MEGA ResoFAST 2025

Resonance Future Achievers Scholarship Test

TEST PAPER

Duration
1 Hour

Currently Studying in
Class - X(JEE)

Max. Marks
160

Important Instructions to the Students

1. The question paper contains a total of **40 Multiple Choice Questions**, numbered from **Q1 to Q40**.

2. **Pattern & Marking Scheme of each section:**

Parts	Subject	No. of questions	Questions Range	Marks
Part-A	Physics	10	Q1 to Q10	40 M
Part-B	Chemistry	10	Q11 to Q20	40 M
Part-C	Mathematics	15	Q21 to Q35	60 M
Part-D	Mental Ability	05	Q36 to Q40	20 M
	Total	**40**	**Q1 to Q40**	**160 M**

3. Attempt all questions, each having only one correct answer.

4. Each question carries **4 marks**.

5. Candidates must ensure that the **OMR Sheet is not folded or damaged** in any way. Avoid making any **stray marks** on the OMR sheet. **Do not** write your **Roll Number** anywhere except in the designated space provided in the OMR Sheet.

6. The use of **white correction fluid** is **strictly prohibited** on the OMR Sheet.

7. The use of **blank papers, clipboards, log tables, slide rules, calculators, mobile phones**, or **any other electronic gadgets** is **strictly not permitted** inside the examination hall.

8. There is an empty page left at the end of this question paper for **rough work.**

1. **Force-Time Mystery Ride**

The initial speed of a body of mass 10 kg is 7 m s^{-1}, for 5 s. A force acts on the body in the direction of motion. The force time graph is shown in the figure. The speed of body at $t = 5$ s is:
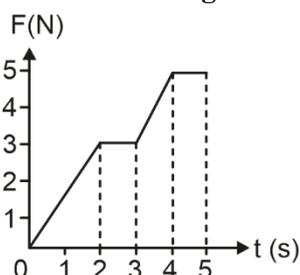
(A) 5.2 m s^{-1} (B) 8.5 m s^{-1} (C) 10.2 m s^{-1} (D) 13.1 m s^{-1}

2. **Who Pushes Whom in the Lift?**

Two blocks of mass 4 kg and 8 kg are kept in a lift accelerating upward with an acceleration of 5 ms^{-2} as shown in the given figure. Select the **incorrect** statement(s). (Take g = 10 m/s^2)
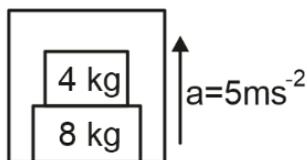

(i) The normal force between block of mass 8 kg and floor of the lift is 180 N.

(ii) The normal force between blocks of mass 8 kg and 4 kg is 80 N.

(iii) Normal force is always perpendicular to the plane surface at the point of contact.

(A) (i) and (ii) only   (B) (ii) only

(C) (i) and (iii) only   (D) (ii) and (iii) only

3. **The Floating Cylinder Secret**

A solid cylinder of height h, cross sectional area A and density 1.40×10^3 kg m^{-3} is immersed completely in a mixture of liquid such that it floats with its axis vertical at the liquid-liquid interface with length $3h/4$ in lesser dense liquid as shown in the figure. The lesser dense liquid is open to atmospheric pressure P_0. If the density of lesser dense liquid is 1.0×10^3 kg m^{-3}, then the density of denser liquid will be
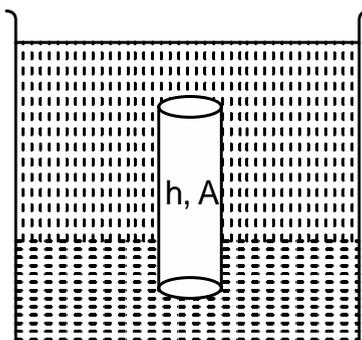
(A) 1.5×10^3 kg m^{-3} (B) 2.0×10^3 kg m^{-3}

