MHT CET 2025 Memory Based Question Paper PDF (April 17, 2025) (Shift 1)

Questions :

1. A body of mass 5 kg is initially at rest on a smooth horizontal surface. A constant force of 20 N is applied to the body. Find the acceleration of the body and the distance traveled by the body in 10 seconds.

   (1) 2 m/s^2, 50 m

   (2) 4 m/s^2, 80 m

   (3) 4 m/s^2, 40 m

   (4) 2 m/s^2, 100 m

2. A spherical object of radius R is placed in a uniform electric field E. If the dielectric constant of the material of the object is K, find the induced charge on the surface of the object.

   (1) $K \cdot E \cdot R^2$

   (2) $\frac{K \cdot E \cdot R^2}{2}$

   (3) $\frac{E \cdot R^2}{K}$

   (4) $E \cdot R^2$

3. A 100 W light bulb is connected to a 220 V power supply. Find the current flowing through the bulb.

   (1) 0.45 A

   (2) 0.50 A

   (3) 1.00 A

   (4) 2.00 A

4. A ball is thrown vertically upwards with an initial speed of 10 m/s. Calculate the maximum height reached by the ball. (Assume $g = 9.8$ m/s^2)

   (1) 5 m

   (2) 10 m

   (3) 15 m

(4) 20 m

5. A car accelerates from rest with a constant acceleration of 2 m/s^2 for 5 seconds. Find the final velocity of the car.

(1) 5 m/s
(2) 10 m/s
(3) 15 m/s
(4) 20 m/s

6. A metal wire has a length of 2 meters and a resistance of 10 Ω. If the length of the wire is doubled, while keeping the material and cross-sectional area the same, what will be the new resistance?

(1) 10 Ω
(2) 20 Ω
(3) 40 Ω
(4) 5 Ω

7. A 1.0 kg object is dropped from a height of 5 meters. Calculate the velocity of the object just before it hits the ground. (Assume no air resistance and $g = 9.8$ m/s^2)

(1) 5 m/s
(2) 10 m/s
(3) 15 m/s
(4) 20 m/s

8. In a p-n junction diode, if the forward bias voltage is increased, how does the current flowing through the diode change?

(1) The current increases exponentially.
(2) The current increases linearly.
(3) The current remains constant.
(4) The current decreases exponentially.

9. A ray of light passes through a glass slab with refractive index $n = 1.5$ at an angle of incidence of 30°. What is the angle of refraction inside the glass? (Use $\sin 30° = 0.5$)

(1) 20°
(2) 25°

(3) 18°

(4) 15°

10. A body oscillates with simple harmonic motion with an amplitude of 2 cm and a period of 4 seconds. What is the maximum speed of the body?

(1) 0.5 m/s

(2) 1.0 m/s

(3) 0.25 m/s

(4) 2.0 m/s

11. A magnetic field of strength $B = 2$ T is applied perpendicular to a current-carrying conductor. If the current in the conductor is $I = 3$ A and the length of the conductor within the magnetic field is $L = 1.5$ m, calculate the force acting on the conductor.

(1) 9 N

(2) 6 N

(3) 3 N

(4) 12 N

12. The reaction between hydrogen and oxygen to form water is given as: $2H_2 + O_2 \rightarrow 2H_2O$. If 4 moles of hydrogen react with excess oxygen, how many moles of water will be formed?

(1) 1 mole

(2) 2 moles

(3) 4 moles

(4) 8 moles

13. What is the oxidation state of chromium in the compound Cr_2O_3?

(1) +2

(2) +3

(3) +6

(4) +1

14. Which of the following gases is most likely to exhibit ideal gas behavior?

(1) H_2

(2) CO_2

(3) H_2O

(4) NH_3

15. What is the pH of a solution with a hydrogen ion concentration of $[H^+] = 1 \times 10^{-4}$ M?

(1) 4

(2) 7

(3) 10

(4) 3

16. Which of the following compounds is an example of an ester?

(1) CH_3COOH

(2) CH_3COOCH_3

(3) CH_3OH

(4) C_6H_6

17. Which of the following is the correct electron configuration for the element with atomic number 19?

(1) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

(2) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

(3) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$

(4) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$

18. Which of the following compounds has the highest boiling point?

(1) CH_4

(2) H_2O

(3) NH_3

(4) CO_2

19. Which of the following is a strong electrolyte?

(1) $NaCl$

(2) C_6H_6

(3) CH_3OH

(4) C_2H_5OH

20. What is the limiting reagent in the reaction: $2H_2 + O_2 \rightarrow 2H_2O$, if 3 moles of H_2 and 2 moles of O_2 are reacted together?

(1) H_2

(2) O_2

(3) Both are limiting reagents

(4) Neither is limiting

21. Which of the following is the primary function of ribosomes in a cell?

(1) Protein synthesis

(2) Energy production

(3) DNA replication

(4) Transport of materials

22. Which of the following is NOT a part of the human circulatory system?

(1) Heart

(2) Arteries

(3) Lungs

(4) Veins

23. Which organ in the human body is primarily responsible for regulating blood sugar levels?

(1) Liver

(2) Pancreas

(3) Kidney

(4) Small intestine

24. What is the role of chlorophyll in photosynthesis?

(1) It absorbs light energy and converts it to chemical energy.

(2) It synthesizes glucose from carbon dioxide.

(3) It breaks down glucose to release energy.

(4) It transports oxygen to other parts of the plant.

25. What is the primary function of the large intestine in the human digestive system?

(1) It absorbs nutrients and water from digested food.

(2) It breaks down food into simpler molecules.

(3) It stores and concentrates bile.

(4) It absorbs water and forms feces.

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

(1) Protein synthesis

(2) Energy production

(3) Genetic information storage

(4) Detoxification of harmful substances

27. Which of the following is an example of active transport in cells?

(1) Osmosis

(2) Diffusion

(3) Sodium-potassium pump

(4) Facilitated diffusion

28. Which of the following is responsible for the synthesis of ribosomal RNA (rRNA) in eukaryotic cells?

(1) Mitochondria

(2) Nucleolus

(3) Endoplasmic reticulum

(4) Golgi apparatus

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

(1) Presence of a defined nucleus

(2) Presence of membrane-bound organelles

(3) Presence of ribosomes

(4) Presence of multiple linear chromosomes

30. In which stage of the cell cycle does DNA replication occur?

(1) G1 phase

(2) S phase

(3) G2 phase

(4) M phase

31. Which of the following is a function of white blood cells (WBCs) in the human body?

(1) Transporting oxygen to tissues

(2) Fighting infections and diseases

(3) Producing insulin

(4) Clotting blood