Department: Mechanical Engineering

The Program Outcomes (POs) of B.Tech Mechanical Engineering are:

- **a.** Graduates will be able to apply knowledge of applied sciences, mathematics and engineering fundamentals to mechanical engineering applications.
- **b.** Graduates will be able to outline, design and conduct experiments as well as analyze and interpret observations and report the results.
- **c.** Graduates will be able to conceptualize and design the mechanical systems that meet desired specifications and requirements.
- **d.** Graduates will be able to identify, formulate, evaluate and solve engineering problems and have the confidence to optimize the available resources.
- **e.** Graduates will be able to function individually as well as a member of multidisciplinary teams to solve engineering and multidisciplinary problems with leadership qualities.
- **f.** Graduates will have the ability to work professionally with ethical responsibility at all times.
- **g.** Graduates will be able to communicate effectively in oral, written, visual and graphic forms.
- **h.** Graduates will be having the knowledge to understand the impact of engineering solutions on society and demonstrate awareness of contemporary issues.
- **i.** Graduates will be able to recognize of the need for new engineering tools and knowledge acquired through lifelong learning.
- **j.** Graduates will be able to deliver the engineering fundamentals in effective and innovative ways.
- **k.** Graduates will be able to use modern engineering softwares, skills and computing tools necessary for engineering problems.

Program Specific Outcomes (PSO)

1. Will be able to apply the acquired theoretical and practical skills to solve the industrial and research problems in the major streams such as thermal, design, manufacturing and industrial engineering.
2. Will be able to take up their career in government, public, private sector industrial/research organizations, start enterprises and pursue higher studies with high regard for social and professional ethics.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	ACME-16301	Strength of Materials-I	**CO1.** Understand the basic concepts of stress, strain and their variations due to different type of loading. **CO2.** Formulate the mechanics problems using calculus and differential equations. **CO3.** Know design considerations of structures subject

			to wide range of loading including thermal loads. **CO4.** Predict shear forces (SF) and bending moments (BM) in beams when subjected to various types of concentrated, distributed loads and external moments. **CO5.** To solve problems subjected to the simple as well as combined twisting and bending moments. **CO6.** To design the columns with appropriate slenderness ratio to get minimum deflections. **CO7.** Calculate slope and deflection under different loading and supporting conditions.
2	**ACME-16302**	**Theory of Machines - I**	**CO1.** Draw velocity and acceleration diagrams of various mechanisms (including coriolis component).. **CO2.** Understand the working of various primitive components of machine. Know design considerations of structures subject to wide range of loading including thermal loads. **CO3.** Determine the physical parameters of power transmission devices, friction devices and different dynamometers. To solve problems subjected to the simple as well as combined twisting and bending moments. **CO4.** Compute the essential parameters like fluctuation of speed and energy of a flywheel in a vehicle, moment of governor, dynamometers etc. **CO5.** Understand the parameters involved in the working and application of different types of brakes and clutches of vehicle. **CO6.** Recommend various types of belts, chains and rope drives for power transmission.
3	**ACME-16303**	**Applied Thermodynamics-I**	**CO1.** To identify, track and solve various combustion problems. **CO2.** To recognize and understand the working of devices involved in steam power generation system. **CO3.** To evaluate theoretically the performance of various components involved in steam power plants and reciprocating compression machines. **CO4.** To design some components of steam power plants and reciprocating compression machines. **CO5.** To suggest and design different types of boilers for different commercial applications. **CO6.** To design different parameters of steam turbines (impulse/reaction) for various industrial applications. **CO7.** To find out the various losses from different thermal systems and can suggest various preventative measures.
4	**ACME-16304**	**Engineering Materials, Metallurgy and Manufacturing-1**	**CO1.** To develop the ability to understand the concepts of crystal structure of ferrous and non-ferrous materials. **CO2.** To understand the transformations at atomic levels in a engineering material with respect to time-temperature transformations. **CO3.** To learn the role of Time temperature transformation

