

**SRM UNIVERSITY**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**

*SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING*  
*DEPARTMENT OF ECE*  
*COURSE PLAN*

**Course Code** : EC0206  
**Course Title** : Transmission Lines and Networks  
**Semester** : IV  
**Course Time** : JANUARY – MAY 2011  
**Location** : S.R.M.E.C

**Faculty Details**

| Sec. | Name                | Office  | Office hour                                                                                             | Mail id                           |
|------|---------------------|---------|---------------------------------------------------------------------------------------------------------|-----------------------------------|
| A    | Mr. K. Kalimuthu    | TP12S9  | Day 1- 1 <sup>st</sup> , Day-2 -2 <sup>nd</sup> and 7 <sup>th</sup> , Day-5 5 <sup>th</sup> hours       | kalimuthu.k@ktr.srmuniv.ac.in     |
| B    | Mrs. Kolangiammal.S | TP1003A | Day 1- 2 <sup>nd</sup> and 4 <sup>th</sup> , Day-3 -5 <sup>th</sup> , Day-4 2 <sup>nd</sup> hours       | kolangiammal.s@ktr.srmuniv.ac.in  |
| C    | Mr.P.Easwaran       | TP10S8  | Day 1- 6 <sup>th</sup> and 7 <sup>th</sup> , Day-2 -6 and 7 <sup>th</sup> , Day-4 2 <sup>nd</sup> hours | easwaran.p@ktr.srmuniv.ac.in      |
| D    | Mr.Ramchandran      | TP1206A | Day 1- 1 <sup>st</sup> , Day-2 6 <sup>th</sup> and 7 <sup>th</sup> , Day-5 2 <sup>nd</sup> hours        | ramachandran.ma@ktr.srmuniv.ac.in |
| E    | Mrs. Sabitha Gauni  | TP12S5  | Day 1- 3 <sup>rd</sup> and 4 <sup>th</sup> , Day-2 -5 <sup>th</sup> , Day-4 2 <sup>nd</sup> hours       | sabithagauni@ktr.srmuniv.ac.in    |
| F    | Mrs. J.Subhashini   | TP12S6  | Tue 5 <sup>th</sup> , Thurs 2 <sup>nd</sup> , Fri 1 <sup>st</sup> and 7 <sup>th</sup> hours             | subhashini.j@ktr.srmuniv.ac.in    |

**Required Text Books:**

1. John D.Ryder, “*Networks, Lines and Fields*”, Prentice Hall of India, 1997.
2. Sudhakar. A, Shyammoohan S Palli, “*Circuits and Networks – Analysis and Synthesis*”, Tata McGraw Hill, 2nd Edition, 2002.
3. Samarajit Ghosh, “*Network Theory – Analysis and Synthesis*”, Prentice Hall of India, 2005
4. David. K. Cheng, “*Field and Wave Electromagnetics*”, Addison Wesley, 2004

**Web Resources:**

1. <http://www.tpub.com/neets/book10/41.htm>
2. [www.complextoreal.com](http://www.complextoreal.com)
3. [http://download.intel.com/education/highered/signal/elct762/class06\\_transmission\\_line\\_basics](http://download.intel.com/education/highered/signal/elct762/class06_transmission_line_basics).
4. <http://www.mypptsearch.com/search-ppt/study+for+fault+diagnosis+in+transmission+lines+using+artificial+neural+network+ppt/>
5. <http://www.ece.umd.edu/class/enee482.S2002/ENEE482/Imped-matching.ppt#3>

**Prerequisite :**

- EC0102 - Electric Circuits
- EC0201 - Electromagnetic Theory and Waveguides

**Instructional Objectives:**

1. To become familiar with propagation of signals through lines
2. Calculation of various line parameters by conventional and graphical methods
3. Need for impedance matching and different impedance matching techniques
4. Design of different types of filters, equalizer and attenuators

**Assessment Details**

Cycle Test – I : 10 Marks

Cycle Test – II : 10 Marks

Surprise Test : 5 Marks

Model Exam : 20 Marks

Attendance : 5 marks

**Test Schedule**

| S.No. | DATE       | TEST         | PORTIONS         | DURATION         |
|-------|------------|--------------|------------------|------------------|
| 1     | 30/01/2012 | Cycle Test-1 | Session 1 to 14  | 1 hour and 40min |
| 2     | 05/03/2012 | Cycle Test-2 | Session 15 to 36 | 1 hour and 40min |
| 3     | 09/04/2012 | Model Test   | Session 37 to 60 | 3 hours          |

