Vision

Provide quality education to create engineering professionals of global standards by keeping pace with rapidly changing technologies to serve the society.

Mission

M1: To educate the students with the state-of-the-art technologies and value based education to meet the growing challenges of industry.

M2: To provide scholarly ambience & environment for creating competent professionals.

M3: To inculcate awareness towards societal needs.

Programme Educational Objectives

PEO1: Exhibit adaptability, teamwork, leadership and communication skill required for successful career.
PEO2: Pursue higher education or research, demonstrate entrepreneur quality.
PEO3: Solve problem in diverse fields using knowledge of electronics and communication engineering.

Program Outcomes (POs)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO):

1. Analyze & Design electronics systems for hybrid engineering applications.
2. Implement functional blocks of hardware, software or hardware software Co-design for electronics applications.

Department of Electronics & Telecommunication Engineering
K. K. Wagh Institute of Engineering Education and Research
Hirabai Haridas Vidyanagari, Amrut Dham, Panchavati, Nashik-422003

Course Outcomes (COs)
Program: BE (Electronics)
Syllabus: 2015 pattern

Class: SE (2016-17)				
SE Sem-I				
Sr. No.	**Course Code**	**Course Name**	**CO No.**	**CO Statement**
1	204181	Signals & Systems	CO204181.1	Analyze the basic concepts related to CT and DT signals and systems.
			CO204181.2	Resolve the signals in frequency domain using Fourier transform and analyze the system in frequency domain.
			CO204181.3	Identify the limitation of Fourier transform and need for Laplace transform and develop the ability to analyze the system in S- domain.
			CO204181.4	Apply basic concepts of probability, random variables and random signals.
2	204182	Electronic Devices & Circuits	CO204182.1	Explain constructional details, characteristics, operation of JFET and MOSFET and also compare various configurations.
			CO204182.2	Analyze DC and AC circuits of JFET and MOSFET.
			CO204182.3	Explain concepts of both positive and negative feedbacks in electronic circuits. Also study various applications of MOSFET.
			CO204182.4	Classify different types of voltage regulators and design variable voltage regulator.
3	204183	Electrical Circuits & Machines	CO204183.1	Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, and network theorems.
			CO204183.2	Explain the working principle of different electrical machines.
			CO204183.3	Select proper electrical motor for given application.
			CO204183.4	Design and analyze transformers.
4	204184	Data Structures & Algorithms	CO204184.1	Select appropriate data types with different control, decision and looping statements.
			CO204184.2	Implement modular programs for different applications such as handling database by using user defined functions.
			CO204184.3	Analyze the performance of algorithm after developing any application based on time complexity and space complexity.
			CO204184.4	Implement linear and non-linear data structures and their applications such as stacks, queues, trees, graphs. Compare the performance of all.

5	204185	Digital Electronics	CO204185.1	Analyze and synthesize combinational and sequential digital logic circuits and modular design techniques.
			CO204185.2	Understand various digital logic families, their characteristics and able to select digital IC family for required application.
			CO204185.3	Explore various types of semiconductor memories and their architecture.
			CO204185.4	Understand the architecture and use of microcontrollers for basic operations.
6	204186	Electronic Measuring Instruments & Tools	CO204186.1	Get acquainted with the fundamental of measurements of various electrical parameters.
			CO204186.2	Interpret and describe specifications, features, functions and capabilities of electronic instruments.
			CO204186.3	Select appropriate instrument & carry out required measurement.
SE Sem-II				
7	207005	Engineering Mathematics - III	CO207005.1	Do mathematical modelling of systems using differential equations and solve the differential equations using appropriate method.
			CO207005.2	Apply Fourier & Z transform to solve first and second order difference equation.
			CO207005.3	Classify the different numerical methods & solve the problems choosing the most suitable method.
			CO207005.4	Recognize nature of vector fields, use vector differential operators & evaluate vector integrals & its Applications.
			CO207005.5	Analyze functions of complex variables in terms of continuity, differentiability and analyticity.
8	204187	Integrated Circuits	CO204187.1	Analyze different stages of Op-amp, justify requirement of each stage and determine various performances based parameters.
			CO204187.2	Analyze and design linear and nonlinear applications of Op-Amp.
			CO204187.3	Analyze and design signal convertor.
			CO204187.4	Study PLL, its applications and design RC oscillators.
			CO204187.5	Analyze & design first and second order active filters.
			CO204187.6	Select, interpret, plan, analyze, design & build any one application based on integrated circuit.
9	204188	Control Systems	CO204188.1	Do mathematical modelling by means of block diagrams and transfer function for control system.
			CO204188.2	Perform time domain and frequency domain analysis of a control system.
			CO204188.3	Analyze stability of system using different methods.
			CO204188.4	Model and analyze the control systems using state space analysis and also get detailed knowledge of PLC.

