

KEAM 2025 April 27 Question Paper

Time Allowed :3 Hours	Maximum Marks : 600	Total Questions :150
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. This question paper comprises 150 questions.
2. The Paper is divided into three parts- Maths, Physics and Chemistry.
3. There are 45 questions in Physics, 30 questions in Chemistry and 75 questions in Mathematics.
4. For each correct response, candidates are awarded 4 marks, and for each incorrect response, 1 mark is deducted.

1. Solution set of $-12x > 38$ for $x \in \mathbb{N}$

$$-12x > 38$$

- (A) $x \leq -\frac{38}{12}$
 - (B) $x > -\frac{38}{12}$
 - (C) $x > \frac{38}{12}$
 - (D) $x \leq \frac{38}{12}$
-

2. Evaluate the following integral:

$$\int e^x \left[\frac{1}{1 + x(1 + x)^2} \right] dx$$

- (A) $\frac{e^x}{1+x(1+x)^2}$
 - (B) $\int \frac{e^x}{(1+x(1+x)^2)} dx$
 - (C) $\frac{e^x}{(1+x(1+x))^2}$
 - (D) None of the above
-

3. Evaluate the following sum:

$$\sum_{n=1}^{2025} i^n (1 + i)$$

- (A) $2025i$
 - (B) $2025(1 + i)$
 - (C) 2025
 - (D) None of the above
-

4. Evaluate the following statement:

$$f(x) = \sin(|x|) - |x| \text{ is not differentiable at } x = \underline{\hspace{2cm}}$$

- (A) $x = 0$
- (B) $x = 1$
- (C) $x = -1$

(D) $x = 2$

5. Evaluate the derivative of the function:

$$f(x) = x|x|, \quad \text{find } f'(-10)$$

(A) -20

(B) 0

(C) 20

(D) -10

6. Given the following probabilities:

$$P(A) = 0.7, P(B) = 0.5, P(A \cup B) = 0.9, \quad \text{find } P(A/B)$$

(A) 0.2

(B) 0.4

(C) 0.6

(D) 0.9

7. Find the mean deviation of the following data:

x	2	4	6	10
f	7	4	5	4

(A) 2.5

(B) 3

(C) 4

(D) 5

8. Evaluate the following integral:

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (x^4 + x^3 + x) \cos x \, dx$$

- (A) 0
 - (B) $\frac{2\pi}{3}$
 - (C) $\frac{\pi}{3}$
 - (D) 1
-

9. Find the minimum of the function

$$f(x) = |x + 2|$$

- (A) $x = -2$
 - (B) $x = 0$
 - (C) $x = 2$
 - (D) $x = -4$
-

10. Find the center of the ellipse given by the equation

$$4x^2 + 24x + 9y^2 - 18y + 9 = 0$$

- (A) $(h, k) = (-3, 1)$
 - (B) $(h, k) = (3, -1)$
 - (C) $(h, k) = (-2, 3)$
 - (D) $(h, k) = (0, 0)$
-

11. Water flows through a pipe with velocity $V_1 = 3$ m/s where the area of the pipe is A_1 . What is the velocity V_2 , where the diameter of the pipe is half of that at area A_1 ?

- (A) $V_2 = 6$ m/s
 - (B) $V_2 = 1.5$ m/s
 - (C) $V_2 = 3$ m/s
 - (D) $V_2 = 9$ m/s
-

12. When a rotating disc suddenly shrinks in radius, what happens to the angular velocity ω ?

- (A) ω decreases
 - (B) ω increases
 - (C) ω remains constant
 - (D) None of the above
-

13. The center of mass of a rod of length l is at a distance from one end of the rod.

- (A) $\frac{l}{4}$
 - (B) $\frac{l}{2}$
 - (C) $\frac{l}{3}$
 - (D) l
-

14. The acceleration of a particle varies with time as $a = 6t$. What is the displacement and velocity of the particle at $t = 4s$?

