

# Edge Educellence

## Sample Paper

(Class XII studying/XII<sup>th</sup> Passed )

(Engineering)

### IMPORTANT INSTRUCTIONS

#### A. GENERAL:

- Please read the instructions given for each question carefully and mark the correct answers against the question numbers on the answer sheet in the respective subjects.
- Duration of Test is 1 Hour.
- This Test contains 40 questions divided in 3 sections. Section I contains questions of Physics and Section II contains questions of Chemistry and Section III contains questions of Mathematics.
- Maximum marks are 80.

#### B. MARKING SCHEME :

Each subject in this paper consists of following 3 types of sections :-

##### ***SECTION - I***

- The section contains **13** questions.
- Each question has four options. ***Only one*** of the four option is correct.
- For each question, marks will be awarded in one of the following categories :  
Full Marks : +2, If only the correct options is marked.  
Zero Marks : 0, In all other cases.

##### ***SECTION - II***

- The section contains **13** questions.
- Each question has four options. ***Only one*** of the four option is correct.
- For each question, marks will be awarded in one of the following categories :  
Full Marks : +2, If only the correct options is marked.  
Zero Marks : 0, In all other cases.

##### ***SECTION - III***

- The section contains **14** questions.
- Each question has four options. ***Only one*** of the four option is correct.
- For each question, marks will be awarded in one of the following categories :  
Full Marks : +2, If only the correct options is marked.  
Zero Marks : 0, In all other cases.

***All the Best!***



11. A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20 A in 0.5 s, change of flux linkage with the other coil is  
 (a) 45 Wb (b) 35 Wb (c) 40 Wb (d) 30 Wb
12. A uniformly wound long solenoid of inductance  $L$  and resistance  $R$  is broken into two equal parts in the ratio  $\frac{n}{1}$ , which are then joined in parallel. This combination is then joined to a cell of emf  $\varepsilon$ . The time constant of the circuit is  
 (a)  $\frac{L}{R^2}$  (b)  $\frac{L}{R}$  (c)  $\frac{2L}{R}$  (d)  $\frac{L}{2R}$
13. A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0.5 A, the efficiency of the transformer is approximate:  
 (a) 50% (b) 90% (c) 30% (d) 10%

### Section - I (Chemistry)

14. The plant cell will shrink when placed in:  
 (a) hypotonic solution (b) water  
 (c) hypertonic solution (d) isotonic solution
15. Which one of the following pairs will form an ideal solution?  
 (a) Phenol and aniline (b) n - hexane and n - heptane  
 (c) chloroform and acetone (d) ethanol and acetone
16. A compound  $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$  undergoes complete dissociation in water. The Van't Hoff factor  $i$  is:  
 (a) 3 (b) 4 (c) 9 (d) 6
17. The conductivity of 0.20 M solution of KCl at 298 K is  $0.0248 \text{ S cm}^{-1}$ . Calculate its molar conductivity.  
 (a)  $124.0 \text{ S cm}^2 \text{ mol}^{-1}$  (b)  $122.0 \text{ S cm}^2 \text{ mol}^{-1}$   
 (c)  $129.0 \text{ S cm}^2 \text{ mol}^{-1}$  (d)  $120.0 \text{ S cm}^2 \text{ mol}^{-1}$
18. When  $\text{KMnO}_4$  acts as an oxidizing agent and ultimately forms,  $\text{MnO}_4^{2-}$ ,  $\text{MnO}_2$ ,  $\text{Mn}_2\text{O}_3$  and  $\text{Mn}^{2+}$ , then the number of electrons transferred in each case:  
 (a) 3, 5, 7, 1  
 (b) 1, 3, 4, 5  
 (c) 4, 3, 1, 5  
 (d) 1, 5, 3, 7
19. Electrolysis of dilute aqueous NaCl solution was carried out by passing 10 milliamperere current. The time required to liberate 0.01 mol of  $\text{H}_2$  gas at the cathode is (1 Faraday =  $96500 \text{ C mol}^{-1}$ )  
 (a)  $1.93 \times 10^5 \text{ s}$  (b)  $19.3 \times 10^5 \text{ s}$   
 (c)  $9.34 \times 10^4 \text{ s}$  (d)  $1.93 \times 10^4 \text{ s}$
20. Unit of rate constant for the zero order reaction is:  
 (a)  $\text{mol}^{-2} \text{ L}^2 \text{ s}^{-1}$  (b)  $\text{s}^{-1}$   
 (c)  $\text{mol}^{-1} \text{ L s}^{-1}$  (d)  $\text{mol L}^{-1} \text{ s}^{-1}$
21. The half - life period for a zero order reaction is equal to  
 (where  $[\text{R}]_0$  is initial concentration of reactant and  $k$  is rate constant)  
 (a)  $\frac{2k}{[\text{R}]_0}$  (b)  $\frac{2.303}{k}$   
 (c)  $\frac{[\text{R}]_0}{2k}$  (d)  $\frac{0.693}{k}$
22. Which of the following is paramagnetic as well as coloured ion?

