3. COURSE OUTCOMES AND PROGRAM OUTCOMES

Course Name:Strength of Materials-I CAY- 2018 Onwards

Course Outcomes After the course completion, students will be able to:	
BTME301-18.1	Understand the fundamental concepts of stress and strain and the relationship between both through the strain-stress equations in order to solve the related problems.
BTME301-18.2	Understand the concept of shear force diagram and bending moment diagram for various types of loading on different beams.
BTME301-18.3	Solve problems relating to pure and non-uniform bending of beams and other simple structures.
BTME301-18.4	Solve problems relating to torsional deformation of bars and other simple tri-dimensional structures.

Course Name: BTME 303-18 (Machines Drawing)

Course Outcomes After the course completion, students will be able to:	
BTME303-18.1	1. Students understand the principles and requirements of production drawings and learning how to assemble and disassemble important parts used in major mechanical engineering applications.
BTME303-18.2	2. Students have an ability to apply knowledge of Modeling, science & engineering.
BTME303-18.3	3. Student can model this drawing even in CAD/CAM software by applying the basic knowledge of machine drawing.
BTME303-18.4	4. Students will able to demonstrate an ability to design and conduct experiments, analyze and interpret data and assembly and disassembly drawings knowledge will be provided.
BTCS 303-18.5	Students understand the components of screw jack, cam shaft, and gear profile.

Course Name: BTME-304 (Applied Thermodynamics)CAY- Before 2018

Course Outcomes After the course completion, students will be able to:

BTME-304-18.1	Students will able to learn about the functioning and performance evaluation of reciprocating air compressors.
BTME-304-18.1	Students will able to learn and analyze the combustion phenomenon in boilers and I.C. engines.
BTME-304-18.1	Students will able to learn to various types vapour power cycle problems.
BTME-304-18.1	Students will able to learn to features and working of steam power plants to evaluate their performance.

Course Name: MP (BTME- 305)CAY- Before 2018

Course Outcomes **After the course completion, students will be able to:**	
BTME-305-18.1	Ability to handle various casting processes in foundries.
BTME-305-18.2	Understand various patterns and pattern allowances.
BTME-305-18.3	They will also get knowledge of fabrication work related to welding.
BTME-305-18.4	They can frequently handle production work related to welding.
BTME-305-18.5	They can design core and gating systems in casting processes.

Course Name: Engg. Materials BTME-306CAY- 2018 Onwards

Course Outcomes **After the course completion:**	
BTME-306-18.1	To develop the ability to understand the concepts of crystal structure of ferrous and non-ferrous materials.
BTME-306-18.2	To understand the transformations at atomic levels in a engineering material with respect to time-temperature transformations.
BTME-306-18.3	To learn the role of Time temperature transformation curves (TTT curves) and Fe_3C diagram for controlling the structure and properties of materials.
BTME-306-18.4	To understand the various heat treatment processes like annealing, hardening, stress-relieving etc.
BTME-306-18.5	Knowledge about classification, composition of alloys, effect of alloying elements.

Course Name: BTME-307 (Engineering materials & Metallurgy lab)CAY- Before 2018

Course Outcomes

BTME-307-18.1	The students are expected to develop the ability to understand the concepts of crystal structure, microstructure and deformation.
BTME-307-18.2	The students will determine hardenability of steel specimen by conducting Jominy End Quench Test.
BTME-307-18.3	The students shall be able to prepare specimen of various materials in the lab.
BTME-307-18.4	The students are able to identify the various constituents in given specimen of mild steel
BTME-307-18.5	The students will be able to select appropriate heat treatment processes for the desired properties in steel.

Course Name:BTME-308 (Strength of Materials-Lab)

Course Outcomes **After the course completion, students will be able to:**	
BTME-308-18.1	Understand the concept of stress, strain and stress-strain curve for ductile material and brittle material practically.
BTME-308-18.2	Understand the real breakdown/failure of material under various load values.
BTME-308-18.3	To understand the real meaning of various mechanical properties of material like as hardness, fatigue, elasticity, ductility etc.
BTME-308-18.4	Analyze the design parameters of a structure.

