KOGI STATE UNIVERSITY, KABBA

FACULTY OF SCIENCE AND COMPUTING (Department of Physics)

PHY 101: General Physics I **UNIT**: 2

Session: 2023/2024 **Semester**: FIRST **Date**: 02/05/2024 **Time allowed:** 2 Hours.

Instructions: Answer Section A and any two questions in Section B

SECTION A:

1. ---- is the dimension for acceleration

   (a) ms^{-1} (b)LT^{-2} (c)ms^{-2} (d)kg.ms

2 .The following are fundamental quantities except?

   (a) Velocity (b) mass (c) length (d) electric current

3. The S.I unit for force is ---

   (a) $N.m^2$ (b) N (c) mkg/s (d) $MLT^{-2,}$

4. Mass can be expressed in the following units except?

   (a) Metre (b)kg (c)Gram (d)pound

5. In the cylindrical polar coordinates,---- symbols are used to represent coordinates.

   (a) (x,y,z) (b) (r,s,t) (c) (ϱ,ϕ,Z) (d) (r,θ,ϕ)

6. The dimension for pressure is?

   (a)$M^1L^{-1}T^{-2}$ (b) $m^1L^1T^{-1}$ (c) M^2 (d) M^3

7. The displacement of particles along x-axis with respect to time is $x=at+bt^2+ct3$, the dimension of C is?

   (a) LT^2 (b) T^2 (c) LT^3 (d) T^3

8. Rad/sec is the unit of?

   (a) Angular displacement (b) angular velocity (c) energy (d) angular acceleration

9. What is the unit for measuring the amplitude of a sound?

   (a) Decibel (b) Coulomb (c) cycles (d) radian

10. What is the maximum possible number of components a vector can have?

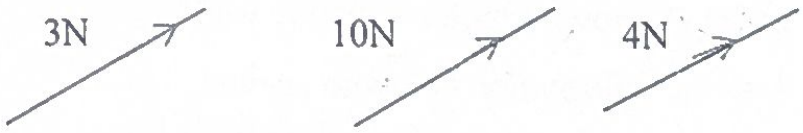
   (a) 2 (b) 4 (c) 5 (d) any number

11. A vector quantity has magnitude and ---- ----- (a) Scalar (b) direction (c) sound (d) number

12. The following are types of vector, except?

   (a) Equal vector (b) unit vector (c) zero vector (d) scalar vector

13. Consider the following vectors along the same direction, find their resultant quantity.



   (a) 17N (b)13N (c)14N (d)7N

14. The following are vector quantities except-------

(a) Velocity (b) Force (c)speed (d)displacement

15. The time taken to complete one cycle by a body is called--------

(a) Frequency (b) Period (c) angular velocity (d) angular acceleration

16. An unbalanced force of 20N acts on a 4.0kg mass. What acceleration does it give?

(a)$5ms^{-2}$ (b)$20m/s^2$ (c)24m/s (d)5m/s

17. A body of mass 3.0kg moves with a velocity of $10ms^{-1}$. Calculate the momentum of the body.

(a) 13kg (b) $30.0kgms^{-1}$ (c) $7kgms^{-1}$ (d) $10kgms^{-1}$

18. A man weighing 50kg carries a load of 10kg on his head. Find the work done

(a) 13kg (b) 0kg (c) 500N (d) 0J

19. The unit of energy is------

(a) erg (b)Newton (c)Joule (d)ML^2T^2

20. $1/2mv^2$ is to kinetic energy as ----- is to potential energy.

(a)MT^{-1} (b) $1/2mu^2$ (c) mgh (d)$v^2-u^2=2as$

21. The following are examples of kinetic energy except------

(a) Mango hanging on a tree (b) Running water (c)moving bullet (d)a boy walking

Use the information below to answer questions 22 and 23.

