MHT CET 2025 April 13 Shift 2 Question Paper

Time Allowed :3 Hours	Maximum Marks :200	Total Questions :200

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 3 hours duration.
2. The question paper consists of 200 questions. The maximum marks are 200.
3. There are three parts in the question paper consisting of Physics, Chemistry and Biology (Botany and Zoology) having 50 questions in each part of equal weightage.

Q1. A ball is thrown vertically upwards with an initial velocity of 20 m/s. Calculate the time it takes for the ball to reach the highest point. (Assume $g = 9.8\ \text{m/s}^2$)

(1) 2.04 s
(2) 1.8 s
(3) 3.0 s
(4) 4.0 s

Q2. A 0.5 kg object is moving with a velocity of 10 m/s. What is its kinetic energy?

(1) 50 J
(2) 100 J
(3) 200 J
(4) 25 J

Q3. A 5 kg block is placed on a horizontal surface. A force of 10 N is applied to the block. The coefficient of friction between the block and the surface is 0.2. Find the acceleration of the block.

(1) 0.6 m/s^2
(2) 1.0 m/s^2
(3) 2.0 m/s^2
(4) 1.5 m/s^2

Q4. A 2 kg object is hanging vertically from a rope. The tension in the rope is 15 N. What is the acceleration of the object? (Assume $g = 9.8$ m/s^2)

(1) 1.0 m/s^2
(2) 2.0 m/s^2
(3) 0.5 m/s^2
(4) 3.0 m/s^2

Q5. A car accelerates uniformly from rest to a speed of 20 m/s in 10 seconds. What is the car's acceleration?

(1) 1.0 m/s^2
(2) 2.0 m/s^2
(3) 0.5 m/s^2
(4) 4.0 m/s^2

Q6. A 0.2 kg ball is dropped from a height of 10 meters. What is the velocity of the ball just before it hits the ground? (Neglect air resistance, $g = 9.8$ m/s^2)

(1) 14.0 m/s
(2) 9.8 m/s
(3) 20.0 m/s
(4) 5.0 m/s

Q7. In a p-n junction diode, what happens to the width of the depletion region when the forward bias is increased?

(1) It increases.
(2) It decreases.
(3) It remains the same.
(4) It first increases and then decreases.

Q8. A light ray passes from air (refractive index = 1) into water (refractive index = 1.33). If the angle of incidence is 30°, what is the angle of refraction in water?

(1) 22.2°
(2) 30.0°
(3) 23.0°

(4) 17.0°

Q9. The frequency of a wave is 50 Hz, and its wavelength is 2 m. What is the speed of the wave?

(1) 25 m/s
(2) 100 m/s
(3) 50 m/s
(4) 75 m/s

Q10. A gas expands from a volume of 2 m^3 to 5 m^3 at a constant pressure of 2×10^5 Pa. Calculate the work done by the gas.

(1) 6×10^5 J
(2) 6×10^4 J
(3) 2×10^6 J
(4) 1×10^5 J

Q11. A 1.5 kg block is placed on a frictionless surface and attached to a spring with a spring constant of 100 N/m. If the block is displaced by 0.2 m from equilibrium, what is the potential energy stored in the spring?

(1) 1.0 J
(2) 2.0 J
(3) 0.5 J
(4) 3.0 J

Q12. A spaceship moves with a velocity of 5000 m/s. What is the relativistic factor γ for the spaceship? ($c = 3 \times 10^8$ m/s)

(1) 1.0001
(2) 1.001
(3) 1.0005
(4) 1.00001

Q13. What is the pH of a 0.01 M solution of hydrochloric acid (HCl)?

(1) 1
(2) 2
(3) 4
(4) 3

Q14. Which of the following gases is most likely to deviate from ideal gas behavior at high pressures and low temperatures?

(1) O_2
(2) CO_2
(3) N_2
(4) He

Q15. Which of the following is the correct order of increasing atomic size?

(1) Na ¡ Mg ¡ Al
(2) Na ¿ Mg ¿ Al
(3) Mg ¡ Na ¡ Al
(4) Al ¡ Na ¡ Mg

Q16. What is the oxidation state of sulfur in H_2SO_4?

(1) +4
(2) +6
(3) -2
(4) 0

Q17. Which of the following compounds will exhibit hydrogen bonding?

(1) CH_4
(2) NH_3
(3) H_2O_2
(4) CO_2

Q18. What is the number of moles of oxygen atoms in 4.0 g of O_2?

