

## KEAM 2025 April 26 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. Evaluate the following expression:**

$$\frac{\cos 75^\circ - \cos 15^\circ}{\cos 75^\circ + \cos 15^\circ}$$

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

**2. In a linear programming problem (L.P.P.), the corner points of the feasible region are  $(5, 0)$ ,  $(10, 0)$  and  $(4, 1)$ . Find the maximum value of  $Z = 2x + 3y$ .**

- (A) 20
  - (B) 25
  - (C) 30
  - (D) 35
- 

**3. Evaluate the integral:**

$$\int \frac{1}{x(x^4 + 1)} dx$$

- (A)  $\frac{1}{2} \log |x^4 + 1|$
  - (B)  $\frac{1}{x^4+1}$
  - (C)  $\frac{1}{2} \log |x|$
  - (D)  $\frac{1}{x}$
- 

**4. Evaluate the following expression:**

$$\frac{\cos 75^\circ - \cos 15^\circ}{\cos 75^\circ + \cos 15^\circ}$$

- (A) 0
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- (C) 1

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**6. Evaluate the integral:**

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(B)  $\frac{1}{x^4 + 1}$

(C)  $\frac{1}{2} \log |x|$

(D)  $\frac{1}{x}$

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**7. Evaluate the following integral:**

$$\int \frac{\sec x}{(\sec x + \tan x)^2} dx$$

(A)  $-\frac{1}{\sec x + \tan x}$

(B)  $\frac{1}{\sec x + \tan x}$

(C)  $-\ln |\sec x + \tan x|$

(D)  $\ln |\sec x + \tan x|$

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**8. Evaluate the following integral:**

$$\int e^{2\theta} (2 \cos^2 \theta - \sin 2\theta) d\theta$$

(A)  $\frac{e^{2\theta}}{2} (2 \cos^2 \theta - \sin 2\theta)$

- (B)  $e^{2\theta} \cos^2 \theta - \frac{1}{2} \sin 2\theta$   
(C)  $e^{2\theta} (\cos^2 \theta - \sin^2 \theta)$   
(D)  $\frac{e^{2\theta}}{2} (\cos^2 \theta + \sin^2 \theta)$
- 

**9. Evaluate the following limit:**

$$\lim_{\theta \rightarrow 0} \frac{\theta \sin 2\theta}{1 - \cos 2\theta}$$

- (A) 0  
(B) 1  
(C) 2  
(D) 4
- 

**10. Current in a coil changes at the rate of 10 A/s. The induced emf is 120V. Find the inductance  $L$  of the coil.**

- (A) 12 H  
(B) 10 H  
(C) 15 H  
(D) 18 H
- 

**11. The initial amount of radioactive element in a sample is  $6 \times 10^3$ . After 48 years, the number of radioactive elements becomes  $0.75 \times 10^3$ . Find the half-life.**

- (A) 24 years  
(B) 48 years  
(C) 72 years  
(D) 96 years
- 

**12. What is the working principle of a Bunsen Burner?**

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**13 The effective capacitance when  $n$  identical capacitors are connected in parallel is 10F, and when connected in series is 0.4F. Find the value of  $n$ .**

- (A) 25
  - (B) 20
  - (C) 15
  - (D) 10
- 

**14. Find the incorrect pair:**

- (A) Isobaric - constant pressure
  - (B) Isochoric - constant volume
  - (C) Isothermal - constant temperature
  - (D) Adiabatic - involves heat exchange
- 

**15. The displacement of a body varies with time  $t$  as  $S = \frac{1}{2}t^2 - 6t$ . Find the time at which the velocity becomes zero.**

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

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---

**18. The displacement of a body varies with time  $t$  as  $S = \frac{1}{2}t^2 - 6t$ . Find the time at which the velocity becomes zero.**

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

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**19. Minimum wavelength of Brackett series corresponds to transition from  $n_1$  to  $n_2$ , where  $n_1$  and  $n_2$  are respectively...**