(C) 2.6×10^3 kg m^{-3} (D) 3.2×10^3 kg m^{-3}

4. Gravitational Tug-of-War: Which Configuration Pulls M the Most?

Some identical particles of masses m, and one with mass 'M' are arranged in four configurations as shown in the given figures.
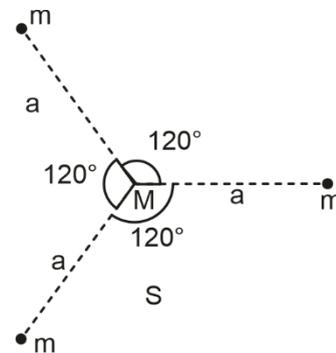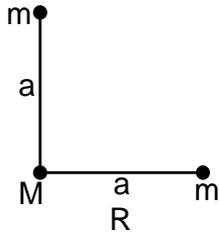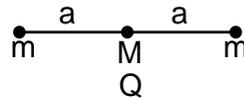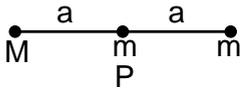
Arrange the given configurations from greatest to least according to the magnitude of the gravitational force on M.

(A) R, P, Q = S   (B) P, Q, R, S   (C) R, Q, P, S   (D) P, R, Q, S

5. Who Explains What?

Match column I with column II and select the correct option from the given codes.

	Column I		Column II
P.	When a body does work against friction, its kinetic energy	(i)	Can be +ve or –ve or zero
Q.	Work done by a force	(ii)	Must be –ve
R.	Work done by static friction	(iii)	Force may be conservative
S.	When work done over a closed path is zero	(iv)	Decreases
		(v)	Force may be nonconservative

(A) P-(i), Q-(iv), R-(iii), S-(v)   (B) P-(iv), Q-(i), R-(i), S-(iii)

(C) P-(ii), Q-(iii), R-(i), S-(v)   (D) P-(iv), Q-(ii), R-(i), S-(iii)

6. Where Does Energy Change Most?

For a particle moving along the positive x-axis from origin to $x = x_1$, the variation of the magnitude of force on the particle is depicted in the given graphs. The force is parallel to the x-axis and is conservative. The maximum magnitude of force F_1 has the same value for all the graphs.
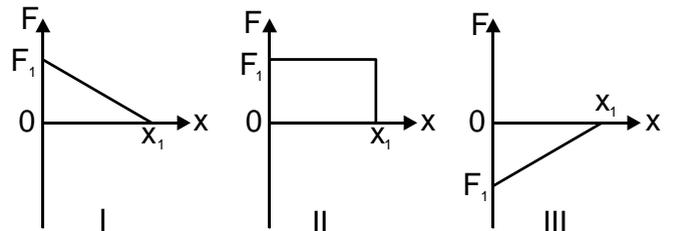
On the basis of given graphs, which of the following statements are correct?

(i) The change in potential energy is maximum in graph II.

(ii) The change in potential energy is minimum in graph II.

(iii) The change in potential energy is greater in graph III as compared to graph I.

(iv) The change in potential energy is smaller in graph III as compared to graph I.

(A) (i) and (iii) only (B) (iii) and (iv) only   (C) (ii) and (iii) only   (D) (ii) and (iv) only

7. Impulse on a Particle!

The given graph represents the variation of magnitude of net force (F) exerted in x direction on a 2.50 kg particle with time. On the basis of given graph, fill in the blanks by selecting the correct option, from t = 0 to t = 5 seconds.
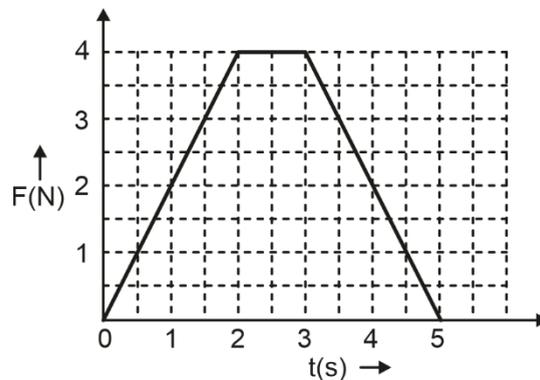
The impulse of the force is __(i)__ kg m s^{-1}. Final velocity of the particle, if it is originally at rest is __(ii)__ ms^{-1}. Its final velocity if its original velocity is –2.0 m s^{-1}, is __(iii)__ ms^{-1}. The average force exerted on the particle for the time interval 0 to 5 s is __(iv)__ N.

