Printed Pages - 7

A MEDBURGER MILE

328456 (28)

BE (4th Semester) Examination, Nov-Dec 2021

Branch : Et & T

ELECTROMAGNETIC FIELDS & TRANSMISSION LINES (NEW)

Time Allowed : Three Hours Maximum Marks : 80 Minimum Pass Marks : 28

Note : (a) Part (a) of each question is compulsory.

(b) Attempt any two parts from (b), (c), (d).

Unit-I

Q. 1. (a) Define divergence of a vector and write the

expression associated with different co-

ordinate system ?

328456 (28)

P.T.O.

2

(b) Given point P(-2, 6, 3) and vector $A = ya_x + (x + z) a_y$, express P and A in cylindrical coordinate system. (c) Three equal point charges of 2 µC are in free space at (0, 0, 0), (2, 0, 0) and (0, 2, 0), respectively. Find the net force on $Q_4 = 5 \mu C$ at (2, 2, 0). (d) Three parallel line charges P_{L1} = 5 nC/m,

 $P_{L2} = 4 \text{ nC/m}$ and $P_{L3} = -6 \text{ nC/m}$ are located at (0, 0), (3, 0) and (0, 4) m, respectively. Find D and E.

Unit-II

Q. 2. (a) Define Gauss's law and mention its application for D at different charge distribution.

328456 (28)

(b) An electric dipole represented by 0.1 a_v

nC-m is at origin. Find the potential at point

(0, 10, 0).

(c) Consider concentric shells in free space in

which V = 0 Volts and r = 10 cm and V = 10

Volts at r = 20 cm. Find E and D. 7

(d) In a spherical region, the electric

displacement is given by $D = 10 r^2 a_r mC/m^2$.

Find the total charge enclosed by the volume

specified by r = 40 cm $\theta = \frac{\pi}{4}$ and $\phi = 2\pi$. 7

Unit-III

Q. 3. (a) If a magnetic field $H = 3a_x + 2a_y A/m$ exists

at a point in free space, what is the magnetic

flux density at the point ?

328456 (28)

P.T.O.

2

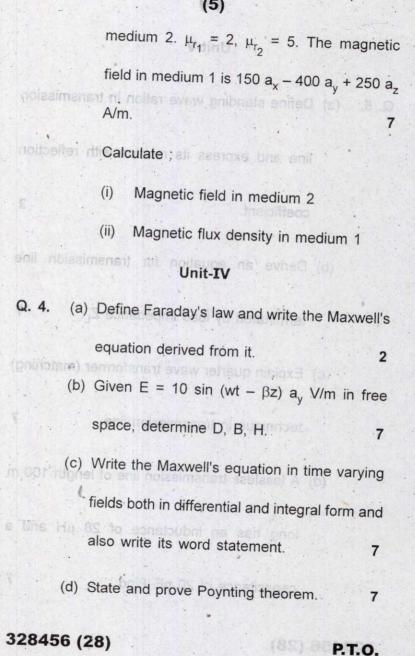
7

(b) Define Biot-Savart's law and derive the expression for magnetic field due to infinitely long current element. (c) An electron has a velocity of 1 km/s along a_x in magnetic field whose magnetic flux density is $B = 0.2 a_x - 0.3 a_y + 0.5 a_z Wb/m^2$. 7 Determine the electric field intensity if (i) no force is applied to the electron Also find the force on the electron under (ii) the influence of both E and B when $E = (a_x + a_y + a_z) kV/m$ (d) Two homogeneous, linear and ISO isotropic media have an interface at x = 0. x < 0

7

describes medium 1 and x > 0 describes

328456 (28)



Unit-V

Q. 5. (a) Define standing wave ration in transmission

- line and express its relation with reflection
 - coefficient. 2
 - (b) Derive an equation for transmission line
 - terminated by load impedance Z_L. 7
 - (c) Explain quarter wave transformer (matching)
 - technique in transmission line.
 - (d) A lossless transmission line of length 100 m
 - long has an inductance of 28 µH and a
 - capacitance of 20 nF. Find :

328456 (28)