Course Name: -BTME-309 APPLIED THERMODYNAMICS LAB

Course Outcomes **After the course completion, students will be able to:**	
BTME-309-18.1	Students will able to learn about the functioning and performance evaluation of reciprocating air compressors.
BTME-309-18.2	Students will able to learn and analyze the combustion phenomenon in boilers and I.C. engines.
BTME-309-18.3	Students will able to learn to various types vapour power cycle problems.
BTME-309-18.4	Students will able to learn to features and working of steam power plants and to evaluate their performance**.**

Course Code 301-18 (Fluid Mechanics)

Course Outcomes **After the course completion, students will be able to:**	
BTME-301-18.1	Identify how properties of fluids change with temperature and their effect on pressure and fluid flow.
BTME-301-18.2	Describe fluid pressure and its measurement.
BTME-301-18.3	Define the relationship between pressure as it relates to manometers and other pressure measuring devices.
BTME-301-18.4	Calculate forces on a plane submerged in a static fluid.

BTME-301-18.5	Calculate buoyancy on a body submerged in a static fluid.
BTME-301-18.6	Use the general energy equation (Bernoulli's equation) to calculate changes in fluid flow for circular pipes i.e., change in pressure, velocity and elevation

Course Code 305-18 (Basic Thermodynamics)

Course Outcomes **After the course completion, students will be able to:**	
BTME-305-18.1	Explain fundamental thermodynamic properties.
BTME-305-18.2	Derive and discuss the first and second laws of thermodynamics.
BTME-305-18.3	Solve problems using the properties and relationships of thermodynamic fluids.
BTME-305-18.4	Analyze basic thermodynamic cycles.
BTME-305-18.5	Students must have understanding of thermodynamic fundamentals before studying their application in applied thermodynamics.

Course Code:BTME-308-18 (Fluid Mechanics lab)

Course Outcomes **After the course completion, students will be able to:**	
BTME-308-18.1	Calculate pressure changes using manometers and piezometers.
BTME-308-18.2	Calculate buoyancy for a body partially submerged in a fluid.
BTME-308-18.3	Calculate cross section areas.
BTME-308-18.4	Determine flow discharge given velocity and cross sectional area.
BTME-308-18.5	Determine the rate of fluid flow using stop watch.
BTME-308-18.6	Calculate Reynolds number for laminar and turbulent flow.

Course Code: 305-18(Basic Electronics Engineering)

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Understand construction of diodes and their rectifier applications.
CO-2	Appreciate the construction and working bipolar junction transistors and MOSFETs.
CO-3	Design Op-Amp IC based fundamental applications.
CO-4	Comprehend working of basic elements of digital electronics and circuits.

Course Name:Applied Thermodynamics Subject Code BTME401-18

Course Outcomes After the course completion, students will be able to:	
BTME401-18.1	Apply energy balance to Systems and Control Volumes in situations involving heat and work interactions.
BTME401-18.2	Evaluate changes in thermodynamic properties of substances
BTME401-18.3	Evaluate performance of energy conversion devices.
BTME401-18.4	Explain and apply various gas power and vapor power cycles.

Course Name: Fluid Machines Subject Code BTME402-18

Course Outcomes After the course completion, students will be able to:	
BTME**402-18.1**	Analyze the forces exerted by a jet of fluid on vanes of different shapes, either stationary or moving
BTME**402-18.2**	Study and analyze the construction features and working principles of different classes of hydraulic turbines.
BTME**402-18.3**	Analyze the performance characteristic curves of hydraulic turbines
BTME**402-18.4**	Distinguish between different classes of pumps, their construction features and further analyze their performance
BTME**402-18.4**	Understand the working principles of various hydraulic systems, hydraulic control systems and fluidics

Course Name:Strength of Materials-II Subject Code BTME403-18

Course Outcomes After the course completion, students will be able to:	
CO403-18.1	Understand the concepts failure of complex system by getting the thorough knowledge of different theories of failure.
CO403-18.2	Understand the concepts of strain energy, resilience, stress under impact loading.
CO403-18.3	Calculate various stresses in different types of springs under different type of loading.

