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1. LAWS OF MOTION

I. Choose the correct answer.

1) Inertia of a body depends on
a) weight of the object b) acceleration due to gravity of the planet
c) mass of the object d) Both a & b

2) Impulse is equals to
a) rate of change of momentum b) rate of force and time
c) change of momentum d) rate of change of mass

3) Newton's III law is applicable
a) for a body is at rest b) for a body in motion
c) both a & b d) only for bodies with equal masses

4) Plotting a graph for momentum on the X-axis and time on Y-axis. slope of momentum-time graph gives
a) Impulsive force b) Acceleration
c) Force d) Rate of force

5) In which of the following sport the turning of effect of force used
a) swimming b) tennis c) cycling d) hockey

6) The unit of 'g' is m s^{-2}. It can be also expressed as
a) cm s^{-1} b) N kg^{-1} c) N m^2 kg^{-1} d) cm^2 s^{-2}

7) One kilogram force equals to
a) 9.8 dyne b) 9.8 × 104 N c) 98 × 104 dyne d) 980 dyne

8) The mass of a body is measured on planet Earth as M kg. When it is taken to a planet of radius half that of the Earth then its value will be____kg a) 4 M b) 2M c) M/4 d) M

9) If the Earth shrinks to 50% of its real radius its mass remaining the same, the weight of a body on the Earth will
a) decrease by 50% b) increase by 50%
c) decrease by 25% d) increase by 300%

10) To project the rockets which of the following principle(s) is /(are) required?
a) Newton's third law of motion b) Newton's law of gravitation
c) law of conservation of linear momentum d) both a and c

II. Fill in the blanks.

1. To produce a displacement _____is required
2. Passengers lean forward when sudden brake is applied in a moving vehicle. This can be explained by _____
3. By convention, the clockwise moments are taken as _____ and the anticlockwise moments are taken as_____.
4. _____ is used to change the speed of car.
5. A man of mass 100 kg has a weight of _____ at the surface of the Earth

III. State whether the following statements are true or false. Correct the statement if it is false:

1. The linear momentum of a system of particles is always conserved.
2. Apparent weight of a person is always equal to his actual weight
3. Weight of a body is greater at the equator and less at the polar region.
4. Turning a nut with a spanner having a short handle is so easy than one with a long handle.
5. There is no gravity in the orbiting space station around the Earth. So the astronauts feel weightlessness.

IV. Match it:

1. Newton's I law	-	propulsion of a rocket
2. Newton's II law	-	stable equilibrium of body
3. Newton's III law	-	law of force.
4. Law of conservation of linear momentum	-	flying nature of bird

2. OPTICS

I. Choose the correct answer:

1. The refractive index of four substances A, B,C and D are 1.31,1.43, 1.33, 2.4 respectively. The speed of light is maximum in
a) A b) B c) C d) D

2. Where should an object be placed so that a real and inverted image of same size is obtained by a convex lens
a) f b) 2f c) infinity d) between f and 2f

3. A small bulb is placed at the principal focus of a convex lens. When the bulb is switched on, the lens will produce
a) a convergent beam of light b) a divergent beam of light
c) a parallel beam of light d) a coloured beam of light

4. Magnification of a convex lens is
a) Positive b) negative c) either positive or negative d) zero

5. A convex lens forms a real, diminished point sized image at focus.

Then the position of the object is at
a) focus b) infinity c) at 2f d) between f and 2f

6. Power of a lens is –4D, then its focal length is
a) 4m b) –40m c) –0.25 m d) –2.5 m

7. In a myopic eye, the image of the object is formed
a) behind the retina b) on the retina
c) in front of the retina d) on the blind spot

8. The eye defect 'presbyopia' can be corrected by
a) convex lens b) concave lens
c) convex mirror d) Bi focal lenses

9. Which of the following lens would you prefer to use while reading small letters found in a dictionary?
a) A convex lens of focal length 5 cm
b) A concave lens of focal length 5 cm
c) A convex lens of focal length 10 cm
d) A concave lens of focal length 10 cm

10. If VB, VG, VR be the velocity of blue, green and red light respectively in a glass prism, then which of the following statement gives the correct relation?
a) VB = VG = VR b) VB > VG >VR
c) VB < VG < VR d) VB < VG > VR

II. FILL IN THE BLANKS:

1. The path of the light is called as_____
2. The refractive index of a transparent medium is always greater Than_____
3. If the energy of incident beam and the scattered beam are same, then the scattering of light is called as _____scattering.
4. According to Rayleigh's scattering law, the amount of scattering of light is inversely proportional to the fourth power of its_____.
5. Amount of light entering into the eye is controlled by_____.

