Shri Siddheshwar Devasthan, Solapur.
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**Department of Electronics & Telecommunication Engineering**

**Course outcomes of all courses**

| **Second Year(SEM-III)** | |
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| **Course Code: BTBS301** | **Course Name: Engineering Mathematics-III** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Solve problems related to laplace and inverse laplace transform. |
| **CO2** | Solve higher order linearD.E and it's applications to communication systems & signal processing. |
| **CO3** | Solve parseval's identity depends on f.t,f.sine &f.cosine transform. |
| **CO4** | Solve one dimensional heat equation and wave equation when ivp & bvp is given . |
| **CO5** | Perform contour integration of complex function in the study of electrostatic signal processing. |
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| **Course Code: BTETC302** | **Course Name:Electronic Devices & Circuits** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Draw BJT characteristics with different configurations. |
| **CO2** | Draw Jfet characteristics and distinguish between Jfet and Mosfet |
| **CO3** | Classify various Power Amplifiers |
| **CO4** | explain principle of negative feedback amplifier with its types |
| **CO5** | Distinguish between different oscillators with reference to Barkhausen criteria and explain various applications of voltage regulators |
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| **Course Code: BTETC303** | **Course Name: Digital Electronics** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | To acquaint the students with the fundamental principles of two-valued logic and various devices used to implement logical operations on variables. |
| **CO2** | To lay the foundation for further studies in areas such as communication, VHDL, computer. |

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| **CO3** | Use the basic logic gates and various reduction techniques of digital logic circuit in detail |
| **CO4** | Design combinational and sequential circuits. |
| **CO5** | Design and implement hardware circuit to test performance and application. Understand the architecture and use of VHDL for basic operations and Simulate using simulation software. |
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| **Course Code: BTES304** | **Course Name:Electrical Machines & Instruments** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | The ability to formulate andthen analyse the working of any electrical machine |
| **CO2** | Mathematical model under loaded and unloaded condition |
| **CO3** | The skill to analyse the response of any electrical machine |
| **CO4** | The ability to troubleshoot the operation of electrical machine |
| **CO5** | The ability to select sutable measuring instrument for a given application |
| **CO6** | The ability to select correct machine for correct application |
| **CO7** | The ability to estimate a correct deviations in a measurement due to influences of the instruments and due to acuracy of instruments |

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| **Course Code: BTETL305** | **Course Name: Electronic Devices & Circuits Lab** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Draw BJT characteristics with different configurations. |
| **CO2** | Draw Jfet characteristics and distinguish between JFET and MOSFET |
| **CO3** | Classify various Power Amplifiers |
| **CO4** | explain principle of negative feedback amplifier with its types |
| **CO5** | Distinguish between different oscillators with reference to Barkhausen criteria and explain various applications of voltage regulators |
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| **Course Code: BTETL306** | **Course Name:Digital Electronics Lab** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | To acquaint the students with the fundamental principles of two-valued logic and various devices used to implement logical operations on variables. |

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| **CO2** | To lay the foundation for further studies in areas such as communication, VHDL, computer. |
| **CO3** | Use the basic logic gates and various reduction techniques of digital logic circuit in detail |
| **CO4** | Design combinational and sequential circuits. |
| **CO5** | Design and implement hardware circuit to test performance and application. Understand the architecture and use of VHDL for basic operations and Simulate using simulation software. |

| **Course Code: BTETS307** | **Course Name:Seminar I** |
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| **CO'S** | After completion of the course students will be able to |
| **CO1** | Search for the needed relevant information using various reference sources and comprehend it in literature review |
| **CO2** | Develop audience-centered presentations which meet the objectives of the chosen topic by integrating appropriate visual aids. |
| **CO3** | Demonstrate effective writing skills by employing the systematic techniques of academic writing, including critical analysis and evaluation etc |
| **CO4** | Deliver well-rehearsed and polished presentations which meet the time, content, and interactive requirements (Presentation Skill). |
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| **Course Code: BTES211P** | **Course Name:Internship-I Evaluation** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Write a report based on the experiences, observations and case study carried applying the knowledge of Mathematics, Science, and Engineering fundamentals. |
| **CO2** | Demonstrate competency in relevant engineering fields through problem identification, formulation and solution as case study. |
| **CO3** | Identify career opportunities in particular domain and skills required for that post. |
| **CO4** | Demonstrate the presentation skill by sharing the experience gained in the internship. |
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| **Second Year(SEM-IV)** | |
| **Course Code: BTETC401** | **Course Name:Network Theory** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/source transformation/ |
| **CO2** | Solve network problems by applying superposition/ reciprocity/ thevenin‘s/ norton‘s/ maximum power transfer/ millman‘s network theorems and electrical laws to reduce circuit |
| **CO3** | Calculate current and voltages for the given circuit under transient conditions |
| **CO4** | Apply laplace transform to solve the given network 5) solve the given network using specified two port network parameter like z or y or t or h. understand the concept of |

