KADI SARVA VISHVAVIDYALAYA

B.E. SEMESTER V EXAMINATION (NOV/2016)

SUBJECT CODE: EE-502 **SUBJECT NAME:** ENGINEERING ELECTROMAGNETICS

DATE: 11/11/2016 **TIME:** 10: 30 a.m. to 01:30 p.m. **TOTAL MARKS:** 70

Instructions:

1. Answer each section in separate answer sheets.
2. Use of scientific Calculator is permitted.
3. All questions are compulsory.
4. Indicate clearly the options you attempted along with the respective question number.
5. Use the last page of your supplementary for rough work.
6. Draw the figure, wherever it is necessary.

Section – I

Q-1 A Starting from the Gauss's Law as applied to the Differential Volume element, Obtain mathematical equation for Divergence. **5**

B Convert $\bar{A} = 10\,\bar{a}_x - 8\,\bar{a}_y + 6\,\bar{a}_z$ at the point P (10,-8,6) to Cylindrical Coordinate system. **5**

C Given three charge distribution in free space: 0.25 nC/m on the line X=3, Y=2; -0.2 nC/m on the line Z=1, Y=3 and a point charge of 0.5 nC at origin. Find $\bar{E}$ at point (2, 3, 4). **5**

OR

C A Charge of 1 C is at (2,0,0). What charge must be placed at (-2,0,0) which will make Y component of total $\bar{E}$ zero at (1,2,2)? **5**

Q-2 A Given $\bar{A} = 6\,\bar{a}_x$ and $\bar{B} = 4\,\bar{a}_x + B_y\,\bar{a}_y$, then find B_y such that angle between A and B is 45^0. If $\bar{B}$ also has a term $B_z\,\bar{a}_z$, What relationship must exist between B_y and B_z? **5**

B Find the total charge inside a volume having volume charge density as $10z^2\,e^{-0.1x}\sin\pi y$ C/m^3.
The volume is defined between $-2 \leq x \leq 2$, $0 \leq y \leq 1$ and $3 \leq z \leq 4$. **5**

OR

Q-2 A Obtain an expression for an Electric Field Intensity due to infinite sheet of the charge placed in XY plane, having surface charge density of ρ_s C/m^2. **5**

B Given three points as A(3,-2,1), B(-3,-3,5) and C(2,6,4): Find (1) The vector from A to C, (2) Unit vector from B to A, (3) The vector from A to the mid-point of line joining B to C. **5**

Q-3 A What is the potential at the center of a square with a side of 2 m, while charges 2 μC, -4 μC, 6 μC and 2 μC are located at its four corners? **5**

B Define a work done and obtain the equation for work done in moving a point charge Q in an Electric field $\bar{E}$. **5**

OR

Q-3 A Obtain the Relationship between E and V, $\bar{E} = -(\text{grad } V)$ **5**

B Find $\overline{D}$ in Cartesian co-ordinate system at point (6,8,-10) due to (1) A point charge of 40 mC at (0,0,0) and (2) a uniform line charge of 40 μC/m on the Z-axis. 5

Section – II

Q-4 A Explain and derive the boundary conditions for Electric field Intensity for a dielectric-dielectric surface. 5

B State and Explain Biot-savart's Law. 5

C Derive poisson's and Laplace's equation. 5

OR

C State and explain continuity equation of current in integral and point form. 5

Q-5 A Write short note on Stoke's Theorem. 5

B Classify different magnetic materials with suitable examples. 5

OR

Q-5 A Derive Lorrentz force Equation. 5

B Derive the expression for a curl, applying Ampere's circuital law to an incremental surface element. 5

Q-6 A Explain Method of Images in brief. 5

B Write a note on Maxwell's Equations. 5

OR

Q-6 A Write-a note on magnetic levitation. 5

B Explain briefly finite difference method. 5

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KADI SARVA VISHVAVIDYALAYA

B.E. SEMESTER V EXAMINATION APRIL/2015

SUBJECT CODE:EE-502 **SUBJECT NAME:**ENGINEERING ELECTROMAGNETICS

DATE:21/04/2015 **TIME:** 10: 30 a.m. to 1:30 p.m. **TOTAL MARKS:**70

Instructions:

1. Answer each section in separate answer sheets
2. Use of scientific Calculator is permitted.
3. All questions are compulsory
4. Indicate clearly the options you attempted along with the respective question number.
5. Use the last page of your supplementary for rough work.