- (A) Displacement = 48 m, Velocity = 24 m/s
 - (B) Displacement = 72 m, Velocity = 24 m/s
 - (C) Displacement = 72 m, Velocity = 48 m/s
 - (D) Displacement = 48 m, Velocity = 72 m/s
-

15. What is the potential energy of an object of mass m placed on the surface of the Earth? (Mass of Earth = M , radius of Earth = R)

- (A) $-\frac{GMm}{R}$
 - (B) $\frac{GMm}{R^2}$
 - (C) $-\frac{GMm}{R^2}$
 - (D) $\frac{GMm}{R}$
-

16. A block is tied to a string of length 98 cm and is rotated in a horizontal circle. Find the angular velocity if the centripetal acceleration $a = g$.

- (A) $\omega = \sqrt{g}$
- (B) $\omega = \frac{g}{R}$

(C) $\omega = \sqrt{g/R}$

(D) $\omega = \frac{g}{\sqrt{R}}$

17. If n cells of emf E and internal resistance r are connected in parallel, what is the equivalent emf and internal resistance of the combination?

(A) $E_{\text{eq}} = E, r_{\text{eq}} = \frac{r}{n}$

(B) $E_{\text{eq}} = nE, r_{\text{eq}} = \frac{r}{n}$

(C) $E_{\text{eq}} = E, r_{\text{eq}} = nr$

(D) $E_{\text{eq}} = nE, r_{\text{eq}} = nr$

18. A guitar string is vibrating in the third harmonic. The number of nodes and antinodes present are:

(A) 3 nodes, 2 antinodes

(B) 4 nodes, 3 antinodes

(C) 2 nodes, 3 antinodes

(D) 3 nodes, 4 antinodes

19. A rod of length 0.5 m moves with a velocity of 3 m/s in a perpendicular magnetic field of strength 2 T. Find the emf induced across its ends.

(A) 1.5 V

(B) 0.5 V

(C) 3 V

(D) 2 V

20. According to Huygen's principle, secondary wavelets move:

(A) Forward

(B) In all directions

(C) In a circular motion

(D) Backward

21. Coefficient of friction is the ratio of?

- (A) Force of friction to the normal force
- (B) Normal force to the force of friction
- (C) Force of friction to the weight of the object
- (D) Weight of the object to the normal force

22. Electric field lines around a positive charge are directed:

- (A) Outward
- (B) Inward
- (C) Radially inward and outward
- (D) None of the above

23. The temperature of the source and sink of a heat engine are 127°C and 27°C respectively. By how much should the temperature of the source be increased so as to double the efficiency?

- (A) 100°C
- (B) 200°C
- (C) 150°C
- (D) 50°C

24. Which of the following is an ambidentate ligand? a) $\text{C}_2\text{O}_4^{2-}$ b) CN^- c) NH_3

- (A) $\text{C}_2\text{O}_4^{2-}$
 - (B) CN^-
 - (C) NH_3
 - (D) None of the above
-

25. 10 g of (90 percent pure) CaCO_3 , treated with excess of HCl , gives what mass of CO_2 ?

- (A) 4.4 g
 - (B) 5.6 g
 - (C) 3.6 g
 - (D) 6.4 g
-

26. Pressure of pure benzene is 0.75. When 0.2g of a non-volatile solute is added to 39g of benzene, pressure changes to 0.745. The molar mass of solute is?

- (A) 40 g/mol
 - (B) 100 g/mol
 - (C) 60 g/mol
 - (D) 80 g/mol
-

27. In which of the following $K_c = K_p$?

a) $\text{PCl}_5(g) \rightleftharpoons \text{PCl}_3(g) + \text{Cl}_2(g)$ b) $\text{H}_2(g) + \text{I}_2(g) \rightleftharpoons 2\text{HI}(g)$

- (A) Reaction a)
 - (B) Reaction b)
 - (C) Both reactions
 - (D) None of the above
-

