SKVedge

Sample Paper

(Class XII studying/XIIth 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!

Section – I (Physics)

1. A pendulum bob of mass m carrying a charge q is at rest with its string making an angleθ with the vertical in a uniform horizontal electric field E. The tension in the string is
   (a) $\frac{qE}{sin\theta}$ (b) $\frac{qE}{cos\theta}$ (c) $\frac{mg}{sin\theta}$ (d) mg
2. A hollow spherical conductor of radius 2m carries a charge of 500μ C. Then electric field strength at its surface is
   (a) 1.125×10^6N/C (b) 2.25×10^6N/C
   (c) zero (d) 44.5×10^6N/C
3. If P.D. across a capacitor is changed from 15 V to 30 V, work done is W. What will be the work done when P.D. is changed from 30 V to 60 V?
   (a) W (b) 3 W
   (c) 4 W (d) 2 W
4. Ammeter is always used
   (a) in parallel with the element through which current is to be determined
   (b) to simulate the element across which voltage is to be determined
   (c) in series with the element through which current is to be determined
   (d) to simulate the element through which resistanceis to be determined
5. Two charges - 10C and +10C are placed 10 cm apart. Potential at the centre of the line joining the two charges is:
   (a) zero (b) 4 V (c) 2 V (d) – 2 V
6. The resistances of the four arms P, Q, R and S in a Wheatstone's bridge are 10 ohm, 30 ohm, 30 ohm and 90 ohm, respectively. The emf and internal resistance of the cell are 7 volt and 5 ohm respectively. If the galvanometer resistance is 50 ohm, the current drawn from the cell will be:
   (a) 0.2 A (b) 1.0 A
   (c) 0.1 A (d) 2.0 A
7. A particle having charge 100 times that of an electron is revolving in a circular path by radius 0.8 m with one rotation per second. The magnetic field produced at the centre is:
   (a) $10^{-15}\mu_0$ (b) $10^{-17}\mu_0$
   (c) $10^{-16}\mu_0$ (d) $10^{17}\mu_0$
8. The deflection in moving coil galvanometer falls from 50 divisions to 10 divisions, when a shunt of12Ω is applied, the resistance of galvanometer coil is
   (a) 50Ω (b) 48Ω (c) 12Ω (d) 24Ω
9. Tiem period of oscillation of a magnetic needle is
   (a) $T = 2\pi\sqrt{\frac{I}{MB}}$ (b) $T = \sqrt{\frac{I}{MB}}$ (c) $T = 2\pi\sqrt{\frac{MB}{I}}$ (d) $T = \pi\sqrt{\frac{MB}{I}}$
10. Two bar magnets having same geometry with magnetic moments Mand 2Mare firstly placed in such a way that their similar poles are on the same side and its period of oscillation is T_1 . Now the polarity of one of the magnets is reversed and its time period becomes T_2 . Then,
    (a) $T_1 < T_2$ (b) $T_1 = T_2$
    (c) $T_1 > T_2$ (d) $T_2 = \infty$

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 $\frac{\eta}{1}$, which are then joined in parallel. This combination is then joined to a cell of emf ε. 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 from an ideal solution?

(a) Phenol and aniline (b) n – hexane and n - heptane

(c) chloroform and acetone (d) ethanol and acetone

16. A compound $CaCl_2 \cdot 6H_2O$ 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 S cm^{-1}. Calculate its molar conductivity.

(a) 124.0 S cm^2 mol^{-1} (b) 122.0 S cm^2 mol^{-1}

(c) 129.0 S cm^2 mol^{-1} (d) 120.0 S cm^2 mol^{-1}

18. When $KMnO_4$ acts as an oxidizing agent and ultimately forms, MnO_4^{2-} MnO_2, Mn_2O_3 and 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 milliampere current. The time required to liberate 0.01 mol of H_2 gas at the cathode is (1 Faraday = 96500 C mol^{-1})

(a) $1.93 \times 10^5 s$ (b) $19.3 \times 10^5 s$

(c) $9.34 \times 10^4 s$ (d) $1.93 \times 10^4 s$

20. Unit of rate constant for the zero order reaction is:

(a) mol^{-2} L^2 s^{-1} (b) s^{-1}

(c) mol^{-1} L s^{-1} (d) mol L^{-1} s^{-1}

21. The half – life period for a zero order reaction is equal to

(where $[R]_0$ is initial concentration of reactant and k is rate constant)

(a) $\frac{2k}{[R]_0}$ (b) $\frac{2.303}{k}$

(c) $\frac{[R]_0}{2k}$ (d) $\frac{0.693}{k}$

22. Which of the following is paramagnetic as well as coloured ion?

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

23. Silver ornaments turn black by the presence of which gas in the atmosphere?
(a) O_2 (b) N_2 (c) H_2S (d) Cl_2

24. On addition of small amount of $KMnO_4$ to concentrated H_2SO_4, a green oily compound is obtained which is highly explosive in nature. Identify the compound from the following.
(a) MnO_2 (b) Mn_2O_2 (c) Mn_2O_3 (d) $MnSO_4$

25. The pair $[Co(NH_3)_4Cl_2]Br_2$ and $[Co(NH_3)_4Br_2]Cl_2$ 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) NH_4^+ (b) H_2O (c) CO (d) 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× 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 : R→ R satisfies
1. f(x + y) = f(x) + f(y) , for all x and y
2. 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. $\lim\limits_{x\to 0} \frac{\sin^2 x}{\sqrt{2}-\sqrt{1+\cos x}}$ 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 λ =
(a) – 2 (b) 1 (c) – 1 (d) 2

32. Let $\lambda \in \mathbf{R}$. 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 λ (b) every value of λ

(c) exactly one positive value of λ (d) exactly one negative value of λ

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 $(\cos\alpha_1) \cdot (\cos\alpha_2) \ldots (\cos\alpha_n)$, under the restrictions $0 \le \alpha_1, \alpha_2, \ldots, \alpha_n \le \frac{\pi}{2}$ and $\cot\alpha_1 \cdot \cot\alpha_2 \ldots \cot\alpha_n = 1$ is:

(a) $\frac{1}{2n}$ (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∈ 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$\{(x, y): y^2 \ge 2x$ and $x^2 + y^2 \le 4x, x \ge 0, y \ge 0\}$ 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. $\lim_{x\to-\frac{1}{\sqrt{2}}} \frac{\sin(\cos^{-1}x)-x}{1-\tan(\cos^{-1}x)}$ is equal to:

(a) $-\sqrt{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\sqrt{2}$ (d) $-\frac{1}{\sqrt{2}}$

40. Let g : R→ $\left[\frac{\pi}{6}, \frac{\pi}{2}\right)$ 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)