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Physics paper 1

S.#	Question	Option (A)	Option (B)	Option (C)	Option (D)	Correct Answer
1	A horizontal line in displacement-time graph represents:...	uniform accelerated motion	motion with constant velocity	motion with constant speed	body at rest	D
2	A car travels 30 m toward east, then it takes turn and travels 40 m towards north. It takes 50 seconds. Its average velocity is:....	7/5 m/s	1 m/s	1/5 m/s	5 m/s	B
3	A constant force $F = 2i + 3j + 4k$ is applied on a body what will be the work done to move a body 5 m in z- direction	0	10 J	45 J	20 J	D
4	electron volt is the unit of	voltage	current	energy	power	C
5	What is 1 radian in degrees approximately	57.3 degrees	360 degrees	π degrees	π^2 degrees	A
6	If a wheel of radius r turns through an angle of 30° , then the distance through which any point on its rim moves is?	$\pi/3r$	$\pi/6r$	$\pi/30r$	$\pi/180r$	B
7	The oscillating object overshoots the rest position due to:	restoring force	inertia	gravitational potential energy	elastic potential energy	B
8	Time period of the wave is 1/4 sec. How long does it take to pass 20 complete waves from a point?	5 sec	80 sec	1/80 sec	1/5 sec	A
9	In a periodic wave, the distance between second and fifth crests is 15 cm, what is the wavelength of the wave?	45 cm	5 cm	1/5 cm	1/3 cm	B
10	When an ideal gas of constant mass is heated in a container of fixed volume. What is the reason for the increase in pressure of the gas?	number of molecules per unit volume increases	molecules occupy greater volume of the container	average force per impact at the container wall increases	molecules collide with each other with greater force	C
11	Some ice, at its melting point, is added to m kg of water at initial temperature 290 K. If c is the specific heat capacity of water and L is latent heat of fusion of ice. Ice melts completely. Final temperature of the water is 273 K. What is the minimum mass of ice that is required?	$\frac{17mc}{L}$	$\frac{L}{17mc}$	$\frac{17m}{Lc}$	$\frac{290m}{Lc}$	D
12	An ideal gas of N molecules are enclosed in a container at a constant pressure p . The graph between volume of gas and its absolute temperature is a straight line. What is the gradient of the graph?	$\frac{NR}{p}$	NR/P	$\frac{Nk}{p}$	Nkp	C
13	If two point charges of charge q_1 and q_2 are placed at distance d . The force between them is proportional to:...	$q_1 + q_2$	$q_1 - q_2$	$\frac{q_1}{q_2}$	$q_1 * q_2$	D
14	An charge is moving with velocity v , it enters a uniform magnetic field B . The direction of v is perpendicular to B . What is the path of the charge particle inside the magnetic field?	parabolic	circular	parallel to v	parallel to E	B
15	Ohm's Law is applicable only when temperature remains	changing	absolute zero	constant	None of these	C
16	Resistivity of a conductor depends upon	temperature	length	cross sectional area	None of these	A
17	Internal resistance of a battery is _____ ohm, if, $E=10V$, $Vt=9V$, $I=1A$	1	0.1	0.01	None of these	A
18	$\cos \theta = \Phi /$	BA	A	B	B^2	A
19	An electron is moving along the line of force in magnetic field B with velocity u , then maximum force acting on the charge is given by	Bue	Bq/u	Bu/q	0	D
20	Face of coil having clockwise current	behaves like north pole	behaves like south pole	becomes magnet of varying poles	does not behaves like magnet	B
21	If we make the magnetic field stronger, the value of induced current is	Decreased	Increased	Vanished	Kept constant	B
22	The principle behind the working of cathode ray oscilloscope is	oscillation	half wave rectification	full wave rectification	none of these	B
23	If a half wave rectifier is used to convert 50Hz AC into DC, then the number of pulses present in rectifier voltage is	25	50	100	75	B
24	Charge of photon is	0	positive	negative	positive/negative	A
25	The uncertainty in momentum and position is due to its	property of matter and radiation	two dimensional motion	extreme velocities	small size	A
26	Energy of the 4th orbit in hydrogen atom is	-2.51 eV	-3.50 eV	-13.6 eV	-0.85 eV	B
27	If the ionization energy of hydrogen atom is 13.6 eV, its ionization potential will be	13.6 eV	136.0 eV	3.4 eV	none of these	A
28	What is the unit of decay constant	second	minute	hour	$(\text{sec})^{-1}$	D
29	what is the maximum electron energy in neutron beta decay	783 eV	783 KeV	783 GeV	783 Tev	B
30	The half life of U-238 against alpha decay is 4.5×10^9 years, find the activity of 1 kg of U-238	2.4×10^{-4} Ci	3.34×10^{-4} Ci	4.34×10^{-4} Ci	2.4×10^{-5} Ci	B
31						



