SAMPLE PAPER

GRADE– 12th (PCM)

SECTION – A (English)

In each of the following questions (1-10), a part of the sentence is underlined. Four alternatives are given for the underlined part. Select the alternative that best improves the sentence and makes it grammatically and contextually correct.

1. **He was elected the captain of the team despite being one of its youngest members.**
   (A) a captain of the team (B) captain of the team
   (C) an captain of the team (D) the captain of the team
2. **There is few hope of completing the project on time unless additional resources are provided.**
   (A) a few hope (B) the few hope
   (C) little hope (D) a little hope
3. **The principal prevented the students to enter the examination hall after the gates had been closed.**
   (A) prevented the students from entering (B) prevented the students for entering
   (C) prevented the students from enter (D) prevented the students to entering
4. **You had better to revise these rules thoroughly before appearing for the examination.**
   (A) had better revised (B) had better revise
   (C) had better revising (D) had better to revising
5. **Nobody informed you about the change in the examination schedule, didn't they?**
   (A) did they? (B) did he?
   (C) hadn't they? (D) doesn't he?
6. **The accused was acquitted from all the charges due to lack of sufficient evidence.**
   (A) acquitted with (B) acquitted of
   (C) acquitted by (D) acquitted against
7. **The government has decided to bring out several reforms to improve the recruitment process.**
   (A) bring about (B) bring up
   (C) bring off (D) bring down
8. **Neither of the explanations given by the witnesses seem convincing to the investigating officer.**
   (A) seems convincing (B) have seemed convincing
   (C) are seeming convincing (D) were seemed convincing

9. The authorities made the contractor <u>to repair</u> the damaged portion of the road immediately.

(A) to repairing (B) repaired

(C) repair (D) repairing

10. The candidates are looking forward <u>to receive</u> their appointment letters after the final verification.

(A) to receiving (B) for receiving

(C) to have received (D) to receive

<u>Choose the alternative which best expresses the meaning of the given sentence in one word</u>.

11. One who can use both hands equally well

(A) Ambivalent (B) Ambidextrous

(C) Ambiguous (D) Amphibious

<u>Select the correctly spelt word</u>.

12. (A) Perseverence (B) Perseverance

(C) Perserverance (D) Persevarance

13. (A) Conscientious (B) Conscentious

(C) Consciencious (D) Conscientous

<u>Choose the alternative which best expresses the meaning of the given idiom phrase</u>.

14. Not hold water

(A) To remain unsuccessful (B) To be unable to keep a secret

(C) To be unconvincing or illogical (D) To lose patience quickly

<u>Change the narration</u>.

15. She asked me whether I had seen her documents the previous day.

(A) She said to me, “Did you see my documents yesterday?”

(B) She said to me, “Have you seen my documents yesterday?”

(C) She said to me, “Had you seen her documents the previous day?”

(D) She asked me, “Did I see your documents yesterday?”

SECTION – B (Physics)

16. Two large conducting plates facing each other carry equal and opposite surface charge densities σ. An electron released from rest from the negative plate reaches the positive plate in time te. If a proton is released from rest from the positive plate, it reaches the negative plate in time tp. Neglecting gravity, the ratio te tp is equal to:

(A) 1 (B) (me/mp)½

(C) (mp/me)½ (D) (m_e /mp)

17. A cylindrical metallic wire of resistance R is stretched uniformly such that its radius reduces to 1/n times its original value. Its new resistance will be:

(A) Nr (B) n^2R

(C) n^3R (D) n^4R

18. A circular coil of radius R carries a current I. The magnetic field at the center of the coil is B_0. At what distance from the center along the axis of the coil will the magnetic field drop to $B_0/8$?

(A) R (B) $R\sqrt{3}$

(C) 2R (D) 3R

19. In a Young's double – slit experiment, the slits are illuminated by monochromatic light. The entire experimental setup is completely immersed in a liquid of refractive index μ. If the fringe width in air was β, the new fringe width in the liquid will become:

(A) β/μ (B) $\mu\beta$

(C) β/μ^2 (D) β

20. If the kinetic energy of a free electron doubles, its de Broglie wavelength changes by a factor of:

(A) 2 (B) 1/2

(C) $\sqrt{2}$ (D) $1/\sqrt{2}$

21. For a short electric dipole of dipole moment p, the ratio of electric field magnitudes at a distance r on its axial line to that on its equatorial line (E_{axial} : $E_{equatorial}$) is:

