INDIAN SCHOOL MUSCAT
ANNUAL EXAMINATION
SUBJECT : Physics

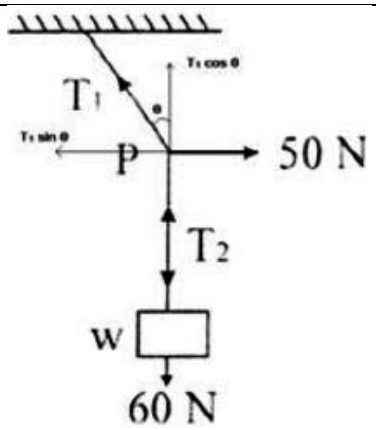
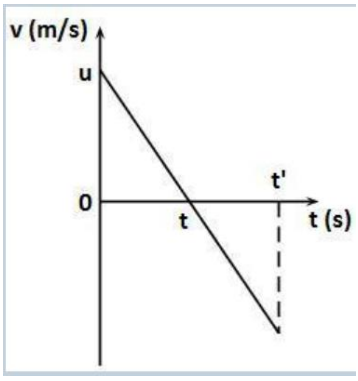
CLASS: XI **MARKING SCHEME : SET A**

Max.Marks: 70

SECTION A

1	(d) K/4	(1)
2	(b) 20 s	(1)
3	(c) 30 cm	(1)
4	((a) velocity of the particle is constant (b) acceleration of particle is zero	(1)
5	(b) 120 degree	(1)
6	(b) The acceleration vector is tangent to the circle	(1)
7	(b) 45^0 **OR** (b) power, energy and temperature	(1)
8	(a) Law of conservation of energy	(1)
9	(c) -37.5 N	(1)
10	(c) Frequency **OR** (b) Parallel to propagation	(1)
11	(a) Brittle materials	(1)
12	(b) Its momentum is doubled	(1)
13	(a) Nm	(1)

14	(a) Increases	(1)
15	Gravitational force<Weak nuclear force<Electromagnetic force<Strong Nuclear force	(1)
16	90 degree	(1)
17	(a) torque (b) angular momentum	(1)
18	Statement of Wien's displacement law .	(1)
19	Reason for sound travels faster on a rainy day than on a dry day: Humidity	(1)
20	mechanical energy per unit volume consumed by the material	(1)
	Section B	
21	A body cannot have momentum without having energy. This is because only moving objects have momentum	(2)
22	(a) No. Any justification (1 mark) (b) To increase time to bring down momentum or any acceptable reason (1 mark)	(2)
23	Derivation of the expression for pressure exerted by a gas deduce the relation between kinetic energy and absolute temperature T of an ideal gas. **OR** any four postulates of kinetic theory of gases	(2)
24	a) To show graphically how acceleration due to gravity varies as we move from the centre of the earth to great heights above the surface of the earth. (1) b) using , KE = -E =15 x 10^9 J, E = PE/2 = - 15 x 10^9 J,	(2)
25	Using equation of motion S= ut + ½ at^2 a = 2 m/s^2 (1) F= ma F= 14000 N (1) **OR**	(2)

	 $T_1 \sin \theta = 50$ $T_1 \cos \theta = 60$ **tan θ =5/6** **or θ = $\tan^{-1}(5/6)$ = 39.8**	
26	$\frac{\Delta P}{P} = \left[3\frac{\Delta a}{a} + 2\frac{\Delta b}{b} + \frac{1}{2}\frac{\Delta c}{c} + \frac{\Delta d}{d}\right]$ = 14%	(2)
27	Explanation for how in a thermos flask the loss of heat due to three modes is minimized.	(2)
	Section C	
28	(a) Yes-as velocity changes its direction (1) (b) Derivation of the expression for centripetal acceleration for an object under uniform circular motion, along a path of radius r with speed v. (2)	(3)
29	(a) velocity-time graph for an object thrown vertically upwards returning to the point of projection.  (1 mark) (b) Yes. For a body at rest. (1 mark)	(3)

	(c) Yes, projectile motion (1 mark)	
30	showing that among the three bodies the sphere has the greatest and the ring has the least velocity of the centre of mass at the bottom of the inclined plane.	(3)
31	(a) Definition of escape velocity of an object. (1) (b) Derivation of the expression for the escape velocity of an object from the earth. (2) **OR** Derivation of expression for acceleration due to gravity at a depth d below the surface of the earth of radius R in terms of acceleration due to gravity g on the surface of the earth. Assume the earth to be a perfect sphere of uniform density ρ.	(3)
32	Statement of the law of equipartition of energy. (1) Derivation of the expression for C_p and C_v (1) and calculate the ratio of C_p/C_v. (1)	(3)
33	Discussion of the harmonics formed in a stretched string and obtain the ratio of the frequencies of the harmonics in the string.	(3)
34	(a) any two difference between adiabatic and isothermal process. (1) (b) reason why efficiency of a heat engine cannot be 100% or unity (1) (c) the coefficient of performance of a refrigerator = $T_2/(T_1 - T_2) = 9$	(3)
	Section D	
35	(a) To show that in case of one dimensional elastic collision of two bodies , the relative velocity of separation after collision is equal to the relative velocity of approach before collision. (b) $\frac{1}{2} mv^2 = 10\%$ of $\frac{1}{2} mu^2 = (10/100) \times 1000$ $v = 63.24$ m/s **OR** (a) Statement of the law of conservation of mechanical energy. (1) (b) To show that the total mechanical energy of a freely falling body under gravity is conserved. (2) (c) Showing the variations in kinetic energy , potential energy and total energy graphically (2)	(5)
36	(a) To show that the oscillations of a simple pendulum are simple harmonic and derive the expression for time period of the simple pendulum. (3 marks) (b) Reason why soldiers are asked not to march over old bridges: resonance might damage the bridge. (1 mark) (c) graph showing the variation of energy with respect to time for a harmonic oscillator executing	(5)

	damped oscillations. (1 mark) **OR** (a) Definition of Simple harmonic motion.(1) (b) Derivation of the differential equation for a simple harmonic motion. (2) (c) $Y = 0.05 \sin (50 \pi t + \pi/3)$ (i) time period T= 0.04 s (ii) amplitude a = 0.05 m (iii) velocity amplitude = 2.5 π m/s or 7.85 m/s	
37	(a) Statement (1) and proof Bernoulli's principle (2). (b) Low pressure (1 mark) (c) fine capillaries in the soil are broken (1 mark) **OR** (a) Definition of terminal velocity. (1) (b) Derivation of expression for the terminal velocity attained by a spherical body falling through a viscous medium. (2) (c) $F=6\pi \eta r v = 1.35 \times 10^{-6}$ N	(5)