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CLASS XI

TERM-1 EXAMINATION (2021-22)

PHYSICS THEORY (042)

TIME : 90 MINUTES

MM: 35 MARKS

General Instructions:

1. The Question Paper contains three sections.
2. Section A has 25 questions. Attempt any 20 questions.
3. Section B has 24 questions. Attempt any 20 questions.
4. Section C has 6 questions. Attempt any 5 questions.
5. All questions carry equal marks.
6. There is no negative marking.

SECTION A

This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

1. In the equation $[P + (a / V^2)] (V-b) = RT$, the S.I unit of a is:
 (a) Nm^2 (b) Nm^4 (c) Nm^{-3} (d) Nm^{-2}
2. Consider a new system of units in which c (speed of light), h (Planck's constant) and G (gravitational constant) are taken as fundamental units. Which of the following would correctly represented mass in new system?
 (a) $(hc/G)^{1/2}$ (b) $(Gc/h)^{1/2}$ (c) $(hG/c)^{1/2}$ (d) $(hGc)^{1/2}$
3. Which of the following physical quantities has the same dimensional formula as that of energy?
 (a) Power (b) force (c) momentum (d) work
4. Light year is the unit of:
 (a) Time (b) Distance (c) Frequency (d) Velocity
5. What is the number of significant figures in 0.310×10^3 :
 (a) 2 (b) 3 (c) 4 (d) 6
6. A body travels uniformly a distance of (13.8 ± 0.2) m in a time (4.0 ± 0.3) sec. The velocity of the body within error limits is:
 (a) $(3.45 \pm 0.2) \text{ ms}^{-1}$ (b) $(3.45 \pm 0.3) \text{ ms}^{-1}$ (c) $(3.45 \pm 0.4) \text{ ms}^{-1}$ (d) $(3.45 \pm 0.5) \text{ ms}^{-1}$
7. The unit of percentage error is:
 (a) Same as that of physical quantity
 (b) Different from that of physical quantity
 (c) Percentage error is unitless
 (d) Errors have got their own units which are different from that of physical quantity measured
8. The decimal equivalent of $1/20$ upto three significant figures is
 (a) 0.0500 (b) 0.05000 (c) 0.0050 (d) 5.0×10^{-2}
9. Accuracy of measurement is determined by:
 (a) Absolute error (b) Percentage error (c) Both (d) None of these

10. The velocity v of water waves may depend on their wavelength λ , the density of water (ρ) and the acceleration due to gravity (g). The method of dimensions gives the relation between these quantities as:

- (a) $v^2 \propto \lambda^{-1} \rho^{-1}$ (b) $v^2 \propto \lambda g$ (c) $v^2 \propto \lambda \rho g$ (d) $g^{-1} \propto \lambda^3$

11. The velocity of a body is given by the equation: $v = (b/t) + ct^2 + dt^3$. The dimensional formula for b is :

- (a) $M^0L^0T^0$ (b) ML^0T^0 (c) M^0L^0T (d) MLT^{-1}

12. The period of oscillation of a simple pendulum is given by $T = 2\pi (l/g)^{1/2}$, where l is about 100 cm and is known to 1 mm accuracy. The period is about 2 sec. The time of 100 oscillations is measured by a stop watch of least count 0.1 sec. The percentage error in g is:

- (a) 0.1 % (b) 1 % (c) 0.2 % (d) 0.8 %

13. $\int \left(x^2 + \frac{2}{x^3} - 7 \right) dx = ?$

- (a) $\frac{x^3}{3} + \frac{2}{x^2} - 7x$ (b) $\frac{x^3}{3} - \frac{2}{x^2} - 7x$ (c) $\frac{x^3}{3} - \frac{1}{x^2} - 7x$ (d) $\frac{x^3}{3} - \frac{1}{x^2} - 7x + C$

