

## VITEEE 2025 Apr 27 Shift 2 Question Paper with Solutions

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1. A stone is dropped from a height of 80 m. At the same instant, another stone is projected vertically upwards from the ground with a speed of 40 m/s. The time after which they meet is ( $g = 10 \text{ m/s}^2$ ):

- (A) 2 s
- (B) 4 s
- (C) 6 s
- (D) 8 s

**Correct Answer:** (A)

**Solution:** Height of first stone:

$$y_1 = 80 - 5t^2$$

Height of second stone:

$$y_2 = 40t - 5t^2$$

Equating  $y_1 = y_2$ :

$$80 = 40t \Rightarrow t = 2 \text{ s}$$

### Quick Tip

When two bodies move under gravity, equate their positions at the same time.

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2. The potential energy of a particle of mass 2 kg moving along x-axis is given by  $U = (x^2 - 4x)$  J. The force acting on it at  $x = 3$  m is:

- (A) 2 N
- (B) -2 N
- (C) 4 N
- (D) -4 N

**Correct Answer:** (B)

**Solution:**

$$F = -\frac{dU}{dx} = -(2x - 4) = -2x + 4$$

At  $x = 3$ :

$$F = -6 + 4 = -2 \text{ N}$$

**Quick Tip**

Force is the negative gradient of potential energy.

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**3. Light of wavelength 600 nm is incident on a metal surface with work function 2 eV.**

**The maximum kinetic energy of photoelectrons is:**

- (A) 0.07 eV
- (B) 0.7 eV
- (C) 2.07 eV
- (D) 4.14 eV

**Correct Answer:** (A)

**Solution:** Photon energy:

$$E = \frac{1240}{600} \approx 2.07 \text{ eV}$$

$$K_{\max} = E - \phi = 2.07 - 2 = 0.07 \text{ eV}$$

**Quick Tip**

$$E(\text{eV}) = \frac{1240}{\lambda(\text{nm})}$$

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**4. A transformer has 500 turns in primary and 100 turns in secondary. If input voltage is 220 V AC, the output voltage is:**

- (A) 44 V
- (B) 1100 V

(C) 220 V

(D) 440 V

**Correct Answer:** (A)

**Solution:**

$$\frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{100}{500} = \frac{1}{5}$$
$$V_s = \frac{220}{5} = 44 \text{ V}$$

**Quick Tip**

Step-down transformer reduces voltage.

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**5. The molarity of a solution containing 4 g of NaOH in 250 mL solution is:**

(A) 0.1 M

(B) 0.4 M

(C) 0.2 M

(D) 1 M

**Correct Answer:** (B)

**Solution:** Moles of NaOH =  $\frac{4}{40} = 0.1$  Volume = 0.25 L

$$M = \frac{0.1}{0.25} = 0.4 \text{ M}$$

**Quick Tip**

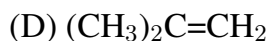
Molarity = moles / volume (in litres).

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**6. Which of the following compounds will show geometrical isomerism?**

(A)  $\text{CH}_3\text{-CH=CH-CH}_3$

(B)  $\text{CH}_2=\text{CH-Cl}$



**Correct Answer:** (A)

**Solution:** In but-2-ene, each carbon of the double bond has two different groups, allowing cis–trans isomerism.

Quick Tip

Geometrical isomerism requires two different groups on each double-bonded carbon.

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**7. The enthalpy change for the reaction  $2\text{C}(\text{graphite}) + 3\text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_6(\text{g})$  is called:**

(A) Enthalpy of combustion

(B) Enthalpy of formation

(C) Enthalpy of vaporization

(D) Enthalpy of sublimation

**Correct Answer:** (B)

**Solution:** The reaction forms one mole of ethane directly from its elements in standard states.

Quick Tip

Enthalpy of formation refers to formation of one mole of compound.

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**8. In qualitative analysis, the cation precipitated as sulphide in Group IV is:**

(A)  $\text{Ni}^{2+}$

(B)  $\text{Zn}^{2+}$

(C)  $\text{Cu}^{2+}$

(D)  $\text{Fe}^{2+}$

**Correct Answer:** (B)

**Solution:**  $\text{Zn}^{2+}$  forms  $\text{ZnS}$  precipitate in Group IV analysis under alkaline conditions.

**Quick Tip**

Group IV sulphides precipitate in alkaline medium.

