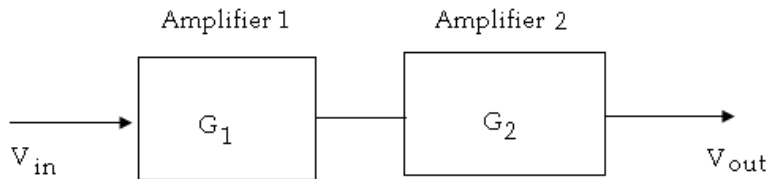


Sample Paper
Sub :- Physics
Class - XII

Time – Three Hours

Max. Marks : 70

1. No force is exerted by a stationary charge when placed in a magnetic field. Why? 1
2. Why are the oscillations of a copper disc in a magnetic field lightly damped? 1
3. Name two factors on which electrical conductivity of a pure semiconductor at a given temperature depends. 1
4. Why is a quantity $\epsilon_0 \frac{d\phi E}{dt}$ called the displacement current? 1
5. Two identical coherent waves, each of intensity I_0 , are producing an interference pattern. Write the value of the resultant intensity at a point of (i) constructive interference and (ii) destructive interference. 1
6. The radius of the first electron orbit of the hydrogen atom is 5.3×10^{-11} m. What is the radius of the second orbit? 1
7. Find the time required of a 60 Hz alternating current to reach its peak value starting from zero. 1
8. Two amplifiers are connected one after the other in series (cascaded). The first amplifier has a voltage gain of 10 and the second has a voltage gain of 20. If the input signal is 0.01 V, calculate the output a.c. signal. 1



9. A parallel plate capacitor with air as dielectric is charged by a d.c. source to a potential 'V'. Without disconnecting the capacitor from the source, air is replaced by another dielectric medium of dielectric constant 10. State with reason, how does (i) electric field between the plates, and (ii) energy stored in the capacitor changes? 2
10. Explain how electron mobility changes for a good conductor when (i) the temperature of the conductor is decreased at constant potential difference and (ii) applied potential difference is doubled at constant temperature. 2
11. How does the resolving power of a compound microscope change, when (i) refractive index of the medium between the object and the objective lens increases; and (ii) wavelength of the radiation used is increased? 2
12. A coil of n turns and radius R carries I . It is unwound and rewound to make another coil of radius 2

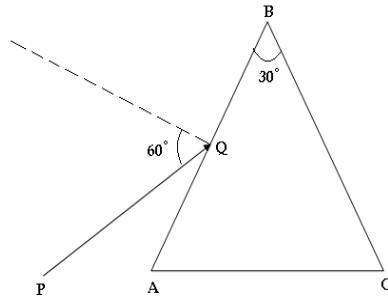
$R/2$, current remaining the same. Calculate the ratio of the magnetic moments of the new coil and the original coil.

13. When can a charge act as a source of electromagnetic waves? How are the directions, of the electric and magnetic field vectors, in an electromagnetic wave, related to each other and to the direction of propagation of the wave? 2
- Which physical quantity, if any, has the same value for waves belonging to the different parts of the electromagnetic spectrum? 2
14. A microscope is focused on a dot at the bottom of a beaker. Some oil is poured into the beaker to a height of y cm and it is found necessary to raise the microscope through a vertical distance of x cm to bring the dot again into focus. Express refractive index of oil in terms of x and y . 2
15. A D.C. voltage of 220V is applied across the primary of transformer find output voltage. 2
16. In an experiment on photoelectric effect, the slope of the cut-off voltage versus frequency of incident light is found to be 4.12×10^{-15} Vs. 2
- Given $e = 1.6 \times 10^{-19}$ C estimate the Planck's constant.
17. Explain how radioactive nuclei can emit β -particles even though atomic nuclei do not contain these particles. Hence explain why the mass number of radioactive nuclide does not change during β -decay. 2
18. Define the terms transducer, signal, noise and attenuation in respect of an electronic communication system. 2
19. State Gauss's law in electrostatics. Using this theorem, show mathematically that for any point outside the shell, the field due to uniformly charged thin spherical shell is the same as if entire charge of the shell is concentrated at the centre. Why do you expect the electric field inside the shell to be zero according to this law? 3
- Draw a graph showing the variation of electric field E with distance r from the centre of a uniformly charged thin spherical shell.
20. State the principle of superposition of electric fields. Use it to derive an expression for the electric field at a point due to a system of N point charges. 3
21. Two identical cells of emf 1.5 V each joined in parallel provide supply to an external circuit consisting of two resistances of 17Ω each joined in parallel. A very high resistance voltmeter reads the terminal voltage of cells to be 1.4 V. Calculate the internal resistance of each cell. 3

