Code No. **KVS/GHY/DD**	Total Pages: 03

KENDRIYA VIDYALAYA SANGTHAN,GUWAHATI REGION

HALF YEARLY EXAMINATION – 2018

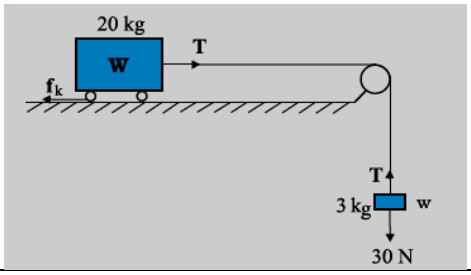
SUBJECT:	PHYSICS	CLASS:	XI
TIME:	3 HOURS	MAXIMUM MARKS:	70

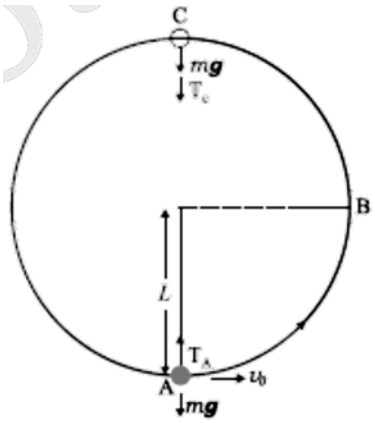
General Instructions:

1. *All questions are compulsory.*
2. *There are 27 questions in total. Questions 1 to 5 carry one mark each, questions 6 to 12 carry two marks each, and questions 13 to 24 carry three marks each. Question No. 25 to 27 carry five marks each.*
3. *There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each. You have to attempt only one of the given choices in such questions.*
4. *Use of calculator is not permitted. You can demand for a log table from invigilator if required.*

QUESTIONS

1.	If $x = at + bt^2$ where x is in meters and t is in seconds. What are the units of a and b?	1 mark
2.	What is the difference between A^o and A.U.?	1 mark
3.	Why does a gun recoil when a bullet is fired?	1 mark
4.	What is the angle between two vectors if the ratio of their dot product and cross product is $\sqrt{3}$	1 mark
5.	Which Kepler's law is a direct consequence of law of conservation of angular momentum?	1 mark
6.	If force (F) acceleration (A) and time (T) are taken as fundamental units, then find the dimension of energy. Or Given that displacement of an oscillating particle is $y = A \sin[B x + ct + D]$ What is the dimensional formula for A,B,C,D ?	2 marks
7.	A body constrained to move along the Y- axis of coordinate system is subjected to a constant force $\vec{F}$ given by $\vec{F} = -\hat{i} + 2\hat{j} + 3\hat{k}$ N What is the work done by this force in moving the body a distance of 4m along Y- axis?	2 marks
8.	If a body is moving under non-uniform acceleration of **a = bt,** give the equation for final velocity in terms of initial velocity 'u', time 't' and acceleration.	2 marks
9.	What is the cause of sliding friction? Distinguish between sliding friction and rolling friction?	2 marks
10.	A body is moving unidirectionally, under the influence of a source of constant power. How its displacement is related to time for which it moves?	2 marks
11.	A raindrop of mass 1.00 g falling from a height of 1 km hits the ground with a speed of 50 m s^{-1}. Calculate (a) the loss of P.E. of the drop. (b) The gain in K.E. of the drop. (c) Is the gain in K.E. equal to loss of P.E.? If not why?	2 marks