- (A) 4, 3
- (B) 5, 4
- (C) 6, 5
- (D) 7, 6

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**20. When an electron is accelerated through a 480V, the wavelength is  $\lambda$ . Find the wavelength in terms of  $\lambda$  if it is accelerated through 120V.**

- (A)  $\lambda/2$
- (B)  $2\lambda$
- (C)  $\lambda/4$
- (D)  $\lambda/3$

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**21. The orbital velocity of a satellite is  $V_0$ , at a height  $h = R$  (where  $R$  is the radius of the Earth) from the surface of the Earth. What is the relationship between  $V_0$  and the escape velocity  $V_e$ ?**

- (A)  $V_0 = \frac{V_e}{2}$
- (B)  $V_0 = \frac{V_e}{\sqrt{2}}$
- (C)  $V_0 = \frac{V_e}{4}$
- (D)  $V_0 = \frac{V_e}{3}$

**22. Two particles of the same mass have charges in the ratio 3 : 1. What is the ratio of their time periods when they enter a constant magnetic field with the same velocity?**

- (A) 3 : 1
  - (B) 1 : 3
  - (C) 9 : 1
  - (D) 1 : 9
- 

**23. What is the force to be applied on a body of mass 200g to change its velocity by 25 m/s in 5 seconds?**

- (A) 5 N
  - (B) 10 N
  - (C) 20 N
  - (D) 25 N
- 

**24. 1 torr =**

- (A) 1 atm
  - (B) 1 Pa
  - (C) 133.322 Pa
  - (D) 760 Pa
- 

**25. What is the ratio of distances travelled by a body in the first two intervals of 5 seconds? (Given the initial velocity  $u = 1$  m/s and the body moves with a constant acceleration of  $5 \text{ m/s}^2$ )**

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

**26. A body hanged by a rope in a lift which is moving upward with a constant acceleration of  $0.2 \text{ m/s}^2$ . The tension in the rope is 80 N. Find the mass of the body.**

- (A) 10 kg
  - (B) 20 kg
  - (C) 40 kg
  - (D) 80 kg
- 

**27. If  $V$  is the velocity of wave in a rope having tension  $T$ , find the velocity when the tension becomes  $8T$ .**

- (A)  $8V$
  - (B)  $\frac{V}{8}$
  - (C)  $\sqrt{8}V$
  - (D)  $V$
- 

**28. A musician hits a drum 90 times in a minute. The time period of hit is:**

- (A)  $\frac{1}{90}$  seconds
  - (B)  $\frac{1}{60}$  seconds
  - (C)  $\frac{1}{5400}$  seconds
  - (D)  $\frac{1}{900}$  seconds
- 

**29. Chromatic aberration arises in their lens due to:**

- (A) Difference in the focal length for different wavelengths
  - (B) Dispersion of light
  - (C) Diffraction of light
  - (D) Reflection of light
- 

**30. If the mean free path of a gas molecule at  $27^\circ\text{C}$  is  $10 \times 10^{-7}$  m, then the mean free path at  $87^\circ\text{C}$  is:**

- (A)  $10 \times 10^{-6}$  m
- (B)  $12 \times 10^{-7}$  m
- (C)  $15 \times 10^{-7}$  m
- (D)  $8 \times 10^{-7}$  m



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**31. If an inductor coil of self-inductance 2H stores 25J of magnetic energy, then the current passing through it is:**

- (A) 5A
- (B) 10A
- (C) 7A
- (D) 12A

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**32. Bernoulli's principle is applicable to:**

- (A) Fluid flow
- (B) Thermodynamics
- (C) Electromagnetism
- (D) Quantum Mechanics

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**33. If the angular displacement in 10 seconds is  $150^\circ$ , find the number of revolutions in 10 seconds.**

- (A) 75
- (B) 100
- (C) 150
- (D) 50

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**34. If  $P_0$  is the atmospheric pressure and  $P$  is the pressure at a depth  $h$ , find the Gauge pressure.**

- (A)  $P - P_0$
- (B)  $P_0 - P$
- (C)  $P_0 \times P$
- (D)  $P \times h$

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**35. A pn junction diode without bias acts as:**