**Outcomes**

Students who have successfully completed this course

| Instructional Objective                                                                                                                                                                                                                                                                                            | Program outcome                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. To become familiar with propagation of signals through lines<br><br>2. Calculation of various line parameters by conventional and graphical methods<br><br>3. Need for impedance matching and different impedance matching techniques<br><br>4. Design of different types of filters, equalizer and attenuators | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems.<br><br>j) Graduate will develop confidence for self education and ability for life-long learning.<br><br>k) Graduates will show the ability to participate and try to succeed in competitive examinations. |

## Detailed Session Plan

| <b>TRANSMISSION LINE THEORY</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                |                                                                             |                        |                                                                                                  |                                                                                                 |                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| General theory of Transmission lines - the transmission line - general solution - The infinite line - Wavelength, velocity of propagation - Waveform distortion - the distortion less line - Loading and different methods of loading - Line not terminated in $Z_0$ - Reflection coefficient - calculation of current, voltage, power delivered and efficiency of transmission - Input and transfer impedance - Open and short circuited lines – reflection factor and reflection loss |                                                                                                                                                                |                                                                             |                        |                                                                                                  |                                                                                                 |                                                                                                   |
| Session No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Topics to be covered                                                                                                                                           | Ref                                                                         | Instruction Objective  | Program Outcome                                                                                  |                                                                                                 |                                                                                                   |
| 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | General Theory of Transmission Lines                                                                                                                           | I. John D. Ryder, Networks, Lines and Fields”, Prentice Hall of India, 1997 | Chapter 6.3, Pg.No.236 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems. |                                                                                                 |                                                                                                   |
| 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Transmission line-General Solution-Voltage and Current equation                                                                                                |                                                                             |                        | Chapter 6.5, Pg.No.245                                                                           | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                   |
| 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Physical significance of Infinite Line                                                                                                                         |                                                                             |                        | Chapter 6.10, Pg.No.260                                                                          | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                   |
| 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Computation of Secondary Constants of Transmission Lines- $Z_0, \gamma, \alpha, \beta, \lambda, V$                                                             |                                                                             |                        | Chapter 6.11, Pg.No.260                                                                          | j) Graduate will develop confidence for self education and ability for life-long learning.      |                                                                                                   |
| 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Computation of Primary Constants of Transmission Lines (R, L, G, C). Waveform Distortion – Frequency Distortion and Phase Distortion. Distortionless Condition |                                                                             |                        | Chapter 6.12, Pg.No.262                                                                          | To become familiar with propagation of signals through lines                                    | j) Graduate will develop confidence for self education and ability for life-long learning.        |
| 6.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Tutorial Problem 1: Problems related to Primary and Secondary Constants of Transmission Lines                                                                  |                                                                             |                        | Chapter 6.13, Pg.No.263                                                                          | Calculation of various line parameters by conventional and graphical methods                    | j) Graduate will develop confidence for self education and ability for life-long learning.        |
| 7.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Tutorial Problem 2: Problems related to General Solution, Secondary Constants of Transmission Lines                                                            |                                                                             |                        | Chapter 6.13, Pg.No.263                                                                          |                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning.        |
| 8.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Loading and different methods of loading                                                                                                                       |                                                                             |                        | Chapter 6.14, Pg.No.264                                                                          |                                                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 9.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Line not terminated in $Z_0$ (Open and Short Circuited Lines)-Reflection Coefficient                                                                           |                                                                             |                        | Chapter 6.15, Pg.No.265                                                                          |                                                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 10.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Input and Transfer Impedance, $Z_{oc}, Z_{sc}$                                                                                                                 |                                                                             |                        | Chapter 6.3, Pg.No.236                                                                           |                                                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 11.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Reflection Factor and Reflection loss                                                                                                                          |                                                                             |                        | Chapter 6.5, Pg.No.245                                                                           |                                                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 12.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Tutorial Problem 3: Input Impedance and Reflection Coefficient K                                                                                               |                                                                             |                        | Chapter 6.5, Pg.No.245                                                                           |                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning.        |
| 13.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Tutorial Problem 4: Calculation of current, voltage, power delivered and efficiency of transmission                                                            |                                                                             |                        | Chapter 6.10, Pg.No.260                                                                          |                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning.        |
| 14.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Overview of Session 1 to 13                                                                                                                                    |                                                                             |                        | Chapter 6.3 – 6.15, Pg.No.236 - 264                                                              |                                                                                                 | k) Graduates will show the ability to participate and try to succeed in competitive examinations. |

