MHT CET 2025 Apr 21 Shift 2 Question Paper

Time Allowed :3 Hour	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 150 questions. The maximum marks are 200.
3. There are three parts in the question paper consisting of Physics, Chemistry and Mathematics having 50 questions in each part of equal weightage.

1. What is the energy stored in a capacitor of capacitance $C = 10\,\mu$F when a potential difference of $V = 20$ V is applied across it?

(1) 0.01 J

(2) 2 J

(3) 4 J

(4) 0.1 J

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2. What is the frequency of a wave with a wavelength of 2 m and a velocity of 4 m/s?

(1) 2 Hz

(2) 0.5 Hz

(3) 1 Hz

(4) 4 Hz

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3. What is the gravitational force between two objects of masses $m_1 = 10$ kg and $m_2 = 20$ kg, separated by a distance of $r = 5$ m? (Gravitational constant $G = 6.67 \times 10^{-11}$ N m^2/kg^2)

(1) 1.33×10^{-9} N

(2) 2.67×10^{-9} N

(3) 4.67×10^{-9} N

(4) 5.33×10^{-9} N

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4. A car travels a distance of 200 meters in 20 seconds. What is the average speed of the car?

(1) 10 m/s

(2) 20 m/s

(3) 5 m/s

(4) 40 m/s

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5. A block of mass 5 kg is placed on a frictionless surface. If a force of 10 N is applied to the block, what will be the acceleration of the block?

(1) 2 m/s^2

(2) 5 m/s^2

(3) 0.5 m/s^2

(4) 10 m/s^2

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6. A 0.2 kg ball is thrown vertically upwards with an initial velocity of 10 m/s. What is the maximum height reached by the ball? (Acceleration due to gravity $g = 9.8$ m/s^2)

(1) 5 m

(2) 10 m

(3) 20 m

(4) 2 m

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7. A 1.5 kg object is moving with a velocity of 4 m/s. What is its kinetic energy?

(1) 12 J

(2) 24 J

(3) 6 J

(4) 48 J

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8. The resistance of a wire is $10\,\Omega$ and the current passing through it is 2 A. What is the potential difference across the wire?

(1) 20 V

(2) $5\,\text{V}$

(3) $15\,\text{V}$

(4) $10\,\text{V}$

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9. A 2 kg object is in a gravitational field where the acceleration due to gravity is $9.8\,\text{m/s}^2$. What is the gravitational potential energy of the object at a height of $5\,\text{m}$?

(1) $98\,\text{J}$

(2) $49\,\text{J}$

(3) $196\,\text{J}$

(4) $10\,\text{J}$

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10. A light ray passes from air (refractive index $n_1 = 1$) into water (refractive index $n_2 = 1.33$). If the angle of incidence is $30°$, what is the angle of refraction in the water?

(1) $22°$

(2) $30°$

(3) $23.6°$

(4) $40°$

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11. A force of $100\,\text{N}$ is applied to an object at an angle of $30°$ to the horizontal. What is the work done by the force in moving the object a distance of $5\,\text{m}$?

(1) $500\,\text{J}$

(2) $250\,\text{J}$

(3) $433\,\text{J}$

(4) $100\,\text{J}$

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12. A wire has a resistance of $10\,\Omega$ at $20°\text{C}$. If the temperature coefficient of resistance of the material is 0.004 per$°\text{C}$, what is the resistance of the wire at $50°\text{C}$?

(1) $12\,\Omega$

(2) $10.6\,\Omega$

(3) $15\,\Omega$

(4) $20\,\Omega$

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13. What is the molar mass of a gas, if 2.5 g of the gas occupies 1.12 L at STP?

(1) 32 g/mol

(2) 22.4 g/mol

(3) 44 g/mol

(4) 28 g/mol

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14. Which of the following is the correct electronic configuration for the element with atomic number 16?

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

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

(3) $1s^2 2s^2 2p^6 3s^2 3p^5$

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

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15. What is the pH of a solution when the concentration of hydrogen ions $[H^+]$ is 1×10^{-5} mol/L?

(1) 5

(2) 9

(3) 7

(4) 4

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16. What is the mass of 0.5 moles of water (H_2O)?