Section – I

Q-1	**A**	Convert $\bar{A} = 3\,\bar{a}_x + 4\,\bar{a}_y + 5\,\bar{a}_z$ at the point (3,4,5) in Spherical Coordinates.	**5**
	B	State and Explain Gauss's law.	**5**
	C	Two point charges 0.7 mC and 4.9 μC are situated in free space at (2,3,6) and (0,0,0). Calculate the force on the 0.7 mC charge.	**5**
		OR	
	C	A Charge of 1 C is at (2,0,0). What charge must be placed at (-2,0,0) which will make Y component of total E zero at (1,2,2)?	**5**
Q-2	**A**	Explain Dot product and Cross Product with rules associated with it.	**5**
	B	Find the total charge inside a volume having volume charge density as 40 xyz C/m^3.The volume is defined by: (a) $0 \leq x, y, z \leq 2$; (b) $x=0, y=0, 0 \leq 2x+3y \leq 10, 0 \leq z \leq 2$.	**5**
		OR	
Q-2	**A**	Obtain an expression for an Electric Field Intensity due to infinite line charge, placed along Z-axis, at a point P on Y-axis at a distance of d from Z-axis.	**5**
	B	Given three points as A(2,-3,1), B(-4,-2,6) and C(1,5,-3): Find (1) The vector from A to C, (2) Unit vector from B to A, (3) The vector from A to the mid-point of line joining B to C.	**5**
Q-3	**A**	Starting from the Gauss's Law as applied to the Differential Volume element, Obtain mathematical equation for Divergence.	**5**
	B	Define a work done and obtain the equation for work done in moving a point charge Q in an Electric field $\bar{E}$.	**5**
		OR	
Q-3	**A**	Obtain the Relationship between E and V, $\bar{E}$= -(grad V)	**5**
	B	Find the flux density at a point A(6,4,-5) caused by: (1)a point charge of 20 mC at the origin, (2)a uniform line charge 20 μC/m on the z-axis, (3) a uniform line charge density 60 $\mu C/m^2$ at a plane X=8.	**5**

P.T.O.

Section – II

Q-4	A	Derive the boundary conditions for Electric field Intensity between two perfect dielectrics.	5
	B	State and Explain Biot-savart's Law	5
	C	Derive poisson's and Laplace's equation.	5
		OR	
	C	Derive the continuity equation for current $\Delta \bar{J} = -\rho_v$.	5
Q-5	A	Write short note on Stoke's Theorem.	5
	B	Derive the expression for magnetic Field Intensity due to finite length element.	5
		OR	
Q-5	A	Derive the boundary conditions at an interface between two magnetic media having permeability μ_1 and μ_2 respectively.	5
	B	Explain Ampere's Circuital Law.	5
Q-6	A	Explain Method of Images with suitable example.	5
	B	Write a note on Maxwell's Equations for static fields.	5
		OR	
Q-6	A	State and explain Faraday's law with reference to Lenz's law, transformer emf and motional emf.	5
	B	Explain Finite difference method with appropriate figures and equations.	5

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KADI SARVA VISHVAVIDYALAYA

B.E. SEMESTER V EXAMINATION (NOV/2014)

SUBJECT CODE: EE-502 **SUBJECT NAME:** ENGINEERING ELECTROMAGNETICS

DATE: 14/11/2014 **TIME:** 10: 30 a.m. to 1:30 p.m. **TOTAL MARKS:** 70

Instructions:

1. Answer each section in separate answer sheets
2. Use of scientific Calculator is permitted
3. All questions are compulsory
4. Indicate clearly the options you attempted along with the respective question number.
5. Use the last page of your supplementary for rough work.