- (A) Transistor

- (B) Resistor
  - (C) Voltage regulator
  - (D) AC transformer
- 

**36. A light is incident on a surface having refractive index  $\frac{4}{3}$  and reflected light is completely polarised. ( $\tan 53^\circ = \frac{4}{3}$ ). What is the angle of incidence?**

- (A)  $53^\circ$
  - (B)  $42^\circ$
  - (C)  $63^\circ$
  - (D)  $30^\circ$
- 

**37. A cricketer hits a ball with an initial velocity of 40 m/s. Calculate the maximum range.**

- (A) 80 m
  - (B) 160 m
  - (C) 200 m
  - (D) 320 m
- 

**38. Find  $R$  in the following circuit:**

- (A)  $12\ \Omega$
  - (B)  $6\ \Omega$
  - (C)  $3\ \Omega$
  - (D)  $4\ \Omega$
- 

**39. If  $F = 6\pi\eta x$ , find the dimension of  $x$ .**

- (A)  $[M^1 L^1 T^{-1}]$
  - (B)  $[M^0 L^0 T^1]$
  - (C)  $[M^1 L^2 T^{-2}]$
  - (D)  $[M^0 L^1 T^0]$
-

**40. If the resistance of a wire is  $5\ \Omega$  and  $6\ \Omega$  at  $30^\circ\text{C}$  and  $40^\circ\text{C}$  respectively, find the temperature coefficient of resistance.**

- (A) 0.0015 per  $^\circ\text{C}$
  - (B) 0.0030 per  $^\circ\text{C}$
  - (C) 0.0020 per  $^\circ\text{C}$
  - (D) 0.0005 per  $^\circ\text{C}$
- 

**41. Work done to move a charge of 5C from P to Q is 10J. If the potential at P is 0.5V, then the potential at Q is:**

- (A) 2 V
  - (B) 1.5 V
  - (C) 3 V
  - (D) 4 V
- 

**42. Two satellites are revolving at a distance of  $2.5R$  and  $7.5R$  from the center of the Earth. Find the ratio of time period of the satellites.**

- (A)  $\frac{1}{3}$
  - (B) 1
  - (C)  $\frac{1}{9}$
  - (D) 1 : 2
- 

**43. Find the incorrect statement:**

- A) Isobaric - constant pressure
- B) Isochoric - constant volume
- C) Isothermal - constant temperature
- D) Adiabatic - involves heat exchange

- (A) A
- (B) B

(C) C

(D) D

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**44. Which of the following cannot form hydrogen bonding?**

- A) Phenol
- B) Diethyl ether
- C) Aniline

(A) A

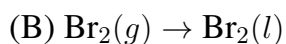
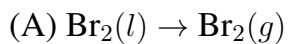
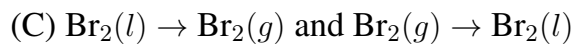
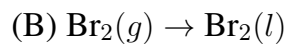
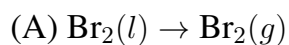
(B) B

(C) C

(D) None of the above

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**45. Entropy decreases in which of the following reactions?**



(C) Both A and B

(D) None of the above

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**46. How many bridging complexes are there in  $[\text{Mg}(\text{Co})_{10}]$ ?**

(A) 3

(B) 2

(C) 1

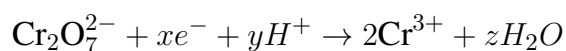
(D) 0

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**47. In which reaction is Benzyl chloride converted to Benzaldehyde?**

- (A) Gatterman Koch reaction
  - (B) Stephan's reaction
  - (C) Etard reaction
  - (D) Rosemend reduction
- 

**48. Given the reaction:**



**Find the values of  $x$ ,  $y$ , and  $z$ .**

- (A)  $x = 6, y = 14, z = 7$
  - (B)  $x = 3, y = 6, z = 3$
  - (C)  $x = 6, y = 12, z = 6$
  - (D)  $x = 4, y = 8, z = 4$
- 