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| **CO5** | Derive formula and solve numerical of two port network and design of filters |
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| **Course Code: BTETC402** | **Course Name:Signals & Systems** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Understand mathematical description and representation of continuous and discrete time signals and systems |
| **CO2** | Understand mathematical description and representation of continuous and discrete time signals and systems |
| **CO3** | Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms |
| **CO4** | Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s-domain |
| **CO5** | Understand and resolve the signals in frequency domain using Fourier series and Fourier transform |
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| **Course Code: BTHM403** | **Course Name: Basic Human Rights** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Understand history of human rights |
| **CO2** | Learn to respect other caste ,religion, & culture |
| **CO3** | Aware of their rights as an indian citizen. |
| **CO4** | To understand importance of groups & communities in the society . |
| **CO5** | Realize the philosophical, cultural basis of historical perspective of human rights, |
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| **Course Code: BTBS404** | **Course Name:Probability Theory & Random Process** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | To understand the concepts of basic probability and random variables. |
| **CO2** | To understand some standard distributions like binomial , poissons, normal, uniform etc. and apply to some problems. |
| **CO3** | To investigate characteristics of random variables |
| **CO4** | To make use of therom related to random signals. |
| **CO5** | To evaluate propogataion of random signals in lit systems. |

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| **Course Code: BTETPE405E** | **Course Name:Python Programming** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Understand python syntax & basic programming concept |
| **CO2** | Demonstrate proficiency with different data types & apply various operators for data manipulation |
| **CO3** | Differentiate different types of argumrnts & define & use different functions |
| **CO4** | Explain oop principles & implement & use class effctively |
| **CO5** | Implement testing strategies & debug & troubleshoot python code effectively. |
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| **Course Code:BTETL406** | **Course Name:Network Theory & Signals & Systems Lab** |
| **CO's** | **After completion of the course students will be able to** |
| **CO1** | Understand mathematical description and representation of continuous and discrete time signals and systems |
| **CO2** | Understand mathematical description and representation of continuous and discrete time signals and systems |
| **CO3** | Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms |
| **CO4** | Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/source transformation/ source shifting. |
| **CO5** | Solve network problems by applying superposition/ reciprocity/ thevenin‘s/ norton‘s/ maximum power transfer/ millman‘s network theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions |
| **CO6** | Calculate current and voltages for the given circuit under transient conditions |
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| **Course Code: BTETS407** | **Course Name:Seminar-II** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Search for the needed relevant information using various reference sources and comprehend it in literature review. |
| **CO2** | Develop audience-centered presentations which meet the objectives of the chosen topic by integrating appropriate visual aids. |

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| **CO3** | Demonstrate effective writing skills by employing the systematic techniques of academic writing, including critical analysis and evaluation etc. |
| **CO4** | Deliver well-rehearsed and polished presentations which meet the time, content, and interactive requirements (presentation skill |
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| **Course Code: BTETP408** | **Course Name: Internship/ Industyrial training(4 weeks)** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Write a report based on the experiences, observations and case study carried applying the knowledge of Mathematics, Science, and Engineering fundamentals. |
| **CO2** | Demonstrate competency in relevant engineering fields through problem identification, formulation and solution as case study. |
| **CO3** | Identify career opportunities in particular domain and skills required for that post. |
| **CO4** | Demonstrate the presentation skill by sharing the experience gained in the internship. |

