**Sample Paper – 2013
Class – XII
Subject –PHYSICS**

1. Please check that this question paper contains 04 printed pages.
2. Code number given on the right hand side of the question paper should be written on the title page of the answer –book by the candidate.
3. Please check that this question paper contains 29 questions. Please write down the serial no of the question before attempting it.
4. 15 minutes time has been allotted to read this question paper.

**Max. Marks: 70 Time allowed: 3 hours**

**General Instructions:-**

1. All questions are compulsory.
2. There are 30 questions in total. Questions 1to 8 carry one marks each., questions 9 to16 carry two marks each, questions17 to25 carry three marks each, question 26 carry 4 marks and questions 27 to 29 carry five marks each..
3. There is no overall choice. However, an internal choice has been provided in , one question of three marks and all questions of five marks each. You have to attempt only one of the choices in such questions. Use of calculators is not permitted.
4. You may use the following values of physical constants wherever necessary:

 c = 3 x108 ms-1

 h = 6.626 x10-34 Js

 e = 1.602 x 10-19 C

 µ0 = 4π x10-7 TmA-1

 $\frac{1}{4πЄ0}$ = 9 x 109 Nm2C-2

Masses of electron me = 9.1 x10-31 kg

Mass of electron mn = 1.675 x10-27 kg

Boltzmann’s constant k = 1.381 x 10-23 JK-1

Avogadro’s number NA= 6.022 x 1023 mol-1

 Radius of earth =6400 km

 QUESTION

Q.1 A converging lens of focal length **f** is cut into two identical part, each forming a plano convex lens. What is the focal length of each part?

Q.2 Find the resistance of a colour coded carbon resistor with first , second and third rings of yellow, green and orange colours.

Q.3 A wire of resistance 40 Ohm is bent in the form of a circle. What is the

A

B

 effective resistance between the ends of a diameter AB?

Q.4 The stopping potential in a experiment of photoelectric effect is 2.5V. What is the maximum kinetic energy of photoelectrons emitted?

Q.5 Calculate refractive index of a medium whose critical angle is 30°.

Q.6 What the de-broglie wavelength of a ball of mass 6 kg and moving with a velocity of 2 m/sec.

Q.7 What is the work done by the magnetic field on a moving charged particle?

Q.8 The electric current in a wire in the direction from B to A is decreasing. What is the direction of induced current in the metallic loop kept

 above the wire as shown in the figure?

A

B

Q.9 (i) In the given diagram, is the diode D forward or reversed biased?

**10**

 (ii)Write the truth table for the gate shown below.

B

A

C

Q.10. Define electric flux. Write its S.I. units. A change q is enclosed by a spherical surface of radius R. If the radius is reduced to half how would the electric flux through the surface change ?

Q.11 Calculate the resistance

 between A and B

Q.12 An electric dipole of length 2cm is placed with its axis making an angle 600 to a uniform electric field of 105 N/C. If it experiences a torque of 8√3 Nm. Calculate the (i) magnitude of the charge on the dipole (ii) potential energy of the dipole.

Q.13 A sinusoidal voltage V=200 sin 314t is applied to a resistor of 10 ohms resistance. Calculate (i) rms value of the voltage, (ii) rms value of the current and (iii) power dissipated as heat in watts.

Q.14 A Double convex lens is to be manufactured from a glass of refractive index 1.55, with both the faces of the same radius of curvature. What is the radius of curvature if the focal length is 20cm?

Q.15 In the photo electric experiment, the graph between the stopping potential and frequency of incident radiations on two metal plates P and Q are shown in figure.

Q

P

Stopping potential (v)

Frequency ( ν )

1. Which has smaller work function?
2. What does the slope of the line depict?

Q.16 A carrier wave of peak voltage 12V is used to transmit a message signal. What should be the peak voltage of the modulating signal in order to have a modulation index of 75%.

Q.17 Identify the part of the electromagnetic spectrum which is

 (i) suitable for radar systems used in aircraft navigation.

 (ii) used for studying crystal structure.

 (iii) produces intense heating.

 (iv) has its wavelength range between 390nm and 700nm.

 (v) has largest penetrating power.

 (vi) used in microwave ovens.

Q.18 Define angle of dip. If the ratio of the horizontal component of earth’s magnetic field to the resultant magnetic field at a place is 1/√2, what is the angle of dip at that place?.

Q.19 Define capacitance of a capacitor.

10μf

A

B

 Calculate the capacitance

C

 C in the figure if the

 equivalent capacitance of

10μf

 the combination between

 A and B is 15μf.

Q.20 (i) What is a metre bridge?

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(ii) In a meter bridge balance point is found at a distance l1= 40cm with resistances R and S as shown in the figure. When a resistance X = 12 Ohm is connected in parallel with the resistance S, the balance point shifts to a distance l2 =50cm from A. Determine the values of R and S.