			curves (TTT curves) and Fe_3C diagram for controlling the structure and properties of materials. **CO4.** Knowledge about classification, composition of alloys, effect of alloying elements. **CO5.** To understand the various heat treatment processes like annealing, hardening, stress-relieving etc. **CO6.** Knowledge of mechanical properties of various alloys over pure metals and their applications
5	**ACME-16305**	**Machine Drawing**	**CO1.** Read the blue prints with detail of dimension, section, tolerance and machining symbols. **CO2.** Find the appropriate thread for nut and bolt as per the application. **CO3.** Draw the bill of material for engineering drawing of some mechanical components/assembly. **CO4.** Find the details of various components from the assembly drawing. **CO5.** Draw the views of assembly with the given details of various components. **CO6.** Recommend the appropriate pipe joint as per position and application. **CO7.** Concept of limits, fits and tolerances in various mating parts.
6	**ACME-16306**	**Engineering Materials, Metallurgy and Manufacturing Lab-1**	**CO1.** The students are expected to develop the ability to understand the concepts of crystal structure, microstructure and deformation. **CO2.** The students will determine hardenability of steel specimen by conducting Jominy End Quench Test. **CO3.** The students shall be able to prepare specimen of various materials in the lab. **CO4.** The students are able to identify the various constituents in given specimen of mild steel **CO5.** The students will be able to select appropriate heat treatment processes for the desired properties in steel. **CO6.** The students will understand the principles of phase transformation in alloys, phase rule and equilibrium diagrams.

7	**ACME-16307**	**Strength of Materials-I Lab**	**CO1.** Student will be able to understand behavior of ductile and brittle materials from stress strain curve. **CO2.** Students will be able to find the impact strength and shear stress by performing impact test and torsion test. **CO3.** Students will determine the fatigue strength on circular test piece. **CO4.** Students will be able to determine Bucking loads of long columns with different end conditions. **CO5.** Students will be able to calculate stiffness and modulus of rigidity of helical coil spring **CO6.** Students will be able to determine the Young's modulus of elasticity and modulus of rigidity.
8	**ACAM-16401**	**Mathematics-III**	**CO1.** In Mathematics a transform is usually a device that converts one type into another type presumably easier. **CO2.** To solve Laplace transformation helpful for the students for the application of Network analysis and synthesis. **CO3.** Fourier series helps the students to understand the application of integral of Fourier integral and Fourier transformation. **CO4.** Fourier series helps the students to understand the application of integral of Fourier integral and Fourier transformation. **CO5.** Partial Differential equation helps the students of mechanical engineering to solve the problems based on heat flow and Fluid mechanics. **CO6.** It is representation of a function as a series of constants times sine and cosine functions of different frequencies in order to see periodic phenomenon have long fascinating mankind. **CO7.** Mathematical models of physical phenomenon involving more than one independent variable often include partial differential equations. They also arise in such diverse area as epidemiology, traffic flow studies and the analysis of economics. **CO8.** There have not only a rich theory, but the application are sometime surprising the derivates and integral of complex numbers. **CO9.** Primary motivation for studying certain special function is that they arise in solving ordinary partial differential that model may physical phenomenon they constitute necessary items in the tool kit of anyone who wishes to understand the work with such models. **CO10.** Solve the laplace heat of wave equations for a variety of Boundary condition in domain of simple metry and within simple BCS technique available with include separation of variable Laplace method. **CO11.** To calculate Laplace transform for a variety of function – students will then be able to use these to

			solve ordinary differential equations. **CO12.** Partial Differential equation helps the students of to solve the problems based on integrated circuits. **CO13.** Partial Differential equation helps the students of to solve the problems based on application of Digital Electronic like gates flip flops.
9	**ACME-16402**	**Strength of Materials-II**	**CO1.** To analyze strain energy in beam under different types of loads. **CO2.** To analyze rotational stresses in various sections. **CO3.** To analyze stresses in thick pressure vessels. **CO4.** To pre-design different types of elements of machine. **CO5.** To analyze and design beams under bending. **CO6.** To analyze shear stress distribution in various sections. **CO7.** To understand the principles of designing springs and cylinders while analyzing the aspects of stresses and strains.
10	**ACME-16403**	**Theory of Machines-II**	**CO1.** To analyze the static and dynamic balancing of forces acting on machine members and also balancing of these forces. **CO2.** To have knowledge of gears, gear trains, gyroscopic motion and couples. **CO3.** To understand the methods of static force analysis of simple mechanisms. **CO4.** To understand the analytical and graphical method for Dynamic force analysis. **CO5.** Select the proper arrangement for power transmission system. **CO6.** To ensure balancing of various dynamic parts like rotating and reciprocating masses as in case of V-engines etc.
11	**ACME-16404**	**Applied Thermodynamics-II**	**CO1.** To understand analytical concepts used in turbo machines involved in power generation. **CO2.** Understand thermodynamic working as well as performance/evaluation of reciprocating/rotary/centrifugal compressors. **CO3.** Understand performance evaluation and design of gas power systems in different commercial applications. **CO4.** To understand principles of jet propulsion and Description of different types of jet propulsion systems. **CO5.** To understand the concept of Surging, Choking and Stalling and to derive isentropic, polytropic and isothermal efficiencies of a compressor. **CO6.** To understand Blade materials, selection criteria for these materials and its requirement and Gas turbine fuels.