(A) 1 : 1 (B) 2 : 1

(C) 1 : 2 (D) 4 : 1

22. A parallel plate capacitor is charged by a battery to potential V and then disconnected. If the distance between the plates is now doubled, the energy stored in the capacitor will:

(A) be halved (B) remain unchanged

(C) become four times (D) be doubled

23. As temperature increases, the electrical resistance of copper (metallic conductor) and silicon (semiconductor), respectively:

(A) increases, decreases (B) decreases, increases

(C) increases, increases (D) decreases, decreases

24. A galvanometer of resistance G gives full-scale deflection for current I_g. To convert it into an ammeter of range 0 to I (where $I > I_g$), the required shunt resistance S connected in parallel is:

(A) $S = I_g G / (I - I_g)$ (B) $S = (I - I_g) G / I_g$

(C) $S = I G / I_g$ (D) $S = (I + I_g) / G$

25. At a certain location on the Earth's surface, the vertical component of the Earth's magnetic field is $\sqrt{3}$ times the horizontal component. The angle of dip (δ) at this place is:

(A) 30° (B) 45°

(C) 60° (D) 90°

26. Two coaxial long solenoids S_1 and S_2 of radii r_1 and r_2 (with $r_1 < r_2$) and lengths l have n_1 and n_2 turns per unit length respectively. The mutual inductance M of the pair is:

(A) $\mu_o n_1 n_2 \pi r_1^2 l$ (B) $\mu_o n_1 n_2 \pi r_2^2 l$

(C) $\mu_o n_1 n_2 \pi (r_1 + r_2)^2 l$ (D) $\mu_o n_1^2 n_2^2 \pi r_1^2 l$

27. An alternating voltage source is described by the equation V = $200\sqrt{2}$ sin(100π t) volts. The rms value of the voltage and its frequency are, respectively:

(A) 200 V and 100 Hz (B) 200 V and 50 Hz

(C) 282 V and 50 Hz (D) $200\sqrt{2}$ V and 100 Hz

28. Which electromagnetic wave is widely utilized in RADAR communication and microwave ovens, having wavelengths ranging from roughly 1 mm to 0.1 m?

(A) Radio waves (B) Microwaves

(C) Infrared rays (D) Gamma rays

29. A ray of light undergoes minimum deviation through an equilateral glass prism (refracting angle A = 60°). If the angle of minimum deviation is δ_m = 60°, the refractive index of the prism is:

(A) 1.5 (B) $\sqrt{2}$ (C) $\sqrt{3}$ (D) 2.0

30. In a single slit diffraction experiment, a slit of width a is illuminated by monochromatic light of wavelength λ. The angular width of the central diffraction maximum is:

(A) λ/a (B) 2λ/a (C) λ/(2a) (D) 4λ/a

SECTION – C (Chemistry)

31. Which of the following is a colligative property?

(A) Boiling point (B) Elevation in boiling point

(C) Melting point (D) Freezing point

32. The Unit of rate constant for a first order reaction is:

(A) $mol\ L^{-1}s^{-1}$ (B) s^{-1}

(C) $L\ mol^{-1}\ s^{-1}$ (D) $mol^{-1}\ L\ s^{-1}$

33. In electrochemical series, the standard electrode potential of hydrogen is taken as:

(A) 0.00 V (B) 1.00 V

(C) –1.00 V (D) 0.50 V

34. The oxidation state of Cr in $K_2Cr_2O_7$ is:

(A) +3 (B) +6

(C) +4 (D) +5

35. The geometry of $[Ni(CN)_4]^{2-}$ is:

(A) Tetrahedral (B) Square planar

(C) Octahedral (D) Linear

36. Which of the following is a primary alkyl halide?

(A) 2 – Chloropropane (B) Chloromethane

(C) 2 – Chloro – 2 – methylpropance (D) 3 – Chloropentane

37. Phenol reacts with B_r in H_2O to give:

(A) o - Bromophenol (B) p – Bromophenol

(C) 2, 4, 6 – Tribromophenol (D) m – Bromophenol

38. The IUPAC name of CH_3COCH_3 is:

(A) Propanal (B) Propanone

(C) Ethanol (D) Ethanal

39. Hoffmann bromamide degradation reaction is used to prepare:

(A) Primary amines (B) Secondary amines

(C) Tertiary amines (D) Quatenary ammonium salls

40. Which of the following is a disaccharide?

(A) Glucose (B) Fructose (C) Sucrose (D) Starch

41. The monomer of natural rubber is:

(A) Isoprene (B) Vinyl chloride (C) Caprolactam (D) Tetrafluoroethylene

42. Which drug is used as an antipyretic?

(A) Chloroquine (B) Aspirin (C) Penicillin (D) Morphine

43. For a reaction, half – life is independent of initial concentration. The order is:

(A) Zero (B) First (C) Second (D) Third

44. The number of unpaired electrons in $Ni^{2+}(Z = 28)$ is:

(A) 0 (B) 2 (C) 3 (D) 4

45. Which of the following complexes shows optical isomerism?

(A) $[Co(NH_3)_6]^{3+}$ (B) $[Co(en)_3]^{3+}$ (C) $[Ni(CN)_4]^{2-}$ (D) $[Cu(NH_3)_4]^{2+}$