10	204189	Analog Communication	CO204189.1	Identify various components of analog communication systems.
			CO204189.2	Explain & calculate signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
			CO204189.3	Explore different analog pulse modulation techniques and digital modulation technique.
			CO204189.4	Compare and contrast the strengths and weaknesses of various communication systems.
11	204190	Object Oriented Programming	CO204190.1	Design, develop, test, and debug simple programs using Tokens, Expressions and Control Structures in an object-oriented programming language.
			CO204190.2	Implement class-object mechanism which supports encapsulation, inheritance and information hiding with the help of Constructors and Destructors in C++.
			CO204190.3	Understand and implement class-object mechanism which supports encapsulation and information hiding with the help of constructors & destructors in JAVA.
			CO204190.4	Implement classes and objects and inheritance, multiple inheritance using interfaces in the JAVA programming language.
			CO204190.5	Implement, design and develop user defined packages, exceptions and applets.
12	204191	Employability Skill Development	CO204191.1	Have skills and preparedness for aptitude tests.
			CO204191.2	Be equipped with essential communication skills (writing, verbal and non-verbal).
			CO204191.3	Master the presentation skill and be ready for facing interviews.
			CO204191.4	Build team and lead it for problem solving.

Class: TE (2017-18)

TE Sem-I

Sr. No.	Course Code	Course Name	CO No.	CO Statement
1	304201	Power Electronics & Applications	CO304201.1	Demonstrate use of different power devices for power conversion mechanism.
			CO304201.2	Design & implement triggering / gate drive circuit for power converters.
			CO304201.3	Implement and analyze working and performance parameters of different Power electronics converters.
			CO304201.4	Apply knowledge of power electronics in various industrial applications.
2	304202	Instrumentation Systems	CO304202.1	Describe the basics of Instrumentation Systems.
			CO304202.2	Describe fundamentals and selection of various sensors / transducers like thermal, mechanical, electrical, Electromechanical for particular

				application.
			CO304202.3	Compare conventional sensors with smart sensor, PC based measurements as well as various MEMS fabrication techniques.
			CO304202.4	Select appropriate Switches and final control elements for industrial applications.
3	304203	Electromagnetics & Wave Propagation	CO304203.1	Evaluate electromagnetic field parameters and their distributions in different media.
			CO304203.2	Apply boundary conditions to different media and determine electromagnetic fields at the interface of two different media.
			CO304203.3	Interpret the electromagnetic problem and solve using Maxwell's equations.
			CO304203.4	Elaborate wave theory and propagation.
4	304204	Microcontrollers & Applications	CO304204.1	Analyze and compare different microcontrollers (8051 and PIC) and learn their importance in designing embedded applications.
			CO304204.2	Use hardware and software tools for development of embedded systems.
			CO304204.3	Develop interfacing to real world devices.
			CO304204.4	Engage in self study to design and analyze an application of microcontroller through an open ended experiment.
5	304205	Data Communication	CO304205.1	Define and explain terminology of data communication.
			CO304205.2	Analyze the impact and limitations of various modulation techniques.
			CO304205.3	Get exposure to entropy and other coding techniques along with identification and explanation of error detection and correction using appropriate technique.
			CO304205.4	Interpret the need and limitations of various multiplexing techniques and acknowledge the need of spread spectrum schemes.
6	304211	Instrumentation & Power Electronics Lab	CO304211.1	Describe the application of Instrumentation Systems to detect various environmental parameters.
			CO304211.2	Select appropriate sensors & interfacing technique for electronics applications.
			CO304211.3	Design control circuits for implementation of different power converters.
			CO304211.4	Understand and analyze the operation of different power electronics converters.
7	304212	Microcontroller & Data Communication Lab	CO304212.1	Study and compare different modulation and demodulation techniques.
			CO304212.2	Perform software assignment on data coding and decoding techniques using MATLAB.

