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PRN:		Course Code :	UEV302

Second Year **B. Tech** End Semester Examination Winter 2023

Electromagnet and Power Transfer

Day and Date: Thursday, 30/11/2023 Max Marks: **100**

Time : 10.30 am to 1.30 PM Duration: **03** hrs

Instructions: All questions are compulsory.

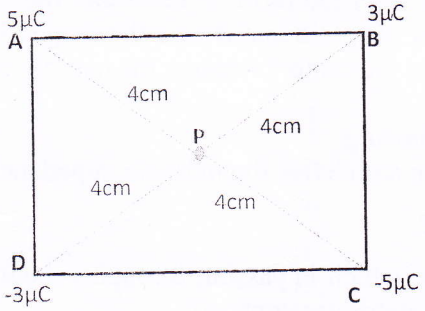
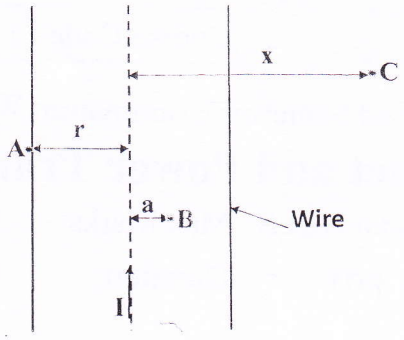
		Marks	Bloom's Level	CO
Q.1	**Attempt the following**			
a)	Differentiate dot product and cross product and explain where those products are applicable with suitable example?	08	L_2	CO1
b)	Derive the matrix to convert Spherical to cartesian Coordinate system and vice versa?	08	L_2	CO1
	OR			
b)	Derive the matrix to convert Spherical to Cylindrical coordinate system and vice versa?	08	L_2	CO1
Q.2	**Attempt the following**			
a)	Determine the electric field intensity produced at a point (0,0,4) m by the system of charges comprising of (a) Charge of 0.5 μC at (0,0,2 m) (b) Charge of -0.6 μC at (3 m,0,0) (c) Charge of 0.35 μC at (0,4 m,0)	08	L_2	CO2
b)	A charge ring of radius a carry a uniform charge distribution. Determine the potential at the point on the axis of ring?	08	L_2	CO2
	OR			
b)		08	L_2	CO2

Fig.1. Charge position

Find the Electric Field intensity at the point P in Fig.1 due to the four charges and justify the answers. Also, assume when the charge in the point B replaced by 1 μC what will be the difference in Electric Field intensity? Assume that BC is along Y Axis and BA is along X Axis and ABCD is the square which has the side of 6 cm?

Q.3 **Attempt any two from the following**

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a) 

08 L3 CO3

Fig. 2. Current Carrying Wire

Consider the wire which is carrying the current of **I**. Find the Magnetic Field Intensity at the point A, B and C using Ampere's Law in Fig. 2.

b) Derive the Stoke's and Divergence theorem? Explain the application of both in Electric and Magnetic Field with suitable example? 08 L3 CO3

c) By applying Gauss's law find the Electric Field Intensity due to point charge? 08 L3 CO3

Q.4 **Attempt any two from the following**

a) A filamentary wire of finite length extends from z=a to z=b. Determine magnetic flux density at a point P in XY plane. What is the magnetic flux density at P if a tends to infinity and b tends to infinity? 08 L3 CO3

b) Differentiate divergence, gradient, curl operation with suitable example and detail the importance of each in practical application? 08 L3 CO3

c) Consider a toroid which has inner radius of 'a' and outer radius of 'b'. Find the mean radius of toroid and derive the magnetic field intensity due to toroid at the center? Assume the number of turns in toroid is N. 08 L3 CO3

Q.5 **Attempt any Two of the following**

a) Generate the wave equation and derive the intrinsic impedance using suitable assumption? 09 L4 CO3

b) Derive the velocity of wave which is passing through vacuum using wave equation with suitable assumption? 09 L4 CO3

c) Derive the wave equation in Lossy Dielectric? 09 L4 CO3

Q.6 **Attempt any Two of the following**

a) Differentiate far field and near field Wireless Power Transfer with merits and demerits? 09 L4 CO4

b) Explain the operation of single side and double side coupler with suitable example? 09 L4 CO4

c) Detail the basic types of compensation circuit and explain the importance? 09 L4 CO4

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