

SATISH SCIENCE ACADEMY DHANORI PUNE-411015

PHYSICS

Class 12 - Physics

Time Allowed: 3 hours	Maximum Marks: 70
General Instructions:	
The question paper is divided into four sect	ions:
1. Section A	
• Q. No. 1 contains Ten multiple choi	ce type of questions carrying One mark each.
• Q. No. 2 contains Eight very short a	answer type of questions carrying One mark each.
2. Section B	
• Q. No. 3 to Q. No. 14 contain Twelv	e short answer type of questions carrying Two marks each. (Attempt any
Eight).	
3. Section C	
• Q. No. 15 to Q. No. 26 contain Twel	ve short answer type of questions carrying Three marks each. (Attempt
any Eight).	
4. Section D	
• Q. No. 27 to Q. No. 31 contain Five	long answer type of questions carrying Four marks each. (Attempt any
Three).	
5. Use of the log table is allowed. Use of ca	alculator is not allowed.
6. Figures to the right indicate full marks.	
7. For each multiple choice type of questio	n, it is mandatory to write the correct answer along with its alphabet. e.g.,
(a)/(b)/(c)/(d) No marks	(s) shall be given, if ONLY the correct answer or the alphabet of the
correct answer is written. Only the first a	ttempt will be considered for evaluation.
	Section A
	the following multiple choice type of questions: [10]
· · · · · · · · · · · · · · · · · · ·	sity of incident light increases [1]
a) the energy of the incident ph	
c) maximum kinetic energy of photoelectron	the d) the stopping potential
(b) The second law of thermodynamic	s deals with the transfer of [1]
a) energy	b) pressure
c) heat	d) work done

(c)	The output of NOR gate is high, when		[1]
	a) all inputs are high	b) only one of its inputs is high	
	c) only one of its inputs is low	d) all inputs are low	
(d)	If the polarizing angle for a given medium is 60° , t	hen the refractive index of the medium is	[1]
	a) $\sqrt{3}$	b) $\frac{\sqrt{3}}{2}$	
	c) 1	d) $\frac{1}{\sqrt{3}}$	
(e)	For two vibrating bodies to be in resonance, which of the following quantity should be equal?		[1]
	a) Wave velocity	b) Amplitude	
	c) Wavelength	d) Frequency	
(f)	Absorption of water by filter paper is due to		[1]
.,		b) capillarity	
		d) elasticity	
(g)	Balmer series is obtained when all transitions of ele		[1]
(0)		b) 2nd orbit	
	c) 1 st orbit	d) 3rd orbit	
(h)	Soft iron is used to make the core of transformer be		[1]
, ,		b) high coercivity and low retentivity	
		d) low coercivity and low retentivity	
(i)	The root mean square speed of the molecules of a g		[1]
()	(T = Absolute temperature of gas)		
	a) $\frac{1}{\sqrt{T}}$	b) $\frac{1}{T}$	
		d) T	
(j)	In a semiconductor, acceptor impurity is		[1]
()/		b) indium	1-1
		b) indium	
	, .	d) arsenic	F01
(a)	er the following questions: State Einstein's photoelectric equation.		[8] [1]
(a) (b)	Write the differential equation for angular S.H.M.		[1]
(c)			[1]
(d)	Define potential gradient of the potentiometer wire.		[1]
(e)	If friction is made zero for a road, can a vehicle move safely on this road?		[1]
(f)	Categorize the following into polar and non-polar dielectrics:		[1]
	a. H ₂ O		
	b. CO ₂		
(g)	What is the value of force on a closed circuit in a m	nagnetic field?	[1]
(h)	What happens if the rod of dia-magnetic material is	placed in a non-uniform magnetic field?	[1]

2.