Q.21 What is the ionisation energy of hydrogen atom. Find the shortest wavelength present in the paschen series of spectral lines?

Q.22 Draw a graph to show the variation of the angle deviation ‘D’ with that of theangle of incidence ‘I’. For a monochromatic ray of light passing through a glass of prism of refracting angle ‘A” deduce the refractive index n of the prism

 $n=\frac{Sin( \frac{A+Dm}{2} )}{Sin(\frac{A}{2})}$ .

Q.23 Find the ratio of the intensities at two points on a screen in young’s double slit experiment when the waves from two slits have a path difference of (i) 0 (ii) λ/4.

Q.24 (a) A radioactive isotope has a half life of 5 years. After how much time is its activity reduces to 3.125 % of its original activity?

 (b) Write the nuclear equations for α decay of $$**.**

Q.25 A message signal of frequency 10KHz and peak voltage of 10 volts is used to modulate a carrier of frequency 1MHz and peak voltage of 20 volts. Determine (a) modulation index (b) the side bands produc*e*d.

 **OR**

 What is modulation? Why modulation is necessary in communication system?

 Q.26 Suhasini’s uncle is advised by his doctor to have an MRI scan on his chest. Her uncle did not know much about the details and the significance of this test. He also felt that it was too expensive and thought of postponing it.

 When suhasini learnt about her uncle’s problems, she immediately decided to do something about it. She took the help of her family, friends and neighbours and arranged for the cost of the test. She also told her uncle that an MRI (Magnetic Reasonance Imaging) scan of his chest would enables the doctors to know the condition of his hearts lungs without causing any( test related) harm to him. This test was expensive because of its set up that needs strong magnetic field ( 0.5T to 3 T) and pulses of radio wave energy.

 Her uncle was convinced and had the required MRI scan of his chest done. The resulting information greatly helped his doctors to treat him well.

 (a) What according to you are the values displayed by suhasini and her family, friends and neighbours to help her uncle ?

 (b) Assuming the MRI scan of his uncle’s chest was done by using a magnetic field of 1T . Find the maximum and minimum value of the force exerted by the magnetic field on a proton that was moving at a speed of 104 m/sec. State the condition under which this force has minimum value.

Q.27 State Huygen’s principle. Derive the law of refraction on the basis of Huygen’s wave theory of light. Hence show that the frequency of light remains same during the light moves from one optical medium to another optical medium

 OR

1. Explain the phenomenon of diffraction of light at a single slit to show the formation of diffraction fringes.
2. Calculate the distance that a beam of light of wavelength 500nm can travel without significant broadening, if the diffracting aperature is 3mm wide.

Q.28 (a) With the help of a circuit diagram explain the working of a transistor as amplifier.

 (b) If a change of 100µA in the base current of an n-p-n transistor causes a change of 10mA in its collector current. What is it’s a.c. current gain.

 OR

 With the help of circuit diagram, explain the working of a p-n junction diode as full wave rectifier. Show the input and output wave forms.

Q29. State the principle and working of an alternating current generator.

 OR

 (a) Derive the expression for the impedance of an ac circuit with a inductor, a capacitor and a resistance in series.

 (b) A 12 ohms resistance and inductance of 0.05/π Henry are connected in series. Across the ends of a circuit which is connected to 130 V alternating voltage of frequency 50cycles/second. Calculate the current in the circuit and potential difference across the inductance.

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| S.No | Unit | VSA(1mark) | SA I(2 marks) | SA II (3marks) | Value Based Question (4marks) | LA(5marks) | Total |
| 1 | Electrostatics | 1(1) | 4(2) | 3(1) | ----- | -- | 8(4) |
| 2 | Currentelectricity | 2(2) | 2(1) | 3(1) | ---- | --- | 7(4) |
| 3 | Magnetic effect of current & magnetism | 1(1) |  | 3(1) | 4(1) | ----- | 8(3) |
| 4 | Electromagnetic induction and alternating current | 1(1) | 2(1) | ---- | -- | 5(1) | 8(3) |
| 5 | Electromagnetic waves | -- | -- | 3(1) | -- | --- | 3(1) |
| 6 | Optics | 1(1) | 2(1) | 6(2) |  | 5(1) | 14(5) |
| 7 | Dual nature of radiation and matter | --- | 4(2) | --- | --- | --- | 4(2) |
| 8 | Atoms and Nuclei | --- | --- | 6(2) | --- | -- | 6(2) |
| 9 | Electronic devices | --- | 2(1) | --- | -- | 5(1) | 7(2) |
| 10 | Communication systems | 2(2) | --- | 3(1) | -- | --- | 5(3) |
|  | total | 8(8)  | 16(8) | 27(9) | 4(1) | 15(3) | 70(29) |