SECTION – D (Mathematics)

46. If $A = \{2, 3\}$, $B = \{4, 5\}$, $C = \{5, 6\}$, then what is the number of elements of $A \times (B \cap C)$?

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

47. If $\emptyset$ is a null set, then which one of the following is correct?

(A) $\emptyset = 0$ (B) $\emptyset = \{0\}$ (C) $\emptyset = \{\emptyset\}$ (D) $\emptyset = \{\ \}$

48. Find $\frac{dy}{dx}$, if $x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$.

(A) $\tan\frac{\theta}{2}$ (B) $\tan\frac{\theta}{4}$ (C) $\tan\frac{\theta}{1}$ (D) $\tan\frac{\theta}{3}$

49. If $log_3[log_3[log_3^x]] = log_3^3$ then what is the value of x?

(A) 3 (B) 27 (C) 3^9 (D) 3^{27}

50. What is the value of $log_{10}^{\left(\frac{9}{8}\right)} - log_{10}^{\left(\frac{27}{32}\right)} + log_{10}^{\left(\frac{3}{4}\right)}$?

(A) 3 (B) 2 (C) 1 (D) 0

51. If α, β are the roots of the equation $x^2 + x + 2 = 0$ then what is $\frac{\alpha^{10}+\beta^{10}}{\alpha^{-10}+\beta^{-10}}$ equal to?

(A) 4096 (B) 2048 (C) 1024 (D) 512

52. Integrate the following functions w.r.t. x : $f(x) = \frac{tan^4\sqrt{x}\, sec^2\sqrt{x}}{\sqrt{x}}$

(A) $\frac{2}{3}tan^5\sqrt{x} + C$ (B) $\frac{2}{5}tan^5\sqrt{x} + C$ (C) $\frac{5}{2}tan^5\sqrt{x} + C$ (D) $\frac{3}{5}tan^5\sqrt{x} + C$

53. What is the value of $\lim_{x \to 0} \frac{\cos(ax)-\cos(bx)}{x^2}$?

(A) $a - b$ (B) $a + b$ (C) $\frac{b^2-a^2}{2}$ (D) $\frac{b^2+a^2}{2}$

54. What is $\lim_{x \to 0} \frac{a^x-b^x}{x}$ equal to?

(A) $\ln(ab)$ (B) $\frac{\ln a}{\ln b}$ (C) $\ln\left(\frac{a}{b}\right)$ (D) $\ln\left(\frac{b}{a}\right)$

55. What is $\lim_{x \to 0} \frac{2(1-\cos x)}{x^2}$ equal to?

(A) 0 (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) 1

56. If $x = \sin\theta + \cos\theta$ and $y = \sin\theta\cos\theta$, then what is the value of $x^4 - 4x^2y - 2x^2 + 4y^2 + 4y + 1$?

(A) 0 (B) 1 (C) 2 (D) None of these

57. What is the value of $\sin 292\frac{1}{2}°$?

(A) $\frac{1}{3}\sqrt{2+\sqrt{3}}$ (B) $-\frac{1}{3}\sqrt{2-\sqrt{3}}$ (C) $\frac{1}{2}\sqrt{2+\sqrt{2}}$ (D) $-\frac{1}{2}\sqrt{2+\sqrt{2}}$

58. What is the value of $(\tan 9° - \tan 27° - \tan 63° + \tan 81°)$?

(A) 1 (B) 2 (C) 3 (D) 4

59. If $\tan\theta = \frac{1}{2}$ and $\tan\emptyset = \frac{1}{3}$ then what is value of $(\theta + \emptyset)$?

(A) $\frac{\pi}{6}$ (B) 0 (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

60. A straight line $x = y + 2$ touches the circle $4(x^2 + y^2) = r^2$ the value of r is:

(A) $\sqrt{2}$ (B) $2\sqrt{2}$ (C) 2 (D) 1