Section – I

Q-1	**A**	Obtain spherical co-ordinates of 10 $\bar{a}x$ system at point P (x=-3, y=2, z= 4).	**5**
	B	State and Explain Gauss's law.	**5**
	C	Find $\bar{D}$ in Cartesian co-ordinate system at point (6,8,-10) due to (1) A point charge of 40 mC at (0,0,0) and (2) a uniform line charge of 40 μC/m on the Z-axis.	**5**
		OR	
	C	A Charge of 1 C is at (2,0,0). What charge must be placed at (-2,0,0) which will make Y component of total E zero at (1,2,2)?	**5**
Q-2	**A**	Given points A(2,5,-1), B(3,-2,4) and C(-2,3,1), Find **(a)** $\bar{R}_{AB}.\bar{R}_{AC}$, **(b)** the angle between $\bar{R}_{AB}$ and $\bar{R}_{AC}$, **(c)** the length of the projection of $\bar{R}_{AB}$ on $\bar{R}_{AC}$.	**5**
	B	Find the total charge inside a volume having volume charge density as $10z^2 e^{-0.1x} \sin\pi y$ C/m^3. The volume is defined between $-2 < x < 2$, $0 < y < 1$ and $3 < z < 4$.	**5**
		OR	
Q-2	**A**	Obtain an expression for an Electric Field Intensity due to infinite line charge, placed along Z-axis, at a point P on Y-axis at a distance of d from Z-axis.	**5**
	B	Given three points as A(3,-2,1), B(-3,-3,5) and C(2,6,4): Find (1) The vector from A to C, (2) Unit vector from B to A, (3) The vector from A to the mid-point of line joining B to C.	**5**
Q-3	**A**	Starting from the Gauss's Law as applied to the Differential Volume element, Obtain mathematical equation for Divergence.	**5**
	B	Define a work done and obtain the equation for work done in moving a point charge Q in an Electric field $\bar{E}$.	**5**
		OR	
Q-3	**A**	Obtain the Relationship between E and V, $\bar{E}$= -(grad V)	**5**
	B	Given three charge distribution in free space: 0.25 nC/m on the line X=3, Y=2; -0.2 nC/m on the line Z=1, Y=3 and a point charge of 0.5 nC at origin. Find $\bar{E}$ at point (2, 3, 4).	**5**

Section – II

Q-4	A	Explain and derive the boundary conditions for Electric field Intensity between two perfect dielectrics.	5
	B	Write short note on Stoke's Theorem.	5
	C	Derive poisson's and Laplace's equation.	5
		OR	
	C	State and prove Uniqueness theorem.	5
Q-5	A	State and Explain Biot-savart's Law.	5
	B	Classify different magnetic materials with suitable examples.	5
		OR	
Q-5	A	Derive Lorrentz force Equation.	5
	B	Derive the expression for a curl, applying Ampere's circuital law to an incremental surface element.	5
Q-6	A	Explain Method of Images in brief.	5
	B	Write a note on Maxwell's Equations.	5
		OR	
Q-6	A	State and explain Faraday's law for induced e.m.f.	5
	B	Explain briefly finite difference method.	5

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KADI SARVA VISHVAVIDYALAYA

B.E. SEMESTER V EXAMINATION (NOV/2015)

SUBJECT CODE: EE-502 **SUBJECT NAME:** ENGINEERING ELECTROMAGNETICS

DATE: 21/11/2015 **TIME:** 10: 30 a.m. to 1:30 p.m. **TOTAL MARKS:** 70

Instructions:

1. Answer each section in separate answer sheets.
2. Use of scientific Calculator is permitted.
3. All questions are compulsory.
4. Indicate clearly the options you attempted along with the respective question number.
5. Use the last page of your supplementary for rough work.