A man weighing 55kg, lifts a mass of 45kg to the top of a building 10m high in 12s. Take $g=9.81ms^{-2}$. Find;

22. Total work done by him

(a) 1000J (b) 10791J (c) 900N (d) 1200N

23. The power developed by him

(a) 899.25W (a) 800KW (c) 750J (d) 800MW

24. Which of the following is not correct for the condition for work not to be done?

(a) Force and displacement are perpendicular to each other

(b) Force and displacement are at 180degrees with each other

(c)Displacement is zero though force is non-zero

(d) Force is zero

25. Which of the following statements is false?

(a)Kinetic energy is positive

(b)Potential energy is positive

(c)Kinetic energy is negative

(d)Potential energy is negative

26. Which of the following is not a kind of potential energy?

(a) Gravitational potential energy

(b) Magnetic potential energy

(c)Electrostatic potential energy

(d)Nuclear potential energy

Use the information below to answer question 27&28 P

If $r_1=3i-2j+k$, $r_2=2i-4j+3k$ and $r_3=-i+2j+2k$.

27.Find the magnitude of $Z=r_1+r_1+r_3$

(a) 30 (b) 7.1 (c) 5.66 (d) 5.9

28. Find the magnitude of $Z=2r_1-3r_2-5r_3$

(a) 40 (b) 6.48 (c) 5.48 (d) 6.66

Use the information below to answer question 29&30

A car accelerates from rest to a speed of $10m/s^2$ in a time of 8s;

29. What is the acceleration?

(a) $2.5m/s^2$ (b) 1.25m/s (c)$1.2LT^{-2}$ (d) $1.25m/s^2$

30. How far will it go in this time? Assume the acceleration to be constant.

(a) 40m (b) 65m/s (c) 50m (d) 55m

31. A mass of 50kg is raised to a height of 2.0m above the ground. Calculate its potential energy. Take $g=9.80m/s^2$.

(a) 120J (b) 122.5J (c) 130KJ (d) 150W

32. The parabolic shape of the path of a projectile, while in motion is called-------

(a) maximum height (b) time of flight (c) trajectory (d) range

33.The formular to find the time of flight T of a projectile is ----

(a) $T=\frac{U^2Sin\theta}{g}$ (b) $T=\frac{2Usin\theta}{g}$ (c) $T=\frac{sin\theta}{2u}$ (d) $2u\frac{sin^2}{g}$

34. The splitting of a vector into two component vectors is called---

(a) vector resolution (b) vector sum (c) vector decomposition (d) vector difference

35. A vector is represented ad 4i+3j. what is the magnitude?

(a)5 (b)10 (C) 4 (d)3

36. Fire is a form of ----

(a) solar energy (b) thermal energy (c) gravitational energy (d) kinetic energy

37. For a free falling body, which of the following quantities will not change?

(a) total kinetic energy (b)total potential energy (c) total mechanical energy (d) insufficient data

38. A sphere can roll purely on a smooth incline surface

(a) true (b) false (c) no (d) none of the above

39. Which of the following types of motion can be used for describing the motion of a car on a straight road

(a) rectilinear (b) circular (c)periodic (d) harmonic

40.What kind of motion is rectilinear motion?

(a)one dimensional (b) two dimensional (c) three dimensional (d) zero dimensional

SECTION B:

1. Derive the dimension of the following physical quantities, state their S.I units respectively

1a. Acceleration (3marks)

1b. Pressure (3 marks)

1c. Force (3marks)

1d. Work (3 marks)

1e. Density (3 marks)

2a. The Vice Chancellor's car travels to Lokoja at an average speed of 100kmhr^{-1}, what distance does it cover in 5minutes? (6marks)

2b. Derive the three equations of rectilinear motion (9marks)

3a. A particle is projected with a speed of 39.2m/s at an elevation of 30°, find the following

3ai. its maximum height (3marks)

3aii. the range on a horizontal plane (3marks)

3aiii. the time of flight (3marks)

Take g=9.8ms^{-2}

3bi. What work is done in dragging a block 100m horizontally, when a 50N force is applied by a rope making an angle of 30° with the ground. (3marks)

3bii. Define work and give its SI unit (1 mark)

3biii. Define power and give its SI unit (1mark)

3biv. Define energy and give its SI unit (1mark)

Length	L	m
mass	M	kg
Time	T	S

$\frac{v^2 \sin 2\theta}{g}$

$100 \times 10 \times 50 \times 30 = 1500.00 = 1500$

$\frac{39.2^2 \sin(30)}{2 \times 9.8} =$

$\frac{1536.64 \times 0.25}{19.6}$