III. True or False. If false correct it.

1. Velocity of light is greater in denser medium than in rarer medium
2. The power of lens depends on the focal length of the lens
3. Increase in the converging power of eye lens cause'hypermetropia'
4. The convex lens always gives small virtual image.

IV. MATCH IT:

1. Retina - Path way of light
2. Pupil - Far point comes closer
3. Ciliary muscles - near point moves away
4. Myopia - screen of the eye
5. Hypermetropia - power of accommodation

3. THERMAL PHYSICS

I. Choose the correct answer

1. The value of universal gas constant
a) 3.81 $mol^{-1}\ K^{-1}$ b) 8.*03* $mol^{-1}\ K^{-1}$
c) 1.38 $mol^{-1}\ K^{-1}$ d) 8.31 $J\ mol^{-1}\ K^{-1}$

2. If a substance is heated or cooled, the change in mass of that substance is
a) positive b) negative c) zero d) none of the above

3. If a substance is heated or cooled, the linear expansion occurs along the axis of
a) X or –X b) Y or –Y c) both (a) and (b) d) (a) or (b)

4. Temperature is the average _____of the molecules of a substance
a) difference in K.E and P.E b) sum of P.E and K.E
c) difference in T.E and P.E d) difference in K.E and T.E

5. In the Given diagram, the possible direction of heat energy transformation is

a) A ← B, A ← C, B ← C
b) A → B, A → C, B → C
c) A → B, A ← C, B → C
d) A ← B, A → C, B ← C

II. Fill in the blanks:

1. The value of Avogadro number _____
2. The temperature and heat are _____quantities
3. One calorie is the amount of heat energy required to raise the temperature of_____ water through_____.
4. According to Boyle's law, the shape of the graph between pressure and reciprocal of volume is _____

III. State whether the following statements are true or false, if false explain why?

1. For a given heat in liquid, the apparent expansion is more than that of real expansion.

2. Thermal energy always flows from a system at higher temperature to a system at lower temperature.
3. According to Charles's law, at constant pressure, the temperature is inversely proportional to volume

IV. Match it:

1. Linear expansion	-	change in volume
2. Superficial expansion	-	hot body to cold body
3. Cubical expansion	-	1.381×10^{-23} JK^{-1}
4. Heat transformation	-	change in length
5. Boltzmann constant	-	change in area

4. ELECTRICITY

I. Choose the best answer

1. Which of the following is correct?
   a) Rate of change of charge is electrical power.
   b) Rate of change of charge is current.
   c) Rate of change of energy is current.
   d) Rate of change of current is charge.
2. SI unit of resistance is
   a) mho b) joule c) ohm d) ohm meter
3. In a simple circuit, why does the bulb glow when you close the switch?
   a) The switch produces electricity.
   b) Closing the switch completes the circuit.
   c) Closing the switch breaks the circuit.
   d) The bulb is getting charged.
4. Kilowatt hour is the unit of
   a) resistivity b) conductivity
   c) electrical energy d) electrical power

II. Fill in the blanks

1. When a circuit is open, _____cannot pass through it.
2. The ratio of the potential difference to the current is known as _____.
3. The wiring in a house consists of _____circuits.
4. The power of an electric device is a product of _____ and _____.
5. LED stands for _____.

III. State whether the following statements are true or false: If false correct the statement.

1. Ohm's law states the relationship between power and voltage.
2. MCB is used to protect house hold electrical appliances.
3. The SI unit for electric current is the coulomb.
4. One unit of electrical energy consumed is equal to 1000 kilowatt hour.
5. The effective resistance of three resistors connected in series is lesser than the lowest of the individual resistances.