- (a)  $\text{Sc}^{3+}$  (b)  $\text{Ti}^{4++}$   
 (c)  $\text{Cu}^+$  (d)  $\text{Cu}^{2+}$

23. Silver ornaments turn black by the presence of which gas in the atmosphere?

- (a)  $\text{O}_2$  (b)  $\text{N}_2$  (c)  $\text{H}_2\text{S}$  (d)  $\text{Cl}_2$

24. On addition of small amount of  $\text{KMnO}_4$  to concentrated  $\text{H}_2\text{SO}_4$ , a green oily compound is obtained which is highly explosive in nature. Identify the compound from the following.

- (a)  $\text{MnO}_2$  (b)  $\text{Mn}_2\text{O}_2$  (c)  $\text{Mn}_2\text{O}_3$  (d)  $\text{MnSO}_4$

25. The pair  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Br}_2$  and  $[\text{Co}(\text{NH}_3)_4\text{Br}_2]\text{Cl}_2$  will show:

- (a) Ionization isomerism  
 (b) Hydrate isomerism  
 (c) Coordinate isomerism  
 (d) Linkage isomerism

26. Which of the following species is not expected to be a ligand?

- (a)  $\text{NH}_4^+$  (b)  $\text{H}_2\text{O}$  (c)  $\text{CO}$  (d)  $\text{NH}_3$

### Section - III (Mathematics)

27. If  $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$ , then determinant of  $A^2 - 2A$  is

- (a) -25 (b) 25  
 (c) -5 (d) 5

28. Let  $M$  be a  $3 \times 3$  matrix satisfying  $M \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$ ,  $M \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}$  and  $M \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 12 \end{bmatrix}$ . Then the sum

of the diagonal entries of  $M$  is

- (a) 7 (b) 8 (c) 6 (d) 9

29. A function  $f: \mathbb{R} \rightarrow \mathbb{R}$  satisfies

- $f(x+y) = f(x) + f(y)$ , for all  $x$  and  $y$
- $f$  is continuous at  $x = 0$ .

Then,

- (a)  $f$  is a constant function  
 (b)  $f$  is a continuous everywhere  
 (c)  $f$  is not continuous at more than one point  
 (d)  $f(1) = 0$

30.  $\lim_{x \rightarrow 0} \frac{\sin^2 x}{\sqrt{2} - \sqrt{1 + \cos x}}$  equals

- (a)  $2\sqrt{2}$  (b) 4 (c)  $\sqrt{2}$  (d)  $4\sqrt{2}$

31. If the matrix  $\begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ \lambda & -3 & 0 \end{bmatrix}$  is singular, then  $\lambda =$

