Registration No: | | | | | | | | | | |

Total Number of Pages: 01 **M.Sc.**

16MPYC303

3rd Semester Regular/Back Examination 2017-18

Classical Electrodynamics

BRANCH: M.Sc.(AP)

Time: 3 Hours

Max Marks: 70

Q.CODE: B579

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) State Gauss' Law in electrostatics.
b) Write two homogeneous Maxwell's equations.
c) Write the two inhomogeneous Maxwell's equations.
d) What is meant by Coulomb gauge
e) State Brewster's law.
f) What is meant by phase matching?
g) Why the sky appears blue?
h) What is difference between wave guide and resonant cavity?
i) Write Larmor's formula and explain the symbols used.
j) Write the expression for the electric dipole moment of an Oscillating electric dipole.

Q2 **a)** Derive the covariant form of two homogeneous Maxwell's equations. **(8)**
b) Write the expressions for the Lagrangian of a free particle and that for a charged particle in presence of external electromagnetic field. **(2)**

Q3 **a)** State Biot-Sovart's law and derive a Maxwell equation from it. **(6)**
b) Derive the wave equation for scalar and vector potentials. **(4)**

Q4 Discuss the reflection and refraction of plane electromagnetic waves for oblique incidence and p-polarization. **(10)**

Q5 **a)** Derive Kramers – Kronig relations. **(6)**
b) What is the basic difference between circular and elliptically polarised E.M. waves? **(4)**

Q6 **a)** Derive an expression for the total power radiated by a center-fed linear antenna when $I = I_0\left(1-\frac{2|Z|}{d}\right)$, where the symbols have usual meaning. **(7)**

b) Derive the covariant form of equation of continuity. **(3)**

Q7 **a)** Derive an expression for the vector potential at a point due to a magnetic dipole. **(5)**
b) Derive the expression for the scalar potential at a point $P(r,\theta,\phi)$ due to an oscillating electric dipole. **(5)**

Q8 **Write short answer on any two:** **(5 x 2)**

a) Green's function solution for advanced potential.
b) Thomson's Scattering.
c) Modes in rectangular wave guide.
d) Kirchoff's integral for diffraction.