EDUCATALYSTS

Class(12th)

Sample Paper Physics

Subject: Physics

Sample Question Paper (Theory)

Maximum Marks: 70 Marks | Time Allowed: 3 hours

(1) All questions are compulsory. There are 33 questions in all.
(2) This question paper has five sections: Section A, Section B, Seoion C, Section D and Section E.
(3) Section A contains ten very short answer questions and four assertion reasoning MCQS of 1 mark each, Seoion B has two use based questions of 4 marks each, Section C contains nine short answer questions of 2 marks each, Section D antains Frye short answer questions of 3 marks each and Section E contains three long answer questions of 5 marks each.
(4) There is no overall choice. However internal choir is provided. You have to attempt only one of the choices in such questions.

Sr		Marks

Secñon - A

All queotlona ace compulsory. In case of Internal choices, attempt

1	Name the physical quantity having unit J/T.	1
2	Mention one use of paA of electromagnetic spectrum to which a wavelength of 21 cm (emitted by hydrogen in interstellar space) belongs.	1
3	An electron with charge -e and mass m travels at a speed v in a plane perpendicular to a magnetic field of magnitude B. The electron follows a circular path of radius K In a time. t, the elecbon bavels halfway around the circle. What is the amount of work done by the magnetic field?	1

5 Mai ie the value a angular momentum oi elecoon in the eecona orbn a Bohrs model of h@rogen atom?

olenoid with N loops of wire
ing an electric current I. If thi
If, then what change would y

OR

6 in a photoolectnc expenment, the potentiai required to stop the ejeoion or

ltemating current from a sou
tive value of current and freq

7 in decsy of free neutron. name the elementary padicle emitiea along with proton end elearon in nuclear readion.

OR

lntñefolowñngnud$a nea‹ xion, ld$nmyunknownlabeledX.

8 How does the width of a depletion region of a pn junction vary if doping concentration is increased?

ln fia Pwav$mctfce#on, vvhatetheoutput fmquency 2inputNeq uencyle 25H*.

9 When ^ °8!W8 drop aQoss a pn junc0on dx›de is Invaded from 0.70 V to a 71v, the change in tie dioae cu=ent is to mA .what is tne dynamic

10 whio' spe•iaiiy fabricataa pn Junccon due is vsea for detecting iigh‹ iniensity7

herqut•tlon numuor• 88• 88• Iz anñ fia. toe sint*riwnu ore 9Ivonuri*

cerroci aacw«rtottiec« questions from the codto tg), tb}, (p) and (d)

b) Both A and R are true but R is NOT the correct explanation of A
o) A is true but R is false
d) A is false and R is also false

	In a nonunifom electric fieid, a dipole will have translatory as well as a onuniform elecbic field. a dipole experiences a force as well as e	
, Z	**Assertion(A):** Electric field is always normal to equipotential surfaces and along the direction of decreasing order of potential Negative gradient of eleoric potential is electric field.	
	A convex mirror cannot form real images. **Reason (R):** Convex mirror converges the parallel rays that are incident on it.	
	A co focal length 30 cm can't be used as a simple microscope For normal seGng, be angular magnifoafon of simpe micOscope is	
	Section - B ouestions 15 and 16 are Case Study baeed questions and are compulsory. Attempt any 4 cub parts from eacft question. Each question cames fi mat.	
	A Faraday cage or Faraday shield is an enclosure made of a conducting material. The fields within a conductor cancel out with any external fields, so the electric field within the enclosure is zero. These Faraday cages act feds A y I shocks the cage receives, pass hamlessly around the 	

	cage2 c) Copper b) plastic box 4. An isolated point charge +q is placed inside the Faraday cage. Its surface must have charge equal to- d) •2q 5. A point charge of 2C is placed at centre of Faraday cage in the shape of cube with surface of 9 cm edge. The number of electric field lines a) 1.9105 Nm^2/C entering the surface b) 1.9105 Nm^2/C leaving the surface c) 2.0105 Nm^2/C leaving the surface	
1s	sparking eniiianc» of oiamona:	4

Tñeloe inemal r‹memonofWelgn +sused +npolsNngdamondsto omat$aspe‹ting bdWanos. By polsWngtñedamond*lt|# spiooum, R iaaduetadth$moetof#•ilghtmyeappmecWngtñe eudaoeam lnddea *khan ange oC lndd$noemomkancd#&lang$. Hence, beyovN$r

gies the alemona a sparking bdllisnce.