Physics paper 2

S.#	Topic	Sub Topics	Question	Answer Option (A)	Answer Option (B)	Answer Option (C)	Answer Option (D)
1	Force and Motion	Velocity	Rate of change in displacement is known as:...	speed	velocity	acceleration	momentum
2	Force and Motion	Displacement-time graph	A motion with increasing velocity can be represented on displacement-time graph by:...	a horizontal line	a curve line with decreasing gradient	a straight line with constant gradient	a curve line with increasing gradient
3	Force and Motion	Displacement	Displacement of an object with respect to a constant moving (v) frame in same direction is	x-vt	x+vt	x	x+vt+at ²
4	Force and Motion	Velocity	Average velocity of an object after completing a circle of 5 m radius in 5 seconds	2π	π	zero	10π
5	Force and Motion	Velocity	Average velocity is defined as	displacement/time	distance/time	distance*time	displacement*time
6	Work and Energy	Work	Work done by friction force is always	Negative	positive	zero	maybe positive, maybe negative
7	Work and Energy	energy	In case of harmonic oscillator total energy remains	variable	infinitely	constant	zero
8	Work and Energy	Kinetic Energy	A bullet fired from gun can pierce a target due to	heat energy	mechanical energy	acceleration	kinetic energy
9	Work and Energy	Kinetic Energy	The K.E. of a body of mass 2kg and momentum of 2N s is :	1J	2J	3J	4J
10	Work and Energy	Potential energy	Force constant k1 and k2 of two spring in ratio 5 : 4. They are stretched by same length, if potential energy stored in one spring is 25 J then potential energy stored in second spring is	25 J	16 J	100 J	20 J
11	Rotational and circular motion	Centripetal force	A body is moving in a circle at constant speed. Which statement is true?	The resultant force acts towards the centre of the circle	There is no resultant force	The resultant force acts away from the centre of the circle	none of these
12	Rotational and circular motion	Angular velocity	What is angular velocity?	Change in angular rotation / change in time	Change in displacement / change in time	Change in speed / change in time	Change in acceleration / change in time
13	Rotational and Circular Motion	Radian	The angular measurement is known as _____ measurement	parameter	area	circumference	all of these
14	Rotational and Circular Motion	Centripetal force	The centripetal acceleration formula is given as	V/r	r/V	ma	none of these
15	Rotational and Circular Motion	Centripetal force	The centripetal acceleration is maximum when radius r is	increasing	decreasing	constant	none of these
16	Waves	Speed of sound in air	Which group consists of only electromagnetic waves:	microwaves, radio waves, infra red	microwaves, radio waves, sound	microwaves, water waves, infra red	waves on a rope, radio waves, infra red
17	Waves	Principle of superposition/superposition of sound waves	A wave passes through a medium, each particle of the medium performs 100 complete vibrations in 5 seconds. What is the frequency of the wave:	2 Hz	20 Hz	4 Hz	40 Hz
18	Waves	Observer is moving away from a stationary source	In a periodic wave, the distance between second and fifth crests is 15 cm, what is the wavelength of the wave?	45 cm	5 cm	1/5 cm	1/3 cm
19	Waves	Amplitude	Frequency of a travelling wave is 2000 Hz. Its speed is 300m/s. What is its wavelength?	20/3 m	20x3 m	3/20 m	2/3 m
20	Waves	Angular frequency	The points which are in phase are separated from one another through a distance of :	1 wavelength	1.5 wavelength	0.5 wavelength	2.5 wavelength
21	Thermodynamics	Specific heat and Molar specific heat/specific heat capacity	A car of mass M is moving with speed v. The brake of mass m and specific heat capacity c, is used to stop the car. If half of the kinetic energy of the car is absorbed by the brake, then what is the increase in temperature of the brake?	Mv ² /4mc	Mv ² /2mc	mv ² /4Mc	mv ² /2Mc