CO403-18.4	Understand stress and strain analysis of thin, thick cylinder and spheres subjected to internal pressure.
CO403-18.5	Analyze and design various mechanical elements like simple beams, curved beams, rotational discs etc from strength point of view after getting thorough knowledge.

Course Name:Materials Engineering Subject Code BTME404-18

Course Outcomes **After the course completion, students will be able to:**	
CO404-18.1	Develop the ability to understand the concepts of crystal structure of ferrous and non-ferrous materials.
CO404-18.2	Understand the transformations at atomic levels in engineering material with respect to time-temperature transformations.
CO404-18.3	To learn the role of Time temperature transformation curves (TTT curves) and Fe3C diagram for controlling the structure and properties of materials.
CO404-18.4	Knowledge about classification, composition of alloys, effect of alloying elements.
CO404-18.5	To understand the various heat treatment processes like annealing, hardening, stress-relieving etc.

Course Name:Theory of Machines-II Subject Code BTME405-18

Course Outcomes **After the course completion, students will be able to:**	
CO 405-18.1	Understand the fundamentals of the theory of kinematics and dynamics of machines.
CO 405-18.2	Understand techniques for studying motion of machines and their components.
CO 405-18.3	Understand balancing of masses.
CO 405-18.4	Understand Cam profile analysis (graphical method).
CO 405-18.5	Identify the basic relations between distance, time, velocity, and acceleration.

Course Name:Environmental ScienceEVS101-18

Course Outcomes After the course completion, students will be able to:	
EVS101-**18.1**	Students will enable to understand environmental problems at local and national level through literature and general awareness.
EVS101-**18.2**	The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues.
EVS101-**18.3**	The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems.
EVS101-**18.4**	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world

Course Name: Fluid Machines lab BTME 407-18

Course Outcomes After the course completion, students will be able to:	
CO407-18.1	Analyze the forces exerted by a jet of fluid on vanes of different shapes, either stationary or moving
CO407-18.2	Study and analyze the construction features and working principles of different classes of hydraulic turbines.
CO407-18.3	Analyze the performance characteristic curves of hydraulic turbines
CO407-18.4	Distinguish between different classes of pumps, their construction features and further analyze their performance
CO407-18.5	Understand the working principles of various hydraulic systems, hydraulic control systems and fluidics.

Course Name: Applied Thermodynamics lab BTME- 406-18

Course Outcomes After the course completion, students will be able to:	
CO1	Students will able to learn about the functioning and performance evaluation of reciprocating air compressors.
CO2	Students will able to learn and analyze the combustion phenomenon in boilers and I.C. engines.
CO3	Students will able to learn to various types vapour power cycle problems.
CO4	Students will able to learn to features and working of steam power plants and to evaluate their performance.

Course Name: Material Engineering Lab BTME 408-18

Course Outcomes After the course completion, students will be able to:	
CO408-18.1	The students are expected to develop the ability to understand the concepts of crystal structure, microstructure and deformation.
CO408-18.2	The students will determine hardenability of steel specimen by conducting Jominy End Quench Test.
CO408-18.3	The students shall be able to prepare specimen of various materials in the lab.
CO408-18.4	The students are able to identify the various constituents in given specimen of mild steel
CO408-18.5	The students will be able to select appropriate heat treatment processes for the desired properties in steel.
CO408-18.6	The students will understand the principles of phase transformation in alloys, phase rule and equilibrium diagrams.

