

**Bhoj Reddy Engineering College for Women: Hyderabad**  
**Department of Electrical and Electronics Engineering**  
**Lesson plan of faculty member for the academic year 2018–19**  
 Class: II B Tech                      Branch-Section: EEE                      Semester: I  
 Subject: Electromagnetic Fields (EMF)                      Lectures per week: 4+1 (Tutorial)

| Lecture Number                                  | Topics to be covered   | Date (s)       |
|---|--|----------------|
| <b>UNIT – I: ELECTROSTATISTICS</b>              |  |                |
| 1   | Tutorial: Introduction to vector analysis-Electrostatic fields                                   | 9 July 2018    |
| 2   | Coulombs law and applications  | 11 July 2018   |
| 3   | Electric field intensity (EFI) due to line charge  | 12 July 2018   |
| 4   | problems on Coulombs law   | 13 July 2018   |
| 5   | Electric field intensity (EFI) due to surface charge   | 14 July 2018   |
| 6   | Tutorial: Work done a moving point charge in an electrostatic field-electric potential-Numerical | 16 July 2018   |
| 7   | Properties of electric potential function and potential gradient                                 | 18 July 2018   |
| 8   | Gauss's law and applications of Gauss's law  | 19 July 2018   |
| 9   | Maxwell's first law  | 20 July 2018   |
| 10  | problems on potential gradient   | 21 July 2018   |
| 11  | Tutorial : Laplace and poisson's equations   | 23 July 2018   |
| 12  | Solution of Laplace equation in one variable form  | 25 July 2018   |
| 13  | Electric Dipole and Dipole moment  | 26 July 2018   |
| 14  | Potential and EFI due to an electric dipole  | 27 July 2018   |
| 15  | problems on electric dipole  | 28 July 2018   |
| 16  | Tutorial :Torque on an electric dipole in an electric field                                      | 30 July 2018   |
| 17  | Behavior of conductor in an electric field   | 1 August 2018  |
| 18  | Conductors and insulators  | 2 August 2018  |
| 19  | Problems   | 3 August 2018  |
| <b>UNIT – II: DIELECTRICS &amp; CAPACITANCE</b> |  |                |
| 20  | Behavior of conductors in an electric field and insulators                                       | 4 August 2018  |
| 21  | problems   | 8 August 2018  |
| 22  | Electric field inside a dielectric material  | 9 August 2018  |
| 23  | Polarization   | 10 August 2018 |
| 24  | Dielectric boundary conditions   | 11 August 2018 |
| 25  | Tutorial: Capacitance and capacitance of parallel plates-  | 13 August 2018 |
| 26  | problems on capacitance  | 16 August 2018 |
| 27  | Spherical and co-axial capacitors with composite dielectrics                                     | 17 August 2018 |
| 28  | Energy stored and energy density in a static electric field                                      | 18 August 2018 |
| 29  | Tutorial: Current density  | 20 August 2018 |
| 30  | problems on current density  | 23 August 2018 |
| 31  | Conduction and convention current densities  | 24 August 2018 |
| 32  | Ohm's law in point form and Equation of continuity   | 25 August 2018 |