(1) 0.125 mol
(2) 0.25 mol
(3) 0.5 mol
(4) 0.1 mol

Q19. What is the molecular formula of a compound that has the empirical formula CH_2O and a molar mass of 90 g/mol?

(1) $C_3H_6O_3$
(2) $C_2H_4O_2$
(3) $C_4H_8O_4$
(4) $C_3H_6O_2$

Q20. What is the ideal gas law equation?

(1) $P = \frac{nRT}{V}$
(2) $PV = nRT$
(3) $P = \frac{V}{nRT}$
(4) $P = \frac{nV}{RT}$

Q21. What is the molarity of a solution prepared by dissolving 8.0 g of NaOH in enough water to make 2.0 L of solution? (Molar mass of NaOH = 40 g/mol)

(1) 0.10 M
(2) 0.15 M
(3) 0.20 M
(4) 0.25 M

Q22. Which of the following compounds will have the highest boiling point?

(1) CH_4
(2) C_2H_6
(3) C_3H_8
(4) C_4H_{10}

Q23. What is the role of chlorophyll in photosynthesis?

(1) It absorbs light energy and converts it into chemical energy.
(2) It provides the plant with nutrients.
(3) It helps in the absorption of water from the soil.
(4) It helps in the transport of sugars within the plant.

Q24. Which of the following processes occurs during the anaphase stage of mitosis?

(1) Chromosomes align at the equator of the cell.
(2) Chromatids are pulled apart to opposite poles.
(3) Nuclear membrane reforms around the chromosomes.
(4) Chromosomes duplicate.

Q25. What is the function of the human heart's left ventricle?

(1) It pumps oxygenated blood to the lungs.
(2) It pumps deoxygenated blood to the lungs.
(3) It pumps oxygenated blood to the body.
(4) It pumps deoxygenated blood to the body.

Q26. Which of the following is a characteristic of prokaryotic cells?

(1) They have a well-defined nucleus.
(2) They lack a plasma membrane.
(3) They have ribosomes but no membrane-bound organelles.
(4) They have a mitochondria.

Q27. What is the function of the enzyme amylase in digestion?

(1) It breaks down proteins into amino acids.
(2) It breaks down starch into glucose.
(3) It breaks down fats into fatty acids and glycerol.
(4) It helps in the absorption of nutrients.

Q28. Which part of the plant is primarily responsible for the absorption of water and minerals?

(1) Leaves
(2) Stem
(3) Roots
(4) Flowers

Q29. Which of the following is true about the structure of DNA?

(1) It is composed of two strands of nucleotides that are held together by hydrogen bonds.
(2) It is composed of four strands of nucleotides.
(3) It is made up of amino acids linked together by peptide bonds.
(4) It consists of a single strand of nucleotides.

Q30. Which of the following is the primary function of red blood cells?

(1) Transport of oxygen and carbon dioxide.
(2) Fight infections.
(3) Form blood clots.
(4) Produce hormones.

Q31. What is the primary function of the mitochondria in eukaryotic cells?

(1) Protein synthesis
(2) Energy production in the form of ATP
(3) Lipid synthesis
(4) Packaging of proteins

Q32. Which of the following structures in the cell is responsible for producing proteins?

(1) Ribosomes
(2) Nucleus
(3) Mitochondria
(4) Endoplasmic Reticulum

Q33. Which of the following is true regarding DNA replication?

(1) It occurs during the G1 phase of the cell cycle.
(2) It occurs in the S phase of the cell cycle.
(3) It occurs in the G2 phase of the cell cycle.
(4) It occurs before the mitotic phase.

Q34. Which of the following is a function of the large central vacuole in plant cells?

(1) Photosynthesis
(2) Storage of water, nutrients, and waste products
(3) Protein synthesis
(4) Detoxification of harmful substances

Q35. Which of the following statements about enzymes is true?

(1) Enzymes are consumed in the reactions they catalyze.
(2) Enzymes increase the activation energy of a reaction.
(3) Enzymes are specific to their substrates.
(4) Enzymes work best at any temperature.

Q36. Which of the following best describes the role of the Golgi apparatus in a cell?

(1) It synthesizes proteins.
(2) It stores water and waste products.
(3) It modifies, sorts, and packages proteins for secretion.
(4) It is responsible for cellular respiration.

Q37. Which of the following statements is true about the process of osmosis?

(1) Osmosis involves the movement of solute molecules from low to high concentration.
(2) Osmosis does not require energy input.
(3) Osmosis occurs only in plant cells.
(4) Osmosis involves the movement of water molecules from high to low concentration.