IV. Match it:

1. Electric current	-	volt
2. Potential difference	-	ohm meter
3. Specific resistance	-	watt
4. Electrical power	-	joule
5. Electrical energy	-	ampere

5. ACOUSTICS

I. Choose the correct answer

1. When a sound wave travels through air, the air particles
   a) vibrate along the direction of the wave motion
   b) vibrate but not in any fixed direction
   c) vibrate perpendicular to the direction of the wave motion
   d) do not vibrate
2. Velocity of sound in a gaseous medium is 330 m s^{-1}. If the pressure is increased by 4 times without causing a change in the temperature, the velocity of sound in the gas is
   a) 330 m s^{-1} b) 660 m s^{1} c) 156 m s^{-1} d) 990 m s^{-1}
3. The frequency, which is audible to the human ear is
   a) 50 kHz b) 20 kHz c) 15000 kHz d) 10000 kHz
4. The velocity of sound in air at a particular temperature is 330 m s^{-1}. What will be its value when temperature is doubled and the pressure is halved?
   a) 330 m s^{-1} b) 165 m s^{-1} c) $330 \times \sqrt{2}$ m s^{-1} d) $320 / \sqrt{2}$ m s^{-1}
5. If a sound wave travels with a frequency of 1.25×10^4 Hz at 344 ms^{-1}, the wavelength will be
   a) 27.52 m b) 275.2 m c) 0.02752 m d) 2.752 m
6. The sound waves are reflected from an obstacle into the same

medium from which they were incident. Which of the following changes?

a) speed b) frequency c) wavelength d) none of these

7. Velocity of sound in the atmosphere of a planet is 500 m s^{-1}. The minimum distance between the sources of sound and the obstacle to hear the echo, should be

a) 17 m b) 20 m c) 25 m d) 50 m

II. Fill up the blanks:

1. Rapid back and forth motion of a particle about its mean position is called _____
2. If the energy in a longitudinal wave travels from south to north, the particles of the medium would be vibrating in _____
3. A whistle giving out a sound of frequency450 Hz, approaches a stationary observer at a speed of 33 m s^{-1}. The frequency heard by the observer is (speed of sound = 330 m s^{-1})_____.
4. A source of sound is travelling with a velocity 40 km/h towards an observer and emits a sound of frequency 2000 Hz. If the velocity of sound is 1220 km/h, then the apparent frequency heard by the observer is _____.

III. True or false:- (If false give the reason)

1. Sound can travel through solids, gases, liquids and even vacuum.
2. Waves created by Earth Quake are Infrasonic.
3. The velocity of sound is independent of temperature.
4. The Velocity of sound is high in gases than liquids.

IV. Match the following

1. Infrasonic	-	(a) Compressions
2. Echo	-	(b) 22 kHz
3. Ultrasonic	-	(c) 10 Hz
4. High pressure region	-	(d) Ultrasonography

6. NUCLEAR PHYSICS

1. Man-made radioactivity is also known as_____

a. Induced radioactivity b. Spontaneous radioactivity
c. Artificial radioactivity d. a & c

2. Unit of radioactivity is _____

a. Roentgen b. Curie c. Becquerel d. all the above

3. Artificial radioactivity was discovered by_____

a. Bequerel b. Irene Curie c. Roentgen d. Neils Bohr

4. In which of the following, no change in mass number of the daughter nuclei takes place

i) α decay ii) β decay
iii) γ decay iv) neutron decay

a. (i) is correct b (ii) and (iii) are correct
c (i) & (iv) are correct d (ii) & (iv) are correct

5. _____ isotope is used for the treatment of cancer.

a. Radio Iodine b. Radio Cobalt
c. Radio Carbon d. Radio Nickel

6. Gamma radiations are dangerous because

a. it affects eyes & bones b. it affects tissues
c. it produces genetic disorder
d. it produces enormous amount of heat