	Take g = 10 m s^{-2}	
12.	What are the factors on which M.I of a solid body depends on? Why does a solid sphere have smaller moment of inertia than a hollow spherical shell of same mass and radius, about an axis passing through their axes of symmetry?	2 marks
13.	What are the different causes of error in the measurement of a physical quantity? (*give the names only*).The density of cylindrical rod is measured by the formula:- $\boldsymbol{\rho = 4m/(\pi D^2 l)}$ The percentage in *m*, *D* and ***l*** are 1%, 1.5% and 0.5%. Calculate the % error in the calculated value of the density (**ρ)**?	3 marks
14.	If **ρ** is the mean density of earth, **r** its radius, **g** the acceleration due to gravity and **G** the Universal- gravitational constant, using the technique of dimensional analysis establish relation between them.	3 marks
15.	What is the difference between **Impulsive force** and an **Ordinary force**? Why impulsive force is so named. Give one example of impulsive force.	3 marks
16.	Find the angle between the vector $\bar{A} = (2\hat{i} + 4\hat{j} + 4\hat{k})$ and $\bar{E} = (4\hat{i} + 2\hat{j} - 4\hat{k})$	3 marks
17.	What is the acceleration of the block and trolley system shown in a fig, if the coefficient of kinetic friction between the trolley and the surface is 0.04?What is the tension in the string?(take g=10 m/s^2) 	3 marks
18.	Give reasons: (i) When a car rounds a curve suddenly, the person sitting inside is thrown outwards (ii) When a stone tied to one end of a string is whirled and the string breaks suddenly, the stone flies off along the tangent to the circle	3 marks
19.	What is the relation between linear momentum and Kinetic energy of an isolated body? A car and a bus are moving with same kinetic energy. Which one of them will have greater momentum? Why?	3 marks
20.	A pump on the ground floor of a building can pump up water to fill a tank of volume 30 m^3 in 8 *min*. If the tank is 40 m above the ground, and the efficiency of the pump is ***30%***, how much electric power is consumed by the pump?	3 marks
21.	What will be the duration of day, if the earth suddenly shrinks to 1/4 th of its original volume, mass remaining unchanged. What will be the answer if density remains unchanged?	3 marks
22.	Is C.M and C.G are always the same points? Give example. Two balls each of mass **M** are placed on two vertices of an equilateral triangle of side L. A ball of mass **2M** is situated at the third vertex. Determine the centre of mass of the system.	3 marks
23.	Find the ratio of distance travelling by a freely falling body in first, second & third second of its fall.	3 marks
24.	State work-energy theorem. Explain +ve, -ve & zero work done with example.	3 marks
25.	(a) A thin circular loop of radius R rotates about its vertical diameter with an angular frequency ω. Show that a small bead on the wire loop remains at its lowermost point for $\boldsymbol{\omega \leq g / R}$. What is the angle made by the radius vector	5 marks

	joining the centre to the bead with the vertical downward direction for $\omega = 2g / R$? Neglect friction. Or (b) What is the banking of a road? Deduce an expression for maximum speed to negotiate a turn in a rough banked road. What should be the optimum speed for a car in order to negotiate the turn with minimum damage of the tyres?	
26.	(a) State the parallelogram law of vector addition and from it deduce the expression for magnitude and direction of the resultant. Diagonal of a parallelogram is given by the vectors **(3i + 1j + 2 k)** and **(i - 3j + 4k)** in meters. Find the area of the parallelogram. Or (b) Define time of flight and horizontal range of an oblique projectile? Find expressions for both of them. From a certain height above the ground a stone A is dropped gently. Simultaneously another stone B is fired horizontally. Which of the two stones will arrive on the ground earlier? Why?	5 marks
27	 (a) A bob of mass m is suspended by a light string of length L. It is imparted a horizontal velocity v_o at the lowest point A such that it completes a semi-circular trajectory in the vertical plane with the string becoming slack only on reaching the topmost point, C. Obtain an expression for (i) v_o; (ii) the speeds at points B and C; (iii) the ratio of the kinetic energies (K_B/K_C) at B and C. Comment on the nature of the trajectory of the bob after it reaches the point C. **Or,** (b) For a 1 Dimensional elastic collision, find the expression for final velocities of the two masses $\mathbf{m_1}$ and $\mathbf{m_2}$. Find the expression for K.E. transferred from one body to another body.	5 marks

****