| <b>UNIT – III: MAGETOSTATICS</b>                                |   |                   |
|---|---|-------------------|
| 33  | Tutorial : Static magnetic fields and Biot savart's   | 27 August 2018    |
| 34  | Concept of Magnetic field intensity (MFI)   | 29 August 2018    |
| 35  | MFI due to a straight current carrying filament and circular  | 30 August 2018    |
| 36  | MFI due to square and solenoid current carrying wire  | 31 August 2018    |
| 37  | Relationship between magnetic flux , magnetic flux density and MFI                                  | 1 September 2018  |
| 38  | Maxwell's second equation   | 7 September 2018  |
| 39  | Ampere's law and applications   | 8 September 2018  |
| 40  | Tutorial :MFI due to infinite sheet of a current and a long current carrying filament               | 10 September 2018 |
| 41  | Point form of Ampere's circuit law  | 12 September 2018 |
| 42  | Problems on MFI   | 14 September 2018 |
| 43  | Maxwell's third equation  | 15 September 2018 |
| <b>UNIT-IV: FORCE IN MAGNETIC FIELDS AND MAGNETIC POTENTIAL</b> |   |                   |
| 44  | Tutorial :Magnetic force-Moving charge in a magnetic field  | 17 September 2018 |
| 45  | Lorentz force equation – force on a current element in a magnetic field                             | 19 September 2018 |
| 46  | Problems on magnetic force  | 20 September 2018 |
| 47  | Force on a straight and a long current carrying conductor in a magnetic field                       | 22 September 2018 |
| 48  | Tutorial: Force between two straight long and parallel current carrying conductors                  | 24 September 2018 |
| 49  | Magnetic dipole and dipole moment –a differential current loop as a magnetic dipole                 | 26 September 2018 |
| 50  | Torque on a current loop placed in a magnetic field , scalar magnetic potential and its limitations | 27 September 2018 |
| 51  | problems on torque  | 28 September 2018 |
| 52  | Vector magnetic potential and its properties  | 29 September 2018 |
| 53  | Tutorial :Vector potential's equations  | 1 October 2018    |
| 54  | Self and mutual inductance-Neumann's formulae   | 3 October 2018    |
| 55  | Determination of self-inductance of solenoid and toroid   | 4 October 2018    |
| 56  | problems on self and mutual inductance  | 5 October 2018    |
| 57  | Mutual inductance between a straight long wire and square loop wire in the same wire in same plane  | 6 October 2018    |
| 58  | Tutorial :Energy stored and energy density in magnetic field  | 8 October 2018    |
| 59  | Introduction to permanent magnetic fields and their characteristics and applications                | 10 October 2018   |
| 60  | Tutorial : problems   | 11 October 2018   |
| <b>UNIT-V: TIME VARYING FIELDS</b>                              |   |                   |
| 61  | Introduction to time varying fields   | 12 October 2018   |
| 62  | Faraday's laws of electromagnetic induction   | 13 October 2018   |
| 63  | Tutorial :Faraday's law integral form and point forms   | 22 October 2018   |
| 64  | Maxwell's fourth equation   | 24 October 2018   |
| 65  | problems  | 25 October 2018   |
| 66  | Statically and dynamically induced emf's  | 26 October 2018   |

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|----|--|------------------|
| 67 | Simple problems  | 27 October 2018  |
| 68 | Tutorial :Modification of Maxwell's equation for time varying fields | 29 October 2018  |
| 69 | Displacement current   | 31 October 2018  |
| 70 | problems on Displacement current                                     | 1 November 2018  |
| 71 | Problems   | 2 November 2018  |
| 72 | Review of Maxwell's Equations  | 3 November 2018  |
| 73 | Tutorial :Problems solving from previous question papers             | 5 November 2018  |
| 74 | Problems solving from previous question papers                       | 8 November 2018  |
| 75 | Revision   | 9 November 2018  |
| 76 | Revision   | 10 November 2018 |

#### **TEXTBOOKS:**

1. "William H.Hayt & John. A. Buck" ," Engineering Electromagnetics", Mc-Graw Hill companies 7<sup>th</sup> Edition, 2009.
2. " Sadiku", "Electromagnetic Fields", Oxford Publications ,4<sup>th</sup> Edition

#### **REFERENCE BOOKS:**

1. "J D Kraus" , "Electromagnetics " Mc-Graw Hill, 4th Edition 1992.
2. "CR Paul and S.A.Nasar" , "Introduction to Electromagnetics", Mc-Graw Hill publications 3<sup>rd</sup> Edition, 1997.

Name and signature of the faculty: Ravi Kumar K ----

Name and signature of Head of the Department: Manju Bhargavi R ----