7. _____ aprons are used to protect us from gamma radiations

a. Lead oxide b. Iron c. Lead d. Aluminium

8. Which of the following statements is/are correct?

i. α particles are photons
ii. Penetrating power of γ radiation is very low
iii. Ionization power is maximum for α rays
iv. Penetrating power of γ radiation is very high

a. (i) & (ii) are correct b. (ii) & (iii) are correct
c. (iv) only correct d. (iii) & (iv) are correct

9. Proton - Proton chain reaction is an example of_____

a. Nuclear fission b. α – decay
c. Nuclear fusion d. β - decay

10. In the nuclear reaction $_6X^{12} \xrightarrow{\alpha \text{ decay}} {}_ZY^A$,the value of A & Z.

a. 8, 6 b. 8, 4
c. 4, 8 d. cannot be determined with the given data

11. Kamini reactor is located at _____

a. Kalpakkam b. Koodankulam
c. Mumbai d. Rajasthan

12. Which of the following is/are correct?

i. Chain reaction takes place in a nuclear reactor and an atomic bomb.

ii. The chain reaction in a nuclear reactor is controlled
iii. The chain reaction in a nuclear reactor is not controlled
iv. No chain reaction takes place in an atom bomb

a. (i) only correct b. (i) & (ii) are correct
c. (iv) only correct d. (iii) & (iv) are correct

II. Fill in the blanks

1. One roentgen is equal to _____disintegrations per second
2. Positron is an_____.
3. Anemia can be cured by _____isotope
4. Abbreviation of ICRP_____
5. _____is used to measure exposure rate of radiation in humans.
6. _____ has the greatest penetration power.
7. ${}_{Z}Y^{A} \rightarrow {}_{Z+1}Y^{A} + X$; Then, X is _____
8. ${}_{Z}X^{A} \rightarrow {}_{Z}Y^{A}$ This reaction is possible in_____ decay.
9. The average energy released in each fusion reaction is about _____ J.
10. Nuclear fusion is possible only at an extremely high temperature of the order of ____ K.
11. The radio isotope of _____ helps to increase the productivity of crops.
12. If the radiation exposure is 100 R, it may cause _____.

III State whether the following statements are true or false: If false, correct the statement

1. Plutonium -239 is a fissionable material.
2. Elements having atomic number greater than 83 can undergo nuclear fusion.
3. Nuclear fusion is more dangerous than nuclear fission.
4. Natural uranium U-238 is the core fuel used in a nuclear reactor.
5. If a moderator is not present, then a nuclear reactor will behave as an atom bomb.
6. During one nuclear fission on an average, 2 to 3 neutrons are Produced.
7. Einstein's theory of mass energy equivalence is used in nuclear fission and fusion.

IV. Match the following

Match: I

a. BARC - Kalpakkam
b. India's first atomic power station - Apsara
c. IGCAR - Mumbai
d. First nuclear reactor in India - Tarapur

Match: II

a. Fuel - lead
b. Moderator - heavy water
c. Coolant - cadmium rods
d. Shield - uranium

Match: III

a. Soddy Fajan - Natural radioactivity
b. Irene Curie - Displacement law
c. Henry Bequerel - Mass energy equivalence
d. Albert Einstein - Artificial Radioactivity

Match: IV

a. Uncontrolled fission reaction - Hydrogen Bomb
b. Fertile material - Nuclear Reactor
c. Controlled fission reaction - Breeder reactor
d. Fusion reaction - Atom bomb

Match: V

a. Co – 60 - Age of fossil
b. I – 131 - Function of Heart
c. Na -11 - Leukemia
d. C - 14 - Thyroid disease

V.Use the analogy to fill in the blank

1. Spontaneous process: Natural Radioactivity, Induced process: __
2. Nuclear Fusion: Extreme temperature, Nuclear Fission: _____
3. Increasing crops: Radio phosphorous, Effective functioning of heart: _____
4. Deflected by electric field: α ray, Null Deflection: _____.

C.VARADHARAJAN M.Sc., B.Ed.,
Physics teacher,
Sri vidya mandir MHSS,palacode.
9790518692.