MODEL QUESTION PAPER OF PHYSICS-I

For Diploma in Information Technology (DIT 02 year)

DIT Semester-II (1st year)

(OBJECTIVE) PART-A

Time Allowed: 1hr 20 Minutes **Marks:** 43

Instructions:

- This part consists of **43 MCQs** of **1 mark each.**
- Attempt all questions on the separate machine-readable answer sheet provided.

Multiple Choice Questions (MCQs)

1. The SI unit of amount of substance is:

A. Candela
B. Mole
C. Kelvin
D. Ampere

2. Which of the following is a scalar quantity?

A. Displacement
B. Velocity
C. Acceleration
D. Speed

3. Two vectors are equal if they have the same:

A. Magnitude only
B. Direction only
C. Magnitude and direction
D. Initial points

4. The scalar product of two perpendicular vectors is:

A. Maximum
B. Minimum
C. Zero
D. Unity

5. The horizontal range of a projectile is maximum when the angle of projection is:

A. 30°
B. 45°
C. 60°
D. 90°

6. Linear momentum is defined as the product of:

A. Mass and acceleration
B. Mass and velocity
C. Force and time
D. Force and displacement

7. Angular displacement is measured in:

A. Metre
B. Radian
C. Newton
D. Joule

8. The direction of centripetal force is always:

A. Along the tangent
B. Away from the centre
C. Towards the centre
D. Opposite to velocity

9. The SI unit of work is:

A. Watt
B. Joule
C. Newton
D. Pascal

10. If a force of 10 N displaces a body through 5 m in the direction of force, the work done is:

A. 2 J
B. 15 J
C. 50 J
D. 100 J

11.The work-energy theorem states that the net work done on a body is equal to the change in its:

A. Potential energy
B. Kinetic energy
C. Momentum
D. Power

12. Which type of solid has a regular and long-range arrangement of atoms?

A. Amorphous solid
B. Crystalline solid
C. Liquid crystal
D. Glass

13. The SI unit of Young's modulus is:

A. Meter
B. Newton
C. Pascal
D. Joule

14. According to Archimedes' principle, the buoyant force on an immersed body is equal to the:

A. Weight of the body
B. Mass of the displaced fluid
C. Weight of the displaced fluid
D. Volume of the body

15. The equation of continuity is based on the conservation of:

A. Energy
B. Momentum
C. Mass
D. Pressure

16. Superfluidity is characterized by:

A. Very high viscosity
B. Zero viscosity
C. High density only
D. High surface tension

17. According to the kinetic theory of gases, gas molecules are in:

A. Rest position
B. Random motion
C. Circular motion only
D. Simple harmonic motion

18.The average kinetic energy of gas molecules is directly proportional to:

A. Pressure
B. Volume
C. Absolute temperature
D. Density

19.Heat is transferred from one body to another due to a difference in:

A. Pressure
B. Temperature
C. Volume
D. Density

20. The second law of thermodynamics determines the:

A. Direction of heat flow
B. Conservation of mass
C. Value of specific heat
D. Volume of a gas

21. A refrigerator works by:

A. Transferring heat from a cold region to a hot region with external work
B. Converting all heat into work
C. Producing cold without energy
D. Converting mechanical energy into mass

22. The distance between two consecutive crests of a wave is called:

A. Amplitude
B. Frequency
C. Wavelength
D. Period

23. In stationary waves, the points of zero displacement are called:

A. Antinodes
B. Nodes
C. Crests
D. Troughs

24. Diffraction of waves is most prominent when the size of the obstacle or aperture is:

A. Much larger than wavelength
B. Comparable to wavelength
C. Zero
D. Independent of wavelength

25. When a source of sound approaches a stationary observer, the observed frequency:

A. Decreases
B. Increases
C. Remains unchanged
D. Becomes zero

26. Polarization of light proves that light waves are:

A) Longitudinal waves
B) Transverse waves
C) Mechanical waves
D) Sound waves

27. Gravitational waves are produced by:

A) Stationary electric charges
B) Accelerating massive objects
C) Stationary planets only
D) Chemical reactions

28. The SI unit of electric flux is:

A) N/C
B) N m^2/C
C) C/N
D) J/C

29. Gauss's law relates electric flux through a closed surface to:

A) Total mass enclosed
B) Total charge enclosed
C) Total current enclosed
D) Total energy enclosed