Section – I

Q-1 A **Choose the correct option.** **5**

1.Inside a hollow conducting sphere electric field
(a)is zero (b) is non-zero constant (c)changes with distance from the center of sphere (d)changes with the magnitude of the change given to conductor

2. What is the value of total electric flux coming out of a closed surface?
(a)zero (b)equal to volume charge density (c)equal to total charge enclosed by the surface (d)equal to surface charge density

3.Electric field strength of charge
(a)decrease with distance (b)decrease with square distance (c)Increase with distance (d) Increase with square distance

4.Two point charges 4μc are placed at a distance of 3 cm apart from each other in free space. Force acting on two charges will be
(a) 100 Nm (b)200 Nm (c)400 Nm (d)0.02 Nm

5.$\nabla \cdot \mathbf{J} = 0$ is frequency known as
(a)Poisson's equation (b)Laplace's equation (c)Continuity equation
(d)None of these

B Convert $\bar{A} = 3\,\bar{a}_x + 4\,\bar{a}_y + 5\,\bar{a}_z$ at the point (3,4,5) in Spherical Coordinates. **5**

C Find $\bar{D}$ in Cartesian co-ordinate system at point (6,8,-10) due to (1) A point charge of 40 mC at (0,0,0) and (2) a uniform line charge of 40 μC/m on the Z-axis. **5**

OR

C A Charge of 1 C is at (2,0,0). What charge must be placed at (-2,0,0) which will make Y component of total E zero at (1,2,2)? **5**

Q-2 A Given points A(2,5,-1), B(3,-2,4) and C(-2,3,1), Find **(a)** $\bar{R}_{AB}.\bar{R}_{AC}$, **(b)** the angle between $\bar{R}_{AB}$ and $\bar{R}_{AC}$, **(c)** the length of the projection of $\bar{R}_{AB}$ on $\bar{R}_{AC}$. **5**

B Find the total charge inside a volume having volume charge density as $10z^2\, e^{-0.1x} \sin\pi y$ C/m^3. **5**
The volume is defined between $-2 < x < 2$, $0 < y < 1$ and $3 < z < 4$.

OR

Q-2 A Obtain an expression for an Electric Field Intensity due to infinite sheet of charge, placed in xy plane having surface charge density ρ_s. **5**

	B	Given three points as A(3,-2,1), B(-3,-3,5) and C(2,6,4): Find (1) The vector from A to C, (2) Unit vector from B to A, (3) The vector from A to the mid-point of line joining B to C.	5
Q-3	A	Starting from the Gauss's Law as applied to the Differential Volume element, Obtain mathematical equation for Divergence.	5
	B	Define a work done and obtain the equation for work done in moving a point charge Q in an Electric field $\bar{E}$.	5
		OR	
Q-3	A	Obtain the Relationship between E and V, $\bar{E}$= -(grad V)	5
	B	What is the potential at the center of a square with a side of 2 m, while charges 2 μC, -4 μC, 6 μC and 2 μC are located at its four corners?	5

Section – II

Q-4	A	Explain and derive the boundary conditions for Electric field Intensity between two perfect dielectrics (dielectric-dielectric interface).	5
	B	State and prove the Stokes theorem.	5
	C	Derive poisson's and Laplace's equation.	5
		OR	
	C	State and prove Uniqueness theorem.	5
Q-5	A	State and Explain Biot-savart's Law.	5
	B	Classify different magnetic materials with suitable examples.	5
		OR	
Q-5	A	Derive Lorrentz force Equation.	5
	B	Derive the expression for a curl, applying Ampere's circuital law to an incremental surface element.	5
Q-6	A	Explain Method of Images in brief.	5
	B	Write a note on magnetic levitation.	5
		OR	
Q-6	A	State and explain Faraday's law for induced e.m.f.	5
	B	Explain briefly finite difference method.	5

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