| <b>HIGH FREQUENCY TRANSMISSION LINES</b>                                                                                                                                                                                                                                                                                                                        |                                                                                                        |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  |                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Transmission line equations at radio frequencies - Line of Zero dissipation - Voltage and current on the dissipation less line, Standing Waves, Nodes , Standing Wave Ratio - Input impedance of the dissipation less line - Open and short circuited lines - Power and impedance measurement on lines - Reflection losses - Measurement of VSWR and wavelength |                                                                                                        |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  |                                                                                                 |
| Session No.                                                                                                                                                                                                                                                                                                                                                     | Topics to be covered                                                                                   | Ref                                                                                                                                                      | Instruction Objective                                                                                                                                                                                                                                                                             | Program Outcome                                                                                                                                  |                                                                                                 |
| 15.                                                                                                                                                                                                                                                                                                                                                             | Transmission line equations at radio frequencies- Line of Zero dissipation                             | 1.John D.Ryder, "Networks, Lines and Fields", Prentice Hall of India, 1997                                                                               | Chapter 1.7 Page No. 7<br><br>Chapter 7.3, Page No.282<br><br>Chapter 7.4, Page No.285<br><br>Chapter 7.5, Page No.291<br><br>Chapter 7.7, Page No.295<br><br>Chapter 7.8, Page No.297<br><br>Chapter 7.9, Page No.299<br><br>Chapter 7.10, Page No.304<br><br>Chapter 1.7 – 7.99 Page No.7 - 299 | To become familiar with propagation of signals through lines<br><br>Calculation of various line parameters by conventional and graphical methods | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |
| 16.                                                                                                                                                                                                                                                                                                                                                             | Voltage and current on the dissipationless line, OC and SC lines                                       |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |
| 17.                                                                                                                                                                                                                                                                                                                                                             | Standing Waves, Nodes and Antinodes , Standing Wave Ratio and its relation with Reflection Coefficient |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |
| 18.                                                                                                                                                                                                                                                                                                                                                             | Input impedance of the dissipation less line, Impedance of Open and Short line                         |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |
| 19.                                                                                                                                                                                                                                                                                                                                                             | Tutorial Problem 1 : Calculation of $V_{max}$ , $V_{min}$ , $I_{max}$ , $I_{min}$ , S, K               |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  | j) Graduate will develop confidence for self education and ability for life-long learning.      |
| 20.                                                                                                                                                                                                                                                                                                                                                             | Tutorial Problem 2 : Input Impedance, Location of $V_{max}$ , $V_{min}$                                |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  | j) Graduate will develop confidence for self education and ability for life-long learning.      |
| 21.                                                                                                                                                                                                                                                                                                                                                             | Power and impedance measurement on lines                                                               |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |
| 22.                                                                                                                                                                                                                                                                                                                                                             | Measurement of VSWR and wavelength                                                                     |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |
| 23.                                                                                                                                                                                                                                                                                                                                                             | Overview of session 15 to 22                                                                           | k) Graduates will show the ability to participate and try to succeed in competitive examinations.                                                        |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  |                                                                                                 |
| <b>IMPEDANCE MATCHING IN HIGH FREQUENCY LINES</b>                                                                                                                                                                                                                                                                                                               |                                                                                                        |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  |                                                                                                 |
| Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stub and double stub matching - Smith chart - Solutions of problems using Smith chart - Single and double stub matching using Smith chart.                                                                                                                                  |                                                                                                        |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  |                                                                                                 |
| Session No.                                                                                                                                                                                                                                                                                                                                                     | Topics to be covered                                                                                   | Ref                                                                                                                                                      | Instruction Objective                                                                                                                                                                                                                                                                             | Program Outcome                                                                                                                                  |                                                                                                 |
| 24.                                                                                                                                                                                                                                                                                                                                                             | Need for Impedance Matching Techniques and its type , Quarter wave transformer                         | Chapter 7.12 Page No.305<br><br>Chapter 7.15 Page No.312<br><br>Chapter 7.15 Page No.312<br><br>Chapter 7.21 Page No.333<br><br>Chapter 7.18 Page No.324 | To become familiar with propagation of signals through lines<br><br>Calculation of various line                                                                                                                                                                                                   | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems                                                  |                                                                                                 |
| 25.                                                                                                                                                                                                                                                                                                                                                             | Impedance matching by stubs :Single stub matching – Derivation of distance between Stub and node point |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems                                                  |                                                                                                 |
| 26.                                                                                                                                                                                                                                                                                                                                                             | Single stub matching – Derivation of Length of the stub                                                |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems                                                  |                                                                                                 |
| 27.                                                                                                                                                                                                                                                                                                                                                             | Disadvantage of Single Stub matching- Need of Double Stub Matching and its concept                     |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems                                                  |                                                                                                 |
| 28.                                                                                                                                                                                                                                                                                                                                                             | Introduction to Smith Chart-Types of Circles and importance of R=1 Circle                              |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                   | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems                                                  |                                                                                                 |

