SUBJECT CODE NO:- P-32
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EEP/EE/EEE) Examination May/June 2017
Electromagnetic Fields
(Revised)

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.

N.B   i)Q.No.1 and Q.No.6 are compulsory.
            ii)Attempt any two other questions from the remaining questions of each section.
            iii)Assume suitable data wherever necessary.

Section A

Q.1   Attempt any five   10

i)What do you mean by scalar and vector field.

ii)$\bar{A}$ = 4ax +6ay

$\bar{B}$=2ax +3ay -2az

Find $\bar{A} \times \bar{B}$

iii) Give the expression for differential vector length in Cartesian, cylindrical and spherical co-ordinate system.

iv) A charge of 7 μc located at the centre of sphere of radius 6cm. What is the flux passing through the sphere.

v) State Coulomb's law.

vi) Transfer the co-ordinates of point P(2,3,-4) to spherical co-ordinate.

vii) What do you mean by gradient.

viii) Define Electric dipole and dipole moment.

Q.2   a)Transfer the following vector to cylindrical co-ordinates.   07
        F=10ax-8ay+6az   at P(10,-8,6)

        b)Derive the expression for electric field intensity due to line charge located along z-axis of infinite extent.   08

Q.3   a)State and explain Gauss's Law? What do you mean by Gaussian surface?   07

        b)In a free space line charge q=100nc/m lies along entire z-axis. find Electric field intensity at P(4,3,2)   08

Q.4   a)What do you mean by divergence. Give its physical significance. Also state divergence theorem.   07

        b)In free space let   08

        D=8xyz^4 ax+4x^{2}z^{4}ay + 16x^{2}yz^3 az pc/m^2

        Find total electric flux passing through the rectangular surface z=2, 0≤x≤2, 1≤y≤3, in the az direction.

Q.5   a)Derive the expression for potential and Electric field due to dipole.   07

        b)Given the potential field.   08

V=x^{2}yz+20y^2 volts in free space

Find a)V at P

        b)$\bar{E}$P

        c)$\frac{dv}{dN}$ at P

        d)a$_N$ at P.

Section B

Q.6   Solve any five   10

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i)State ampere's circuital law.

ii)What do you mean by steady magnetic field? What are the sources of steady magnetic field.

iii)What are the properties of perfect metallic conductor?

iv)Define scalar magnetic potential .

v)State Faraday's law of Electromagnetic induction.

vi)What do you mean by Capacitance? Write the expression for parallel plate capacitor.

vii)Define self and mutual inductance.

viii)Define polarization in dielectric.

Q.7 a)State and Explain Biot Savart law for steady magnetic field.   07

b)Find the incremental field ΔH at point P_2 caused by source at P_1 of $I \Delta \bar{L} = 2\pi a\bar{z}\ \mu A/m$.   08
   given $P_1(4,0,0)$ and $P_2(0,3,0)$

Q.8 a)Derive the expression for magnetic field intensity in free space due to infinite filament carrying   07
   current I in z- direction.

b)Calculate value of vector current density J in Cartesian co-ordinates at P(4,3,4) if $\bar{H} = x^2 zay - y^2 xaz$ 08

Q.9 a)For a time varying field show that $\Delta XE = -\dfrac{\partial \beta}{\partial t}$ 07

b)Evaluate the closed line integral of $\bar{H}$ about a rectangular path   08
   $P_1(2,3,4)$ to $P_2(4,3,4)$ to $P_3(4,3,1)$ to $P_4(2,3,1)$ to P_1 given H= $3zaz-2x^3az$ A/m

Q.10 Attempt any three   15

i)Explain the nature of dielectric material.

ii)Derive the boundary conditions at the interface between two different magnetic material.

iii)Explain Uniqueness theorem.

iv)State and explain Stoke's theorem.

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