	(i)	(ii)	(iii)	(iv)
(A)	12	2.8	2.4	4.8
(B)	6	2.4	2.8	4.8
(C)	12	4.8	2.8	2.4
(D)	24	4.8	2.4	2.8

8. Electrons Lost in a Maze

What will be the value of equivalent resistance between **U** and **V** in the given circuit?

(A) 13Ω   (B) 6.75Ω   (C) 12Ω   (D) 42.3Ω
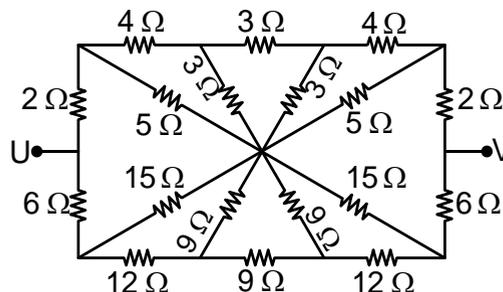
9. Laser Bounce Challenge

The ray from a laser pointer hits a plane mirror and the reflected ray strikes a screen. How far away from point X should the ray strike the mirror to cause the reflected ray to hit point R?

(A) 6 cm

(B) 27 cm

(C) 15 cm

(D) 18 cm

Laser pointer

Screen

12 cm

R

4 cm

X   Mirror

36 cm
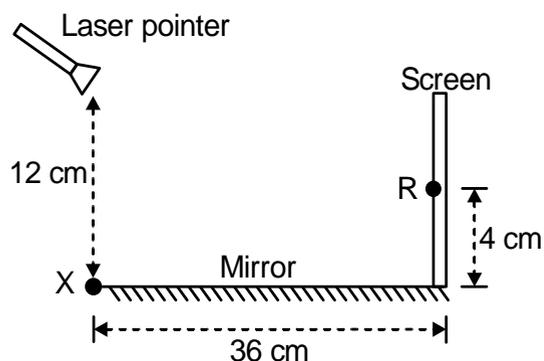
10. The Max Speed of the Journey

A car accelerates from rest at constant rate α for some time and then decelerates at a constant rate β to come to rest. The total time elapsed is t. Which one of the following options represents the maximum velocity attained by the car and distance travelled by the car?

	Maximum velocity attained by the car	Distance travelled by the car
(A)	$\dfrac{\alpha\beta t}{\alpha + \beta}$	$\dfrac{2\alpha\beta t^2}{(\alpha + \beta)}$
(B)	$\dfrac{\alpha\beta t}{2(\alpha + \beta)}$	$\dfrac{\alpha\beta t^2}{\alpha + \beta}$
(C)	$\dfrac{\alpha\beta^2 t}{\alpha^2 + \beta^2}$	$\dfrac{\alpha\beta^2 t^2}{2(\alpha^2 + \beta^2)}$
(D)	$\dfrac{\alpha\beta t}{\alpha + \beta}$	$\dfrac{\alpha\beta t^2}{2(\alpha + \beta)}$

CHEMISTRY

11. Yellow Solid Mystery

In a chemistry lab, Manoj and Karthik were doing an experiment. During the process, they passed H_2S gas into a chamber of SO_2 gas, they suddenly noticed the formation of yellow colour solid and water. Can you help them to identify the type of reaction and Oxidant in the above reaction.