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| **Third Year(SEM-V)** | |
| **Course Code: BTETC501** | **Course Name: Electromagnetic Field Theory** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Illustrate the physical concepts of static electric fields. |
| **CO2** | Describe the physical concepts of static magnetic fields. |
| **CO3** | Apply the maxwell equations to solve problems in electromagnetic field theory. |
| **CO4** | Determine the parameters of transmission lines for various frequencies |
| **CO5** | Analyze the propagation of wave in different media |
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| **Course Code: BTETC502** | **Course Name:Digital Signal Processing** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Explain DSP ,its advantages and application over ASP |
| **CO2** | Explain DFT properties and steps in Radix-2 algorithm and solve the numericals based on algorit |
| **CO3** | Solve numericals based on Z-transform and inverse Z-transform using their properties |
| **CO4** | Design IIR filter using various methods like butterworth filter, Chebyshev filter |
| **CO5** | Design FIR filter using different windowing techniques, concept of Multirate DSP |
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| **Course Code: BTETC503** | **Course Name: Analog Communication** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Explain analog Communication system with the help of block diagram. |
| **CO2** | Calculate frequency & amplitude of the transmitter & receiver. |
| **CO3** | Calculate & draw phase of the signal given in amplitude, frequency & phase modulation. |
| **CO4** | Explain principle of working & types of radio receiver & demodulator with the help of circuit diagram. |
| **CO5** | Calculate the noise level in the given signal from detection section & explain types of noise. |
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| **Course Code: BTETPE504** | **Course Name:Embedded System Design** |
| **CO'S** | **After completion of the course students will be able to** |

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| **CO1** | To understand the embedded system design basics and issues |
| **CO2** | To learn RM processor and it's use in embedded system design |
| **CO3** | To understand embedded linux environment. |
| **CO4** | To learn vrious communication protocol used in embedded system design |
| **CO5** | To understand real time operating system concepts. |
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| **Course Code: BTETOE505** | **Course Name: Control System Engineering** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Able to describe basic concepts and components of control system |
| **CO2** | To apply concept of reduction techniques to solve control system equation |
| **CO3** | To perform stability analysis using time domain and frequency domain response on a given system |
| **CO4** | To design and analyze pid controller |
| **CO5** | Able to apply concept of state space variable to solve system equation |
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| **Course Code: BTETL506** | **Course Name: DSP Lab & Analog Communication Lab** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Explain DSP ,its advantages and application over ASP |
| **CO2** | Explain DFT properties and steps in Radix-2 algorithm and solve the numericals based on algorithm using butterfly diagram |
| **CO3** | Solve numericals based on Z-transform and inverse Z-transform using their properties |
| **CO4** | Explain analog Communication system with the help of block diagram. |
| **CO5** | Calculate frequency & amplitude of the transmitter & receiver. |
| **CO6** | Calculate & draw phase of the signal given in amplitude, frequency & phase modulation. |
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| **Course Code: BTETM507** | **Course Name:Mini Project** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Students will be able to practice acquired knowledge within the chosen area of technology for project development |
| **CO2** | Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. |

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| **CO3** | Reproduce, improve and refine technical aspects for engineering projects. |
| **CO4** | Work as an individual or in a team in development of technical projects. |
| **CO5** | Communicate and report effectively project related activities and findings. |
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| **Course Code: BTETP408** | **Course Name:Internship-2 Evaluation** |
| **CO'S** | After completion of the course students will be able to |
| **CO1** | Write a report based on the experiences, observations and case study carried applying the knowledge of mathematics, science, and engineering fundamentals. |
| **CO2** | Demonstrate competency in relevant engineering fields through problem identification, formulation and solution as case study. |
| **CO3** | Identify career opportunities in particular domain and skills required for that post. |
| **CO4** | Demonstrate the presentation skill by sharing the experience gained in the internship. |
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| **Third Year(SEM-VI)** | |
| **Course Code: BTETC601** | **Course Name:Antennas & Wave Propagation** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Explain process of wave propagation and effects of obstacles, atmospheric conditions and magnetic field on wave propagation |
| **CO2** | Explain working of various types of antennas with the help of diagram. & analyse linear loop and antennas and determine different parameters related to wire antenna and its radiation characteristics |
| **CO3** | Design different antenna arrays and their operating parameters. |
| **CO4** | To understand different concepts of smart antennas. |
| **CO5** | Identify the suitable antenna for a given communication system |
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| **Course Code: BTETC602** | **Course Name:Digital Communication** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Explain digital transmission of analog signal with the help of block diagram |
| **CO2** | Explain digital transmission of analog signal with the help of block diagram |
| **CO3** | Expain baseband digital transmission with the help of multiplexers & synchronization techniques. |

