

PGIMER BSc Nursing Physics

Sample Paper – 11

Duration: 23 Minutes

Maximum Marks: 25

Instructions

- This paper contains **25** Multiple Choice Questions (Single Correct Answer), modelled on the Physics portion of the **PGIMER BSc Nursing** entrance exam.
- Each correct answer carries **+1 mark**. **0.25 mark** is deducted for every incorrect answer. Unattempted questions carry **0 marks**.
- Only **one** option is correct. Choose carefully.
- Syllabus level: **Class 11 and 12 Physics** with emphasis on core concepts, formulas and simple application.
- Calculators, mobile phones and other electronic gadgets are not allowed in the examination.

Q1. The dimensional formula of pressure is:

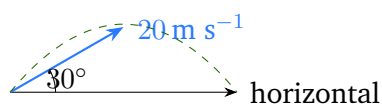
- (A) $[MLT^{-2}]$
- (B) $[ML^2T^{-2}]$
- (C) $[ML^{-1}T^{-2}]$
- (D) $[ML^{-2}T^{-1}]$

Q2. Which of the following is a vector quantity?

- (A) Work
- (B) Energy
- (C) Temperature
- (D) Momentum

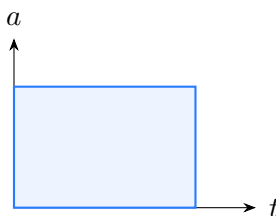
Q3. A projectile is thrown with speed 20 m s^{-1} at 30° to the horizontal as shown. Take $g = 10 \text{ m s}^{-2}$. The time of flight is:





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

Q4. The area under an acceleration-time graph gives:



- (A) Displacement
- (B) Distance only
- (C) Momentum directly
- (D) Change in velocity

Q5. Action and reaction forces always:

- (A) Act on the same body
- (B) Act on two different bodies
- (C) Cancel each other on one body
- (D) Have different magnitudes

Q6. When a body just begins to slide, friction is:

- (A) Limiting friction
- (B) Rolling friction only
- (C) Fluid friction only



(D) Zero friction

Q7. A machine does 600 J of work in 10 s. Its power is:

(A) 6 W

(B) 6000 W

(C) 60 W

(D) 610 W

Q8. Two equal masses are placed at $x = 0$ and $x = 6$ cm. Their centre of mass is at:

(A) $x = 0$ cm

(B) $x = 6$ cm

(C) $x = 12$ cm

(D) $x = 3$ cm

Q9. If a body is taken to a height where g becomes one-fourth of its surface value, its weight becomes:

(A) Four times

(B) Double

(C) One-fourth

(D) Zero always

Q10. Stress is defined as:

(A) Force per unit area

(B) Area per unit force

(C) Change in length per original length

(D) Work per unit time

Q11. Small liquid drops are nearly spherical because of:



- (A) Surface tension
- (B) Viscosity only
- (C) Gravity only
- (D) Magnetic force

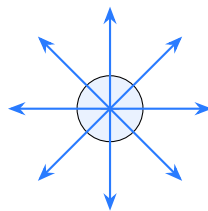
Q12. The first law of thermodynamics is a statement of conservation of:

- (A) Charge
- (B) Momentum only
- (C) Energy
- (D) Mass only

Q13. At absolute zero, the ideal gas molecular motion is expected to be:

- (A) Maximum
- (B) Minimum
- (C) Independent of temperature
- (D) Only circular

Q14. Electric field lines due to an isolated positive charge are:



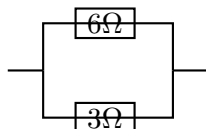
- (A) Radially inward
- (B) Circular clockwise
- (C) Radially outward
- (D) Parallel straight lines

Q15. The SI unit of capacitance is:



- (A) Ohm
- (B) Tesla
- (C) Weber
- (D) Farad

Q16. Two resistors of $6\ \Omega$ and $3\ \Omega$ are connected in parallel as shown. Equivalent resistance is:



- (A) $9\ \Omega$
- (B) $3\ \Omega$
- (C) $6\ \Omega$
- (D) $2\ \Omega$

Q17. Heat produced in a resistor is given by:

- (A) $H = IR/t$
- (B) $H = I^2Rt$
- (C) $H = V/I$
- (D) $H = mc^2$

Q18. A charged particle moves parallel to a uniform magnetic field. The magnetic force on it is:

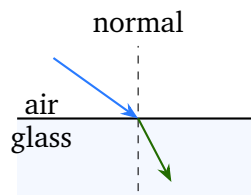
- (A) Zero
- (B) Maximum
- (C) Infinite
- (D) Equal to its weight always

Q19. The device that converts mechanical energy into alternating electrical energy is:



- (A) AC generator
- (B) Transformer
- (C) Rectifier
- (D) Voltmeter

Q20. When light travels from air to glass as shown, it generally bends:



- (A) Away from the normal
 - (B) Towards the normal
 - (C) Along the surface
 - (D) Back along the same path always
- Q21.** For a concave mirror, if an object is at the centre of curvature, the image is formed:
- (A) At the centre of curvature
 - (B) At the focus
 - (C) At infinity
 - (D) Behind the mirror only
- Q22.** Splitting of white light into colours by a prism is called:
- (A) Interference
 - (B) Dispersion
 - (C) Polarisation
 - (D) Photoemission

Q23. In Bohr's model of hydrogen, the electron in a stationary orbit:



- (A) Continuously radiates energy
- (B) Leaves the atom immediately
- (C) Does not radiate energy
- (D) Has zero angular momentum

Q24. Beta-minus radiation consists of:

- (A) Helium nuclei
- (B) Protons only
- (C) Neutrons only
- (D) Electrons

Q25. The output of an AND gate is 1 only when:

- (A) All inputs are 1
- (B) All inputs are 0
- (C) Any one input is 1
- (D) Inputs are unequal



Detailed Solutions**Q1.****Solution**

Concept — Dimensional Analysis: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Pressure = force/area. Force has dimensions $[MLT^{-2}]$ and area has $[L^2]$. Thus pressure has $[ML^{-1}T^{-2}]$.

Step 2 — Match with the options: The option placed at (C) is $[ML^{-1}T^{-2}]$, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A ($[MLT^{-2}]$): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B ($[ML^2T^{-2}]$): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D ($[ML^{-2}T^{-1}]$): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ **C**

Answer: (C) [Go Back to Q1](#)

Q2.**Solution**

Concept — Scalars and Vectors: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Momentum has both magnitude and direction because $\vec{p} = m\vec{v}$. Work, energy and temperature are scalar quantities.

Step 2 — Match with the options: The option placed at (D) is Momentum, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Work): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (Energy): this does not follow the relevant Physics principle, formula or calculation required in the question.



- Option C (Temperature): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ D

Answer: (D) [Go Back to Q2](#)

Q3.

Solution

Concept — Projectile Motion: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Time of flight $T = 2u \sin \theta / g = 2 \times 20 \times \sin 30^\circ / 10 = 40 \times 0.5 / 10 = 2$ s.

Step 2 — Match with the options: The option placed at (B) is 2 s, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (1 s): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (3 s): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (4 s): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ B

Answer: (B) [Go Back to Q3](#)

Q4.

Solution

Concept — Acceleration-Time Graph: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Since acceleration $a = dv/dt$, the area under an acceleration-time graph equals $\int a dt$, which is change in velocity.

Step 2 — Match with the options: The option placed at (D) is Change in velocity, which matches the calculated or conceptual result.

Why other options are wrong:



- Option A (Displacement): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (Distance only): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Momentum directly): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ D

Answer: (D) [Go Back to Q4](#)

Q5.

Solution

Concept — Newton's Third Law: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Newton's third law states that action and reaction are equal and opposite, but they act on different bodies, so they do not cancel on the same body.

Step 2 — Match with the options: The option placed at (B) is Act on two different bodies, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Act on the same body): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Cancel each other on one body): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Have different magnitudes): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ B

Answer: (B) [Go Back to Q5](#)



Q6.

Solution

Concept — Friction: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: The maximum value of static friction just before motion begins is called limiting friction.

