



UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Eighth Semester – 2019

Paper: Classical Electrodynamics-II

Course Code: PHY-423 Part – I (Compulsory)

Time: 15 Min. Marks: 10

Roll No. in Fig.

Roll No. in Words.

Signature of Supdt.:

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the correct option.

(10x1=10)

- i. Equation of continuity in covariant form is _____. (where \mathfrak{J} is four vector current density).
(a) $\frac{\partial \mathfrak{J}_\nu}{\partial x_\nu} = 1$ (b) $\frac{\partial \mathfrak{J}_\nu}{\partial x_\nu} = 0$ (c) $\frac{\partial \mathfrak{J}_\nu}{\partial x_\nu} < 1$ (d) $\frac{\partial \mathfrak{J}_\nu}{\partial x_\nu} > 1$
- ii. The vector $\mathbf{E} + \partial A/\partial t$ has a zero curl, then which one from the following is correct:
(a) $\mathbf{E} + \partial A/\partial t = \varphi$ (b) $\mathbf{E} + \partial A/\partial t = \mathbf{B}$ (c) $\mathbf{E} + \partial A/\partial t = -\nabla\varphi$ (d) None of these
- iii. The transmittance will be treated as absorptance in _____ media.
(a) Non conducting (b) Conducting (c) Dielectric (d) All
- iv. In plasma, the magnetic energy density $B^2/2\mu_0$ is known as
(a) Electric pressure (b) Fluid pressure (c) Magnetic pressure (d) None of these
- v. The basic mechanism causing pinch effect is the interaction of
(a) Current with its own magnetic field (c) Current with the external magnetic field
(c) Electric and magnetic fields (d) None of these
- vi. For any pair of non conducting media, the reflectance R and transmittance T satisfy
(a) $R + T > 1$ (b) $R + T < 1$ (c) $R + T = 1$ (d) $R + T = 0$
- vii. With the external magnetic field \mathbf{B} , the drift motion in plasma occurs due to the presence of
(a) Electric field \mathbf{E} (b) Electric current I (c) Both \mathbf{E} and I (d) None of these
- viii. The criterion for the reflection of plasma in magnetic mirror is
(a) $\sin^2\theta_0 = B_0/B_m$ (b) $\sin^2\theta_0 > B_0/B_m$ (c) $\sin^2\theta_0 < B_0/B_m$ (d) None of these
- ix. On the basis of exhibiting magnetic behavior, plasma is
(a) Paramagnetic (b) Ferromagnetic (c) Diamagnetic (d) None of these
- x. Which pair is correct
(a) $D = E/\epsilon, H = \mu B$ (b) $D = B/\epsilon, H = \mu E$ (c) $D = \epsilon E, H = B/\mu$ (d) None of these



ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

- Q.2. Answer the following questions: (4+5+3+4+4=20)**
- i. Differentiate between a neutral gas and a plasma. 4
 - ii. Discuss briefly the circular and elliptical polarizations. 5
 - iii. What are the three criteria for an ionized gas to be a plasma? 3
 - iv. Discuss briefly the few applications of laser? 4
 - v. Calculate the frequency of sea water if skin depth is $\delta = 1$, $\mu = \mu_0$ and conductivity = $4.3S/m$. 4
- Q.3** What are plasma oscillations? Calculate plasma frequency by using the linearization process. (10)
- Q.4** Discuss the construction and working of PN junction laser. (10)
- Q.5** Define skin depth. Discuss in detail the propagation of plane monochromatic waves in conducting media. (10)