

INTERNATIONAL INDIAN SCHOOL,DAMMAM

MODEL EXAMINATION 2018

CLASS XI

PHYSICS

Time allowed: 3 hours

Max Marks: 70

SET A

GENERAL INSTRUCTIONS:

1. All questions are compulsory.
2. There is no overall choice. However an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5marks.
3. Questions 1 to 5 are very short answer type questions carrying 1mark each.
4. Questions 6 to 10 are short answer type questions carrying 2marks each.
5. Questions 11 to 22 are long answer type questions carrying 3marks each.
6. Question 23 is a value based question carrying 4 marks.
7. Questions 24 to 26 are long answer type questions carrying 5 marks each.
8. Use of calculator is not permitted. However you may use log table if necessary.

- 1 What is the angle between the velocity and acceleration at the uppermost point of a projectile?
- 2 A blanket, which keeps us warm in the winter, is also able to protect ice from melting. How?
- 3 State two physical quantities having the same dimensions as that of work.
- 4 What is the gravitational potential energy of two point masses infinite distance away from each other?

- 5 Which gas molecules will possess higher value of rms velocity-Oxygen or Hydrogen? Why?
- 6 Discuss the variation of 'g' with height. Where is 'g' value the maximum?
- 7 Prove Mayer's relation.
- 8 Define angle of banking. Draw a neat labeled diagram showing different forces and their components acting on a vehicle moving on a banked road.
- 9 Prove that in an elastic collision in one dimension, relative velocity of approach before impact is equal to the relative velocity of separation after collision.
- 10 The radius of ball A is twice that of ball B. What will be the ratio of their terminal velocities in a liquid?

OR

Derive an expression for excess pressure inside an air bubble.

- 11 A stone of mass 1.3kg tied to the end of a string in a horizontal plane is whirled round in a circle of radius 1m with a frequency of 40 rpm. What is the tension in the string? What is the maximum with which the stone can be whirled around if the string can withstand a maximum tension of 200 N?
- 12 State and explain the three modes of transmission of heat with examples.
- 13 State and explain first law of thermodynamics. Derive an expression for work done in an isothermal process.
- 14 The time period of a satellite of earth is 7hours.If the separation between the earth and the satellite is increased to two times the previous value, what will be its new time period?
- 15 The density of a material in cgs system is 8g/cm^3 . In a system of units, in which the unit of length is 5cm and unit of mass is 20g, what is the density of the material?

- 16 Draw velocity-time graph of uniform motion and prove that displacement of an object in a time interval is equal to the area under the v-t graph in that time interval.

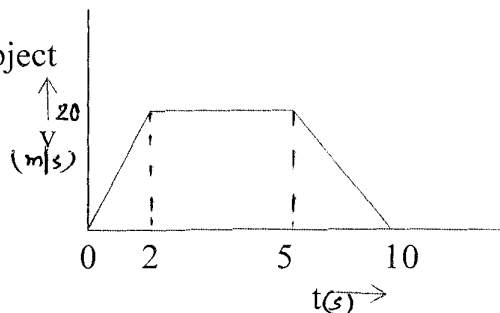
OR

Define relative velocity of an object with respect to other. Draw positive time graphs of two objects moving along a straight line, when their relative velocity is (i) zero (ii) non zero

- 17 Name the analogue of mass in rotational motion. Derive the expression for the kinetic energy of a rotating body.
- 18 Explain 'degrees of freedom'. Discuss the degrees of freedom of a diatomic and triatomic gas molecule.
- 19 The velocity –time graph of an object moving along a straight line is as shown below:

Calculate the distance covered by the object

- i) between $t=0$ and $t=5$
ii) between $t=0$ and $t=10$



- 20 Explain the working of a refrigerator. Derive an expression for its coefficient of performance.
- 21 State Hooke's law. A wire stretches by a certain amount under a load. If the load and radius are both increased to four times, find the stretch caused in the wire.
- 22 State Newton's second law of motion. Prove that second law is the real law of motion.
- 23 Ravi who was overweight started to feel pain in his knee. He consulted a doctor who advised him to reduce his weight. He tried to obey the doctor's advice and change his lifestyle. He started to use stairs instead of using lift, stopped eating junk food and started walking small distances instead of using cars. After some time, he became fit and fine again.
- (i) What values do you infer from this?
(ii) If Ravi weighing 120kg climbs up a staircase having vertical height of 10m, five times a day, how many calories does he burn in a day? (1cal=4.2J)

- 24 a) State Bernoulli's theorem. Using it explain the functioning of a venturimeter to find the velocity of flow of liquid through a tube.
b) During blood transfusion the needle is inserted in a vein where the gauge pressure is 2000 Pa. At what height must the blood container be placed so that the blood may just enter the vein? (density of blood = $1.06 \times 10^3 \text{ kg m}^{-3}$)

OR

- a) Explain capillarity. Derive an expression for the rise of a liquid in a capillary tube.
b) Water rises to a height of 10 cm in a certain capillary tube. The level of mercury in the same tube is depressed by 3.42 cm. Compare the surface tensions of water and mercury.
Specific gravity of mercury is 13.6 g/cc and angle of contact for water and mercury are zero and 135° respectively.

- 25 a) State the theorem of perpendicular axes.
b) What is the moment of inertia of a uniform circular disc of radius 'R' and mass 'M' about an axis passing through its centre and normal to the disc?

OR

- a) State the theorem of parallel axes.
b) What is the moment of inertia of a uniform circular disc of radius 'R' and mass 'M' about an axis passing through a point on its edge and normal to the disc? (Given $I_{\text{centre of gravity}} = \frac{1}{2}MR^2$)

- 26 a) State parallelogram law of vectors addition. Using the law derive the expression for magnitude and direction of the resultant of two vectors inclined at an angle θ .
b) What will be the magnitude and direction if $\theta = \pi/2$.
c) Rain is falling vertically with a speed of 30 m/s. A woman rides a bicycle with a speed of 10 m/s in the north to south direction. What is the direction in which she should hold her umbrella?

OR

- a) A projectile is fired with a certain velocity 'u' making an angle θ with the horizontal. Find the maximum height attained, total time of flight and horizontal range.
b) A cricket ball is thrown at a speed of 28 m/s in a direction 30° above the horizontal. Calculate (a) the max height (b) the time taken by the ball to return to the same level.