Reg. No. :

Question Paper Code : 91447

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
Fourth Semester
Electronics and Communication Engineering
EC6403 – ELECTROMAGNETIC FIELDS
(Regulations 2013)
(Common to PTEC6403 – Electromagnetic Fields for B.E. (Part -Time) – Third
Semester – Electronics and Communication Engineering,
(Regulations 2014)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions
PART – A   (10×2=20 Marks)

1. State Stokes theorem.

2. Define potential difference.

3. What is polarization ?

4. What is 'method of images' ? When it is used ?

5. State Biot Savart Law.

6. State Ampere's circuital law.

7. Define torque and its expression.

8. What is a Ferromagnetic material ? Give example.

9. Define Poynting vector, what is its SI unit ?

10. State Faraday's law of electromagnetic induction.

PART – B   (5×13=65 Marks)

11. a) Derive the electric field due to infinite line charge with charge density ρL.

(OR)

b) i) What is energy density ? Explain energy density in electrostatic fields and
derive the expression for energy storage.   (8)

ii) Define Coulombs law. What is its proportionality constant K in free space ?   (5)

12. a) Explain boundary conditions for electric fields between conductor and free space.

(OR)

b) Derive capacitance of a coaxial cable and for a spherical capacitor.

13. a) Derive magnetic field intensity for a Co-axial Cable.

(OR)

b) i) Determine magnetic field intensity due to infinitely long conductor using Ampere's Law. **(7)**

ii) Given the vector magnetic potential, $\bar{A} = \dfrac{10}{x^2 + y^2 + z^2} a_x$, obtain the magnetic flux density. **(6)**

14. a) i) Derive the inductance of a coaxial cable . **(7)**

ii) Derive the inductance of a solenoid. **(6)**

(OR)

b) Explain and derive the magnetic field boundary condition for two different dielectrics.

15. a) Derive displacement current from circuital analysis and from Ampere circuital law.

(OR)

b) Derive and explain Maxwell's equations both in integral and point forms.

PART – C **(1×15=15 Marks)**

16. a) A point charge Q = 18 nc has a velocity of 5×10^6 m/s in the direction

$\bar{a}_v = 0.6\, a_x + 0.75\, a_y + 0.3 a_z$.

Calculate the magnitude of the force exerted on the charge by

$\bar{E} = -3\bar{a}_x + 4\bar{a}_y + 6\,\bar{a}_z$ kv / m

$\bar{B} = -3 a_x + 4 a_y + 6\,\bar{a}_z$ MT

(OR)

b) Given a 60 µC point charge located at the origin. Find the electric flux passing through the closed surface defined by e = 26 cm and z = ±26 cm.