

Section – A

Answer ALL questions

10 x 2 = 20

1. What are the fundamental forces in nature?
2. If $\vec{A} = \hat{i} + \hat{j}$. What is the angle between the vector and x-axis?
3. State Dalton's law of partial pressures.
4. Give the expression for the excess pressure in a liquid drop.
5. The roofs of the buildings are often painted white during summer. Why?
6. What are significant figures? What do they represent when reporting the result of an experiment?
7. What is the expression between pressure and kinetic energy of a gas molecule?
8. If a bomb at rest explodes into two pieces, the pieces must travel in opposite directions. Explain.
9. Mention any two examples that obey Bernoulli's theorem.
10. What are the lower and upper fixed points in Celsius and Fahrenheit scales?

Section –B

Answer ANY SIX questions

6 x 4 = 24

11. Mention the methods used to decrease friction.
12. Using parallelogram law of vectors, derive an expression for the magnitude and direction of the resultant vector.
13. Define vector product. Explain the properties of a vector product with two examples.
14. A man runs across the roof of a tall building and jumps horizontally on to the lower roof of an adjacent building. If his speed is 9ms^{-1} , the horizontal distance between the buildings is 10m and height difference between the roofs is 9m, will he be able to land on the next building? (take $g = 10\text{ms}^{-2}$)
15. Write equations of motion for a particle rotating a fixed axis of rotation.
16. Explain conduction, convection and radiation with examples.
17. Describe the behavior of a wire under gradually increasing load.

18. The weight of an object is more at the poles than at the equator. At which of these can we get more sugar for the same weight. State the reason for your answer.

Section –C

Answer ANY TWO questions

2 x 8 = 16

19. Develop the notions of work and kinetic energy. Show that it leads to work-energy theorem.
A pump is required to lift 600 kg of water per minute from a well 25 m deep and to eject it with a speed of 50 ms^{-1} . Calculate the power required to perform the above task.
20. Show that the motion of a simple pendulum is simple harmonic and hence derive an equation for its time period.
What is seconds pendulum ?
21. Explain reversible and irreversible processes.
Describe the working of a Carnot's engine. Obtain an expression for the efficiency.

Note:

- The questions are obtained from internet and from the students from their interaction for paper discussion after the examination.
- The questions are given here only for ready reference for the students for preparation for upcoming examinations