Step 2 — Match with the options: The option placed at (A) is Limiting friction, which matches the calculated or conceptual result.

Why other options are wrong:

- Option B (Rolling friction only): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Fluid friction only): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Zero friction): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ A

Answer: (A) [Go Back to Q6](#)

Q7.

Solution

Concept — Power: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Power $P = W/t = 600/10 = 60 \text{ W}$.

Step 2 — Match with the options: The option placed at (C) is 60 W, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (6 W): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (6000 W): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (610 W): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ C



Answer: (C) [Go Back to Q7](#)

Q8.

Solution

Concept — Centre of Mass: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: For equal masses, centre of mass lies at the midpoint. Hence $x = (0 + 6)/2 = 3$ cm.

Step 2 — Match with the options: The option placed at (D) is $x = 3$ cm, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A ($x = 0$ cm): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B ($x = 6$ cm): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C ($x = 12$ cm): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ **D**

Answer: (D) [Go Back to Q8](#)

Q9.

Solution

Concept — Gravitational Acceleration: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Weight $W = mg$. If g becomes $g/4$, weight also becomes $W/4$.

Step 2 — Match with the options: The option placed at (C) is One-fourth, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Four times): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (Double): this does not follow the relevant Physics principle, for-



mula or calculation required in the question.

- Option D (Zero always): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ C

Answer: (C) [Go Back to Q9](#)

Q10.

Solution

Concept — Elasticity: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Stress is restoring force divided by cross-sectional area: $\text{stress} = F/A$.

Step 2 — Match with the options: The option placed at (A) is Force per unit area, which matches the calculated or conceptual result.

Why other options are wrong:

- Option B (Area per unit force): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Change in length per original length): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Work per unit time): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ A

Answer: (A) [Go Back to Q10](#)

Q11.

Solution

Concept — Surface Tension: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Surface tension tends to minimise the surface area of a liquid. A sphere has minimum surface area for a given volume.

Step 2 — Match with the options: The option placed at (A) is Surface tension, which matches the calculated or conceptual result.



Why other options are wrong:

- Option B (Viscosity only): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Gravity only): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Magnetic force): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ A

Answer: (A) [Go Back to Q11](#)

Q12.

Solution

Concept — Thermodynamics: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: The first law, $\Delta Q = \Delta U + W$, expresses conservation of energy in thermal processes.

Step 2 — Match with the options: The option placed at (C) is Energy, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Charge): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (Momentum only): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Mass only): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ C

Answer: (C) [Go Back to Q12](#)



Q13.

Solution

Concept — Kinetic Theory: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Temperature is related to average kinetic energy of molecules. At absolute zero, molecular kinetic energy is minimum in the ideal model.

Step 2 — Match with the options: The option placed at (B) is Minimum, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Maximum): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Independent of temperature): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Only circular): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ **B**

Answer: (B) [Go Back to Q13](#)

Q14.

Solution

Concept — Electric Field: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Electric field direction is the direction of force on a positive test charge. A positive source charge repels it, so field lines are radially outward.

Step 2 — Match with the options: The option placed at (C) is Radially outward, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Radially inward): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (Circular clockwise): this does not follow the relevant Physics principle, formula or calculation required in the question.



- Option D (Parallel straight lines): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ C

Answer: (C) [Go Back to Q14](#)

Q15.

Solution

Concept — Capacitance: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Capacitance is charge per unit potential difference, $C = Q/V$, and its SI unit is farad.

Step 2 — Match with the options: The option placed at (D) is Farad, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Ohm): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (Tesla): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Weber): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ D

Answer: (D) [Go Back to Q15](#)

Q16.

Solution

Concept — Resistors in Parallel: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: For parallel resistors, $1/R = 1/6 + 1/3 = 1/6 + 2/6 = 3/6 = 1/2$, so $R = 2\Omega$.

Step 2 — Match with the options: The option placed at (D) is 2Ω , which matches the calculated or conceptual result.

Why other options are wrong:



- Option A ($9\ \Omega$): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B ($3\ \Omega$): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C ($6\ \Omega$): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ D

Answer: (D) [Go Back to Q16](#)

Q17.