22	Thermodynamics	Specific heat and Molar specific heat/specific heat capacity	A 500 W electric heater is used to heat 1 kg of water without energy losses. The specific heat capacity of water is 4.2 kJ kg ⁻¹ K ⁻¹ . What is the time taken to heat the water from 25 °C to 75 °C?	7 seconds	42 seconds	7 minutes	420 minutes
23	Thermodynamics	Specific heat and Molar specific heat/specific heat capacity	A container is filled with oxygen and helium at the same temperature. The molar mass of oxygen is 32 g/mol and that of helium is 4 g/mol. What is the ratio: $\frac{\text{average speed of oxygen molecules}}{\text{average speed of helium molecules}}$	1/√8	√8	1/8	8
24	Thermodynamics	First law of thermodynamics	Isothermal system has constant	Temperature	Pressure	Entropy	Energy Conservation
25	Electro-statistics	Coulomb's Law	Two point charges are at the distance d. If force between these two charges is F, then what is the force between charges when the distance between them is 3d?	F/3	F/9	F/3 d	F/9 d
26	Electro-statistics	Capacitance of a parallel plate capacitor	What is the change in kinetic energy of a proton when it is accelerated through a potential difference of 2MV?	0.32 μJ	0.32 nJ	0.32 pJ	0.32 fJ
27	Electro-statistics	Charging and Discharging a Capacitor	The greek word "xeros" and "graphos" means:...	sharp graphics	dry writing	wet writing	wet graphics
28	Electro-statistics	Charging and Discharging a Capacitor	Which one is the correct statement about selenium?	selenium is a good conductor	selenium is a good insulator	selenium is an insulator in the dark and becomes conductor when exposed to light	selenium is a conductor in the dark and becomes insulator when exposed to light
29	Current Electricity	Potentiometer	The stator of phase shifting transformer for use in conjunction with an A.C. potentiometer usually has a	Single-phase winding	Two-phase winding	Three-phase winding	Any of the above
30	Current Electricity	Ohm's Law	_____ is a source of electrical energy having fixed polarity and terminals	Motor	Metals	Battery	Generator
31	Current Electricity	Specific resistance or resistivity	Two wires of copper are of the same length but have different diameters. When they are connected in series across a battery, the heat generated is H1 When connected in parallel across the same battery, the heat generated during the same time is H2 Then :	H1 = H2	H1 < H2	H1 > H2	H1 > H2
32	Current Electricity	Kirchhoff's Rule	Kirchhoff's current law is applicable to which type of circuits:	Series	Parallel	Any of these	None of these
33	Electromagnetism	Magnetic flux density	No force acts on a current carrying conductor when it is placed-	perpendicular to the magnetic field	parallel to the magnetic field	far away from the magnetic field	inside a magnetic field
34	Electromagnetism	Magnetic flux density	Magnetic permeability has units as	Tesla	henry	Tesla/m	Henry/m
35	Electromagnetism	Magnetic flux density	Magnetic field outside of a long solenoid is	varying with radial distance	uniform	zero	not enough information
36	Electromagnetism	Magnetic field	Is it possible to visualize magnetic flux lines	yes directly we can see with eyes	we need microscope	we need telescope	All cases are not possible
37	Electromagnetic Induction	Faraday's Law	emf = -N(ΔΦ/Δt) is according to	Ampere's Law	Faraday's Law	Lenz's Law	none of these
38	Electromagnetic Induction	Lenz's Law	The Lenz's law refers to	induced current	induced potential	motional emf	all of these
39	Electromagnetic Induction	Transformers	For a 100% efficient step down transformer	voltage in primary and secondary are equal	current in primary and secondary are equal	input power is same as the output power	output power is zero
40	Electromagnetic Induction	Generating electricity- Alternating Current Generator	Devices that consume electrical energy in the external circuit of generator are known as	appliances	machines	motors	load