28. Given the following concentrations and rates, which one corresponds to the rate law for the reaction?

$$[A] = 0.10 \quad [D] = 0.2 \quad \text{Rate} = 0.2$$

$$[A] = 0.2 \quad [D] = 0.2 \quad \text{Rate} = 0.4$$

$$[A] = 0.10 \quad [D] = 0.1 \quad \text{Rate} = 0.05$$

- (A) Rate law is $\text{Rate} = k[A][D]$
- (B) Rate law is $\text{Rate} = k[A]^2[D]$

(C) Rate law is $\text{Rate} = k[A][D]^2$

(D) Rate law is $\text{Rate} = k[A]^2[D]^2$

29. Friedel Craft's reaction is an example of:

(A) Electrophilic substitution

(B) Nucleophilic substitution

(C) Free radical substitution

(D) Addition reaction

30. Find the ΔG during the reaction:



(A) -10 kJ/mol

(B) +10 kJ/mol

(C) 0 kJ/mol

(D) +20 kJ/mol

31. $E^\circ_{\text{Cell}} = 1.1 \text{ V}$. Find E_{Cell} for the reaction: $\text{Zn} + \text{Cu}^{2+} (0.1M) \rightleftharpoons \text{Zn}^{2+} (0.001M) + \text{Cu}$

(A) 1.05 V

(B) 1.2 V

(C) 1.1 V

(D) 1.0 V

32. The most basic oxide

a) Cr_2O_3 b) CrO c) Mn_2O_7 d) V_2O_5

33. Length of latus rectum of ellipse

$$\frac{x^2}{9} + \frac{y^2}{16} = 1$$

34. Evaluate the integral:

$$\int \frac{\log(1+x)}{1+x} dx$$

35. Evaluate the integral:

$$\int_{-3}^3 \lfloor x \rfloor dx$$

36. Variance of 240, 260, 270, 280

- a) 15
 - b) 16
 - c) 18
 - d) 20
-

37. Evaluate the limit:

$$\lim_{x \rightarrow 2} \frac{(x^3 - 8) \sin(x - 2)}{x^2 - 4x + 4}$$

- a) 2
 - b) 3
 - c) 4
 - d) 5
-

38. Find the range of $f(x) = \log_e(4x^2 - 4x + 1)$

- a) $(-\infty, 0]$
 - b) $(0, \infty)$
 - c) $(-\infty, \infty)$
 - d) $[0, \infty)$
-

39. Evaluate the integral:

$$\int \frac{\sin(2x)}{\sin(x)} dx$$

- a) $2 \sin(x) + C$
 - b) $2 \log \left| \tan \left(\frac{x}{2} \right) \right| + C$
 - c) $2 \log \left| \cot \left(\frac{x}{2} \right) \right| + C$
 - d) $2 \cos(x) + C$
-

40. If

$$(a - 2)^2 + (b - 2)^2 + (c - 2)^2 = 0, \text{ then } a + b + c =$$

- a) 0
 - b) 1
 - c) 2
 - d) 3
-

41. Equation of line through (0, 0, 1) and (1, 1, 0)

- a) $x + y + z = 1$
 - b) $x + y + z = 0$
 - c) $x - y + z = 0$
 - d) $x + y - z = 0$
-

42. Given that $\mathbf{a} \times (2\hat{i} + 3\hat{j} + 4\hat{k}) = (2\hat{i} + 3\hat{j} + 4\hat{k}) \times \mathbf{b}$, $|\mathbf{a} + \mathbf{b}| = \sqrt{29}$, $\mathbf{a} \cdot \mathbf{b} = ?$

- a) 0
 - b) 5
 - c) 10
 - d) 15
-

43. What is the ratio of de Broglie wavelength of the particles if their kinetic energy are 0.002 eV and 2 eV respectively?