**49. Which of the following is an interstitial compound?**

- (A)  $\text{SC}_2\text{O}_3$
  - (B)  $\text{Mn}_4\text{N}$
  - (C)  $\text{TiCl}_4$
  - (D)  $\text{TiN}$
- 

**50. Ethanol is made unfit for drinking by adding?**

- (A)  $\text{HCl}$
  - (B)  $\text{NaOH}$
  - (C)  $\text{KOH}$
  - (D) Methanol
- 

**51. Which is a Lewis acid?**

- (A)  $\text{HCl}$
- (B)  $\text{OH}^-$

(C)  $\text{Co}^{3+}$

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**52. Phenol is treated with conc.  $\text{H}_2\text{SO}_4$ , and then with conc.  $\text{HNO}_3$ . The compound A and B are formed.**

- (A) A is phenol, B is nitrobenzene
  - (B) A is phenol, B is benzene
  - (C) A is phenol, B is phenol derivative
  - (D) A is phenol, B is benzene derivative
- 

**53. IUPAC name of allyl amine?**

- (A) Propanamine
  - (B) 2-aminopropene
  - (C) 3-aminopropene
  - (D) Butanamine
- 

**54. Find the area between the line  $y = x - 1$ ,  $y = 0$ ,  $-2 \leq y \leq 2$ .**

- (A) 6
  - (B) 8
  - (C) 4
  - (D) 10
- 

**55. Find  $\frac{dy}{dx}$  for the equation:**

$$y = \cos x \times \sin y$$

- (A)  $\cos x$
  - (B)  $-\sin x$
  - (C)  $\sin x$
  - (D)  $\cos x \times \cos y$
-

**56. In a GP 9, 3,  $\frac{1}{3}$ ,  $\frac{1}{9}$ , ..., find the 25th term.**

- (A)  $\frac{1}{3^{24}}$
  - (B)  $\frac{9}{3^{24}}$
  - (C)  $\frac{9}{3^{25}}$
  - (D)  $\frac{1}{3^{25}}$
- 

**57. Evaluate the integral:**

$$\int e^{x+\frac{1}{x}} \frac{x^2-1}{x^2} dx$$

- (A)  $e^{x+\frac{1}{x}}$
  - (B)  $e^{x+\frac{1}{x}} \left( \frac{x^2-1}{x^2} \right)$
  - (C)  $\frac{e^{x+\frac{1}{x}}}{x}$
  - (D)  $e^{x+\frac{1}{x}} (\ln |x| - 1)$
- 

**58. Find the value of:**

$$\sin 75^\circ \times \sin 15^\circ \times \sin 45^\circ$$

- (A)  $\frac{1}{4}$
  - (B)  $\frac{1}{8}$
  - (C)  $\frac{1}{2}$
  - (D)  $\frac{1}{16}$
- 

**59. If  $\tan^{-1}(x) = \tan^{-1} \left( 3 - \frac{\pi}{4} \right)$ , find  $x$ .**

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

**60. Find the range of  $f(x) = \sqrt{x^2 + 4x + 4}$ .**

- (A)  $(-\infty, \infty)$
  - (B)  $[0, \infty)$
  - (C)  $(-2, 2)$
  - (D)  $[2, \infty)$
- 

**61. Evaluate the integral:**

$$\int_0^{\frac{\pi}{2}} \frac{1}{1 + \sin x} dx$$

- (A)  $\frac{\pi}{4}$
  - (B)  $\frac{\pi}{2}$
  - (C)  $\frac{1}{2}$
  - (D)  $\frac{\pi}{3}$
- 

**62. Evaluate the derivative of**

$$y = \cos x \times \sin y, \quad \frac{dy}{dx} \text{ at } \left( \frac{\pi}{6}, \frac{\pi}{5} \right)$$

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

**63. If**  $f(x) = \log 3 - \sin x$ ,  $y = f(f(x))$ , **find**  $y(0)$ .

- (A) 2
  - (B) 0
  - (C) 1
  - (D)  $\log 3$
-