14. $\int (\sqrt{x} - \frac{1}{\sqrt{x}} + 3\sqrt{x}) dx = ?$

- (a) $\frac{2}{3}x^{3/2} - 2x^{1/2} + \frac{3}{4}x^{4/3} + C$ (b) $\frac{2}{3}x^{3/2} - 2x^{-1/2} + \frac{3}{4}x^{4/3} + C$
 (c) $x^{3/2} - x^{-1/2} + x^{4/3} + C$ (d) $x^{3/2} - x^{-1/2} + x^{4/3} + C$

15. If $\int_{\pi/2}^a \sin x dx = \frac{1}{2}$, then $a = ?$

- (a) 0 (b) 1 (c) π (d) $-\pi/3$

16. $\frac{d}{dx} \left(\frac{1}{x} \right) = ?$

- (a) x^2 (b) $-x^2$ (c) $1/x^2$ (d) $-1/x^2$

17. Speedometer used in vehicles always measures

- (a) Average speed (b) Uniform speed (c) Instantaneous speed (d) None of the above

18. A particle starts with velocity u and moves with constant acceleration a . what is the nature of the graph between the time (t) and the displacement (x).

- (a) straight line (b) symmetric parabola
 (c) Asymmetric parabola (d) Rectangular hyperbola.

19. The ratio of the numerical values of the average velocity and average speed of a body is always:

- (a) Unity (b) Unity or less (c) Unity or more (d) Less than unity

20. What is the angle between instantaneous displacement and acceleration during the retarded motion:

- (a) zero (b) $\pi/4$ (c) $\pi/2$ (d) π

21. The slope of the velocity time graph for retarded motion is :

- (a) Positive (b) Negative (c) Zero (d) can be +ve, -ve or zero

22. Which of the following can be zero when the particle is in motion for some time ?

- (a) Displacement (b) Distance covered
 (c) speed (d) none of the above

23. If the displacement of a particle is zero, then what can we say about its distance covered ?

- (a) it must be zero. (b) it cannot be zero.
 (c) it is negative (d) it may or may not be zero.

24. A river is flowing from east to west at a speed of 5 m/min. A man on south bank of river, capable of swimming 10m/min in still water, wants to swim across the river in shortest time. He should swim
- (a) Due north (b) Due north-east
 (c) Due north-east with double the speed of river (d) NOTA
25. Time of flight of a projectile is 10sec and its range is 500m. The maximum height reached by it is:
- (a) 50m (b) 80m (c) 100m (d) 125m

SECTION B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

26. Force exerted on a body changes it's
- (a) Direction of motion (b) Momentum (c) Kinetic energy (d) All the above
27. There are two statements
- Statement A:** Rate of change of momentum corresponds to force
Statement B: Rate of change of momentum corresponds to Kinetic Energy
- Which one of the following is correct?
- (a) A only (b) B only
 (c) Both A and B are correct (d) Both A and B are wrong
28. A block A of mass m_1 is released from top of smooth inclined plane and it slides down the plane. Another block of mass m_2 such that $m_2 > m_1$ is dropped from the same point and falls vertically downwards. Which one of the following statements will be true if the friction offered by air is negligible?
- (a) Both blocks will reach ground at same time
 (b) Both blocks will reach ground with the same speed
 (c) Speed of both the blocks when they reach ground will depend on their masses
 (d) Block A reaches ground before block B
29. Newton first law of motion defines:
- (a) Force (b) Inertia (c) Both (a) and (b) (d) NOTA
30. Which of the following is equal with Newton-meter?
- (a) Joule (b) Horse Power (c) Watt (d) Pascal
31. A particle is thrown upward with some kinetic energy. What happened to its kinetic energy at the highest point or height it reaches.
- (a) Its kinetic energy is lost
 (b) Its all kinetic energy is absorbed by the air
 (c) Its kinetic energy is converted to potential energy
 (d) Its kinetic energy is remain same
32. A body is falling freely under the action of gravity alone in vacuum. Which of the following quantities remain constant during the fall?
- (a) Kinetic energy (b) Potential energy
 (c) Total mechanical energy (d) Total linear momentum.