Course Name: Manufacturing Processes Lab BTME 407

Course Outcomes After the course completion, students will be familiar with:	
CO-1	They can identify basic parts and operations of machine tools like lathe, shaper, planer, drilling machine, boring and grinding machines.
CO-2	After completion of their course, students will be able to handle various materials.
CO-3	They can handle working areas including workers and supervisors of industry.
CO-4	They become able to use precision tools like vernier caliper and micrometer.
CO-5	They will also get knowledge of foundry materials.
CO-6	They can produce production schedule for various areas of manufacturing.

Course Name: Manufacturing Processes II BTME-405

Course Outcomes After the course completion, students will be able to:	
CO405-18.1	They can identify basic parts and operations of machine tools like lathe, shaper, planer, drilling machine etc.
CO405-18.2	After completion of their course, students will be able to handle various materials.
CO405-18.3	They can handle working areas including workers and supervisors of industry.

CO405-18.4	They become able to use precision tools like vernier caliper and micrometer

CO'S of subjects of 5th semester according to 2011 and 2018 PTU syllabus

Course Name: Heat transfer BTME-501-18 and BTME-602 year- 2018 onwards

Course Outcomes **After the course completion, students will be able to:**	
CO501-18.1	Understand the basic laws with steady state heat conduction in simple geometries
CO501-18.2	Analyze problems involving transient heat conduction in simple geometries and heat exchange through extended surfaces.
CO501-18.3	Understand the fundamentals of convective heat transfer process in natural and forced convection and understanding the convection phenomenon with phase change.
CO501-18.4	Calculate radiation heat transfer between black body gray body surfaces.
CO501-18.5	Analyze heat exchanger performance by using the method of log mean temperature difference and the method of heat exchanger effectiveness.

Course Name:Design of machine elements BTME502-18 and BTME-501

Course Outcomes **After the course completion, students will be able to:**	
CO502-18.1	Students will be able to demonstrate the fundamentals of stress analysis, theories of failure and material science in the design of machine components.
CO502-18.2	Students will be able to make proper assumptions with respect to material, factor of safety, static and dynamic loads for various machine components.
CO502-18.3	Enable the students to have high ethical standards in terms of team work to be a good design engineer.
CO502-18.4	Describe the design process, material selection, calculation of stresses and stress concentrations under variable loading.
CO502-18.5	Design the solid, hollow shafts and to finding the critical speeds.

Course Name: Manufacturing processes BTME-503-18

Course Outcomes **After the course completion, students will be able to:**	
CO503-18.1	They can identify basic parts and operations of machine tools like lathe, shaper, planer, drilling machine etc.
CO503-18.2	After completion of their course, students will be able to handle various materials.
CO503-18.3	They can handle working areas including workers and supervisors of industry.

CO503-18.4	They become able to use precision tools like vernier caliper and micrometer

Course Name: Heat Transfer lab BTME 505-18

Course Outcomes **After the course completion, students will be able to:**	
CO505-18.1	Determine overall heat transfer co-efficient of a composite slab
CO505-18.2	Determine thermal conductivity of a metal rod.
CO505-18.3	Determine efficiency of a pin-fin
CO505-18.4	Determine heat transfer for film condensation.
CO505-18.5	Determine heat transfer for drop-wise condensation.
CO505-18.6	Determine shape factor of a complex body by an analog technique.

Course Name: Manufacturing Processes Lab BTME 506-18

Course Outcomes **After the course completion, students will be able to:**	
CO506-18.1	They can identify basic parts and operations of machine tools like lathe, shaper, planer, drilling machine, boring and grinding machines.
CO506-18.2	After completion of their course, students will be able to handle various materials.
CO506-18.3	They can handle working areas including workers and supervisors of industry.
CO506-18.4	They become able to use precision tools like vernier caliper and micrometer.
CO506-18.5	They will also get knowledge of foundry materials.
CO506-18.6	They can produce production schedule for various areas of manufacturing.