30. One electron volt (eV) is the energy gained by an electron when it moves through a potential difference of:

A) One ampere
B) One volt
C) One ohm
D) One coulomb

31. According to Ohm's law, at constant temperature:

A) $V \propto I$
B) $V \propto 1/I$
C) $V \propto I^2$
D) $V \propto 1/I^2$

32. A galvanometer is used to detect:

A) Small electric currents
B) High temperatures
C) Large electric power
D) Electric potential only

33. A thermistor is a resistor whose resistance changes significantly with:

A) Pressure
B) Temperature
C) Length
D) Magnetic field

34. The force on a current-carrying conductor placed in a uniform magnetic field is maximum when the angle between the conductor and magnetic field is:

A) 0°
B) 30°
C) 90°
D) 180°

35. Magnetic flux is defined as the product of magnetic field strength and:

A) Length
B) Area perpendicular to the field
C) Electric current
D) Resistance

36. Who predicted the existence of gravitational waves?

A) Galileo Galilei
B) Albert Einstein
C) Issac Newton
D) Leonardo da Vinci

37. According to Faraday's law, induced EMF is proportional to the rate of change of:

A) Electric current
B) Magnetic flux
C) Resistance
D) Temperature

38. Lenz's law is based on the principle of conservation of:

A) Charge
B) Energy
C) Mass
D) Momentum

39. Ferrofluids are liquids that contain:

A) Non-magnetic particles
B) Magnetic nanoparticles
C) Radioactive particles
D) Neutral gas particles

40. 4The central part of an atom is called:

A) Electron cloud
B) Nucleus
C) Shell
D) Orbital

41. The nucleus of an atom consists of:

A) Electrons and protons
B) Protons and neutrons
C) Electrons and neutrons
D) Only protons

42. Which of the following is the weakest fundamental force?

A) Strong nuclear force
B) Electromagnetic force
C) Weak nuclear force
D) Gravitational force

43. Which of the following is a fundamental particle?

A) Proton
B) Neutron
C) Electron
D) Alpha particle

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DIT Semester-II (1st year)

(SUBJECTIVE) PART-B

Time Allowed: 1 Hour 40 Minutes **Marks:** 42

SECTION-I

Instructions: Attempt any **13** questions out of **18**. Each question carries **2** marks.

1. Define physical quantities and distinguish between base quantities and derived quantities with examples.

2. Differentiate between scalar and vector quantities. Give two examples of each.

3. State right hand rule for two vectors with reference to vector product.

4. Define angular momentum and moment of inertia. Write their SI units and mathematical expressions.

5. State and explain the work-energy theorem.

6. Does wind contain kinetic energy? Explain.

6. Differentiate between crystalline and amorphous solids. Give examples.

8. What are superfluids? Explain their important properties.

9. State the assumptions of the kinetic theory of gases.

10. Define internal energy. What are the factors on which the internal energy of an ideal gas depends?

11. What is wave motion? Explain the principle of superposition of waves.

12. What are stationary waves? Explain the formation of nodes and antinodes.

13. Why are the polaroid sunglasses better than the ordinary sunglasses?

14. What are gravitational waves? How are they produced?

15. State Gauss's law and write its mathematical expression.

16. Define magnetic flux and magnetic flux density. Write their SI units.

17. State Lenz's law. How does it obey the law of conservation of energy?

18. What is antimatter? Differentiate between matter and antimatter with an example.

SECTION-II

Instructions: Attempt any **2** questions out of **4**. Each question carries **8** marks.

1. (a) Define Projectile motion. Derive relation for: (i) Time of flight (ii) Range of projectile. (5)

(b) if a CD spins at 210 rpm. what is the radial acceleration of a point on the outer rim of the CD? The CD is 12cm in diameter. (3)

2. (a) State and prove Bernoulli's Equation. (5)

(b) A family uses 10 kW of power. Direct solar energy is incident on horizontal surface at an average rate of 300 W per square metre. If 75% of this energy can be converted into useful electrical energy, how large area is needed to supply 10kW? (3)

3. (a) What are the postulates of kinetic theory of gasses? Derive a relation for ideal gas equation in the form $PV=Nk_nT$ from general gas equation. (5)

(b) Define and exemplify diffraction of waves. Describe this phenomenon by ripple tank experiment. (3)

4. (a) State and explain Faraday's law of electromagnetism. (5)

(b) If the gravitational waves have a wavelength of 3000 km, then find their frequency assuming it moves with the speed of light? (3)

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