12	**ACME-16405**	**Engineering Materials, Metallurgy and Manufacturing-II**	**CO1.** Fundamental principles related to different types of casting and welding processes. **CO2.** Identify various defects during casting and welding processes. **CO3.** Knowledge of Destructive and nondestructive testing viz. visual inspection, x-ray radiography, magnetic particle inspection, dye penetrate test, ultrasonic inspection, eddy current testing, hardness testing, and micro hardness testing. **CO4.** Knowledge to select a suitable metal casting and metal joining processes to fabricate an engineering product. **CO5.** To identify and suggest equipment tools and accessories required for casting and welding processes. **CO6.** Latest technologies in casting and welding processes.
13	**ACME-16406**	**Engineering Materials, Metallurgy and Manufacturing –II Lab**	**CO1.** The students will learn to prepare moulding sand samples to determine clay content, moisture content, shatter index, permeability and grain fineness number as per requirement. **CO2.** The students will bear knowledge of various welding processes/joints and select them as per requirement. **CO3.** The students will have complete knowledge of various machine tools. **CO4.** The students will Use of milling machines for generation of various gears and plane surfaces. **CO5.** The students will be able to apply limits and tolerance in the job performed on lathe machines, shapers and milling machines foe preparing jobs. **CO6.** The students will determine cutting forces with dynamometer for turning, drilling and milling operations

14	**ACME-16407**	**Theory of Machines-II Lab**	**CO1.** The students will be able to draw velocity & acceleration diagrams for four bar mechanism, and various inversions of kinematic chains. **CO2.** The students will understand various types of governors and flywheels. **CO3.** The students will learn balancing of rotating masses and demonstrate a balanced system. **CO4.** Calculate gear train value for compound gear train &epicyclical gear train. **CO5.** Able to demonstrate gyroscope and its concepts in ships, cars, aero planes, etc. **CO6.** Calculate gear train value for compound gear train &epicyclic gear train. **CO7.** Able to draw pressure profile for journal bearings.
15	**ACME-16408**	**Applied Thermodynamics –II Lab**	**CO1.** Demonstrate the principle & working of 2 stroke/4 stroke engines. **CO2.** Demonstrate the principle & working of single/multicylinder Petrol/Diesel engines. **CO3.** To calculate brake power, indicated power, friction power & mechanical efficiency of engine by Morse Test. **CO4.** To find the value of dryness fraction and its impact on steam turbines. **CO5.** To recognize various mountings and accessories of boilers and their practical applications. **CO6.** To select an appropriate steam condenser and cooling tower as per requirement in an industry. **CO7.** To analyze the performance of engines from no load to full load by power consumption and exhaust emission curves.
			CO8. Able to prepare on heat balance sheet for various single/multicylinder engines.
16	**ACME-16501**	**Automobile Engineering**	**CO1.** Knowledge of general layout and type of automotive vehicles. **CO2.** Know the necessity of lubrication and purpose of cooling system. **CO3.** Understand the requirements of transmission systems, steering geometry and braking requirements. **CO4.** Knowledge about Preventive maintenance and other maintenance practices. **CO5.** Knowledge of trouble shooting and rectification in different power supply units. **CO6.** Aware of pollution standards, comfort of drivers while driving, types of tyres, aerodynamics etc. **CO7.** Aware of octane/cetane number of fuels and their impact on performance of vehicles.