41	Electronics	Rectification	A full wave rectifier is operating from 50 Hz mains, fundamental frequency of ripple will be	100 Hz	25Hz	50Hz	200Hz
42	Electronics	Semiconductor	Majority charge carriers in P-type semiconductor are	Holes	electrons	neutrons	protons
43	Electronics	Diode	In the breakdown region zener behaves like a	Constant current	Constant voltage	constant resistance	none of them
44	Electronics	Diode	If the temperature of diode increases the leakage current will	increases	decreases	remains same	none of them
45	Dawn of Modern Physics	The wave-particle duality	white light gives spectrum after occurring	diffraction	interference	reflection	all of these
46	Dawn of Modern Physics	The wave-particle duality	Photocell is similar to	photoelectric effect	compton effect	photoluminescence	none of these
47	Dawn of Modern Physics	The wave-particle duality	The concept of work function was given by	Bohr	Einstein	Rutherford	none of these
48	Dawn of Modern Physics	The wave nature of particles	The electron shows purely a ____ when free.	particle nature	wave nature	dual nature	it transform to photon
49	Nuclear Physics	Half Life and rate of decay	Half life of a radiation active element is that period in which half of the atoms	diffuse	decompose	disturbed	decay
50	Nuclear Physics	Biological effects of Radiation	Iodine-131 is used to trace which cancer	lungs	thyroid gland	breast	liver
51	Nuclear Physics	Law of radioactive decay	Half life of Au-198 is 2.7 days what will be the activity of 1 mg of Au-198	120 Ci	200 Ci	240 Ci	280 Ci
52	Nuclear Physics	Half Life and rate of decay	what is the maximum electron energy in neutron beta decay	783 eV	783 KeV	783 GeV	783 Tev
53	Atomic Spectra	Atomic Spectra / Line Spectrum	The wavenumber of a photon in bracket series is $9/400 R$ then electron transited from orbit with quantum number	$n=3$	$n=2$	$n=4$	$n=5$
54	Atomic Spectra	Atomic Spectra / Line Spectrum	The longest and shortest wavelength of Lyman series is	1215 A to 912 A	1215 A to 500 A	1215 A to 700 A	900 A to 700 A
55	Atomic Spectra	Atomic Spectra / Line Spectrum	The ratio of wavelength of last line of Balmer series and last line of Lyman series is	2	1	4	0.05
56	Atomic Spectra	Atomic Spectra / Line Spectrum	The ratio of longest wavelength of Balmer series and last line of Lyman series is	4/9	9/4	27/5	5/27