(A) Decomposition, H_2O

(B) Precipitation, H_2S

(C) Precipitation, SO_2

(D) Displacement, H_2S

12. Isotopes in a Number Race

The X^- ion has 18 electrons and an atomic mass of 35.5. It has two isotopes, one is having 18 neutrons [X_1] and the other is having 20 neutrons [X_2]. Find the ratio of the availability of X_1 to X_2 respectively.

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

13. **Pharmacolite Power Test**

A chemical called pharmacolite [$CaHAsO_4.2H_2O$] is used to identify the contamination of ground water. During the process if 2.5g of pharmacolite is used, how many hydrogen atoms are actually consumed in this activity? [Atomic mass: Ca-40, H-1, As-75, O-16]

(A) 6.97×10^{21}　　　(B) 2.09×10^{22}　　　(C) 2.79×10^{22}　　　(D) 3.48×10^{22}

14. **Electrolysis Identity Hunt**

Observe the reactions given below and identify **P**, **Q** and **T** correctly.

$$\underset{[Fused]}{R} \xrightarrow{electrolysis} \underset{[Cathode]}{P} + \underset{[Anode]}{Q}$$

$$Q + S \longrightarrow T$$
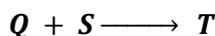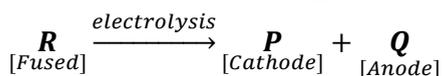
[Hint: **R** is used in freezing mixture and **S** is used for whitewash]

(A) P-Cl_2, Q-H_2, T-HCl　　　　　　(B) P-Na, Q-Cl_2, T-$CaOCl_2$

(C) P-H_2, Q-Cl_2, T-NaCl　　　　　　(D) P-Ca, Q-Cl_2, T-$CaOCl_2$

15. **Spot the Colour-Changing Culprit**

There are four gases present in a gas chamber, out of which one gas **X** diffuses into another chamber, where it reacts with an yellow colour solid and forms a product **Y** which further gets wet in another chamber and forms **Z**. If **Z** is treated with methyl orange the colour change would be:
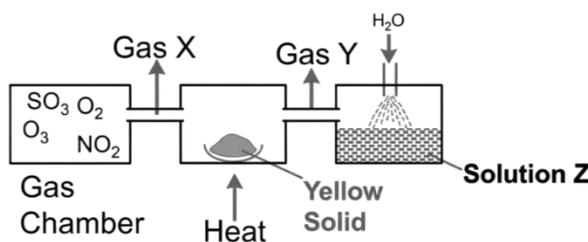
(A) Yellow　　　　(B) Red　　　　(C) Green　　　　(D) Blue

16. **Who Dissolves the Most?**

The solubility of four substances **P, Q, R, S** is given below:

Substance	Solute(gm)	Solvent(gm)
P	5	100
Q	18	50
R	25	100
S	75	150

Identify the descending order of mass percentage of the substances in the solution.

(A) S > R > Q > P　　(B) P > Q > R > S　　　　(C) S > Q > R > P　　　　(D) Q > R > P > S

17. Climbing the Atomic Ladder

The quantum numbers for the valence electron of four elements **W, X, Y** and **Z** are given below.

Element	n	l	m	s
W	2	0	0	+1/2
X	3	1	-1	+1/2
Y	2	1	0	-1/2
Z	4	0	0	-1/2

Arrange the elements in increasing order of atomic number.

(A) W, Y, X, Z　　(B) W, X, Y, Z　　(C) Z, X, Y, W　　(D) Y, W, X, Z

18. Valence Matchmaking!

The number of valence electrons in X and Y are 6 and 1 respectively. Give the correct formula of the compound formed when X combines with Hydrogen and Y combines with Oxygen.

(A) HX, Y_2O　　(B) XH_2, YO　　(C) H_2X, Y_2O　　(D) XH, YO_2

19. Which Gas Fills More?

Which of the following gases occupy the maximum volume at STP?

(A) 14g of N_2　　(B) 1.7g of NH_3　　(C) 80g of SO_3　　(D) 10g of H_2

20. Chromatography Crime Scene

Use of drugs like ephedrine and insulin by athletes is banned.

