AP EAPCET 2025 May 23 Shift 1 Question Paper

Time Allowed :3 Hours	**Maximum Marks :**160	**Total questions :**160

General Instructions

Read the following instructions very carefully and strictly follow them:

1. Duration of Exam: 3 Hours
2. Total Number of Questions: 160 Questions
3. Section-wise Distribution of Questions:
    - Physics - 40 Questions
    - Chemistry - 40 Questions
    - Mathematics - 80 Questions
4. Type of Questions: Multiple Choice Questions (Objective)
5. Marking Scheme: One mark awarded for each correct response
6. Negative Marking: There is no provision for negative marking.

1. If $f(x) = 2x^3 - 3x^2 + 4$, then the minimum value of $f(x)$ in the interval $[0, 3]$ is:

---

2. If z is a complex number such that $|z| = 5$ and Re$(z) = 3$, then the value of z^2 is:

(A) $9 + 40i$

(B) $9 - 40i$

(C) 25

(D) $-7 + 24i$

---

3. Let a circle pass through the point $(1, 2)$ and touch the x-axis at $(3, 0)$. Then the equation of the circle is:

(A) $(x - 3)^2 + (y - 4)^2 = 16$

(B) $(x - 3)^2 + y^2 = 16$

(C) $(x - 3)^2 + (y - 2)^2 = 4$

(D) $(x - 3)^2 + (y - 1)^2 = 1$

---

4. If $\tan A + \tan B + \tan C = \tan A \tan B \tan C$ and $A + B + C = \pi$, then which of the following is true?

(A) One of the angles is $\frac{\pi}{2}$

(B) All angles are equal

(C) $\tan A = \tan B = \tan C$

(D) $A = B = \frac{\pi}{4}$

---

5. If $\vec{a} = 2\hat{i} - \hat{j} + 3\hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$, then the angle θ between $\vec{a}$ and $\vec{b}$ is:

---

6. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then $A^2 - 5A + 6I =?$

(A) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

(B) $\begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$

---

7. Two numbers are selected at random (without replacement) from the first 50 natural numbers. The probability that their sum is even is:

(A) $\frac{24}{50}$

(B) $\frac{24}{29}$

(C) $\frac{26}{49}$

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

---

8. Let $f(x) = 2x^3 - 3x \neq 4$. Then the inverse function $f^{-1}(x)$ is:

---

9. A solid sphere of mass M and radius R is rolling without slipping with speed v. Its total kinetic energy is:

(A) $\frac{1}{2}Mv^2$

(B) $\frac{7}{10}Mv^2$

(C) $\frac{3}{10}Mv^2$

(D) $\frac{9}{10}Mv^2$

---

10. A Carnot engine operates between $500\,\text{K}$ and $300\,\text{K}$. If it absorbs $1000\,\text{J}$ of heat from the source, the amount of work done by the engine is:

(A) $400\,\text{J}$

(B) $600\,\text{J}$

(C) $200\,\text{J}$

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

---

11. A charged particle of mass m and charge q moves with a velocity $\vec{v}$ perpendicular to

a magnetic field $\vec{B}$. The radius of the circular path it follows is:

(A) $\frac{qB}{mv}$

(B) $\frac{qv}{mB}$

(C) $\frac{mv}{qB}$

(D) $\frac{mB}{qv}$

---

12. A pipe closed at one end and open at the other resonates at a fundamental frequency of 340 Hz. If the speed of sound in air is 340 m/s, the length of the pipe is:

(A) 0.25 m

(B) 0.50 m

(C) 1.00 m

(D) 2.00 m

---

13. In a potentiometer experiment, a cell of emf 1.5 V gives a balance point at 75 cm. If the cell is replaced by another cell and the balance point is at 60 cm, the emf of the second cell is:

(A) 1.2 V

(B) 1.0 V

(C) 1.8 V

(D) 2.0 V

---

14. For a first-order reaction, the rate constant k is $1.386 \times 10^{-3}\,\mathrm{s}^{-1}$. What is the half-life $t_{1/2}$ of the reaction? (Use $\ln 2 = 0.693$)

(A) 300 s

(B) 500 s

(C) 200 s

(D) 1000 s

---

15. Calculate the molality of a solution prepared by dissolving 10 g of NaCl ($M = 58.5$ g/mol) in 500 g of water:

(A) 0.171 mol/kg

(B) 0.342 mol/kg

(C) 0.017 mol/kg

(D) 0.34 mol/kg

---

16. In a redox titration, 25 mL of 0.1 M $KMnO_4$ is required to completely react with oxalic acid in acidic medium. The volume of 0.2 M oxalic acid used is:

(Balanced reaction: $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$)

(A) 25 mL

(B) 31.25 mL

(C) 12.5 mL

(D) 62.5 mL

---

17. Calculate the volume occupied by 4.4 g of CO_2 gas at 27°C and 1 atm pressure.

($R = 0.0821$ L-atm/mol-K, Molar mass of CO_2 = 44 g/mol)

(A) 2.46 L

(B) 1.68 L

(C) 4.48 L

(D) 5.6 L

---

18. For the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ at 298 K, the enthalpy change $\Delta H = -92.4$ kJ/mol. What happens to the equilibrium when temperature is increased?

(A) Shifts to the right

(B) Shifts to the left

(C) Remains unchanged

(D) Pressure increases