Answers:

- | | | |
|------|------|------|
| 1. B | 23.A | 45.A |
| 2. D | 24.A | 46.A |
| 3. C | 25.B | 47.B |
| 4. C | 26.C | 48.B |
| 5. A | 27.B | 49.D |
| 6. A | 28.C | 50.B |
| 7. C | 29.B | 51.C |
| 8. D | 30.C | 52.B |
| 9. A | 31.B | 53.D |
| 10.D | 32.B | 54.A |
| 11.A | 33.B | 55.C |
| 12.A | 34.D | 56.D |
| 13.C | 35.C | |
| 14.D | 36.D | |
| 15.B | 37.B | |
| 16.A | 38.A | |
| 17.B | 39.C | |
| 18.B | 40.C | |
| 19.C | 41.A | |
| 20.A | 42.A | |
| 21.B | 43.B | |
| 22.B | 44.A | |



Physics paper 3

S.#	Question	Answer Option (A)	Answer Option (B)	Answer Option (C)	Answer Option (D)
1	The unit of velocity is:...	m	m s	m / s	m / s ²
2	We can calculate velocity of an object from displacement-time graph by:...	calculating area under the graph	finding gradient of displacement-time graph	calculating area above the graph	finding the length of the graph
3	If a car is travelling towards east and slowing down, what is the direction of acceleration?	towards east	towards west	neither east nor west	we can not answer with this data
4	Displacement of sun with respect to earth is	r	2πr	2r	r ²
5	If the velocity of particle is varying linearly with time then shape of d-t curve would be	linear	quadratic	cubic	decreasing linearly
6	Work is a	vector quantity	scalar quantity	sometime scalar some time vector	none of these
7	A particle of mass 'm' is projected from the ground with an initial speed u ₀ at an angle 'a' with the horizontal. At the highest point of its trajectory it makes a completely inelastic collision with another particle of mass which was thrown vertically upward from the ground with the same initial speed u ₀ . The angle that the composite system makes with the horizontal immediately after the collision is	37°	45°-a	45°+a	90°
8	If momentum is increased by 20% then K.E. increases by :	0.44	0.55	0.66	0.77
9	Two springs having force constant of 3 : 4, both the springs are stretched by equal force, if elongation in first spring is x then elongation in second spring is	3x	4x	3*x/4	4*x/3
10	Potential energy of the particle of mass 0.5 kg moving along x axis is given by U = 2*x(x-3), the speed of particle is maximum at	1 m	1.5 m	2 m	3 m
11	A body performing circular motion with a constant speed has a constant :	momentum	angular velocity	acceleration	radius vector
12	A car is moving in a circular track of radius 20m at a constant speed of 20m/sec. Find the centripetal acceleration?	20 m/s ²	40 m/s ²	30 m/s ²	10 m/s ²
13	If an object is undergoing an orbital motion around another object it is called	Revolution	Rotation	Both of them	None of them
14	Angle between radius vector and centripetal acceleration is	0°	π	2π	none of these
15	If angular velocity increases the _____ also increases	time period	frequency	vibration	none of these
16	The object oscillates due to:	a restoring force	its weight	centripetal force	force of friction
17	20 waves pass through a point in a medium, in 5 seconds. What is the time required to pass one wave?	1/4 sec	4 sec	1/2 sec	2 sec
18	Frequency of a travelling wave is 2000 Hz. Its speed is 300m/s. What is its wavelength?	20/3 m	20x3 m	3/20 m	2/3 m
19	If f ₁ and f ₂ are frequencies of two tuning forks, such that f ₁ < f ₂ , then number of beats produced in one second are:	f ₂ - f ₁	f ₂ x f ₁	f ₁ - f ₂	f ₂ + f ₁
20	A steel wire hangs vertically from a fixed point, supporting a weight of 80 N at its lower end. The diameter of the wire is 0.50 mm and its length from the fixed point to the weight is 1.5 m. If density of steel wire = 7.8 x 10 ³ kg/m ³ , then what is the fundamental frequency emitted from the wire.	78 Hz	178 Hz	50 Hz	150 Hz
21	Under which conditions, a real gas approximate to an ideal gas?	pressure = high density = high	pressure = low density = high	pressure = high density = low	pressure = low density = low
22	A liquid has specific heat capacity c. The rate of change in temperature of liquid is R. The rate at which heat is transferred from the liquid is P. What is the mass of the liquid?	P/cR	PR/c	Pc/R	cPR
23	The increase in temperature of the object is an indication of:	decrease in the internal energy	increase in the internal energy	increase in the potential energy only	decrease in the kinetic energy only
24	Molar mass of water is	0.018 kg/mol	0.108 kg/mol	0.027 kg/mol	0.0635 kg/mol
25	If two point charges of charge q ₁ and q ₂ are placed at distance d. The force between them is proportional to:...	d	d ²	1/d	1/d ²
26	A charge is moving with velocity v, it enters a uniform electric field E. The direction of v and E are not parallel. What is the path of the charge particle inside the electric field?	parabolic	circular	parallel to v	parallel to E
27	Two equal, opposite charges are fixed at a distance d. Positive charge is at the right and negative at the left position. As shown below: X - Y + Z At which position, the net electric field is directed to the left?	X, Y and Z	X only	X and Z only	Y only
28	Two charges of -2uC and +4uC are a fixed distance apart. As shown below: A +4uC B -2uC C At which position can the electric field be zero?	at A only	at B only	at C only	at A, B and C
29	Ohm's Law is applicable only when temperature remains	changing	absolute zero	constant	None of these
30	Terminal potential difference of a cell	increases with increase in its internal resistance	decrease with increase in internal resistance	is independent of its internal resistance	None of these
31	Electrical power of a battery is defined as the rate of	Supply of electrical energy by battery	production of electrical energy of a battery	both	none of these
32	Electrical power is given by P=	VI	I ² R	V ² / R	all
33	Cos θ = Φ /	BA	A	B	B ²
34	A charge of 1μC is moving antiparallel to magnetic lines of force, then the magnetic force acting on charge is	0	vB	vB sin θ	qvB
35	Find the magnetic flux density when a flux of 28 units is enclosed in an area of 15cm.	178.33 units	186.67 units	192.77 units	200 units
36	Lorentz force in electric and magnetic field is	F = qv[E+B]	qE[v+B]	qvB	q[E+vB]
37	The principle of a direct current generator is based on	Coulomb's Law	Ampere's Law	Faraday's Law	Lenz's Law
38	Which of the following is the unit of mutual inductance?	VsA ⁻²	V ³ sA ²	V ² s	VsA ⁻¹
39	The maximum instantaneous value measured from zero value is known as?	peak value	peak to peak value	cycle	period
40	Which of the following remains unchanged in transformer	Voltage	current	Power	Capacitance
41	The number of diodes in bridge rectifier is	4	3	2	5
42	what is the range of typical band gap in conductors	100-1000eV	0.5-10eV	0.01-0.1 eV	10000-10000000eV
43	Voltage after which in forward bias current start to rise with increase in voltage is called	breakdown voltage	reverse voltage	forward voltage	knee voltage
44	A half wave rectifier is operating from 50 Hz mains, fundamental frequency of ripple will be	100 Hz	25 Hz	200Hz	50Hz
45	Calculate the energy of a photon of wavelength 6600 angstroms.	0.3x10 ⁻¹⁹ J	3x10 ⁻¹⁹ J	30x10 ⁻¹⁹ J	300 x 10 ⁻¹⁹ J