Course Name:Numerical Methods lab BTME-507-18

Course Outcomes **After the course completion, students will be able to:**	
CO507-	The students will learn how to solve Algebraic equations, Transcendental

18.1	equations and system of equations.
CO507-18.2	Student will be able to solve ordinary and partial differential equations by numerical techniques.
CO507-18.3	Learn the concept of various Probability distribution and various statistical tests which are widely used in research problems.
CO507-18.4	Drive numerical methods for various mathematical operations and tasks such as interpolation, differential, integration.
CO507-18.5	Learn how to arrange and measure large data**.**

Course Name: Mathematics- III BTAM-500

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Derive Fourier series for different types of functions and will be able to use its concepts to various engineering problems.
CO-2	Find solutions of Ordinary and partial differential equations of all kinds.
CO-3	Demonstrate the knowledge of Laplace transforms in various engineering problems.
CO-4	Solve differentiation and integration of functions of a complex variable, apply Cauchy's-Riemann equations that are used in various problems related to engineering.
CO-5	Use the concepts related to Power Series.

ME 5th Sem CO'S according to PTU syllabus of 2011

Course Name:CAD&M BTME-502

Course Outcomes **After the course completion, students will be able to:**	
CO-1	To understand the process of design.
CO-2	To understand the modeling technique used for given part.
CO-3	To understand the basic principles of group technology and division of part families.
CO-4	To understand the basics of CNC working and programming.

Course Name: Mechanical Measurement and Metrology BTME-503

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Understand the need of instruments and learn how they work, design and planning of experiments.
CO-2	Learn about the various types of Pressure Measurement and Flow Measurement, flow visualization techniques, Speed, Force, Torque and Shaft Power measurement by using different instruments.
CO-3	Understand the concepts behind sensors and transducers involved in measurements of various physical units.
CO-4	Understanding of flow measurement, flow visualization techniques, speed, force, torque and shaft power.
CO-5	Be aware of types of errors while measuring and how to eliminate their effects.

CO-6	Demonstrate various types of measurements ad standards used in industry.

Course Name: Industrial Automation and Robotics lab BTME-508

Course Outcomes **After the course completion, students will be able to:**	
CO-1	After completion of course students will be able to understand basics of hydraulic and pneumatic circuits.
CO-2	They can understand the principles of hydraulic and pneumatic systems.
CO-3	They can identify basic parts of robots.
CO-4	They can able to describe working of control valves used in knumatic and hydraulic systems.
CO-5	They will also get basic knowledge of assembly line of hydraulic and knumatic systems.
CO-6	They will be able to understand about the exact location of directional control valves in the systems.
CO-7	Ability to understand working principle of single and double acting cylinders using direction control valves

Co's of ME 6th semesteraccording to IKGPTU syllabus of year 2011

course Name: Design of machine elements-II

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Students will be able to demonstrate the fundamentals of stress analysis, theories of failure and material science in the design of machine components.
CO-2	Students will be able to make proper assumptions with respect to material, factor of safety, static and dynamic loads for various machine components
CO-3	Enable the students to have high ethical standards in terms of team work to be a good design engineer
CO-4	Describe the design process, material selection, calculation of stresses and stress concentrations under variable loading.
CO-5	Design the solid, hollow shafts and to finding the critical speeds.
CO-6	Differentiate between rigid and flexible couplings and also the knuckle joints.

Course Name: Heat Transfer BTME-602

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Understand the basic laws with steady state heat conduction in simple geometries
CO-2	Analyze problems involving transient heat conduction in simple geometries and heat exchange through extended surfaces.

CO-3	Understand the fundamentals of convective heat transfer process in natural and forced convection and understanding the convection phenomenon with phase change.
CO-4	Calculate radiation heat transfer between black body gray body surfaces.
CO-5	Analyze heat exchanger performance by using the method of log mean temperature difference and the method of heat exchanger effectiveness.