|     |                                                                                                              |                                                                              |                                                                                                   |                                                                                                                                 |                                                                                            |
|-----|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 29. | Tutorial Problem 1 : Using Smith Chart find $S$ , $V_{max}$ , $V_{min}$ and $K$ for the given load impedance | 1. John D. Ryder, "Networks, Lines and Fields", Prentice Hall of India, 1997 | Chapter 7.18 Page No.326                                                                          | parameters by conventional and graphical methods<br><br>Need for impedance matching and different impedance matching techniques | j) Graduate will develop confidence for self education and ability for life-long learning. |
| 30. | Tutorial Problem 2 : Using Smith Chart find Input Impedance                                                  |                                                                              | Chapter 7.19 Page No.327                                                                          |                                                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning. |
| 31. | Tutorial Problem 3 : Using Smith Chart find Input Impedance and Load Impedance                               |                                                                              | Chapter 7.19 Page No.330                                                                          |                                                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning. |
| 32. | Tutorial Problem 4: Single Stub Matching using Smith Chart                                                   |                                                                              | Chapter 7.20 Page No.332                                                                          |                                                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning. |
| 33. | Tutorial Problem 5: Single Stub - Determine $L_{stub}$ and $D_{stub}$ using Smith Chart                      |                                                                              | Chapter 7.21 Page No.335                                                                          |                                                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning. |
| 34. | Tutorial Problem 6: Double Stub Matching using Smith Chart                                                   |                                                                              | Chapter 7.21 Page No.335                                                                          |                                                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning. |
| 35. | Tutorial Problem 7: Double Stub Matching using Smith Chart                                                   |                                                                              | Chapter 7.21 Page No.335                                                                          |                                                                                                                                 | j) Graduate will develop confidence for self education and ability for life-long learning. |
| 36. | Overview of session 24 to 36                                                                                 | Chapter 7.12 – 7.21 Page No.305 - 335                                        | k) Graduates will show the ability to participate and try to succeed in competitive examinations. |                                                                                                                                 |                                                                                            |

#### PASSIVE FILTERS

Characteristic impedance of symmetrical networks – filter fundamentals. **Design of filters:** Constant K, Low Pass, High Pass, Band Pass, Band Elimination, m-derived sections and composite.