46	A hydrogen atom in its ground state absorbs 10.2 eV of energy. What is the orbital angular momentum is increased by?	4.22×10^{-34} Js	2.11×10^{-34} Js	3.16×10^{-34} Js	1.05×10^{-34} Js
47	Plank's constant is analogous to :	Inertia	Wave nature	Angular momentum	Liner momentum
48	x-rays are used to investigate	crystals	molecules	ions	electrons
49	If the ionization energy of hydrogen atom is 13.6 eV, its ionization potential will be	13.6 eV	136.0 eV	3.4 eV	none of these
50	The number of protons in the nucleus is called _____ number	atomic	charge	atomic or charge	neither atomic nor charge
51	The existence of positron was discovered in the	thermal radiation	cosmic radiation	electromagnetic radiation	non-electromagnetic radiation
52	Which of the following substances cannot be emitted by radioactive substances during their decay?	proton	neutrinos	helium nuclei	electrons
53	Spectral lines is like a _____ of absorbed or emission energy in a spectrum	charged pattern	fingerprint pattern	discharged pattern	None of these
54	Lifetime of an excited state is	$10^{(-6)}$ s	$10^{(-7)}$ s	$10^{(-8)}$ s	$10^{(-3)}$ s
55	Energy difference in balmer series for longest wavelength is	1.89 eV	2.9eV	5.6eV	7.8 eV
56	Consider the wavelength corresponding to $n=2$ to $n=1$ in hydrogen atom the shortest wavelength is	Hydrogen atom	deuterium	signly ionised helium	doubly ionised helium

Answers:

- | | |
|---|-------|
| 1. C | 29. C |
| 2. B | 30. B |
| 3. C | 31. A |
| 4. C | 32. D |
| 5. B | 33. A |
| 6. B | 34. D |
| 7. the correct option (45 degrees) is not given | 35. B |
| 8. A | 36. D |
| 9. D | 37. C |
| 10. D | 38. D |
| 11. B | 39. A |
| 12. A | 40. C |
| 13. A | 41. A |
| 14. B | 42. C |
| 15. B | 43. D |
| 16. A | 44. D |
| 17. A | 45. C |
| 18. A | 46. D |
| 19. A | 47. C |
| 20. A | 48. A |
| 21. D | 49. A |
| 22. A | 50. A |
| 23. B | 51. B |
| 24. A | 52. A |
| 25. D | 53. B |
| 26. A | 54. C |
| 27. D | 55. A |
| 28. C | 56. D |

Working for question 20:

Example 8.3: A steel wire hangs vertically from a fixed point, supporting a weight of 80 N at its lower end. The diameter of the wire is 0.50 mm and its length from the fixed point to the weight is 1.5 m. Calculate the fundamental frequency emitted by the wire when it is plucked?

(Density of steel wire = $7.8 \times 10^3 \text{ kgm}^{-3}$)

Solution:

Volume of wire = Length x Area of cross section

Mass = Volume x Density

therefore

Mass of wire = Length x Area of cross section x Density

So, mass per unit length m is given by

$m = \text{Density} \times \text{Area of cross section}$

Diameter of the wire = $D = 0.50 \text{ mm} = 0.5 \times 10^{-3} \text{ m}$

Radius of the wire = $r = \frac{D}{2} = 0.25 \times 10^{-3} \text{ m}$

Area of cross section of wire = $\pi r^2 = 3.14 \times (0.25 \times 10^{-3} \text{ m})^2$

$F = w$

therefore

$m = 7.8 \times 10^3 \text{ kgm}^{-3} \times 3.14 \times (0.25 \times 10^{-3} \text{ m})^2$