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| **CO4** | Calculate & derive expression for mean, correlation, covariance function, ergodic process of random process. |
| **CO5** | Calculate map, lrt, met & error probability with signal representation & identify noise ypes. |
| **CO6** | Explain passband digital transmission using coherent & non-coherent techniques with block diagram & mathematical analysis & explain spread spectrum technique using different sequence & represent it using signal space & processing gain. |
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| **Course Code: BTETPE603 A** | **Course Name:Microprocessors & Microcontrollers** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Identify and formulate control and monitoring systems usingmicroprocessors. |
| **CO2** | Will be able to design real time controllers using microcontroller-basedsystem |
| **CO3** | Learn importance of microcontroller in designing embedded application |
| **CO4** | Interface mechanical system to function in multidisciplinarysystem like in robotics, automobiles. |
| **CO5** | Conduct experiments based on interfacing of devices to or interfacing to real world applications. |
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| **Course Code: BTETOE604C** | **Course Name:Computer Network** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Explain various transmission media and their characteristics. |
| **CO2** | Describe the concept of framing, error detection and correction. |
| **CO3** | Explain wireless communication, routing algorithm, protocols, ip addressing and subnetting |
| **CO4** | Describe transport layer protocols like tcp and udp and flow control. |
| **CO5** | Explain the functionalities of higher layers and protocols like http, ftp and dns. |
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| **Course BTHM605** | **Course Name:Employabilitty & Skill Development** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | To introduce the students to skill necessary for getting,keeping and being successful in a profession |
| **CO2** | Have a skill and preparedness for aptitude test |
| **CO3** | Be equipped with essential communication skill |
| **CO4** | Master the presentation skill and be ready for facing interview |
| **CO5** | Build team and lead it for problem solving |

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| **Course Code: BTETL606** | **Course Name:Digital communication lab & MPMC Lab** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Explain digital transmission of analog signal with the help of block diagram |
| **CO2** | Explain digital transmission of analog signal with the help of block diagram |
| **CO3** | Expain baseband digital transmission with the help of multiplexers & synchronization techniques. |
| **CO4** | Students get ability to conduct experiments based on interfacing of devices to interfacing real world applications. |
| **CO5** | Students get ability to interface mechanical system to finction in multidisciplinary system like robotics. Automobiles. |
| **CO6** | Learn use of hardware and software tools. |
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| **Course Code: BTETM607** | **Course Name:Mini Project-2** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Students will be able to practice acquired knowledge within the chosen area of technology for project development |
| **CO2** | Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. |
| **CO3** | Reproduce, improve and refine technical aspects for engineering projects. |
| **CO4** | Work as an individual or in a team in development of technical projects |
| **CO5** | Communicate and report effectively project related activities and findings |
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| **Course Code: BTETP608** | **Course Name: Internship(3)/ Industyrial training(4 weeks)** |
| **CO'S** | After completion of the course students will be able to |
| **CO1** | Write a report based on the experiences, observations and case study carried applying the knowledge of mathematics, science, and engineering fundamentals. |
| **CO2** | Demonstrate competency in relevant engineering fields through problem identification, formulation and solution as case study. |
| **CO3** | Identify career opportunities in particular domain and skills required for that post. |
| **CO4** | Demonstrate the presentation skill by sharing the experience gained in the internship. |

