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SEAT No. \_\_\_\_\_

No. of Printed Papers: 02

**SARDAR PATEL UNIVERSITY**  
**M.Sc. (Physics) 2<sup>nd</sup> Semester Examination**  
**Saturday, 23<sup>rd</sup> March, 2019**  
**Subject: PS02CPHY03**  
**(Electrodynamics and Plasma Physics)**

Time: 02:00 pm to 05:00 pm

Total Marks: 70

**Q-1 Eight multiple choice questions. (MCQ)**

**[01 mark each]**

1. Total energy density of the electromagnetic field is given by \_\_\_\_  
 (a)  $\epsilon_0 E^2 + \mu_0 H^2$  (b)  $1/2[\epsilon_0 E^2 + \mu_0 H^2]$  (c)  $1/2[\epsilon_0 E + \mu_0 H]$  (d) None
2. For the interior of the hollow rectangular waveguide, \_\_\_\_ is zero  
 (a) Curl of E (b) divergence of E (c) curl of B (d) None
3. "Magnetic monopoles do not exist" statement is expressed as \_\_\_\_  
 (a)  $\nabla \times B = \mu_0 J + \mu_0 \epsilon_0 dE/dt$  (b)  $\nabla \cdot E = 0$  (c)  $\nabla \times E = -dB/dt$  (d)  $\nabla \cdot B = 0$
4. The dominant mode of EM transmission through a rectangular waveguide is \_\_\_\_  
 (a)  $TE_{11}$  (b)  $TM_{11}$  (c)  $TM_{10}$  (d)  $TE_{10}$
5. What would be the length of a half wave dipole antenna operating in air at 50 MHZ?  
 (a) 3 m (b) 6 m (c) 50 m (d) 25 m
6. The \_\_\_\_ equation is a differential equation describing time evolution of the distribution function of plasma with long-range interaction.  
 (a) Vlasov (b) Boltzman (c) Landau (d) Van Kampen
7. The Lorentz gauge condition is expressed as \_\_\_\_  
 (a)  $\nabla \cdot A = 0$  (b)  $\nabla \cdot A + \frac{\partial \phi}{\partial t} = 0$  (c)  $\nabla \cdot B = 0$  (d)  $r \cdot A = 0$
8. In the case of planar sheath, the mach number, \_\_\_\_ is called the Bohm sheath criterion  
 (a)  $m^2 < 1$  (b)  $m^2 > 1$  (c)  $1/m > 1$  (d)  $1/m^3 > 1$

**Q-2 Attempt any 7 of the following 9 question briefly.**

**[02 marks each]**

1. What are retarded potentials? How are they computed?
2. Explain the different field zones of an extended radiating source.
3. Explain Poynting theorem.
4. Describe three fundamental laws of Optics.