			CO304212.3	Use of hardware and software tool for microcontroller.
			CO304212.4	Develop interfacing to real world devices.
8	304213	Electronics System Design Practice	CO304213.1	Interpret the specifications of given system.
			CO304213.2	Select optimal design topologies.
			CO304213.3	Interpret datasheets and thus select appropriate components and devices.
			CO304213.4	Validate system performance by simulating the system using an EDA tool for circuit schematic and simulation.
TE Sem-II				
9	304206	DSP & Applications	CO304206.1	Get acquainted with importance of digital signal processing systems, their applications, sampling of analog signal and verify concept of aliasing.
			CO304206.2	Analyze discrete time signals and systems using different transforms.
			CO304206.3	Design, Implement and simulate different types of IIR and FIR digital filters.
			CO304206.4	Describe real world applications of DSP processors and implement the same using DSP processors.
10	304207	Embedded Processors	CO304207.1	To demonstrate MSP430 Microcontroller Architecture and its Low Power Features.
			CO304207.2	Develop interfacing of MSP430 to real world devices.
			CO304207.3	To familiarize with the need and application of ARM Microprocessors in embedded system.
			CO304207.4	To demonstrate the architecture of ARM7 and ARM CORTEX-M3 and LPC2148.
			CO304207.5	Develop interfacing of LPC2148 to real world devices.
			CO304207.6	Engage in self study to design, implement, analyze and demonstrate an application of microcontroller through an open ended experiment.
11	304208	Business Management & Organization	CO304208.1	Get the idea about new developments in management.
			CO304208.2	Compare modern business practices, forms, procedures and functioning of various business organizations.
			CO304208.3	Explore the basic concepts in commerce, trade and industry.
			CO304208.4	Describe basic principles of management – will acquaint himself with management process, functions and principles.
12	304209	Fundamentals of HDL	CO304209.1	Identify the role of HDL in digital system design using latest tools for programming in VHDL and

				Verilog.
			CO304209.2	Describe and test digital logic circuits in dataflow description, structural description and advanced constructs using both VHDL and Verilog.
			CO304209.3	Develop VHDL code to model and simulate basic combinational networks and sequential machines.
13	304210	PLC & Applications	CO304210.1	Apply concepts of PLC, its uses for industrial applications.
			CO304210.2	Demonstrate timer, counter functions & PLC ladder programs for simple industrial applications.
			CO304210.3	Make use of knowledge of Installation, troubleshooting & maintenance of PLC to provide solution for industrial automation problems.
			CO304210.4	Select appropriate interfacing technique & communication protocol to establish communication with field devices, HMI & SCADA.
14	304214	Embedded & DSP Lab	CO304214.1	Interface the advance peripherals to MSP430 Microcontroller.
			CO304214.2	Interface the advance peripherals to LPC2148 Microcontroller.
			CO304214.3	Engage in self study to design and analyze an application of microcontroller through an open ended experiment.
			CO304214.4	Compute DFT, IDFT, Linear and circular convolution of Discrete time signals.
			CO304214.5	Analyze discrete time signals and systems using DFT and Z Transform.
			CO304214.6	Design FIR and IIR Filters.
15	304215	PLC & HDL Programming Lab	CO304215.1	Develop & simulate ladder diagram using timer function for industrial applications.
			CO304215.2	Simulate PLC programs of real life examples like traffic light control, BOTTLE FILLING PLANT, ELEVATOR CONTROL.
			CO304215.3	Develop and simulate VHDL code for any digital circuit.
			CO304215.4	Develop and simulate Verilog code for any digital circuit.
16	304216	Mini Project	CO304216.1	Design and Implement electronic hardware by learning PCB artwork design, soldering techniques, troubleshooting, etc.
			CO304216.2	Understand, plan, execute and validate Mini Project with team.
			CO304216.3	Prepare a technical report based on the Mini project.
			CO304216.4	Deliver technical seminar based on the Mini Project work carried out.

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Class: BE (2018-19)				
BE Sem-I				
Sr. No.	**Course Code**	**Course Name**	**CO No.**	**CO Statement**
1	404201	VLSI Design	CO404201.1	Implement VLSI Design Flow for Digital Applications.
			CO404201.2	Design advance digital circuit using HDL.
			CO404201.3	Design Layout of CMOS circuit using CAD tools and test with Testability methods.
2	404202	Advanced Power Electronics	CO404202.1	Understand operation and implementation of dual converters, Multilevel inverters, cycloconverters and power factor improvement techniques for controlled rectifiers.
			CO404202.2	Select and Design a suitable power converter to meet the demand of DC drive system.
			CO404202.3	Select and Design a suitable power converter to meet the demand of 3 phase induction motor drive.
			CO404202.4	Understand working principle of special purpose motor drives.
			CO404202.5	Understand implementation of Solar and Wind Power System.
3	404203	Electronics System Design	CO404203.1	Understand various stages of hardware, software and PCB design.
			CO404203.2	Analyze reliability of product design.
			CO404203.3	Design and test various electronic products / modules.
			CO404203.4	Describe special design considerations and understand need of documentation.
4	404204a	Elective I a) Embedded Systems & RTOS	CO404204a.1	Get insight of design metrics of embedded systems to design real time applications to match recent trends in technology.
			CO404204a.2	Implement Real time operating system concepts.
			CO404204a.3	Use Linux operating system and device drivers.
			CO404204a.4	Get to know the hardware – software co-design issues and testing methodology for embedded system.
5	404204b	Elective I b) Internet of Things	CO404204b.1	Discover key IoT concepts including identification, sensors, localization, wireless protocols, data storage and security.
			CO404204b.2	Illustrate IoT technologies, architectures, standards, and regulation.
			CO404204b.3	Realize the value created by collecting, communicating, coordinating, and leveraging the data from connected devices.
			CO404204b.4	Explain technological developments that will likely