Solution

Concept — Heating Effect of Current: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: According to Joule's law of heating, heat produced in time t is $H = I^2 R t$.

Step 2 — Match with the options: The option placed at (B) is $H = I^2 R t$, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A ($H = IR/t$): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C ($H = V/I$): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D ($H = mc^2$): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ B

Answer: (B) [Go Back to Q17](#)



Q18.

Solution

Concept — Force on Moving Charge: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Magnetic force $F = qvB \sin \theta$. If velocity is parallel to magnetic field, $\theta = 0^\circ$ and $F = 0$.

Step 2 — Match with the options: The option placed at (A) is Zero, which matches the calculated or conceptual result.

Why other options are wrong:

- Option B (Maximum): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Infinite): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Equal to its weight always): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ A

Answer: (A) [Go Back to Q18](#)

Q19.

Solution

Concept — AC Generator: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: An AC generator works on electromagnetic induction and converts mechanical rotation into alternating emf.

Step 2 — Match with the options: The option placed at (A) is AC generator, which matches the calculated or conceptual result.

Why other options are wrong:

- Option B (Transformer): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Rectifier): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Voltmeter): this does not follow the relevant Physics principle, formula or calculation required in the question.



Final Answer: The correct option is $\Rightarrow$ A

Answer: (A) [Go Back to Q19](#)

Q20.

Solution

Concept — Refraction: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Glass is optically denser than air. When light enters a denser medium, it bends towards the normal.

Step 2 — Match with the options: The option placed at (B) is Towards the normal, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Away from the normal): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Along the surface): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Back along the same path always): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ B

Answer: (B) [Go Back to Q20](#)

Q21.

Solution

Concept — Spherical Mirrors: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: For a concave mirror, an object at C forms a real, inverted image of the same size at C .

Step 2 — Match with the options: The option placed at (A) is At the centre of curvature, which matches the calculated or conceptual result.

Why other options are wrong:

- Option B (At the focus): this does not follow the relevant Physics principle, formula or calculation required in the question.



- Option C (At infinity): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Behind the mirror only): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ A

Answer: (A) [Go Back to Q21](#)

Q22.

Solution

Concept — Prism: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Different colours have different refractive indices in glass and deviate by different amounts. This splitting is dispersion.

Step 2 — Match with the options: The option placed at (B) is Dispersion, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Interference): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Polarisation): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Photoemission): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ B

Answer: (B) [Go Back to Q22](#)

Q23.

Solution

Concept — Bohr Model: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Bohr postulated that electrons in permitted stationary orbits do not radiate energy.

Step 2 — Match with the options: The option placed at (C) is Does not radiate



energy, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Continuously radiates energy): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (Leaves the atom immediately): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Has zero angular momentum): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ **C**

Answer: (C) [Go Back to Q23](#)

Q24.

Solution

Concept — Nuclear Physics: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: Beta-minus particles are high-speed electrons emitted from the nucleus during beta decay.

Step 2 — Match with the options: The option placed at (D) is Electrons, which matches the calculated or conceptual result.

Why other options are wrong:

- Option A (Helium nuclei): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option B (Protons only): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Neutrons only): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ **D**

Answer: (D) [Go Back to Q24](#)



Q25.

Solution

Concept — Logic Gates: Identify the physical law or formula required, substitute the given values carefully, and match the result with the options.

Step 1 — Apply the concept: An AND gate gives high output only when all its inputs are high.

Step 2 — Match with the options: The option placed at (A) is All inputs are 1, which matches the calculated or conceptual result.

Why other options are wrong:

- Option B (All inputs are 0): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option C (Any one input is 1): this does not follow the relevant Physics principle, formula or calculation required in the question.
- Option D (Inputs are unequal): this does not follow the relevant Physics principle, formula or calculation required in the question.

Final Answer: The correct option is $\Rightarrow$ A

Answer: (A) [Go Back to Q25](#)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	D	3	B	4	D	5	B
6	A	7	C	8	D	9	C	10	A
11	A	12	C	13	B	14	C	15	D
16	D	17	B	18	A	19	A	20	B
21	A	22	B	23	C	24	D	25	A