Krish, Monish, Deepak and Vivek were asked by a trainer to give their urine samples for the tests. Chromatogram of their urine samples and drugs is shown below:
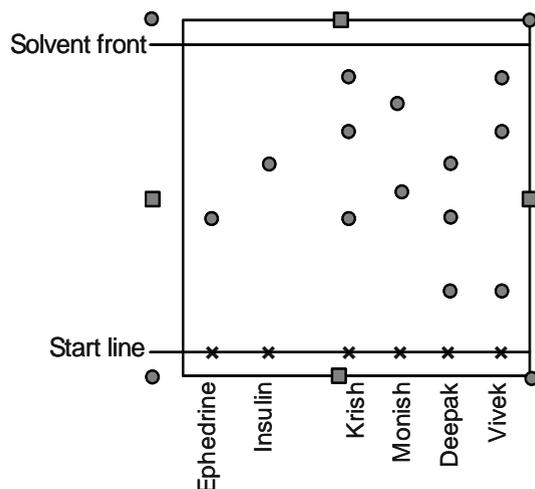
Study the given chromatogram carefully and choose the **incorrect** statement among the following.

(A) Deepak used both the drugs.

(B) Krish and Deepak used insulin.

(C) Krish used ephedrine.

(D) Monish and Vivek did not use any of the given drugs.

21. The Additive Mystery Set

Let **S** be a non-empty, bounded subset of the integers that is closed under addition. Determine all possible sets **S**. The closure property states that when a set of numbers is closed under an arithmetic operation, performing the operation on any two numbers in the set always results in a number belonging to the same set of numbers. If the number of such sets S possible, is K, and the sum of the number of elements in each such possible set is L, then K + L is:

(A) A Prime Number

(B) A Composite Number

(C) An Odd Number

(D) A Double Digit Number

22. The Peculiar Power Triple

Let $D = a^2 + b^2 + c^2$, where a & b being consecutive integers and $c = ab$, then $\sqrt{D}$

(A) is always an even integer

(B) is always an odd integer

(C) is always irrational

(D) can't be concluded

23. Equation Twins Reveal Secrets

Solve the system of equations $5.4x + 4.6y = 104$, $4.6x + 5.4y = 96$. If the solution of these equations is (a, b), find the number of factors of $a^2 + b^2$.

(A) 5   (B) 7   (C) 8   (D) 10

24. Tangent Trails of Geometry

In the following figure it is given that PT = 12 & PO = 24, then length of arc $\overarc{TD}$ is:

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

25. The Decimal Doom Test!

How many positive integers less than 100 have reciprocals that produce terminating decimal expansions?

(A) 13   (B) 14   (C) 21   (D) 25

26. The Six-Digit Spell

Let a, b, c be any three positive digits, then six digit number of the form 'abcabc' is not divisible by –

(A) 77   (B) 11   (C) 13   (D) 17

27. When Powers Align

How many integers 'x' in $\{1, 2, 3, \dots 99, 100\}$ are there such that $(x^2 + x^3)$ is the square of an integer?

(A) 11   (B) 8   (C) 9   (D) 7

28. When Equations Agree

Solve the system of equations for (x, y), and find the value of k.

$x + (1 + k)y = 0$

$(1 - k)x + ky = 1 + k$

$(1 + k)x + (12 - k)y = -(1 + k)$

How many values of k exist in order to ensure that this set of simultaneous set of equations has a legible solution?

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

29. The Colossal Exponent Quest

Evaluate the expression: $(2 + 1)(2^2 + 1)(2^4 + 1) \cdots (2^{2^{10}} + 1) + 1$. The resulting expression is of the form A^B where A is the smallest prime number. Calculate the difference of the numbers B and 2025.

(A) 23   (B) 25   (C) 27   (D) 32

30. Building Triangles with Primes

When each side of a triangle has a length which is a prime factor of 2025, how many different such triangles are there?