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| **Final Year(SEM-VII)** | |
| **Course Code: BTETC701** | **Course Name: Microwave Engineering** |
| **CO'S** | After completion of the course students will be able to |
| **CO1** | Formulate the wave equation in wave guide for analysis. |
| **CO2** | Identify the use of microwave components and devices in microwave applications. |
| **CO3** | Understand the working principles of all the microwave tubes |
| **CO4** | Understand the working principles of all the solid-state devices. |
| **CO5** | Choose a suitable microwave tube and solid-state device for a particular application |
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| **Course Code: BTETPE702D** | **Course Name:Fibre Optic Communication** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | To learn basic elements of optical fiber transmission link,modes,configuration |
| **CO2** | To understand different losses,distortions in optical waveguide. |
| **CO3** | To learn optical sources,materials,quantum efficiency,laser diodes. |
| **CO4** | To learn functionality of each components like transmiter,receiver,amplifier ,fiber and to understand properties that effect performance of communication,study also basic amplifier |
| **CO5** | To learn effects of fibers on performance,signal power,noiser system etc. |
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| **Course Code: BTETOE703D** | **Course Name: Mobile Computing** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Working understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities |
| **CO2** | Develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts |
| **CO3** | Comprehension and appreciation of the design and development of context-aware solutions for mobile devices |

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| **CO4** | An awareness of professional and ethical issues, in particular those relating to security and privacy of user data and user behavior. |
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| **Course Code: BTETOE704** | **Course Name:E Waste Management** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Explain e-waste management and sources of e-waste. |
| **CO2** | Explain environmental and public heath issues and health risk assessment. |
| **CO3** | Explain recovery of materials from e-waste. |
| **CO4** | Explain recovery of e-waste from metals. |
| **CO5** | Explain lca applications for electronics. |
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| **Course Code: BTHM705** | **Course Name: Engineering Economics & FM** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | The student will be able to understand & define basic terminology used in finance & accounts. |
| **CO2** | The student will be able to prepare & appraise Financial statement & evaluate a company in the light of different measurement system. |
| **CO3** | The student would be able to analyze the risk and returns of alternative sources of financing. |
| **CO4** | Estimate cash flow from project including operating, net working capital and capital spending. |
| **CO5** | To estimate the required return on projects of different risk to estimate the cast flow from an investment project, calculate the appropriate discount rate, determine the vlue added from the project & make recommendadtion to accept or reject the project. |
| **CO6** | To describe & illustrate the important elements in project finance using financial calculator & excel in a variety of problems. |
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| **Course Code: BTHM706** | **Course Name: Foreign language studies** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Formulate the wave equation in wave guide for analysis. |
| **CO2** | Identify the use of microwave components and devices in microwave applications. |

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| **CO3** | Understand the working principles of all the microwave tubes |
| **CO4** | Understand the working principles of all the solid-state devices. |
| **CO5** | Choose a suitable microwave tube and solid-state device for a particular application |
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| **Course Code: BTETL707** | **Course Name:Microwave Engineering Lab** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Formulate the wave equation in wave guide for analysis. |
| **CO2** | Identify the use of microwave components and devices in microwave applications. |
| **CO3** | Understand the working principles of all the microwave tubes |
| **CO4** | Understand the working principles of all the solid-state devices. |
| **CO5** | Choose a suitable microwave tube and solid-state device for a particular application |
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| **Course Code: BTETM708** | **Course Name:Mini Prioject-3** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Students will be able to practice acquired knowledge within the chosen area of technology for project development |
| **CO2** | Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. |
| **CO3** | Reproduce, improve and refine technical aspects for engineering projects. |
| **CO4** | Work as an individual or in a team in development of technical projects |
| **CO5** | Communicate and report effectively project related activities and findings |
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| **Course Code: BTETP608** | **Course Name:Internship Evaluation-3** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Write a report based on the experiences, observations and case study carried applying the knowledge of Mathematics, Science, and Engineering fundamentals. |
| **CO2** | Demonstrate competency in relevant engineering fields through problem identification, formulation and solution as case study. |

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| **CO3** | Identify career opportunities in particular domain and skills required for that post. |
| **CO4** | Demonstrate the presentation skill by sharing the experience gained in the internship. |
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| **Final Year(SEM-VIII)** | |
| **Course Code: BTETP801** | **Course Name:Project work/Internship** |
| **CO'S** | **After completion of the course students will be able to** |
| **CO1** | Write a report based on the experiences, observations and case study carried applying the kr |
| **CO2** | Demonstrate competency in relevant engineering fields through problem identification, formulation and solution as case study. |
| **CO3** | Identify career opportunities in particular domain and skills required for that post. |
| **CO4** | Demonstrate the presentation skill by sharing the experience gained in the internship. |