



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES

(Autonomous)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### QUESTION BANK (I/B. TECH I SEM) (2019-20)

#### ELECTROMAGNETICS (20BSC241)

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S.NO	QUESTION	PO Attainment
<b>UNIT-1 ELECTROSTATIC FIELD</b>		
<b>PART A( TWO MARK QUESTIONS)</b>		
1	State vector form of coulombs law?	PO2,P04
2	Define electric flux and flux density.	PO1
3	What is a point charge?	PO2
4	Define electric field intensity or electric field.	PO3
5	Mention some applications of Gauss's law in electrostatics.	PO1
6	State Coulomb's law.	PO2
7	State Gauss's law.	PO2
8	Define Potential and Potential difference.	PO1
9	What are the sources of Electric field?	PO4
10	What are the sources of magnetic fields?	PO4
11	Define vector and scalar field.	PO1
12	State Stoke's theorem.	PO2
13	What do you understand by linear, surface and volume charge densities?	PO2
14	Define Vector Product of two vectors.	PO1
15	Define a unit vector	PO1
16	What is meant by coordinate systems?	PO2
17	What is the application of divergence theorem?	PO2
18	What is the application of divergence theorem?	PO2
19	Define Potential.	PO1
20	Define Potential Difference	PO1
<b>PART B (TEN MARKS QUESTIONS)</b>		
1	State and explain Coulomb's law indicating clearly the units of quantities in the equation of force?	PO2,PO4
2	State and prove Gauss's law and write limitations of Gauss's law?	PO1,PO2
3	Derive Maxwell first equation?	PO3,PO4
4	Derive an expression for electric potential due to point charge?	PO1,PO2,PO3,PO4
5	Derive electrical field intensity due to charged circular ring?	PO1,PO3
6	Derive the expression for the electric field intensity due to line charge?	PO1,PO4

7	Four point charges each of $10\mu\text{C}$ are placed in free space at the points $(1, 0, 0)$ , $(-1, 0, 0)$ , $(0, 1, 0)$ and $(0, -1, 0)$ m respectively. Determine the force on a point charge of $30\mu\text{C}$ located at a point $(0, 0, 1)$ m?	PO2,PO3
8	Four concentrated charges $Q_1= 0.3 \mu\text{C}$ , $Q_2= 0.2 \mu\text{C}$ , $Q_3= -0.3 \mu\text{C}$ , $Q_4= 0.2 \mu\text{C}$ are located at the vertices of a plane rectangle. The length of rectangle is 5 cm and breadth of the rectangle is 2 cm. Find the magnitude and direction of resultant force on $Q_1$ ?	PO2,PO4
9	Four positive point charges $10^{-12}$ coulomb each are situated in X-Y plane at points $(0, 0)$ , $(0, 1)$ $(1, 1)$ and $(1, 0)$ m. Find the electric field and potential at $(3/4, 3/4)$ and $(1, 1)$ ?	PO2,PO4
10	Derive the expression for absolute electric potential and electric potential difference.	PO2,PO3,PO4

S.NO	QUESTION	PO Attainment
<b>UNIT-2 ELECTROSTATIC APPLICATIONS</b>		
<b>PART A( TWO MARK QUESTIONS)</b>		
1	Define polarization in dielectric materials.	PO2
2	Write the relation between current I and current density J?	PO1
3	Write the equation for energy stored in capacitor?	PO3
4	Define Dielectric Strength.	PO2
5	A conductivity of a wire is 5000 mho/m and it is subjected to an electric field of 0.1 volts/m. Then what is the current density (J) in a wire?	PO1
6	Write the condition for Laplace equation?	PO3
7	What is the relation between electric flux density and electric field intensity?	PO3
8	Define dipole moment.	PO4
9	Define an electric dipole.	PO2
10	What is meant by dielectric breakdown?	PO1
11	Define current density at a given point.	PO2
12	Write the relation between Perfect conductor and electrostatic field.	PO3
13	Write the Poisson's equation.	PO3
14	Write the Laplace's equation.	PO4
15	Obtain Poisson's equation from Gauss's law.	PO2
16	Define Polarization in dielectric material.	PO2
17	Express the value of capacitance for a coaxial cable.	PO1
18	Write the expression for the energy density in electrostatic field.	PO3
19	Write down the magnetic boundary conditions.	PO3
20	What is meant by displacement current density?	PO1
<b>PART B (TEN MARKS QUESTIONS)</b>		
1	Derive Laplace and Poisson's equation.	PO1,PO2,PO3
2	Find electric potential due to electric dipole?	PO1,PO2,PO4
3	Derive the expression for torque on electric dipole in the presence of uniform electric field.	PO1,PO2,PO4
4	Derive the expression for capacitance of a co-axial cable.	PO1,PO2

5	Derive the expression for parallel plate capacitor.	PO1,PO2,PO4
6	Explain the boundary conditions between conductor and free space?	PO1,PO2
7	Derive the point form of ohms law.	PO1,PO2,PO4
8	Explain the boundary conditions of two perfect dielectrics materials?	PO1,PO4
9	Explain the phenomenon of polarization when a dielectric slab is subjected to an electric field?	PO1,PO3
10	Derive the continuity equation. What is its physical significance?	PO1,PO2