				shape the industrial landscape in the future.
6	404205	Elective II) Bio-Medical Electronics	CO404205.1	Have knowledge about human physiology system such as cardiac, respiratory and neural physiological systems.
			CO404205.2	Have knowledge of the principle, operation and design of biomedical instruments and specific applications of biomedical engineering.
			CO404205.3	Interpret the operation and working principle of Clinical Lab Instruments.
			CO404205.4	Interpret the working principle and applications of Radiology Instrumentation.
7	404206	Lab practice-I (APE+ ESD)	CO404206.1	Understand the operation and application of modern power electronics converters.
			CO404206.2	Select and Design a suitable power converter to meet the demand of electrical drive system.
			CO404206.3	Design and test various electronic products / modules.
			CO404206.4	Analyze the circuit for various parameters such as reliability, sensitivity, etc.
8	404207	Lab practice-II (VLSI + Ele I)	CO404207.1	Understand front end VLSI design flow.
			CO404207.2	Design layout of any digital circuit.
			CO404207.3	Design and program the IoT based system with practical hardware (Raspberry Pi3 board and Arduino Board).
			CO404207.4	Interfacing of external peripherals to Raspberry Pi3 board and Arduino Board and networking of IoT devices.
			CO404207.5	Implement embedded system application using RTOS and Linux.
BE Sem-II				
9	404209	Computer Networks & Security	CO404209.1	Design, implement, and analyze simple computer networks.
			CO404209.2	Identify, formulate, and solve network engineering problems.
			CO404209.3	Use techniques, skills, and modern networking tools necessary for engineering Practice.
			CO404209.4	Have a basic knowledge of the use of cryptography and network security.
10	404210	Process Instrumentation	CO404210.1	Realize any kind of process by framing it in block diagram, mathematical model and different process variables.
			CO404210.2	Compare different types of controller like electronic, pneumatic and hydraulic.
			CO404210.3	Implement different control schemes to various processes.

			CO404210.4	Design relay logic for various processes.
			CO404210.5	Understand batch process with an example.
11	404211	Elective III) Artificial Intelligence and Machine Learning	CO404211.1	Identify and apply suitable Intelligent agents for various AI applications.
			CO404211.2	Design system using different informed search / uninformed search or heuristic approaches.
			CO404211.3	Apply the suitable algorithms to solve AI problems.
			CO404211.4	Distinguish different learning based applications.
			CO404211.5	Design Neural Network models.
			CO404211.6	Design and implement supervised and unsupervised machine learning algorithm.
12	404212	Elective IV) Renewable Energy Systems & DSM	CO404212.1	Survey the environmental and cost economics issues of renewable energy sources in comparison with non-renewable energy sources.
			CO404212.2	Understand operation and applications of Solar, Wind and Biomass Energy systems.
			CO404212.3	Apply principle of Demand Side Management (DSM) and Demand Response (DR) for efficient energy management.
			CO404212.4	Use various energy measurement and audit instruments.
13	404213	Lab Practice-III (CNS+PI)	CO404213.1	Design, implement, and analyze simple computer networks.
			CO404213.2	Identify, formulate, and solve network engineering problems.
			CO404213.3	Compare different types of controller like electronic, pneumatic and hydraulic.
			CO404213.4	Implement different control schemes to various processes.
14	404214	Lab Practice-IV (Elective-III)	CO404214.1	Design system using different informed search / uninformed search or heuristic approaches.
			CO404214.2	Design Neural Network models.
			CO404214.3	Design and implement supervised and unsupervised machine learning algorithm.
15	404208 & 404215	Project Stage I & Project Stage II	CO404215.1	Define, analyze and solve complex real life problem.
			CO404215.2	Work in collaborative team as a member or leader.
			CO404215.3	Apply project management techniques.
			CO404215.4	Identify and apply appropriate tools.
			CO404215.5	Communicate effectively in verbal and written form.
			CO404215.6	Imbibe ethical practices.