- (a) -2 (b) 1 (c) -1 (d) 2

32. Let  $\lambda \in \mathbb{R}$ . The system of linear equations

$$2x_1 - 4x_2 + \lambda x_3 = 1$$

$$x_1 - 6x_2 + x_3 = 2$$

$$\lambda x_1 - 10x_2 + 4x_3 = 3$$

- (a) exactly two value of  $\lambda$  (b) every value of  $\lambda$

- (c) exactly one positive value of  $\lambda$                       (d) exactly one negative value of  $\lambda$
33. The real number  $k$  for which the equation,  $2x^3 + 3x + k = 0$  has two distinct real roots in  $[0, 1]$
- (a) lies between 1 and 2                                      (b) lies between 2 and 3  
 (b) Does not exist    (d) lies between 1 and 0
34. The maximum value of  $(\cos \alpha_1) \cdot (\cos \alpha_2) \dots (\cos \alpha_n)$ , under the restrictions  $0 \leq \alpha_1, \alpha_2, \dots, \alpha_n \leq \frac{\pi}{2}$  and  $\cot \alpha_1 \cdot \cot \alpha_2 \dots \cot \alpha_n = 1$  is:
- (a)  $\frac{1}{2^n}$                       (b)  $\frac{1}{2^{n/2}}$                       (c)  $\frac{1}{2^n}$                       (d) 1
35. If  $f(x)$  is a non - zero polynomial of degree four, having local extreme points at  $x = -1, 0, 1$ , then the set  $S = \{x \in \mathbb{R} : f(x) = f(0)\}$  contains exactly
- (a) Four rational numbers  
 (b) Two irrational and two rational numbers  
 (c) Four irrational numbers  
 (d) Two irrational and one rational number
36. The area (in sq units) of the region  $\{(x, y) : y^2 \geq 2x \text{ and } x^2 + y^2 \leq 4x, x \geq 0, y \geq 0\}$  is:
- (a)  $\frac{\pi}{2} - \frac{2\sqrt{2}}{3}$                       (b)  $\pi - \frac{4}{3}$                       (c)  $\pi - \frac{8}{3}$                       (d)  $\pi - \frac{4\sqrt{2}}{3}$
37. The area enclosed by the curves  $y^2 + 4x = 4$  and  $y - 2x = 2$  is:
- (a)  $\frac{22}{3}$                       (b) 9                      (c)  $\frac{23}{3}$                       (d)  $\frac{25}{3}$
38. Area of the region bounded by the curve  $x = 2y + 3$ , the  $y$  - axis and between  $y = -1$  and  $y = 1$  is:
- (a) 4 sq. units    (b) 6 sq. units  
 (c) 8 sq. units    (d)  $3/2$  sq. units
39.  $\lim_{x \rightarrow -\frac{1}{\sqrt{2}}} \frac{\sin(\cos^{-1}x) - x}{1 - \tan(\cos^{-1}x)}$  is equal to:
- (a)  $-\sqrt{2}$                       (b)  $\frac{1}{\sqrt{2}}$                       (c)  $\sqrt{2}$                       (d)  $-\frac{1}{\sqrt{2}}$
40. Let  $g : \mathbb{R} \rightarrow \left[\frac{\pi}{6}, \frac{\pi}{2}\right)$  is defined by  $g(x) = \sin^{-1} \left(\frac{x^2 - c}{1 + x^2}\right)$ . Then the possible values of 'c' for which  $g$  is surjective function, is:
- (a)  $\left\{-\frac{1}{2}\right\}$   
 (b)  $\left[-\frac{1}{2}, 1\right)$   
 (c)  $\left(-1, -\frac{1}{2}\right]$   
 (d)  $\left\{\frac{1}{2}\right\}$

|     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1.  | 2.  | 3.  | 4.  | 5.  | 6.  | 7.  | 8.  | 9.  | 10. |
| (a) | (a) | (c) | (c) | (a) | (a) | (b) | (b) | (a) | (a) |
| 11. | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. |
| (d) | (b) | (b) | (c) | (b) | (a) | (a) | (b) | (a) | (d) |
| 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. |
| (c) | (d) | (c) | (b) | (a) | (a) | (b) | (d) | (b) | (d) |
| 31. | 32. | 33. | 34. | 35. | 36. | 37. | 38. | 39. | 40. |
| (d) | (c) | (c) | (b) | (d) | (c) | (b) | (b) | (d) | (a) |