Class No. : .....

FY 1024

Name : .....

FIRST YEAR HIGHER SECONDARY SECOND TERMINAL EXAMINATION, DECEMBER 2022

Part – III

PHYSICS

Maximum : 60 Scores

Time : 2 Hours

Cool-off Time : 15 Minutes

General Instructions to Candidates :

- *There is a 'Cool off time' of 15 minutes in addition to the writing time.*
- *Use 'cool off time' to get familiar with questions and to plan your answers.*
- *Read questions carefully before answering.*
- *Calculations, figures and graphs should be shown in the answer sheet itself.*
- *Malayalam version of the questions is also provided.*
- *Give equations wherever necessary.*
- *Electronic devices except non programmable calculators are not allowed in the Examination Hall.*

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിട്ട് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

Score

SECTION – A

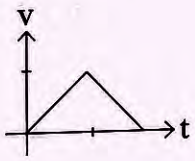
Answer any 5 questions from 1 to 7. Each carries 1 score. (5×1=5)

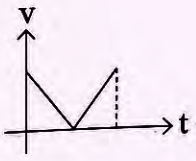
1. The strongest force among the fundamental forces is _____

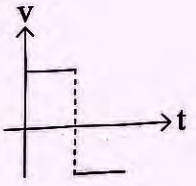
2. How many significant figures are there in the measurement 0.0020 cm ?

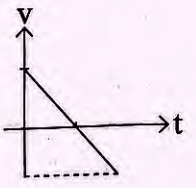
3. If one makes 4% error in measuring the radius of a sphere, what is the % error in the calculation of it's area.

4. A boy throws a stone vertically up and it falls back to his hand. The velocity-time graph of the stone is

a) 

b) 

c) 

d) 

Score

5. An athlet projects a Javelin, so as to get maximum horizontal range. Then it's

a) horizontal velocity is greater than vertical velocity

b) vertical velocity is greater than horizontal velocity

c) vertical and horizontal velocities are equal

6. An object travels in the direction of

a) it's acceleration

b) it's velocity

c) the net force acting on it

d) the change of momentum

7. The dimensional formula of force is

a) $M^1L^1T^1$

b) $M^1L^1T^2$

c) $M^1L^{-1}T^{-1}$

d) $M^1L^1T^{-2}$

Score

SECTION – B

Answer any 5 questions from 8 to 14. Each carries 2 scores. **(5×2=10)**

8. The sun's angular diameter is measured to be 1920″. The distance D of the sun from earth is $1.496 \times 10''$ m. What is the diameter of the sun ?

9. Give any two differences between speed and velocity.

10. Derive an expression for the maximum height reached by a projectile.

11. Define momentum of an object. Give it's unit.

12. State Newton's law of inertia. What are the different types of inertia ?

13. What is the force required to lift a school bag of 12 kg mass ? ($g = 10\ m/s^2$).

14. Consider the rotation of second hand of a clock. All points of this second hand have

a) same angular velocity but different linear velocity

b) same linear velocity but different angular velocity

c) same angular and linear velocity

d) different angular and linear velocity

Score

SECTION – C

Answer any 6 questions from 15 to 21. Each carries 3 scores. **(6×3=18)**

15. What is principle of homogeneity of dimension ? Check the correctness of the equation. $F = \frac{mv}{R}$, using dimensions.

16. Can an object has zero velocity but still accelerating ? Argue with an example.

17. Derive the following equations of uniformly accelerated motion.

a) $v^2 = u^2 + 2as$

b) $s = ut + \frac{1}{2} at^2$

18. A car travels from A to B at a speed of 20 m/s and returns to A at a speed of 30 m/s. Calculate the average speed and average velocity of the car during the motion.

19. State law of conservation of linear momentum. Prove it using Newton's third law of motion.

20. A cricket ball is thrown at a speed of 28 m/s in a direction 30° above the horizontal. Calculate the maximum height and time taken by the ball to the same level. (sin 30° = .5)

21. 'Friction is a necessary evil'. Why we say like this ?

Score

SECTION – D

Answer any 3 questions from 22 to 25. Each carries 4 scores. **(3×4=12)**

22. It is assumed that centripetal force depends on mass of the object rotated, it's velocity and radius of rotation. Using dimensions find the formula for centripetal force.

23. A stone is dropped from the top of a tower. It reaches ground in 3s. ($g = 10\ m/s^2$)

a) Make a table of time and velocity of stone for times 0s, 1s, 2s and 3s. **(1)**

b) Draw the velocity time graph of the stone for 3s. **(2)**

c) From the graph find the height of the tower. **(1)**

24. Derive the formula for the time of flight of a projectile. **(2)**

Using this obtain the expression for it's horizontal range. **(2)**

25. State Newton's second law of motion and arrive at an expression for force.

Score

SECTION – E

Answer any 3 questions from 26 to 29. Each carries 5 scores. **(3×5=15)**

26. Roads are banked for safety and more speed.

a) What is banking of roads ? **(1)**

b) Show different forces acting on a car on a banked road, (with no friction) in a neat figure. **(1)**

c) Derive equation for maximum safe speed. **(2)**

d) If banking angle is 5° and radius of curve is 20 m, what is the maximum safe speed ? **(1)**

27. Two vectors A and B are at an angle θ.

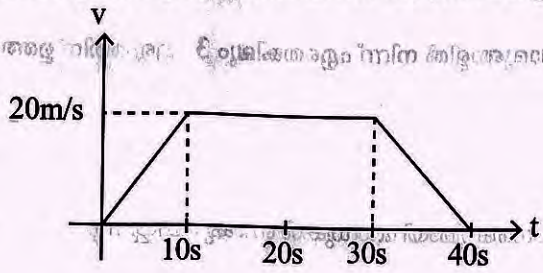
a) Show them and their resultant in a diagram. **(1)**

b) Find an equation for the magnitude of their resultant. **(3)**

c) Obtain an expression that helps in finding the direction of resultant. **(1)**

Score

28. Study the given velocity time graph and answer the following questions.



a) Find the time interval, when no force is acting on the object. **(1)**

b) Find the acceleration of the object in the first 10s. **(1)**

c) What is the acceleration of the object at the 20^{th} second ? **(1)**

d) Find the total distance travelled by the object. **(2)**

29. a) What is relative velocity ? **(1)**

b) When does the relative velocity between two objects becomes zero ? **(1)**

c) Rain is falling vertically with a speed of 35 m/s. A women rides a bicycle with a speed of 12 m/s in east to west direction. What is the direction in which she should hold her umbrella ? **(3)**