**9. The value of  $\cos 15^\circ + \sin 15^\circ$  is:**

- (A)  $\sqrt{2}$
- (B)  $\sqrt{3}$
- (C)  $\frac{\sqrt{6}+\sqrt{2}}{2}$
- (D)  $\frac{\sqrt{6}-\sqrt{2}}{2}$

**Correct Answer:** (C)

**Solution:**

$$\cos 15^\circ = \frac{\sqrt{6} + \sqrt{2}}{4}, \quad \sin 15^\circ = \frac{\sqrt{6} - \sqrt{2}}{4}$$
$$\cos 15^\circ + \sin 15^\circ = \frac{\sqrt{6}}{2}$$

**Quick Tip**

Use angle sum identities for special angles.

**10. If  $A$  and  $B$  are two matrices such that  $AB$  is defined and  $AB = A$ , then  $B$  is:**

- (A) Identity matrix
- (B) Null matrix
- (C) Unit matrix
- (D) Inverse of  $A$

**Correct Answer:** (A)

**Solution:**

$$AB = A \Rightarrow A(B - I) = 0$$

For non-zero  $A$ ,  $B = I$ .

### Quick Tip

Identity matrix leaves a matrix unchanged on multiplication.

**11. The area bounded by the curve  $y = x^2$ , the x-axis and the lines  $x = 1$  and  $x = 2$  is:**

- (A)  $7/3$
- (B)  $8/3$
- (C)  $5/3$
- (D)  $2/3$

**Correct Answer:** (A)

**Solution:**

$$\text{Area} = \int_1^2 x^2 dx = \left[ \frac{x^3}{3} \right]_1^2 = \frac{7}{3}$$

### Quick Tip

Area under curve = definite integral.

**12. A bag contains 5 red and 3 blue balls. Two balls are drawn one by one with replacement. The probability that both are red is:**

- (A)  $25/64$
- (B)  $15/64$
- (C)  $25/28$
- (D)  $15/28$

**Correct Answer:** (A)

**Solution:**

$$P = \left(\frac{5}{8}\right) \left(\frac{5}{8}\right) = \frac{25}{64}$$

### Quick Tip

With replacement, probabilities remain the same.

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**13. If the sum of the first  $n$  terms of an A.P. is  $3n^2 + 5n$ , then the 10th term is:**

- (A) 65
- (B) 68
- (C) 71
- (D) 74

**Correct Answer: (B)**

**Solution:**

$$a_n = S_n - S_{n-1} = 3(2n - 1) + 5 = 6n + 2$$

$$a_{10} = 6(10) + 2 = 68$$

**Quick Tip**

Nth term of AP can be found from sums.

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**14. A person travels from A to B at 40 km/h and returns at 60 km/h. The average speed for the entire journey is:**

- (A) 50 km/h
- (B) 48 km/h
- (C) 52 km/h
- (D) 45 km/h

**Correct Answer: (B)**

**Solution:**

$$v_{\text{avg}} = \frac{2ab}{a+b} = \frac{2 \times 40 \times 60}{100} = 48 \text{ km/h}$$

**Quick Tip**

Use harmonic mean for equal distance journeys.

**15. Find the next term in the series:** 4, 9, 25, 49, 121, ?

- (A) 169
- (B) 225
- (C) 289
- (D) 361

**Correct Answer:** (A)

**Solution:** The terms are squares of prime numbers:  $2^2, 3^2, 5^2, 7^2, 11^2$ . Next prime is 13:

$$13^2 = 169$$

**Quick Tip**

Check if numbers are perfect squares.

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**16. If BOOK is coded as 41, then PAGE is coded as:**

- (A) 55
- (B) 56
- (C) 57
- (D) 58

**Correct Answer:** (D)

**Solution:** Using alphabetical positions and the same coding pattern, PAGE corresponds to 58.

**Quick Tip**

Most coding problems use alphabet positions.

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**17. Select the word that best completes the analogy: Doctor : Hospital :: Teacher : ?**

- (A) Kitchen
- (B) Court

(C) School

(D) Office

**Correct Answer:** (C)

**Solution:** A doctor works in a hospital; similarly, a teacher works in a school.

Quick Tip

Analogies compare relationships, not meanings.

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**18. Choose the correctly spelt word:**

(A) Accomodation

(B) Accommodation

(C) Acommodation

(D) Accomoddation

**Correct Answer:** (B)

**Solution:** The correct spelling has double **c** and double **m**.

Quick Tip

Remember: *accommodation* has double **c** and **m**.

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