Course Name: Fluid Machinery BTME-603

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Analyze the forces exerted by a jet of fluid on vanes of different shapes, either stationary or moving
CO-2	Study and analyze the construction features and working principles of different classes of hydraulic turbines.
CO-3	Analyze the performance characteristic curves of hydraulic turbines
CO-4	Distinguish between different classes of pumps, their construction features and further analyze their performance
CO-5	Understand the working principles of various hydraulic systems, hydraulic control systems and fluidics

Course Name: Statistical and numerical methods in engineering BTME-604

Course Outcomes **After the course completion, students will be able to:**	
CO-1	The students will learn how to solve Algebraic equations, Transcendental equations and system of equations.
CO-2	Student will be able to solve ordinary and partial differential equations by numerical techniques.
CO-3	Learn the concept of various Probability distribution and various statistical tests which are widely used in research problems.
CO-4	Drive numerical methods for various mathematical operations and tasks such as interpolation, differential, integration.
CO-5	Learn how to arrange and measure large data.

Course Name: Departmental elective BTME-DE Power plant Engineering

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Describe sources of energy and types of power plants.
CO-2	Analyze different types of steam cycles and it's efficiencies in a steam power plant.
CO-3	Describe basic working principles of gas turbine and diesel engine power plants.
CO-4	Define the performance characteristics and components of such power plants.
CO-5	List the principal components and types of nuclear reactors.

CO-6	List types, principles of operations, components and applications of steam turbines, steam generators, condensers, feed water and circulating water systems.

Course Name: Departmental elective BTME-DE Non-Traditional Machining

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Understand the latest trends in manufacturing processes.
CO-2	Demonstrate the capabilities of ultrasonic machining & selection of various abrasives for desired MRR.
CO-3	Use of chemical and electrochemical process and comparison of their MRR with other processes.
CO-4	Select the appropriate tool and work selection for EDM process.
CO-5	Understand the working principle & applications of PAM, LBM & EBM.
CO-6	Understand hybrid machining by combining various non-traditional processes.
CO-7	Select the appropriate parameter for various non-traditional processes to get the desired MRR

Course Name:Heat Transfer Lab BTME-605

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Understand the basic laws with steady state heat conduction in simple geometries.
CO-2	Analyze problems involving transient heat conduction in simple geometries and heat exchange through extended surfaces.
CO-3	Understand the fundamentals of convective heat transfer process in natural and forced convection and understanding the convection phenomenon with phase change.
CO-4	Analyze heat exchanger performance by using the method of log mean temperature difference and the method of heat exchanger effectiveness.
CO-5	Calculate radiation heat transfer between black body gray body surfaces.

Course Name:Fluid machinery lab BTME-606

Course Outcomes **After the course completion, students will be able to:**	
CO-1	To study the basic working principal of hydraulic turbines from different turbine apparatus in lab.
CO-2	To study various characteristics of Centrifugal and reciprocating pump.

CO-3	To develop ability amongst the student for understating the actual working mechanism of turbines at hydro power station.

Co's of ME 6th semester of year 2018 onwards

course Name: Refrigeration and Air conditioning BTME 601-18

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO-2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
CO-3	Present the properties, applications and environmental issues of different refrigerants
CO-4	Calculate cooling load for air conditioning systems used for various
CO-5	Operate and analyse the refrigeration and air conditioning systems.

course Name: Mechanical Measurement and Metrology BTME 602-18

Course Outcomes **After the course completion, students will be able to:**	
CO602-18.1	Understand the need of instruments and learn how they work, design and planning of experiments.
CO602-18.2	Learn about the various types of Pressure Measurement and Flow Measurement, flow visualization techniques, Speed, Force, Torque and Shaft Power measurement by using different instruments.
CO602-18.3	Understand the concepts behind sensors and transducers involved in measurements of various physical units.
CO602-18.4	Understanding of flow measurement, flow visualization techniques, speed, force, torque and shaft power.
CO602-18.5	Be aware of types of errors while measuring and how to eliminate their effects.
CO602-18.6	Demonstrate various types of measurements and standards used in industry.
CO602-18.6	Understanding the concept of calibration of measuring instruments.

course Name: AUTOMOBILE ENGINEERING (BTME 603-18)