33. During inelastic collision between two bodies, which of the following quantities always remain conserved?

- (a) Total kinetic energy (b) Total potential energy
(c) Total linear momentum (d) Speed of each body

34. The distance between two mass particles is doubled, how will the gravitational force between the mass particle change?

- (a) will remain unchanged (b) will become double
(c) will become one fourth (d) NOTA

35. If the velocity of the object is increased by 0.1%, then the kinetic energy is increased by

- (a) 0.1 % (b) 0.2% (c) 0.4% (d) 0.01%

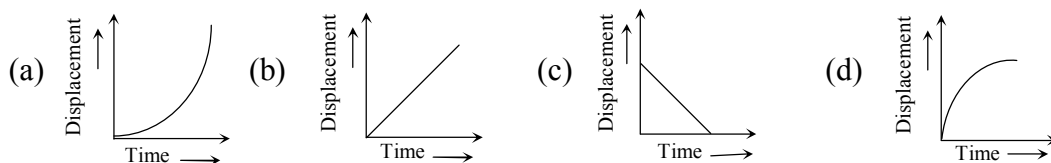
36. The force of gravitation is:

- (a) Repulsive (b) Electrostatic (c) Attractive (d) Non-conservative

37. If the body covers one-third distance at speed v_1 , next one third at speed v_2 and last one third at speed v_3 , then average speed will be

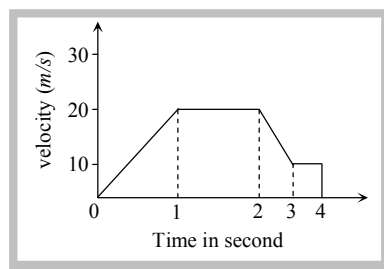
- (a) $\frac{v_1 v_2 + v_2 v_3 + v_3 v_1}{v_1 + v_2 + v_3}$ (b) $\frac{v_1 + v_2 + v_3}{3}$ (c) $\frac{v_1 v_2 v_3}{v_1 v_2 + v_2 v_3 + v_3 v_1}$ (d) $\frac{3v_1 v_2 v_3}{v_1 v_2 + v_2 v_3 + v_3 v_1}$

38. A car decelerates at a constant rate during a period commencing at $t = 0$. Which of the displacement time graphs represents the displacement of the car



39. The variation of velocity of a particle with time moving along a straight line is illustrated in the following figure. The distance travelled by the particle in four seconds is

- (a) 60 m (b) 55 m
(c) 25 m (d) 30 m



40. At the top of the trajectory of a projectile, the directions of its velocity and acceleration are

- (a) Perpendicular to each other (b) Parallel to each other
(c) Inclined to each other at an angle of 45° (d) Antiparallel to each other

41. The equation of motion of a projectile is $y = 12x - \frac{3}{4}x^2$. Given that $g = 10 \text{ ms}^{-2}$, what is the range of the projectile

- (a) 12.4 m (b) 16 m (c) 30.6 m (d) 36.0 m

42. **Assertion:** If the initial and final positions coincide, the displacement is a null vector.

Reason: A physical quantity can not be called a vector, if its magnitude is zero.

- (a) both assertion and reason are true and reason is the correct explanation of assertion
(b) both assertion and reason are true but reason is not the correct explanation of assertion
(c) assertion is true but reason is false
(d) assertion is false and reason is also false

43. Assertion: A vector quantity is a quantity that has both magnitude and a direction and obeys the triangle law of addition or equivalently the parallelogram law of addition.

Reason: The magnitude of the resultant vector of two given vectors can never be less than the magnitude of any of the given vector.

- (a) both assertion and reason are true and reason is the correct explanation of assertion
- (b) both assertion and reason are true but reason is not the correct explanation of assertion
- (c) assertion is true but reason is false
- (d) assertion is false and reason is also false

44. Assertion: The dot product of one vector with another vector may be a scalar or a vector.

Reason: If the product of two vectors is a vector quantity, then product is called a dot product..

