

Class 12th

BOARD MOCK 1

PHYSICS

(Marks 70)

Q1). A particle of mass m and charge q is released from rest in a uniform electric field of intensity E . calculate the kinetic energy it attains after moving a distances between the plates?

Q2). Drive an expression for the total work done in rotating an electric dipole through an angle θ in a uniform electric field?

Q3). Why is constantan or manganin used for making standard resistors?

Q4). A coil of inductance 0.50 H and resistance 100Ω is connected to a 240 V , 50 Hz ac supply.

(a) What is the maximum current in the coil?

(b) What is the time lag between the voltage maximum and the current maximum?

Q5). What is the radial magnetic field? How is obtained in moving coil galvanometer?

Q6). A beam of light consisting of two wavelengths, 650nm and 520nm , is used to obtain interference fringes in a Young's double-slit experiment.

(a) Find the distance of the third bright fringe on the screen from the central maximum for wavelength 650nm .

(b) What is the least distance from the central maximum where the bright fringes due to both the wavelengths coincide?

$\lambda_1 = 600\text{nm}$

Q7). The energy of a charged particle moving in a uniform magnetic field does not change. Why?

Q8). The wavelength of light from the spectral emission line of sodium is 589 nm. Find the kinetic energy at which

(a) an electron, and

(b) a neutron would have the same de Broglie wavelength.

Q9). Calculate the current drawn by the primary of a transformer which steps down 200 V to 20 V to operate a device of resistance 20Ω . Assume the efficiency of transformer to be 80%.

Q10). A 44 mH inductor is connected to 220 V, 50 Hz ac supply. Determine the rms value of the current in the circuit.

Q11). Write the application of infra-red radiations?

Q12). For sound waves, the Doppler formula for frequency shift differs slightly between the two situations: (i) source at rest; observer moving, and (ii) source moving; observer at rest. The exact Doppler formulas for the case of light waves in vacuum are, however, strictly identical for these situations. Explain why this should be so. Would you expect the formulas to be strictly identical for the two situations in case of light travelling in a medium?

Q13). Find the radius of curvature of the convex surface of a plan-convex lens, whose focal length is 0.3 m and the refractive index of the material of the lens is 1.5 ?

Q14). Derive an expression for de Broglie wavelength of an electron?

Q15). The half-life period of a radioactive substance is 30 days. What is the time taken for $\frac{3}{4}$ th of its original mass to disintegrate?

Q16). Show that in the free oscillations of an LC circuit, the sum of energies stored in the capacitor and the inductor is constant in time?

Q17). The wavelength of the first member of Balmer series in hydrogen spectrum is 6563 \AA . Calculate the wavelength of the first member of Lyman series in the same spectrum.

Q18). Two electric bulbs A and B are marked 220V, 40W and 220V, 60W respectively. Which one has a higher resistance?

Q19). (a) The peak voltage of an AC supply is 300 V. What is the RMS voltage?

(b) The RMS value of current in an AC circuit is 10 A. What is the peak current?

Q20). State Biot-Savart's Law. Derive an expression for magnetic field at the centre of a circular coil of n -turns carrying current I ?

Q21). In a single slit experiment, how is the angular width of the central bright fringe maximum changed when

- The slit width is increased.
- The distance between the slit and screen is increased.
- Light of smaller wavelength is used.

Q22). What is the total force on all the electrons in 1m of the beam if it passes through the field of $0.1 \text{ NA}^{-1} \text{ m}^{-1}$?

Q23). An electron has kinetic energy equal to 100eV. Calculate

a) Momentum

b) Speed

c) Debroglie wavelength of the electron

Q24). Obtain an expression for the self inductance of a long solenoid? Hence define one Henry?

Q25. Draw a label diagram of telescope when the image is formed at the least distance of distinct vision? Hence derive the expression for its magnifying power?

Q26). A small candle, 2.5cm in size is placed at 27cm in front of a concave mirror of radius of curvature 36cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image? Describe the nature and size of the image. If the candle is moved closer to the mirror, how would the screen have to be moved?

Q27). Photoelectric work function of a metals is 1eV. Light of wavelength 3000 \AA falls on it.

What is the velocity of the effected photoelectron?

Q28). In Young's double slit experiment, using light of wavelength 400 nm, interference fringes of width to 600nm, and and the separation between the slits is halved. If one wants the observed fringe width on the screen to be the same in the two

cases, find the ratio of the distance between the screen and the plane of the interfering.