S.NO		PO Attainment
<b>UNIT-3 STEADY ELECTRO-MAGNETIC FIELDS</b>		
<b>PART A( TWO MARK QUESTIONS)</b>		
1	Define Magnetic dipole moment.	PO2
2	Write Lorentz force equation?	PO3
3	State point form of Amperes law.	PO1
4	State Ampere's circuital law.	PO4
5	State Biot-savart law.	PO1
6	Define magnetic flux density.	PO3
7	Define magnetic scalar potential.	PO1,PO2
8	Define magnetic vector potential.	PO3
9	What is solenoid?	PO2
10	List the applications of Ampere's circuital law.	PO4
11	Define magnetic moment.	PO2
12	Write the force equation on a current element.	PO3
13	Give torque equation on closed circuits.	PO1
14	Give an equation of torque on a solenoid.	PO4
15	Distinguish between solenoid and toroid.	PO1
<b>PART B (TEN MARKS QUESTIONS)</b>		
1	Explain Biot-savart's law. Find H and B due conductor of finite length.	PO1,PO4
2	Explain Maxwell's second equation.	PO1,PO3
3	State and explain ampere's circuital law.	PO1,PO4
4	Write down Maxwell's third equation in point and integral form?	PO1,PO2,PO3,PO4
5	Explain relationship between magnetic torque and moment.	PO1,PO2,PO3,PO4
6	Derive an expression for the force between two current carrying wires?	PO1,PO2,PO4
7	Distinguish between scalar and vector magnetic potential.	PO1,PO2
8	Explain the vector magnetic potential and derive its expression.	PO1,PO4
9	Explain about Magnetic Dipole Moment.	PO1,PO4
10	Derive an expression for magnetic field at the centre of toroidal coil.	PO1,PO4

S.NO	QUESTION	PO Attainment
<b>UNIT-4 MAGNETOSTATICS &amp; APPLICATIONS</b>		
<b>PART A( TWO MARK QUESTIONS)</b>		
1	Define self inductance.	PO2
2	Define mutual inductance.	PO3
3	Define inductance.	PO4
4	What is the inductance of Solenoid?	PO3
5	What is the inductance of Toroid?	PO2
6	Write the force equation on a current element.	PO4
7	Define Coupling coefficient.	PO1
8	State the boundary conditions at the interface between two perfect dielectrics.	PO2
9	What is torque on a solenoid?	PO3
10	Give the expression for inductance of a solenoid.	PO4
11	Define dissipation factor.	PO4
12	What is ferromagnetic material?	PO1
13	What is electromotive force?	PO2
14	What is the energy stored in a magnetic field in terms of field quantities?	PO3
15	Differentiate conduction current and displacement current.	PO4
<b>PART B (TEN MARKS QUESTIONS)</b>		
1	Derive the expression for Lorentz force equation.	PO1,PO2,PO4
2	A coil of 500 turns is wound on a closed iron ring of mean radius 10cm and cross section of 3 cm <sup>2</sup> . Find the self inductance of the winding if the relative permeability of iron is 800?	PO1,PO2,PO4
3	Derive an expression for the force between two straight long and parallel conductors.	PO1,PO3
4	Explain the difference between self inductance and mutual inductance?	PO1,PO4
5	A toroid has air core and has a cross sectional area of 10mm <sup>2</sup> it has 1000 turns and its mean radius is 10mm. find its inductance?	PO1,PO4
6	Derive the expression for self inductance of solenoid and toroid.	PO1,PO2,PO3
7	Derive the expression for inductance of a co-axial cable.	PO1,PO2
8	Find the mutual inductance between a long, straight wire and square loop lying in same plane?	PO1,PO4
9	Derive the expression for Neumann's formula.	PO1,PO2

10	Explain the concept of energy stored in magnetic fields.	PO1,PO\$
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S.NO	QUESTION	PO Attainment
<b>UNIT-5 CURRENT DENSITY AND WAVE PROPAGATION</b>		
<b>PART A(TWO MARK QUESTIONS)</b>		
1	Define displacement current.	PO3
2	State Faraday's law of electromagnetic induction.	PO1,PO2,PO4
3	Write Maxwell equations in time varying fields.	PO3
4	Define pointing vector.	PO3
5	Define a wave.	PO2
6	Mention the properties of uniform plane wave.	PO4
7	Write down the Maxwell's equations in point phasor form.	PO1
8	Write down the Maxwell's equations in integral phasor form.	PO1,PO2,PO3,PO4
9	Write down the Maxwell's equations for free space in integral form.	PO2,PO4
10	Write down the Maxwell's equation for free space in point form.	PO2,PO4
11	Define Skin depth.	PO3
12	Define dielectric strength.	PO3
13	List any two properties of uniform plane waves.	PO2
14	State Faraday law for a moving charge in a constant magnetic field.	PO4
15	State Poynting theorem.	PO1
<b>PART B (TEN MARKS QUESTIONS)</b>		
1	State and prove poynting theorem.	PO1,PO2,PO3,PO4
2	Write Maxwell's equation in good conductors for time varying fields and static fields both in differential and integral form?	PO1,PO2,PO4
3	Explain faradays law of electromagnetic induction and there from derive Maxwell's equation in differential and integral form.	PO1,PO2,PO3
4	Explain pointing vector and its significance.	PO1,PO2,PO3
5	Derive the equation of Continuity for time varying fields.	PO1,PO2,PO4
6	Derive an expression for motional and transformer induced emf.	PO1,PO2,PO3
7	What is displacement current? Explain physical significance of displacement current.	PO1,PO2,PO4

8	Derive expressions for integral and point forms of poynting theorem.	PO1,PO2,PO4
9	Explain faradays law of electromagnetic induction and derive the expression for induced emf.	PO2,PO3,PO4
10	Derive Maxwell's equations from Faraday's law and Gauss's law and explain them.	PO1,PO2,PO3,PO4