| Session No. | Topics to be covered                                                         | Ref                                                                                                        | Instruction Objective                                           | Program Outcome                                                                                 |                                                                                                 |
|-------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 37.         | Characteristic impedance of symmetrical networks – filter fundamentals       | Sudhakar. A,                                                                                               | Design of different types of filters, equalizer and attenuators | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                 |
| 38.         | Characteristics of the Filter, Design of Filter – Constant K Low Pass Filter | Shyammohan S Palli, "Circuits and Networks – Analysis and Synthesis", Tata McGraw Hill, 2nd Edition, 2002. |                                                                 | Chapter 16.5 Page No.773                                                                        | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |
| 39.         | Design of Filter – Constant K High Pass Filter                               | Chapter 16.5 Page No.774                                                                                   |                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                 |
| 40.         | Design of Filter – Constant K Band Pass Filter                               | Chapter 16.5 Page No.778                                                                                   |                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                 |
| 41.         | Design of Filter – Constant K Band Elimination Filter                        | Chapter 16.9 Page No.790                                                                                   |                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                 |
| 42.         | m-Derived Filters, m-Derived Low Pass Filter                                 | Chapter 16.10 Page No.794                                                                                  |                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                 |
| 43.         | m-Derived High Pass, Band Pass Filters                                       | Chapter 16.8 Page No.784                                                                                   |                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                 |
| 44.         | m-Derived Band Stop Filters                                                  | Chapter 16.8 Page No.787                                                                                   |                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                 |
| 45.         | Composite Filters                                                            | Chapter 16.10 Page No.794                                                                                  |                                                                 | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                 |

|     |                              |  |                                        |  |                                                                                                   |
|-----|------------------------------|--|----------------------------------------|--|---------------------------------------------------------------------------------------------------|
| 46. | Overview of section 37 to 45 |  | Chapter 16.5 – 16.10 Page No.773 - 794 |  | k) Graduates will show the ability to participate and try to succeed in competitive examinations. |
|-----|------------------------------|--|----------------------------------------|--|---------------------------------------------------------------------------------------------------|

**ATTENUATORS AND EQUALIZERS**

**Attenuators:** T,II, Lattice Attenuators, Bridged – T attenuator, L-Type Attenuator. **Equalizers:** inverse network, series, full series, shunt, full shunt, constant resistance T, constant resistance  $\Pi$ , constant resistance lattice and bridged T network.

| Session No. | Topics to be covered                                                        | Ref                                                                                                                                  | Instruction Objective                                           | Program Outcome                                                                                 |                                                                                                   |
|-------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 47.         | <b>Attenuators</b> – Symmetrical Attenuators                                | 2. Sudhakar. A, Shyammo han S Palli, “ <i>Circuits and Networks – Analysis and Synthesis</i> ”, Tata McGraw Hill, 2nd Edition, 2002. | Design of different types of filters, equalizer and attenuators | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems |                                                                                                   |
| 48.         | Symmetrical T Attenuator                                                    |                                                                                                                                      |                                                                 | Chapter 16.11 Page No.798                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 49.         | Symmetrical $\Pi$ Attenuator, Symmetrical Bridged –T-Attenuator             |                                                                                                                                      |                                                                 | Chapter 16.15 Page No.804                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 50.         | Symmetrical Lattice Attenuator                                              |                                                                                                                                      |                                                                 | Chapter 16.14 Page No.801                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 51.         | Asymmetrical T and L-Attenuator                                             |                                                                                                                                      |                                                                 | Chapter 16.16 Page No.806                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 52.         | Asymmetrical $\Pi$ Attenuator                                               |                                                                                                                                      |                                                                 | Chapter 16.13 Page No.800                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 53.         | Equalizers – Classification, Series and Shunt Equalizer, Inverse Impedance  |                                                                                                                                      |                                                                 | Chapter 16.17 Page No.807                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 54.         | Inverse Network                                                             |                                                                                                                                      |                                                                 | Chapter 16.18 Page No.808                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 55.         | Full Series Equalizer                                                       |                                                                                                                                      |                                                                 | Chapter 16.20 Page No.811                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 56.         | Full Shunt Equalizer                                                        |                                                                                                                                      |                                                                 | Chapter 16.22 Page No.814                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 57.         | Constant resistance T Equalizer                                             |                                                                                                                                      |                                                                 | Chapter 16.23 Page No.816                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 58.         | Constant resistance $\Pi$ Equalizer , Constant resistance Lattice Equalizer |                                                                                                                                      |                                                                 | Chapter 16.26 Page No.819                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 59.         | Bridge T network                                                            |                                                                                                                                      |                                                                 | Chapter 16.24 Page No.816                                                                       | b) Graduates will demonstrate the ability to identify, formulate and solve engineering problems   |
| 60.         | Overview of section 47 to 59                                                |                                                                                                                                      |                                                                 | Chapter 16.11 - 16.24 Page No.798 - 816                                                         | k) Graduates will show the ability to participate and try to succeed in competitive examinations. |

