Diagnostic Test 2022

Department of Physics, B. N. College

Time: 45 Min **Marks: 25**

Name of the student	
Class Roll Number	
Signature of Invigilator	

(Each question carries 1 mark and all questions are compulsory. Write the answer option in the box provided)

Signature of the student after verified the marks

1. The distance covered by a particle undergoing simple harmonic motion in one time period with amplitude (A) is
   (a) 2A
   (b) Zero
   (c) 4A
   (d) A

2. The equation of motion of a particle is given by $a = -bx$, where a is the acceleration, X is displacement from the mean position and b is any constant. The time period of the particle is
   (a) $2\sqrt{\frac{\pi}{b}}$
   (b) $2\frac{\pi}{b}$
   (c) $\frac{2\pi}{\sqrt{b}}$
   (d) $2\pi\sqrt{b}$

3. If V is velocity, A is acceleration and X is displacement, then at the mean position of the particle in simple harmonic motion
   (a) A is maximum and X and V are zero
   (b) V is maximum and X and A are zero
   (c) V and A are maximum and X is zero
   (d) X and A are maximum and V is zero

4. A simple harmonic motion is represented by
   X = 0.2 sin (1000t +0.1). Its frequency of oscillation is given by
   (a) $\frac{200}{\pi}$ Hz
   (b) $\frac{1000}{\pi}$ Hz
   (c) $\frac{400}{\pi}$ Hz
   (d) $\frac{500}{\pi}$ Hz

5. An inertial frame is
   (a) An accelerated frame
   (b) A decelerated frame
   (c) Moving with uniform velocity
   (d) None of the above

6. An accelerated frame of reference is called
   (a) Inertial frame
   (b) Moving frame
   (c) Non Inertial frame
   (d) None of the above

7. Ficticious force arises in
   (a) Inertial frame
   (b) Moving frame
   (c) Non Inertial frame
   (d) All of the above

8. Earth is an
   (a) Inertial frame
   (b) Moving frame
   (c) Non Inertial frame
   (d) Perfect frame

9. What is the dimension of G?
   (a) $M^{-1}L^{3}T^{-2}$
   (b) $M^{-2}L^{3}T^{-1}$
   (c) $M^{-1}L^{-3}T^{1}$
   (d) $M^{2}L^{3}T^{-1}$

10. Which of the following fundamental force is strongest?
   (a) Gravitational
   (b) Electromagnetic
   (c) Weak
   (d) Nuclear

11. Which of the following is not a property of central force?
   (a) Torque acting on a moving particle in central force is zero
   (b) Angular momentum acting on a moving particle in central force is zero
   (c) Force is negative gradient of a scalar quantity
   (d) Motion is confined on a plane.

12. What is the expression of gravitational field intensity due to a solid sphere of radius R, at a point, at a distance r, which is located outside the sphere?
   (a) $-\frac{GM}{R^2}$
   (b) $-\frac{GM}{r^2}$
   (c) $-\frac{GM}{R}$
   (d) $-\frac{GM}{r}$

13. Solution of a nth order differential equation contains ……. number of arbitrary constants.
   (a) One
   (b) $(n-1)$
   (c) n
   (d) None

14. Order and degree of the differential equation

$$\left(\frac{d^3y}{dx^3}\right)^{\frac{2}{3}} = \left(y + \frac{dy}{dx}\right)^{\frac{3}{2}}$$ are respectively

   (a) 3, 2
   (b) 3, 4
   (c) 3, 9
   (d) 4, 3

15. Solution of the initial value problem,

$$\frac{dy}{dx} = -2xy\,,\ \ y(0) = 1.8 \text{ is}$$

(a) $y = 1.6e^{-x^2}$
(b) $y = 1.8e^{-x}$
(c) $y = 1.8e^{-y^2}$
(d) None of the above

16. Identify the nonlinear differential equation/(equations.)

i. $\frac{d^3y}{dx^3} + 5\left(\frac{dy}{dx}\right)^2 - 5xy = 0$

ii. $\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} + y = \sin x$

iii. $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y^2 = 0$

iv. $\frac{d^2y}{dt^2} + 2b\frac{dy}{dt} + \omega^2 y = A\sin t$

(a) i and ii
(b) i, ii and iii
(c) i and iii
(d) All

17. Who is father of C Language?
(a) Bjarne Stroustrup
(b) Dennis Ritchie
(c) James A. Gosling
(d) Dr. E.F. Codd

18. A C variable cannot start with
(a) An alphabet
(b) A number
(c) A special symbol other than underscore
(d) both (b) and (c)

19. The output of the following printf statement is

printf("My name is ---------\n);

(a) My name is ---------
(b) My name is ---------\n
(c) My name is
(d) Invalid statement

20. Which of the following shows the correct hierarchy of arithmetic operations in C
(a) / + * -
(b) * - / +
(c) + - / *
(d) * / + -

21. Which of the following is not an operator?
    (a) &&
    (b) ||
    (c) &
    (d) *

22. Inertial frame of reference are those which
    (a) Remain at rest
    (b) Moving with uniform velocity
    (c) Both a and b
    (d) None of the above

23. Which of the following were one of the conclusions of the Michaelson Morley experiment?
    (a) All laws of physics remain invariant in all inertial frames
    (b) Light propagates with different speeds in different directions
    (c) Ether has no observable properties
    (d) The velocity of light in free space is constant

24. In Michaelson Morley experiment which of the following device was used
    (a) Silvered Mirror
    (b) Thin sheet
    (c) Semi-silvered mirror
    (d) Fluorescent screen

25. What was the purpose of the Michelson–Morley experiment?
    (a) To determine the exact speed of light
    (b) To analyse the electromagnetic spectrum
    (c) To establish that Earth is the true frame of reference
    (d) To learn how the ether affect the propagation of light

(Space for rough work)