$m = 1.53 \times 10^{-3} \text{ kgm}^{-1}$

Weight = 80 N = 80 kgms⁻²

Using the equation (8.17), we get

$$f_1 = \frac{1}{2l} \sqrt{\frac{F}{m}}$$

$$f_1 = \frac{1}{2 \times 1.5 \text{ m}} \sqrt{\frac{80 \text{ kgms}^{-2}}{1.53 \times 10^{-3} \text{ kgm}^{-1}}} = 76 \text{ s}^{-1}$$

or

$$f_1 = 76 \text{ Hz.}$$



Physics paper 4

S.#	Question	Answer Option (A)	Answer Option (B)	Answer Option (C)	Answer Option (D)
1	If a car moves from 15 m/s to 5 m/s in 10 sec then average acceleration is	1 m/s ²	2m/s ²	5 m/s ²	10m/s ²
2	if a car starts from rest and reaches 20 m/s velocity in 10 m distance then acceleration is	20 m/s ²	10 m/s ²	5 m/s ²	2m/s ²
3	instantaneous velocity is defined as	dx/dt	$\Delta x/\Delta t$	$\Delta x \cdot \Delta t$	$\Delta v/\Delta t$
4	For a straight trajectory of a particle instantaneous velocity is	2*(average velocity)	average velocity	zero	not enough info
5	instantaneous velocity is	always positive	always negative	positive and negative	not enough info
6	Work done by the centripetal force on a body moving in circle is zero because	the body moves parallel to F	the body move opposite to F	the body move right angle to F	centripetal and centrifugal balance each other
7	Which is the unit of energy	joule	erg	unit(Kwh)	all of these
8	A particle having mass m and momentum p, kinetic energy of the particle is given by	p ² /m	p/m	p ² /(2m)	m ² /p
9	A spring of force constant 800 N/m has an extension of 5 cm, the work don in extending it from 5 cm to 15 cm	16 J	8 J	32 J	24 J
10	A spring gun has a force constant 1000 N/m. When a ball of 10 gm is shot from this gun, its spring is compressed by 10 cm. Find the maximum horizontal distance that can be achieved by the ball : (g = 10 m/s ²)	20m	25m	50m	100m
11	What is 1 radian in degrees approximately	57.3 degrees	360 degrees	π degrees	π^2 degrees
12	The angular speed for the daily rotation of Earth in rad s ⁻¹ is?	2 π	π	4 π	7.3 x 10 ⁻⁵ rad s ⁻¹
13	Angular displacement is zero when	angle =0	v=0	r=0	both b and c
14	Which quantity is a scalar quantity	angular displacement	angular velocity	angular acceleration	none of these
15	Angular velocity cannot be	zero	negative	infinite	linear
16	The stationary waves can be set up on the string only with the frequencies of harmonic series determined by:	the tension, length and mass per unit length of the string	the tension and mass per unit length of the string only	the length and mass per unit length of the string only	the tension and length of the string only
17	The frequency of a string on a musical instrument can be changed either by:	varying the diameter or by changing the length	varying the tension or by changing the thickness	varying the tension or by changing the length	varying the thickness or by changing the length
18	A standing-wave pattern is formed when the length of the string is:	an odd multiple of quarter wavelength	an integral multiple of quarter wavelength	an integral multiple of wavelength	an integral multiple of half wavelength
19	A stationary wave is setup on a string of length 10 cm. Four loops are formed. what is the distance between two consecutive crests?	4.5 cm	5 cm	2.5 cm	1.25 cm
20	If a pipe is closed at one end and open at the other, the closed end is a:	antinode	node	rarefaction	crest
21	System in thermodynamics is disconnected with surrounding by	Pressure	Universe	Boundary	Temperature
22	For an ideal gas heated under constant pressure the % of heat utilised in work is	0.4	0.5	0.3	0.2
23	Two samples A and B of a gas initial at same pressure compressed from V to V/2 (A isothermally and isobarically) What is the pressure in A	equal to B	greater than B	less than B	Twice of pressure at B
24	When a ideal monatomic gas is heated at constant pressure fraction of energy supplied which increases internal energy of gas is	44232	44260	44201	44259
25	A proton has mass m and charge q. It is suspended in electric and gravitational field. What is the magnitude of electric field?	E = m*g / q	E = m*g / q*v	E = m*g / q*v*B	E = q / m*g
26	What is the formula for Coulomb's law?	F=Kq1q2/r ²	F=2Kq1q2/r ³	F=Kq1/r	F=Kq1/q2