Course Outcomes **After the course completion, students will be able to:**	
CO-603-18.1	The anatomy of the automobile in general and location and importance of each part.
CO-603-18.2	The functioning of the engine and its accessories, gear box, clutch, brakes, steering, axles and wheels

CO-603-18.3	Suspension, frame, springs and other connections
CO-603-18.4	Emissions, ignition, controls, electrical systems and ventilation.

course Name: Introduction to Industrial Management BTME-604-18

Course Outcomes **After the course completion, students will be able to:**	
CO-604-18.1	Use the techniques, skills, and modern Management tools necessary for engineering practice.
CO-604-18.2	Understand the professional responsibility.
CO-604-18.3	Understand the concepts of world class manufacturing i.e. Group technology, JIT and their implementation.
CO-604-18.4	Understand the process of decision making in industries.
CO-604-18.5	Communicate their technical knowledge effectively.
CO-604-18.6	Recognize the need of lifelong learning.

course Name:Elective-1 NCER

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Apply knowledge of mathematics, science for calculating the size of solar energy collectors and utilization of sun energy.
CO-2	Understand the concept of biomass energy and its proper utilization.
CO-3	Understand the concepts wind energy, wind mills ad its applications.
CO-4	Understand the concepts of geothermal energy and chemical energy and its use.

course Name:Refrigeration & Air Conditioning-Lab [BTME-605-18].

Course Outcomes **After the course completion, students will be able to:**	
CO-605-18.1	To understand the working of various components of refrigerator and Air conditioner.
CO-605-18.2	To understand the working of domestic refrigerator and also find the performance parameters.

CO-605-18.3	To understand the actual working procedure of ice plant by inculcating practical knowledge.
CO-605-18.4	To analyse the design parameters of window air conditioner, water cooler etc.
CO-605-18.5	Enable the students to make endeavour to design small cooling equipment as a project.

course Name:Mechanical Measurement and metrology lab BTME-606-18

Course Outcomes **After the course completion, students will be able to:**	
CO-606-18.1	Select the approximate standard of length, weight, angle and other quantities
CO-606-18.2	Use sine bar, profile projector, tool maker microscope and stroboscope.
CO-606-18.3	Use thermo couples and measure the temperature.
CO-606-18.4	Recommend appropriate threads for various industrial applications.
CO-606-18.5	Understand Reynolds's number, prandtl number, etc for fluid flow.
CO-606-18.6	Understand the working of Pressure measuring devices and select an approximate device for industrial applications

course Name:AUTOMOBILE ENGINEERING LAB (BTME 607-18)

Course Outcomes **After the course completion, students will be able to:**	
CO-607-18.1	1.To study and prepare report on the constructional details, working principles and operation of the 2-stroke and 4-stroke petrol & diesel engine.
CO-607-18.2	2.To study importance and features of different systems like axle, differential, brakes, steering, suspension, and balancing etc.
CO-607-18.3	3.To study the cooling system and electrical system from working models.

CO's of ME 8th according to IKGPTU Syllabus 2011

Course Name: Industrial Engineering and Management BTME-801

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Use the techniques, skills, and modern Management tools necessary for engineering practice.

CO-2	Understand the professional responsibility.
CO-3	Understand the concepts of world class manufacturing i.e. Group technology,JIT and their implementation.
CO-4	Understand the process of decision making in industries.
CO-5	Communicate their technical knowledge effectively.
CO-6	Recognize the need of lifelong learning.

Course Name:Refrigeration and air conditioning BTME-802

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO-2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
CO-3	Present the properties, applications and environmental issues of different refrigerants
CO-4	Calculate cooling load for air conditioning systems used for various
CO-5	Operate and analyze the refrigeration and air conditioning systems.

Course Name: Mechanical Vibrations BTME-803

Course Outcomes **After the course completion, students will be able to:**	
CO-1	State the single degree of freedom systems.
CO-2	Sketch the impulse response for a periodic excited virtual work.
CO-3	Examine the concept of forced vibration.
CO-4	Extend the concept to two degree of freedom systems.
CO-5	Manipulate the vibration of continuous systems.
C0-6	Solve problems using wave and euler equations.