- a) 1:10
- b) 1:5
- c) 1:100

d) 1:50

44. If

$$(a - 2)^2 + (b - 2)^2 + (c - 2)^2 = 0, \text{ then } a + b + c =$$

a) 0

b) 1

c) 2

d) 3

45. Equation of line through (0, 0, 1) and (1, 1, 0)

a) $x + y + z = 1$

b) $x + y + z = 0$

c) $x - y + z = 0$

d) $x + y - z = 0$

46. Given that $\mathbf{a} \times (2\hat{i} + 3\hat{j} + 4\hat{k}) = (2\hat{i} + 3\hat{j} + 4\hat{k}) \times \mathbf{b}$, $|\mathbf{a} + \mathbf{b}| = \sqrt{29}$, $\mathbf{a} \cdot \mathbf{b} = ?$

a) 0

b) 5

c) 10

d) 15

47. What is the ratio of de Broglie wavelength of the particles if their kinetic energy are 0.002 eV and 2 eV respectively?

a) 1:10

b) 1:5

c) 1:100

d) 1:50

48. The position of body varies as

$S = 9t^2 - 6t$. What is the time at which the body becomes at rest?

- a) 0
 - b) 1
 - c) 2
 - d) 3
-

49. Given:

$$\frac{197}{96}X \rightarrow \frac{197}{95}Y + Z + V \quad \text{what is } Z?$$

- a) $X - Y - V$
 - b) $X + Y + V$
 - c) $Y - X - V$
 - d) $X + Y - V$
-

50. Galvanometer can be converted into a voltmeter by connecting...

- a) a shunt resistor in parallel
 - b) a high resistance in series
 - c) a low resistance in series
 - d) a low resistance in parallel
-

51. What is the dimension of

$$\frac{MB}{KT}$$

where M represents magnetic moment, K represents the Boltzmann constant, B represents the magnetic field, and T represents temperature?

- a) $[M] \cdot [T]^2$
 - b) $[M] \cdot [K]$
 - c) $[M] \cdot [K]^{-1}$
 - d) $[M] \cdot [T]^{-1}$
-

52. If force is 500 N and instantaneous velocity is 20 m/s, what is the instantaneous power?

- a) 10,000 W
 - b) 5,000 W
 - c) 500 W
 - d) 2,000 W
-

53. The tennis ball of mass 120 g moving with a velocity of 20 m/s towards gets by a rocket of velocity and the final speed becomes 30 m/s with direction reversed. If the time of contact is 0.01 s, what is the average force acting on the ball?

- a) 1,200 N
 - b) 600 N
 - c) 240 N
 - d) 1,000 N
-

54. For an ideal gas of molar mass M , the slope of the graph between the rms speed V and $\sqrt{T}$ where T represents the temperature is...

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

55. Relation between Azimuthal quantum number and magnetic quantum number

- a) $l = m$
 - b) $l = 2m$
 - c) $l \geq m$
 - d) $l \leq m$
-

56. Maximum magnetic moment shown by:

- a) Mn^{2+}

- b) Fe^{2+}
 - c) Cr^{3+}
 - d) Ni^{2+}
 - e) CO^{2+}
-

57. Molecule with 2σ and 2π bonds:

- a) CO_2
 - b) CO
 - c) H_2
 - d) Cl_2
 - e) F_2
-

58. Number of valence electrons in Germanium?

- a) 4
 - b) 2
 - c) 6
 - d) 8
-

59. Which of the following contains 2 primary $-\text{OH}$ groups in its structure?

- a) Glycerol
 - b) Ethylene glycol
 - c) Isopropyl alcohol
-

60. Name of the reaction in which benzoyl chloride is converted to benzaldehyde is

- a) Friedel-Crafts acylation
 - b) Reduction
 - c) Rosenmund reduction
 - d) Nucleophilic substitution
-

61. Benzene when treated with Br_2 in the presence of FeBr_3 , gives 1,4-dibromobenzene and 1,2-dibromobenzene. Which type of reaction is this?

