

- Q1. State law of conservation of linear momentum.
- Q2. How many electrons would weigh 1 kg?
[Given mass of one electron = 9.11×10^{-31} kg]
- Q3. What is the relation between bar and torr?
- Q4. What is the scientific principle on which rocket propulsion is based?
- Q5. Define binding energy.
- Q6. Name the contribution made by the following physicists:
(a) Maxwell (b) Max Planck (c) C. V. Raman (d) de Broglie.
- Q7. State law of conservation of energy.
- Q8. Who discovered radioactivity?
- Q9. State law of conservation of angular momentum.
- Q10. Name the principle on which a nuclear reactor works.
- Q11. What is electromagnetic force?
- Q12. Mention a few properties of electromagnetic force.
- Q13. Give properties of gravitational force.
- Q14. What are the properties of nuclear force?
- Q15. How many nanometer constitute 4 metre?
- Q16. Out of the four fundamental forces which one is (a) strongest and (b) weakest?
- Q17. What do you mean by mass-energy equivalence? Give example.
- Q18. Mention some areas in which physics has contributed to development.
- Q19. Name the different types of forces and their range.
- Q20. Match the technology (A) and related principle (B).
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| A. Technology | B. Principle |
| (a) Steam engine | (i) Propagation of electromagnetic waves. |
| (b) Nuclear reactor | (ii) Thermodynamics. |
| (c) Radio and Television | (iii) Fission of uranium. |
| (d) Computers | (iv) Superconductivity. |
| (e) Lasers | (v) Digital logic of circuits. |
| (f) Production of ultra high magnetic fields | (vi) Light amplification by stimulated emission of radiation. |

Q21. Match the scientist's name against their discovery.

- | A. Scientist | B. Discovery |
|---------------------|--|
| (a) Faraday | (i) Neutron. |
| (b) Rutherford | (ii) Nuclear model of atom |
| (c) Chadwick | (iii) Law of gravitation. |
| (d) Bohr | (iv) Quantum model of hydrogen atom. |
| (e) Newton | (v) Unification of light and electromagnetism. |
| (f) Maxwell | (vi) Law of electromagnetic induction. |

Q22. The mass of air inside a room of dimension $(3 \times 4 \times 6) \text{ m}^3$ can be compared to the mass of (a) hen (b) pencil (c) table (d) truck.

Choose the correct option. [Given density of air = 1.3 kg m^{-3}].

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S1. It states that if no external force acts on a system, the linear momentum of the system remains constant.

S2. Mass of 1 electron = 9.11×10^{-31} kg

For, $n \times 9.11 \times 10^{-31} = 1$ kg

$$\therefore n = \frac{1}{0.11 \times 10^{-31}}$$
$$\approx 1.1 \times 10^{30}.$$

S3. Both are units of measuring pressure.

$$1 \text{ bar} = 1 \text{ atm pressure}$$
$$= 760 \text{ mm of Hg column}$$
$$= 105 \text{ Nm}^{-2}$$

and $1 \text{ torr} = 1 \text{ mm of Hg column}$

Clearly, $1 \text{ bar} = 760 \text{ torr}.$

S4. Newton's third laws of motion.

S5. The energy used in the process of binding masses together is called binding energy.

- S6.** (a) Maxwell — Electromagnetic theory.
(b) Max Planck — Quantum theory.
(c) C. V. Raman — Raman effect.
(d) de Broglie — Wave nature of particles.

S7. It states that energy can neither be created nor destroyed, however, it may change from one form to another.

S8. Henri Becquerel

S9. It states that if no external torque acts on a system, then the total angular momentum of the system always remains constant.

S10. Nuclear fission.

S11. It is the force of attraction or repulsion between two electric charges in motion.

S12. The electromagnetic force has the following properties:

- (a) It obeys the inverse square law.
- (b) It may be attractive or repulsive in nature.
- (c) It is also a long range force.

S13. The gravitational force has the following properties:

- (a) It obeys the inverse square law.
- (b) It is always attractive in nature.
- (c) It is a long range force *i.e.*, it extends up to infinity.
- (d) The **graviton** is the field particle* of gravitational force.

S14. The nuclear force has the following properties:

- (a) It varies inversely with some higher power of distance.
- (b) It is basically an attractive force.
- (c) It is a short-range force and is operative only over the size of the nucleus ($\approx 10^{-15}$ m).
- (d) The **π -meson** is its field particle.

S15.

$$n \times 10^{-9} = 4$$

(As 1 nm = 10^{-9} m)

$$n = 4 \times 10^9.$$

- S16.** (a) Strongest is nuclear force and
(b) Weakest is gravitational force.

S17. According to Albert Einstein, energy and mass are interconvertible.

Example: An e^- (electron) collides with an e^+ (positron) and the two annihilate giving two photons. The total mass of e^- and e^+ is converted into energy.

- S18.** Thermodynamics — Steam engine.
Electromagnetism — Communication.
Nuclear reactions — Development of nuclear power.
Energy resources — Alternative fuel in renewable energy.

- S19.** Gravitational force — 10^{-39} , infinite range
Weak nuclear force — 10^{-13} , 10^{-15} m (nuclear size)
Electromagnetic force — 10^{-2} , infinite
Strong nuclear force — 1, within nucleus (10^{-15} m)

S20. A. Technology

- (a) Steam engine
- (b) Nuclear reactor
- (c) Radio and Television
- (d) Computers
- (e) Lasers
- (f) Production of ultra high magnetic fields

B. Principle

- (ii) Thermodynamics.
- (iii) Fission of uranium.
- (i) Propagation of electromagnetic waves.
- (v) Digital logic of circuits.
- (vi) Light amplification by stimulated emission of radiation.
- (iv) Superconductivity.

S21. A. Scientist

- (a) Faraday
- (b) Rutherford
- (c) Chadwick
- (d) Bohr
- (e) Newton
- (f) Maxwell

B. Discovery

- (vi) Law of electromagnetic induction.
- (ii) Nuclear model of atom
- (i) Neutron.
- (iv) Quantum model of hydrogen atom.
- (iii) Law of gravitation.
- (v) Unification of light and electromagnetism.

S22. Mass of air in the room = $3 \times 4 \times 6 \times 1.3 \text{ kg}$ [\because mass = volume x density]
= 93.6 kg [\because Volume of the room $3 \times 4 \times 6 \text{ m}^3$]

Which is approximately equal to the mass of table.

So, correct option is (c).

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