(1) 9 g

(2) 18 g

(3) 36 g

(4) 45 g

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17. Which of the following represents the correct IUPAC name for CH_3CH_2OH?

(1) Methanol

(2) Ethanol

(3) Propanol

(4) Butanol

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18. Which of the following gases is responsible for the greenhouse effect?

(1) Oxygen

(2) Carbon dioxide

(3) Nitrogen

(4) Hydrogen

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19. What is the oxidation state of chlorine in Cl_2O_7?

(1) +7

(2) +5

(3) -1

(4) +3

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20. Which of the following is the strongest acid in aqueous solution?

(1) HCl

(2) H_2SO_4

(3) HNO_3

(4) HF

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21. What is the value of the ionization constant K_a for acetic acid (CH_3COOH) if the concentration of acetic acid is 0.1 M and the concentration of H^+ ions at equilibrium is 1.0 x 10^{-3} M?

(1) 1×10^{-5}

(2) 1×10^{-4}

(3) 1×10^{-3}

(4) 1×10^{-6}

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22. Which of the following compounds is the most soluble in water?

(1) NaCl

(2) $CaSO_4$

(3) $BaSO_4$

(4) AgCl

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23. Which of the following represents the correct IUPAC name for $CH_3CH_2CH_2OH$?

(1) Methanol

(2) Ethanol

(3) Propanol

(4) Butanol

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

(1) 12

(2) 2

(3) 7

(4) 1

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25. Which of the following is the correct hybridization of the central atom in CO_2?

(1) sp^3

(2) sp^2

(3) sp

(4) dsp^3

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26. Which of the following is the correct value of the molar volume of an ideal gas at standard temperature and pressure (STP)?

(1) 22.4 L/mol

(2) 22.8 L/mol

(3) 24.0 L/mol

(4) 20.0 L/mol

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27. If the roots of the quadratic equation $x^2 - 5x + 6 = 0$ are p and q, then what is the value of $p + q$?

(1) 5

(2) -5

(3) 6

(4) -6

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28. The area of a triangle with base 12 cm and height 5 cm is?

(1) 30 cm^2

(2) 60 cm^2

(3) 24 cm^2

(4) 12 cm^2

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29. Find the value of $\sin 30^\circ + \cos 60^\circ$.

(1) 1

(2) $\frac{\sqrt{3}}{2}$

(3) $\frac{1}{2}$

(4) 0

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30. Find the roots of the quadratic equation $2x^2 - 4x - 6 = 0$.

(1) $x = 1, -3$

(2) $x = 3, -1$

(3) $x = -3, 1$

(4) $x = -1, 3$

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31. The sum of the ages of a father and his son is 60 years. The father is three times as old as the son. What is the son's age?

(1) 15 years

(2) 20 years

(3) 18 years

(4) 25 years

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32. Find the area of a circle whose radius is 7 cm.

(1) $49\pi\,\text{cm}^2$

(2) $14\pi\,\text{cm}^2$

(3) $49\,\text{cm}^2$

(4) $154\,\text{cm}^2$

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33. Find the value of $\frac{5}{6} + \frac{3}{4}$.

(1) $\frac{19}{12}$

(2) $\frac{14}{12}$

(3) $\frac{13}{12}$

(4) $\frac{8}{12}$

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34. Find the value of $\log_2 32$.

(1) 5

(2) 4

(3) 6

(4) 3

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35. If $\sin\theta = \frac{3}{5}$, find the value of $\cos\theta$.

(1) $\frac{4}{5}$

(2) $\frac{2}{5}$

(3) $\frac{3}{5}$

(4) $\frac{1}{5}$

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36. If the sum of the first n terms of an arithmetic progression (AP) is given by $S_n = 3n^2 + 2n$, find the 4th term of the AP.

(1) 20

(2) 18

(3) 15

(4) 12

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37. Find the value of $\tan 45^\circ$.

(1) 1

(2) $\sqrt{2}$

(3) 0

(4) $\frac{1}{\sqrt{2}}$

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38. Find the value of $\frac{d}{dx}(3x^2 + 4x + 5)$.

(1) $6x + 4$

(2) $6x + 5$

(3) $3x + 4$

(4) $6x + 3$