Section B

Attempt any 8 questions

3.	Define coefficient of viscosity. State its formula and S.I. units.	[2]	
4.	Draw a neat and labelled diagram of suspended coil type moving coil galvanometer.		
5.	Explain the principle of conservation of angular momentum with the help of two appropriate examples.		
6.	Define capacitance of a capacitor and its S.I. unit.	[2]	
7.	Define second's pendulum. Derive a formula for the length of second's pendulum.	[2]	
8.	What is a thermodynamic process? Give any two types of it.	[2]	
9.	A 0.1 H inductor, a 25×10^{-6} F capacitor and a 15Ω resistor are connected in series to a 120 V , 50 $HzAC$ source. Calculate the resonant frequency.		
10.	A particle performing linear S.H.M. has a period of 6.28 seconds and a pathlength of 20 cm. What is the velocity when its displacement is 6 cm from mean position?	[2]	
11.	Distinguish between free vibrations and forced vibrations	[2]	
12.	Calculate the energy radiated in half a minute by a black body of surface area $200~cm^2$ at $127^{\circ}C$.	[2]	
13.	A moving coil galvanometer has a resistance of 25Ω and gives a full scale deflection for a current of 10 mA.	[2]	
	How will you convert it into a voltmeter having range $0-100V$?		
14.	An electron is orbiting in 5 th Bohr orbit. Calculate ionisation energy for this atom, if the ground state energy is	[2]	
	-13.6 eV.		
	Section C		
	Attempt any 8 questions		
15.	What is diffraction of light ? Explain its two types.	[3]	
16.	Draw neat, labelled diagram of a parallel plate capacitor with a dielectric slab between the plates.	[3]	
17.	Draw the diagrams showing the dipole moments in paramagnetic substance when external magnetic field is	[3]	
	i. absent		
	ii. strong		
18.	What is photoelectric effect?	[3]	
	Define:		
	i. Stopping potential		
	ii. Photoelectric work function.		
19.	Explain how a moving coil galvanometer can be converted into voltmeter.	[3]	
20.	Explain the reflection of transverse and longitudinal waves from a denser medium and rarer medium.	[3]	
21.	Explain, why the equivalent inductance of two coils connected in parallel is less than the inductance of either of	[3]	
	the coils.		
22.	In a set, 21 tuning forks are arranged in a series of decreasing frequencies. Each tuning fork produces 4 beats per second with the preceding fork. If the first fork is an octave of the last fork, find the frequencies of the first and	[3]	
22	tenth fork.	[2]	
23.	In Young's double slit experiment, the slits are 0.5 mm apart and interference is observed on a screen placed at a distance of 100 cm from the slit. It is found that 9 th bright fringe is at a distance of 8.835 mm from the 2 nd dark fringe on the same side of the centre of the fringe pattern. Find the varyalength of light used	[3]	
24	fringe, on the same side of the centre of the fringe pattern. Find the wavelength of light used. A circular coil of 250 turns and diameter 18 cm carries a current of 12 A. What is the magnitude of magnetic.	וכן	
24.	A circular coil of 250 turns and diameter 18 cm carries a current of 12 A. What is the magnitude of magnetic	[3]	
25	moment associated with the coil? An a coircuit consists of industor of 125 mH connected in parallel with a capacitor of 50 u. F. Determine	ופן	
25.	An a.c circuit consists of inductor of 125 mH connected in parallel with a capacitor of $50 \mu~F$. Determine	[3]	

roconant	frequency
resonam	Treamency

26. Find the value of energy of electron in eV in the third Bohr orbit of hydrogen atom. [3] [Rydberg's constant $(R)=1.097 imes 10^7~m^{-1}$, Planck's constant $(h)=6.63 imes 10^{-34}~J-s$, Velocity of light in air(c) = $3 \times 10^8 \ m/s$.

Section D

Attempt any 3 questions

- 27. Define surface energy of the liquid. Obtain the relation between the surface energy and surface tension. [4]
- 28. Answer the following questions:

[4]

[2]

- (a) State the principle on which a transformer works. With neat diagram, explain the construction of a
 - [2]
- A metal rod $\frac{1}{\sqrt{\pi}}$ m long rotates about one of its ends perpendicular to a plane whose magnetic (b) induction is 4×10^{-3} T. Calculate the number of revolutions made by the rod per second if the e.m.f. induced between the ends of the rod is 16 mV.
- 29. Answer the following questions:

[4]

[2]

- (a) Define:
 - a. Isothermal process
 - b. Adiabatic process.
- An ideal mono-atomic gas is adiabatically compressed so that its final temperature is twice its initial (b) [2] temperature. Calculate the ratio of final pressure to its initial pressure.
 - [4]

- 30. **Answer:**
 - Represent graphically energy distribution of a black body against wavelength at various temperatures. [2] (a)
 - Calculate the kinetic energy of 10 grams of Argon molecules at $127^{\circ}C$. (b) [2] [Universal gas constant R = 8320 J/k mole K, Atomic weight of Argon = 40]
- Obtain an expression for torque acting on a rotating body with constant angular acceleration. Hence state the 31. [4] dimensions and SI unit of torque.