i) 		1 1

	(ii) acceleration (iii)a_1/a_2=tan30/tan60=1/3	1
19	Velocity-time graph Introduction and Derivation of v=u+at	1 1+1
20	Obtaining the relation $\upsilon = \frac{k}{l}\sqrt{T/m}$ by dimensional method.	3
21	free body diagram to show various forces acting on a body moving down the incline with uniform acceleration and deriving acceleration a=gsinθ-μgcosθ	1 2
22	Definition of angle of friction and angle of repose Proving both are numerically equal.	½+½ 2
23	Advanatges and disadvantages of friction i) Increase friction, (ii) Increase **the** grip with **the** ground and thus avoiding **their** skidding.	1+1 1
24	Derivation of $a=v^2/r$ Diagram direction	1 ½ 1 ½
	SECTION D	
25	(i) Angular measurement method(diagram, explanation, formula) (ii) any two advantages of defining standard metre in terms of wavelength of light. (iii) Statement principle of homogeneity of dimensions. OR (i) any four advantages of SI system (ii) work , volume, linear momentum , angular velocity (iii) m/s	2 2 1 2 2 1
26	(i) pulling is easier. Free body diagrams and proof and explanation $ma = f_s \le \mu_s N = \mu_s mg$ i.e. $a \le \mu_s g$ $\therefore a_{max} = \mu_s g = 0.15 \times 10\ m\,s^{-2}$ $= 1.5\ m\,s^{-2}$ (ii **OR** (i) statement and proof of law of conservation of linear momentum. (ii) $F = \frac{Ah\rho(v-u)}{t} = \frac{10^{-2}\times 15\times 1000\times(0-15)}{1} = -2250N$ Force=2250N	5
27	(i) Proving the path of a projectile is a parabola (ii)	3

$t_1 = \frac{2v \sin\theta}{g}$

$t_2 = \frac{2v \sin(90^\circ - \theta)}{g} = \frac{2v \cos\theta}{g}$

Now, $t_1 t_2 = \frac{(2v \sin\theta)(2v \cos\theta)}{g^2}$

$\Rightarrow \frac{2}{g}\left[\frac{v^2(2 \sin\theta \cos\theta)}{g}\right] = \frac{2}{g}\frac{v^2 \sin 2\theta}{g}$

$T_1T_2 = 2/g \times R$

$T_1T_2 \alpha R$

OR

(i) Obtaining the expressions for time of flight, horizontal range and Maximum height — 1+1+1

(ii) $R_{max} = u^2/g$ (for $\theta = 45^0$) — 1

$H = \frac{u^2 \sin^2\theta}{2g} = \frac{u^2 \sin^2 45}{2g} = \frac{u^2}{4g}$ — ½ +1/2

$R_{max} / H = 4$