- (a) both assertion and reason are true and reason is the correct explanation of assertion
- (b) both assertion and reason are true but reason is not the correct explanation of assertion
- (c) assertion is true but reason is false
- (d) assertion is false and reason is also false

45. Assertion: In projectile motion, the angle between the instantaneous velocity and acceleration at the highest point is 90° .

Reason: At the highest point, velocity of projectile will be in horizontal direction on.

- (a) both assertion and reason are true and reason is the correct explanation of assertion
- (b) both assertion and reason are true but reason is not the correct explanation of assertion
- (c) assertion is true but reason is false
- (d) assertion is false and reason is also false

46. Assertion: Adding a scalar to a vector of the same dimensions is a meaningful algebraic operation.

Reason: The displacement can be added with distance.

- (a) both assertion and reason are true and reason is the correct explanation of assertion
- (b) both assertion and reason are true but reason is not the correct explanation of assertion
- (c) assertion is true but reason is false
- (d) assertion is false and reason is also false

47. Mass is the measure of :

- (a) Inertia
- (b) velocity
- (c) acceleration
- (d) viscosity

48. The direction of centripetal force is always:

- (a) toward the centre
- (b) away from the centre
- (c) both (a) and (b)
- (d) NOTA

49. Gravitational constant G is a:

- (a) Universal constant
- (b) non-universal constant
- (c) may be universal or non-universal
- (d) NOTA

SECTION C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

50. For two complimentary angles, range of the projectile is:

- (a) same
- (b) different
- (c) may be same or different
- (d) NOTA

CASE STUDY

Read the following paragraph and answers the questions:

In one dimensional motion of the objects only two directions are possible so the directional aspects of the quantities like displacement position velocity and acceleration can be described by using either positive or negative science physical quantity shown along positive direction will be given the positive sign whereas shown along negative direction possesses negative science but in case of motion of objects in two dimensions or in three dimension any object can have large number of directions so in order to deal with such situation we need to introduce the concept of new physical quantities in which we take care of both magnitude and direction in physics the physical quantities are broadly classified into categories scalars and vectors.

Magnitude of Resultant Vector and direction:-

$$R = \sqrt{A^2 + B^2 + 2AB\cos\theta}, \quad \tan = \frac{B \sin\theta}{A+B \cos\theta}$$

51. Angle between negative vectors is

- (a) 0° (b) 60° (c) 90° (d) 180°

52. If resultant of two vectors of equal magnitude is equal to the magnitude of either vector then the angle between the two vectors is

- (a) 30° (b) 90° (c) 60° (d) 120°

53. Which of the following is a scalar

- (a) displacement (b) kinetic energy (c) couple (d) momentum

54. Which of the following is not essential for three forces to produce zero resultant?

- (a) they should be in the same plane.
(b) it should be possible to represent them by the three sides of a triangle taken in same order.
(c) they should act along the sides of a parallelogram.
(d) the resultant of any two forces should be equal and opposite to the third force.

55. What is the maximum number of rectangular components into which a vector can be resolved in a plane?

- (a) two (b) three (c) four (d) Any number

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MARKING SCHEME SET A			
Q.NO.	ANSWER OPTION	Q.NO.	ANSWER OPTION
1	B	29	C
2	A	30	A
3	D	31	C
4	B	32	C
5	B	33	C
6	B	34	C
7	C	35	B
8	A	36	C
9	B	37	D
10	B	38	D
11	A	39	B
12	C	40	A
13	D	41	B
14	A	42	C
15	D	43	C
16	D	44	D
17	C	45	A
18	C	46	D
19	B	47	A
20	D	48	A
21	B	49	A
22	A	50	A
23	D	51	D
24	A	52	D
25	D	53	B
26	D	54	C
27	A	55	A
28	A		