- a) Nucleophilic substitution
 - b) Nucleophilic addition
 - c) Electrophilic substitution
 - d) Electrophilic addition
 - e) Free radical substitution
-

62. Alkali metal with highest first ionization enthalpy is:

- a) Li
 - b) Na
 - c) K
 - d) Rb
 - e) Cs
-

63. A first-order reaction is 75 percent completed in 6000s. What is the half-life?

- a) 50 minutes
 - b) 45 minutes
 - c) 60 minutes
 - d) 20 minutes
 - e) 100 minutes
-

64. Total number of orbitals when $n = 3$?

- a) 9
 - b) 18
 - c) 12
 - d) 6
 - e) 15
-

65. Nitrogen base not present in DNA:

- a) Uracil
 - b) Guanine
 - c) Adenine
 - d) Thymine
 - e) Cyclosine
-

66. Given that $a, \frac{3}{4}ar^2, ar^3$ are in G.P. Product of first four terms = $\frac{3^6}{4^3}$, then find a :

- a) 1
 - b) $\frac{3}{4}$
 - c) 4
 - d) 3
-

67. Coefficient of x^9 in the expansion of $\left(4 - \frac{x^2}{9}\right)^{12}$

- a) 100
 - b) 50
 - c) 25
 - d) 75
-

68. Integrating factor of

$$\frac{dy}{dx} - 2y = 2x - 3$$

- a) e^{2x}
 - b) e^{-2x}
 - c) e^{3x}
 - d) e^{-3x}
-

69. If

$$\frac{x}{4} + \frac{x}{3} < 13, \text{ then } x \in$$

- a) (0, 24)
- b) (-24, 0)

- c) $(-24, 24)$
d) $(0, 12)$
-

70. Find the limit:

$$\lim_{x \rightarrow 0} \frac{\sin[x]}{[x]}, \text{ where } [x] \text{ represents greatest integer function}$$

- a) 0
b) 1
c) Does not exist
d) Infinity
-

71. Evaluate the integral:

$$\int \frac{\cos \theta}{2 - \sin^2 \theta} d\theta$$

- a) $\frac{\cos \theta}{2}$
b) $\frac{\sin \theta}{2}$
c) $\frac{\sin \theta}{4}$
d) $\frac{1}{2} \ln |\cos \theta|$
-

72. Find the probability of getting at most 2 heads when 4 coins are tossed.

- a) $\frac{5}{16}$
b) $\frac{3}{8}$
c) $\frac{7}{16}$
d) $\frac{1}{2}$
-

73. Find the limit:

$$\lim_{x \rightarrow 0} \frac{\sin(\pi \sin^2 x)}{x^2}$$

- a) 1
b) 0
c) ∞

d) Does not exist

74. Find the values of:

$$\cos 75^\circ, \cos 15^\circ, \cos 45^\circ$$

- a) $\cos 75^\circ = 0.2588, \cos 15^\circ = 0.9659, \cos 45^\circ = 0.7071$
 - b) $\cos 75^\circ = 0.5736, \cos 15^\circ = 0.8660, \cos 45^\circ = 0.7071$
 - c) $\cos 75^\circ = 0.7071, \cos 15^\circ = 0.9659, \cos 45^\circ = 0.2588$
 - d) $\cos 75^\circ = 0.5000, \cos 15^\circ = 0.9342, \cos 45^\circ = 0.7071$
-

75. Evaluate the expression:

$$\frac{\sin \frac{\pi}{7} + \sin \frac{3\pi}{7}}{1 + \cos \frac{\pi}{7} + \cos \frac{2\pi}{7}}$$

- a) 1
 - b) 2
 - c) $\frac{1}{2}$
 - d) $\frac{\sqrt{3}}{2}$
-

76. Axis of parabola is $x = 0$. If the vertex is at a distance of 3 from the origin above the x-axis, find the vertex.

- a) $(0, 3)$
 - b) $(3, 0)$
 - c) $(0, -3)$
 - d) $(-3, 0)$
-

77. Find the integral:

$$\int (\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}) dx$$

- a) $\frac{x}{2} + C$
- b) $x + C$
- c) $\frac{2x}{3} + C$
- d) $\frac{x^2}{2} + C$

78. Evaluate:

$$\sec \left(\cos^{-1} \left(\frac{2024}{2025} \right) \right)$$

a) 2025

b) 1

c) $\sqrt{2}$

d) $\frac{2025}{2024}$