(A) 3   (B) 4   (C) 6   (D) 7

31. Polynomial with a Hidden Past

The leading coefficient of a polynomial $P(x)$ of degree 3 is 2025. Suppose that $P(1) = 5, P(2) = 7, P(3) = 9$, then find $P(4)$.

(A) 11   (B) 9   (C) 7   (D) None of These

32. Roots That Rearrange

Let α and β be the roots of the equation $(x - a)(x - b) = c, c \neq 0$. Then the roots of the equation $(x - \alpha)(x - \beta) + c = 0$ are

(A) a, c (B) b, c (C) a, b (D) $a + c, b + c$

33. A Zigzag of Equal Links

As shown in the figure, $AB = BC = CD = DE = EF = FG = GH, \angle\alpha = 70°$.

Find the size of $\angle\beta$ in degrees.
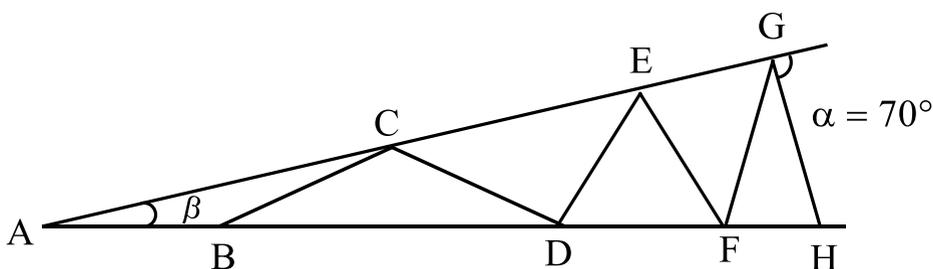
(A) 70°   (B) 35°   (C) 14°   (D) 10°

34. Pythagoras' Hidden Trio

Given that in a right triangle the length of a leg of the right angle is 11 and the lengths of the other two sides are both positive integers. Find the perimeter of the triangle.

(A) 110   (B) 121   (C) 132   (D) 144

35. Sector Dance in a Circle

In the adjoining figure **O** is the centre of the circle with radius **r. AB, CD** and **EF** are the diameters of the circle. $\angle OAF = \angle OCB = 60°$. What is the area of the shaded region?

(A) $\frac{r^2}{2}\left(\pi - \frac{3\sqrt{3}}{2}\right)$ (B) $\frac{r^2}{2}\left(\pi - \frac{3\sqrt{3}}{4}\right)$

(C) $\frac{r^2}{3}\left(\pi - \frac{2\sqrt{3}}{3}\right)$ (D) data insufficient

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MENTAL ABILITY

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36. Series with a Secret

Which of the following numbers will replace the question mark (?) in the given series?

4, 6, 11, 24, 51, 130, ?

(A) 298   (B) 289

(C) 277   (D) More than one of the above

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37. Number Wheels Puzzle

Find the missing number of given figure.

$$1\;\overset{4}{\underset{2}{\textstyle\bigcirc 30}}\;3 \qquad 2\;\overset{5}{\underset{3}{\textstyle\bigcirc 42}}\;4 \qquad 3\;\overset{6}{\underset{4}{\textstyle\bigcirc\; ?}}\;5$$

(A) 54   (B) 45   (C) 35   (D) 53

38. The Coded Word Game

If PET = 4, LET = 3, JEY = 2. Then what is the value of XET ?

(A) 6   (B) 4   (C) 2   (D) 3

39. Letters That Act Like Numbers

If A represents 30, B represents 42, C represents 7, D represents 6 and E represents 25, then which mathematical equation will be equal to 55 ?

(A) A − B + C × D + E   (B) A × B ÷ C + D × E

(C) A + B × C + D + E   (D) A + B ÷ C × D − E

40. Symbol Math Mystery

If 7 # 6 = 84, 1 # 4 = 8 and 2 # 3 = 12, then find the value of 8 # 4 = ?

(A) 64   (B) 36   (C) 12   (D) 40