4. Light cannot easily esnpe a aiamona without multiple internal refractions. This is beuuuse:
   a) lte crificul an9le witfi reference to air is too large
   b) Itsicul an9le with reference to siriotoosmall
   c) The diamond ie transparent
   d) Ruye stony enter at srrgle greater tfian witical angle

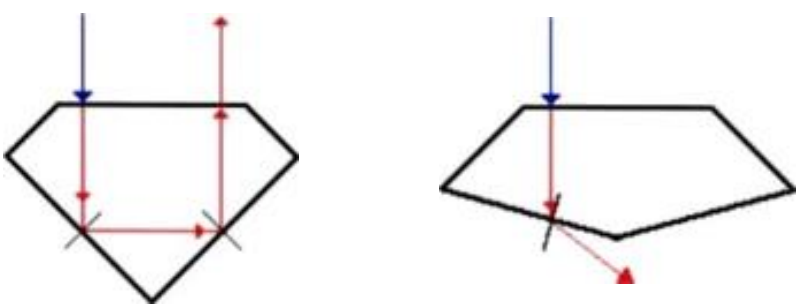
2. The critical angle for a diamond is 24.4°. Then iB refractive indax is-
   e) 2.42

3. The baelc ruseon for the extraordinary sparkle of suhn ip cut aiamond is thul

   b) liñasmghtmnspemncy
   c) tñasWghreFsdCeinge*

4. A diamond ie immersed in a liquid wtth s refrudve index greater than water. Then the cfical angle for lotel internet reflection will
   a) will depena on the nsture of the liquid

5. Tñefolowlngdagmmsñowe*mmmdiamond‹xain wmodTNensnt



	The brilliance ui diamond in the second diamond will be: a) less than the first c) same as first d) will depend on the intensity of light	
	Section - C **All questions are compulsory. In caee** ‹rf Internal **choices, attempt**	
17	Two straight infinitely long wires are fixed in space so that the current in the leh wire is 2 A and directed out of the plane of the page and the current in the right wire is 3 A and directed into l/ie plane of the page. In which region(s) is/are there a point on the x-axis, at which the magnetic field is equal to zero due to these currents carrying wires* Justify your answer.	
18	Draw the graph showing intensity disuibution of fringes with phase angle due to dii“n'o t*ui through single slit. What should be If+e width of each slit to obtain n maxima of double slit pattern within the central maxima of single slit panem*	2
19	Deduce an expression for the potential energy of a system of two poini charges q, and q, located at positions rJ and r, respemively in an external feld (E) Establish the relation between eledric field and electric potential at a wimitsmagnRudeincreasingatoonsantmteaong-Zdiredion	
20	I-xplain with nelp at cJrcuit diagram. me amion O* a forward Diased p•n junction diode which emits spontaneous radiation. Slate the least band gap energy of this diode to have emission in visible region.	

z4	6 coil of wire enclosing an area 4o£i w• is placoo witfi lk plane mating an the coil? If magneilc field Is reduced to zero In 10“ s. then find the induoed	
22	1s waves mom Mo cohemnt eouroee Sana S' euperimpoee ul8 seebowa in the fi9ure. If X iss point on the second minima ana SS - S'X ia 4.5 cm. Tulculate the wavelenJ of the waves. S S’	2
23	Draw the energy band diagram when intrinsic semiconductor (Ge) is doped with impurity atom8 of Antimony (Sb). Nama the extñn8ic eemioonductor so obtained and majoñty charge caTtiers in ie	
•s	serine be w •s magnelic inclination anu horizontal component ot **eare-s** ma9ne«c ieia at a piaco. Eetssiieh tht reismnaip t›envoen inc H wiin OR Hoñaonmloompon$ntWeaññsmagneacAegatapaceisV3dmeem$ veRcWoomponentAhai$ eyaueoHndnaéonatWagace7	
25	Xritstwolanaded$€ceoflmagefonnodwhenenob$olspaced~~w0.~~ 0eoptoMoenveandtoou$ofaminoonve,len$.Dnewtñ$gmpñsbnñng veñoDonoWmagedismnoe,vñthobedd,mnoeuln ñiacase.	2
	UI **questions on cempulnery.** In **ence ct** Internal choices, **uttumpt** sny erm.	
28	Sedauguarbopwhldhpesinisanyineg$meegMnofunFomandsme ndmntmagne:cfleg,iepu:edoutwnhoonmantvelo¿tyrgeshmvn n	