Or

Four identical cells, each of emf 2 V, are joined in parallel providing supply of current to external circuit consisting of two 15Ω resistors joined in parallel. The terminal voltage of the cells, as read by an ideal voltmeter is 1.6 volt. Calculate the internal resistance of each cell.

22. A ray of light PQ is incident at angle of 60° on the face AB of a prism of angle 30° , as shown in fig.3. The ray emerging out of the prism makes an angle of 30° with the incident ray. Show that the emergent ray is perpendicular to the face BC through which it emerges. Also calculate the refractive index of the prism material. 3



23. Using phasor diagram, derive an expression for the impedance of a series LCR-circuit. What do you mean by resonance condition of such a circuit? 3
24. An angular magnification (magnifying power) of $30\times$ is desired using an objective of focal length 1.25 cm and an eyepiece of focal length 5 cm . How will you set up the compound microscope? 3
25. A long solenoid with 15 turns per cm has a small loop of area 2.0 cm^2 placed inside, normal to the axis of the solenoid. If the current carried by the solenoid changes steadily from 2 A to 4 A in 0.1 s , what is the induced voltage in the loop while the current is changing? 3
26. A heavy nucleus X of mass number $A = 240$ and binding energy per nucleon 7.6 MeV is split into two nearly equal fragments Y and Z of mass numbers $A_1 = 110$ and $A_2 = 130$. The binding energy of each one of these nuclei is 8.5 MeV per nucleon. Calculate the total binding energy of each of the nuclei X, Y and Z and hence the energy Q released per fission in MeV . 3
27. With the help of a simple circuit diagram, briefly explain the production of amplitude modulated carrier wave.
28. (a) State the Biot-Savart law for the magnetic field due to a current carrying element. Use this law to obtain a formula for magnetic field at the centre of a circular loop of radius R carrying a steady current I . Indicate the direction of the magnetic field. 3
- (b) A long wire is bent into a circular coil of one turn and then into a circular coil of smaller radius having n turns. If the same current passes in both the case, find the ratio of the magnetic fields produced at the centres in the two cases. 5

Or

- (a) Derive an expression for the maximum force experienced by a straight conductor of length l , carrying current I and kept in a uniform magnetic field, B .

(b) A straight wire, of length L , carrying a current I , stays suspended horizontally in mid air in a region where there is a uniform magnetic field B . The linear mass density of the wire is λ . Obtain the magnitude and direction of this magnetic field.

29. What is interference of light? Write two essential conditions for sustained interference pattern to be produced on the screen. Draw a graph showing the variation of intensity versus the position on the screen in Young's experiment when (a) both the slits are opened and (b) one of the slits is closed. 5

What is the effect on the interference pattern in Young's double slit experiment when : (i) screen is moved closer to the plane of slits? (ii) separation between two slits is increased? Explain your answer in each case.

Or

What is diffraction of light? Draw a graph showing the variation of intensity with angle in a single slit diffraction experiment. Write one feature which distinguishes the observed pattern from the double slit interference pattern. 5

(i) The width of the slit is decreased ?

(ii) The monochromatic source of light is replaced by a source of white light?

30. For an n-p-n transistor in the common-emitter configuration, draw a labeled circuit diagram of an arrangement for measuring the collector current as a function of collector-emitter voltage for at least two different values of base current. Draw the shape of the curves obtained. 5

Define the terms : (i) output resistance and (ii) current amplification factor.

Or

Draw a circuit diagram to show the connections for the operation of p-n-p transistor as a common emitter amplifier. Explain its different biasing. What is phase relationship between the input and output voltages in this case.

Ajay Sharma
Princ Academy of Higher Education
Sikar (Rajasthan)
Contact - 9414368091
Sharmajay846@gmail.com