KRM PHY

Ritika

Series.	K I	R II	M III	GIV

Roll No.			

Code No.-1/1/1

Candidate must write the Code No. on the title page of the answer book.

- Please check that this question paper contains **3** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **26** questions.
- Please write down the Serial Number of the question before attempting it.

FIRST TERM EXAMINATION 2014 -15
SUBJECT CODE - 1103

Time allowed: **3 Hours** Maximum Marks: **70**

General Instruction:

(a) All questions are compulsory.

(b) There are 26 questions in total. Questions 1 to 5carry one mark each, questions 6 to 10 carry two marks each, questions 11 to 22, carry three marks each Queno.23carry four marks and questions 24to 26 carry five marks each.

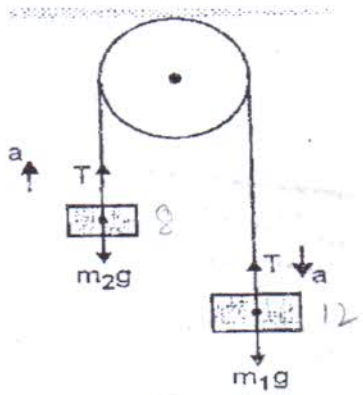
(c) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and in all question of five marks each.

(d)Use of calculators is not permitted.

(e)You may use the following physical constants wherever necessary:

$c = 3X\ 10^{8}\ m/s$	*Mass of electron* $=9.1X\ 10^{-31} kg$
$h = 6.6 \times 10^{-34}\ Js$	*Mass of neutron* $=1.67 \times 10^{-27} kg$
$e = 1.6 \times 10^{-19}\ C$	*Boltzmann's constant* $= 1.38 \times 10^{-23}\ J/K$
$\mu_0 = 4\Pi \times 10^{-7}\ TmA^{-1}$	*Avogadro Number* $=6.023 \times 10^{23}\ /mol$

1. What is the difference between 4.0 and 4.000?
2. Write the dimensions of coefficient of viscosity and torque.
3. A ball is thrown up in air. What is the acceleration and velocity at the instant it reaches its highest point?
4. Give the magnitude and direction of net force acting on a drop of rain falling down with a constant speed.
5. A thief jumps from the roof of a house with a box of weight W on his head. What will be the weight of the box as experienced by the thief during jump?
6. The escape velocity from the surface of earth is given by $v=\sqrt{2GM/R}$, where M is the mass and R is the radius of the earth. Check the correctness of the formula.
7. If resultant of two forces which have equal magnitudes and act at right angle to each other is 1414 dynes. Calculate the magnitude of each force.
8. Displacement is given by $x=1+2t+3t^2$. Find the value of instantaneous acceleration.
9. Two masses 8 kg and 12 kg are connected at the two ends of a light inextensible string that passes over a frictionless pulley. Find the acceleration of the masses and the tension in the string, when the masses are released.



OR

Ten one rupee coins are put on top of each other on a table. Give the magnitude and direction of

(a) The force on the 7th coin (counted from the bottom) due to all coins at the top.

(b) The reaction of the 6th coin on the 7th coin.

10.Explain why it is easier to pull a lawn mower than to push it?

11.A physical quantity x is calculated from $x=ab^2/(cd)^{1/2}$. Calculate percentage errors in x if a,b,c,d are measured respectively with an error of 1%,3%,4% and 2%.

12. The velocity v of a particle depends upon the time t, according to the equation v=a+bt+c/(d+t). Write the dimension of a,b,c and d.

13. What are random errors? How can we minimize these errors?

14. State parallelogram law of vectors. Find analytically the magnitude and direction of 2 vectors inclined at angle θ.

15. A jet airplane traveling at a speed of 500km/h ejects its products of combustion at the speed of 1500km/h related to the jet plane. What is the speed of the product with respect to the observer on the ground?

OR

Draw velocity –time graphs for uniformly accelerated motion in the following cases:

u=+ve, a =+ve (b) u =-ve, a =+ve (c) u=+ve, a=-ve

16. Deduce the ~~equations of motion by calculus method~~.

17.State Newton's second law of motion. Express it mathematically and hence obtain a relation between force and acceleration.

18 Why are shockers used in cars, scooters and motorcycles?

19. A bag of sand of mass M is hanging from a rope. A bullet of mass M/x is fired at it with a velocity v. The bullet gets embedded into the bag. What is the velocity of the bag after the bullet gets embedded into it?

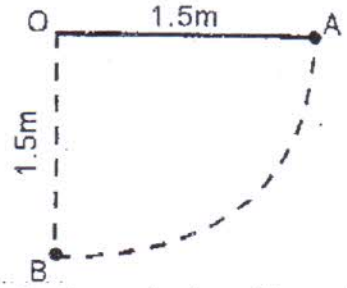
20.What is the value of work done if angle θ between the direction of force and resulting displacement is

(a) 0^0 (b) 90^0 (c) 180^0 ?

21. (a). Under what condition, the 3 vectors (i) cannot give zero result (ii) can give zero result

(b). Two forces acting on a particle in opposite directions, have the resultant of 10N.If they act at right angles to each other ,the resultant is 50N.Find the two forces.

22. The bob of a pendulum is released from a horizontal position A as shown. If the length of the pendulum is 1.5m, what is the speed with which the bob arrives at the lowermost point B, given that it dissipates 5% of its initial energy against air resistance?



23.A monkey is sitting on a tree. Rahim seeing the monkey brought some fruits and gave them to the monkey, and ran in to the house immediately. On hearing the sound produced when rahim was running the monkey was scared and climed the nearby tree.

(a) What values of Rahim inspired you?

(b) A monkey of mass 40 kg climbs on a rope which can stand a maximum tension of 600 N. In which of the following cases will the rope break: the monkey

(a) climbs up with an acceleration of 6 m s^{-2}

(b) climbs down with an acceleration of 4 m s^{-2}

(c) climbs up with a uniform speed of 5 m s^{-1}

(d) falls down the rope nearly freely under gravity?

24. A projectile is projected with a certain velocity u at an angle θ with horizontal from the ground. Find expression for its trajectory. Find the angle of projection at which the horizontal range and the maximum height of a projectile are equal.

OR

Prove the following:

For two angles of projection θ and $(90 - \theta)$ with same velocity v

(i) Range is same; (ii) Heights are in the ratio $\tan^2 \theta$: 1

25. With the help of a neat diagram briefly explain how banking of a curved road provides necessary centripetal force for a vehicle to run on it. Find expression for angle of banking. Ignore friction between wheels and the road.

OR

Explain why:-

(i) A stone tied to one end of a string is whirled in a circle. If the string breaks the stone flies of tangentially.

(ii) How do we save petrol when the tires of the motorcycle are fully inflated?

(iii) Sand is spread on track covered with snow?

(iv) Action and reaction do not cancel each other?

26. Two balls of different masses undergo perfectly elastic collision in one dimension. Obtain expressions for their velocities after collision.

OR

State law of conservation of energy. Prove that the total energy of a freely falling body is constant.