a) Skerh the vaña#on d magneuc lux, the induced cunent and po*erdsspaedasJoweheatasbndonoftme.

expect the same vaue of induoad cumanr? JusNy your answe. Skedi Oe vanaaon of fiuxn his case with ame

27	A vanable resistor R s connected across a cell oF emF E and internal resistance r. c) Atwhatvaue‹ fRcunenincircuRv€bemakmum. As:omgebaWeryisofemf8Vandintemaresisauoe0.Sohmisbmug 1aqedbydcxpp\of120Vusingamsistorof1S5ohm b) Calculate the potential difference aaoss the battery. c) Mat is the purpose of having series resistance in this circuit?	3
28	a) Explain de-Broglie argument to propose his hypothesis. Show that de-Broglie wavelength of photon equals electromagnetic radiation. b) t.deaemnsandapñapaniheareaoce!$‹ atedthmugñsamepoen0al Wndk$m0odtñ$axodaedd$Brogl$waveengbsofW State the man impicatons of obsewatons oM ned #em vañm photo€eañcezpeñmenb. Can these implcawOns be expaned by wave	

hydrogen atom de-exclles from level n to level (n — 1). Also show that for large values of n, this frequency equals la classical frequency of revolution

30 a) Give one point or aiiference t›etween nueiear tssion ana nuclear 3

b) Suppose we consider fission of a $^{56}_{26}Fe$ into two equal fragments of $^{28}_{13}Al$ nucleus. Is the fission energetically possible? Justify your answer by working out Q value of the process.

Given $(m)^{56}_{26}Fe = 55.93494$ u and $(m)^{28}_{13}Al = 27.98191$

All questions ace compulcery. In crime **of Int+mat oholc*s, attempt** any one.

* at 'a) State **Gauss's** law in eledrostatics. Show that with help of suitable figure 5 that ouMard flux due to a goint charge Q, in vacuum wfifiin gaussian surface, is independent of its size and shape.

b) In the figure thare are three infinite long thin sheets having surface charge density *2o. •2o and *o respectively. Give the magnitude and direction of electric field at a point to the left of sheet of chage density +2o and to the right of sheet of charge density *o.

2‹r -2c ‹r

A B C D

	a) Define an ideal electric dipole. Give an example. b) Derive an expression for the torque experienced by an electric dipole in a uni1b+”m eledric field. What is net face acâng on this c) An elecbic dipole of length 2cm is placed wfifi its axis making an angle of 60° wk respect to uniform electric field of 10*N/C. If it experiences a torque of 8^/3 Nm, calculate the (i) magnitude of charge on the dipole. and fis potential energy.	
32	a) Derive the expression for the current floing in an ideal capacitor and ia readance wt›en connemed to an ac source of voltage V•VeaIntat. ocour iu be cuuent flowing in ‹he ñrcuñand phsse angle behveen a) Siatetñepñnwpeo(aogeneraor. b) Expanwdñiñe ñelpofawe#labmeddagmm,#s*otingand obantñeexprmssonformeemfg$ne‹ated inlheooil c hiipoesbOtog$neteemf# owrolaingtecoiltExpan	
33	a) Define a wave front. pass through (i) a thin prism and (ii) a thin convex lens. State the nature of ~~i”u++aurT~~ wave front. c) Verify Snell's law of ~~+cnouri~~ui i using Huygens‘s principle. a) State two main considerations taken into account while c) SateWeadvanagesoCretecflng:ypetelessopeover1he	