27	The change in potential energy per unit charge between two points in an electric field is called	Potential difference	Absolute Potential	Electric intensity	Permittivity
28	Series combination of two capacitor C1 and C2 is	C1+ C2	(C1)(C2)	(C1C2)/(C1+C2)	C1/C2
29	The fractional change in resistivity per kelvin	coefficient in resistance	coefficient of resistivity	resistance	None of these
30	In case of source of charge at a point, the total charge flowing towards the point and the total charge flowing away from the point must be	equal	not equal	does not relate	none of these
31	The ratio of emf of two cells E1/E2 equals	L1/L2	1:2	L2/L1	2:1
32	With the help of Kirchoff's Current Law (KCL) and Kirchoff's Voltage Law (KVL), you can find equivalent _____ and _____ of different conductors.	current, frequency	current, voltage	resistance, current	resistance, voltage
33	Find the Lorentz force of a charge 2.5C having an electric field of 5 units and magnetic field of 7.25 units with a velocity 1.5m/s.	39.68	68.93	89.39	63.98
34	Magnetic Field lines move from _____	north to south	south to north	east to west	west to east
35	A square coil of side length 2 mm is placed in the x-y plane and in uniform magnetic field 0.1 T, find total flux through the coil	1.6 Wb	0.16 Wb	16 Wb	0 Wb
36	Strength of magnetic field is called	strength	flux	magnetic flux density	density
37	In order to enhance magnetic flux, the primary and secondary coils of the transformer are wound on	soft iron core	iron core	hard iron core	steel core
38	Transformer operates on	A.C	D.C	both	none of these
39	SI unit of inductance is	Henry	Farad	Maxwell	Weber
40	A cable 4 km long and of total resistance 1 ohm carries electric current from a generator producing 100kW at 10,000 Volts. The current in amperes in the cable is	10	10,000	1000	100,000
41	Transistors can be used as	half wave rectifier	full wave rectifier	both	none of these
42	electrons in the valence band of semiconductors are called	valence electrons	free electrons	fermi electrons	none of them
43	Pure semiconductors are called	intrinsic semiconductor	extrinsic semiconductor	electronic devices	none of them
44	Which of the following rectifier uses wheatstone bridge to rectify signal	half wave	full wave	bridge	All of the above
45	Electron microscope describes the _____ nature of particles which are electrons	particle	wave	both	none of these
46	Which of the following statements is incorrect about the photons	Momentum of photon h/λ	Rest mass of photon is zero	photon exert no pressure	Energy of photon is hv
47	In stationary waves	Strain is maximum at antinodes	Strain is minimum at nodes	Strain is maximum at node	Amplitude is same at all points
48	A particle performing SHM when its displacement is 3 cm, its acceleration is 12 cm S ⁻² . It is vibrating with period	4 π Sec	3 π Sec	2 π Sec	π Sec
49	Molecular spectra are examples of	solar spectra	continuous spectra	band spectra	line spectra
50	As mass number increases, which of the following does not change	mass	density	volume	binding energy
51	If alpha, beta, and gamma rays carry the same momentum, which has the longest wavelength?	alpha rays	beta rays	gamma rays	all have same wavelength
52	The half life of radioactive element is	0.693λ	0.693/λ	λ/0.693	1/λ
53	An Ionic atom which is equivalent to hydrogen atom has wavelength equal to 1/4th of hydrogen lines is	He+	Li++	Ne+9	Na10+
54	When two electrons are removed from an atom the charge on atom becomes	2+	2-	0	4
55	If two neutrons hit together at slow speed they behave like	snooker balls	immediately comes to rest	fuse into each other	nothing will happen
56	Radiation exchange occurs in which medium	solid	liquid	gas	vacuum

Answers:

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

24. Wrong options; The correct answer is 3/5

25. A
26. A
27. A
28. C
29. B
30. B
31. A
32. C
33. A
34. A

35. Incorrect question.

Should be "A square coil of side length 2 mm is placed in the x-y plane and in uniform magnetic field 0.1 T, which is also in the same plane, find total flux through the coil."

The answer would then be D.

36. C

37. A
38. A
39. A
40. A
41. D
42. A
43. A
44. C
45. B
46. A
47. C
48. D
49. C
50. B
51. D
52. B
53. A
54. A
55. A
56. D