Course Name:Departmental Elective-II NCER BTME-DE

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Apply knowledge of mathematics, science for calculating the size of solar energy collectors and utilization of sun energy.
CO-2	Understand the concept of biomass energy and its proper utilization.

CO-3	Understand the concepts wind energy, wind mills ad its applications.
CO-4	Understand the concepts of geothermal energy and chemical energy and its use.

Course Name: Open Elective Human Resources Management

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Explain the importance of human resources and their effective management in organizations
CO-2	Demonstrate a basic understanding of different tools used in forecasting and planning human resource needs
CO-3	Describe the meanings of terminology and tools used in managing employees effectively
CO-4	Record governmental regulations affecting employees and employers
CO-5	Analyze the key issues related to administering the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics, and training

Course Name-Refrigeration& Air Conditioning-Lab [BTME-804].

Course Outcomes **After the course completion, students will be able to:**	
CO-1	To understand the working of various components of refrigerator and Air conditioner.
CO-2	To understand the working of domestic refrigerator and also find the performance parameters.
CO-3	To understand the actual working procedure of ice plant by inculcating practical knowledge.
CO-4	To analyze the design parameters of window air conditioner, water cooler etc.
CO-5	Enable the students to make endeavor to design small cooling equipment as a project.

Course Name: Mechanical Vibration Lab BTME-805

Course Outcomes **After the course completion, students will be able to:**	
CO-1	To understand the force-motion relationship in components subjected to External

	Forces
CO-2	To analyse the force-motion characteristics of standard mechanisms
CO-3	To study the undesirable effects of unbalances resulting from prescribed motions in mechanism.
CO-4	To give understanding various aspects of mechanical vibrations and their control.

Course Name: Composite Material (BTME 612-18) Department Elective 2021 onwards

Course Outcomes **After the course completion, students will be able to:**	
CO-1	Understand the need of and various engineering applications of composite materials
CO-2	Demonstrate a basic understanding of reinforcement types and procedures.
CO-3	Describe the matrix polymer formations.
CO-4	Record interfacial bond strength, Instrumented Indentation Tests and its durability.
CO-5	Analyze the key issues related to Metal Matrix Composites.
Course Name: Product Design and Development (BTME 614-18) Department Elective 2021 onwards **Course Outcomes:** **After the course completion, students will be able to:**	
CO-1	Understand essential factors of product design
CO-2	Understand desirable design aspects considering various production processes and also understand the economic factors of design.
CO-3	Employ engineering, scientific, and mathematical principles to execute a design from concept to finished product
CO-4	Apply the modern approaches to product design considering concurrent design, quality function deployment and various rapid prototyping methods
CO-5	Apply innovative process techniques in synthesizing information, problem-solving and critical thinking.

2021 onwards Compulsary Subjects (7-8th Semester)

Course Name: AUTOMATION IN MANUFACTURING (BTME702-18

Course Outcomes **After the course completion, students will be able to:**

CO-1	**Students should be able to design and implement automated systems using pneumatics.**
CO-2	**Students should be able to provide hydraulic solutions for designing automated systems.**
CO-3	**design and implement electro-pneumatic/hydraulic solutions for automated systems.**
CO-4	**Apply PLC programming and implement it on PLC kits.**
CO-5	**Devise Assembly automated systems using feeders, orienteers and escapement devices**

Course Name: Fundamentals of Management for Engineers (BTME703-18)

Course Outcomes **After the course completion, students will be able to:**	
CO-1	**To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.**
CO-2	**To help the students gain understanding of the functions and responsibilities of industrial managements.**
CO-3	**To enable them to analyze and understand the environment of the organization.**
CO-4	**To help the students to develop cognizance of the importance of management principles.**
CO-5	**To provide them tools and techniques to be used in the performance of the managerial job.**