17	**ACME-16502**	**Design of Machine Elements -I**	**CO1.** Develop the ability to understand the design processes, various criteria of design. **CO2.** Predict reasons of failure and then correlate it to the theoretical knowledge. **CO3.** Able to learn about design of fasteners, transmission shafts, rigid and flexible coupling and pipe joints **CO4.** Understand the failure of Keys and stresses related to it. **CO5.** Understand the Stress Concentration in case of Stepped shafts. **CO6.** Identify the reasons responsible for failure of components of the machinery during working. **CO7.** Select appropriate factor of safety for designing a mechanical component.
18	**ACME-16503**	**Fluid Mechanics**	**CO1.** To understand the concept of statics and dynamics **CO2.** To derive and apply Bernoulli's equation and Euler's equation of motion. **CO3.** To apply the analytical tools to solve different types of problems related to fluid flow in pipes, design the experiments effectively. **CO4.** To understand the working of various Pressure and Flow Measurement equipments **CO5.** To calculate the flow measurement using manometers, orificemeter, pitot tube etc.
19	**ACME-16504**	**Mechanical Measurement & Metrology**	**CO1.** Understand the need of instruments and learn how they work, design and planning of experiments. **CO2.** 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. **CO3.** Understand the concepts behind sensors and transducers involved in measurements of various physical units. **CO4.** Understanding of flow measurement, flow visualization techniques, speed, force, torque and shaft power. **CO5.** Be aware of types of errors while measuring and how to eliminate their effects. **CO6.** Demonstrate various types of measurements ad standards used in industry. **CO7.** Understand the process and importance of calibration.

20	**ACME-16505**	**Computer Aided Design & Manufacturing**	**CO1.** Able to practice various functions of a graphics package. **CO2.** Understand the concept of geometric transformations, representations of curves and surfaces, concepts and characteristics in geometric modeling. **CO3.** Analyze the components and systems of NC and CNC machine tools. **CO4.** Able to classify various CAPP systems, understand FMS and CIMS with reference to components, advantages and applications. **CO5.** Adapting CIMS in Manufacturing under various controllers. **CO6.** Able to write art-programs for various trajectories.
21	**ACME-16506**	**Automobile Engineering Lab**	**CO1.** Understand the Construction, working and other details about Internal Combustion Engines used in automobiles. **CO2.** Identify Construction, working, preventive maintenance, trouble shooting and diagnosis of various Automobile Systems. **CO3.** Understand importance and features of different systems like axle, differential, brakes, steering, suspension, and balancing etc. **CO4.** Identify Modern technology and safety measures used in Automotive Vehicles.
22	**ACME-16507**	**Mechanical Measurements & Metrology Lab**	**CO1.** Select the approximate standard of length, weight, angle and other quantities. **CO2.** Use sine bar, profile projector, tool maker microscope and stroboscope. **CO3.** Use thermo couples and measure the temperature. **CO4.** Recommend appropriate threads for various industrial applications. **CO5.** Understand Reynolds's number for fluid flow. **CO6.** Understand the working of Pressure measuring devices and select an approximate device for industrial applications.

23	**ACME-16508**	**Fluid Mechanics Lab**	**CO1.** Student will be able to find Metacentric concept and their application for ships/boats. **CO2.** Students are expected to understand Bernoulli's energy equation and their applications. **CO3.** Students are expected to understand head loss in a pipe line. **CO4.** Student will be able to determine the velocity distribution for pipeline flow with a pitot static probe. **CO5.** Students will be able to calculate discharge coefficient, hydraulic coefficients and friction coefficients **CO6.** Student will be able to evaluate Reynold's no., Prandet no., Nusset's no., Froude's no., etc to find different types of flows in actual situation.
24	**ACME-16509**	**Computer Aided Design &Manufacturing Lab**	**CO1.** The students will be able to make 2D and 3D Drawings using AutoCAD software. **CO2.** The students will be able to draw mechanical components like crane hook, bench vice, screw jack in 3D. **CO3.** The students shall be able to demonstrate limits, fits and tolerances for proper mating of components in the assembly. **CO4.** The students will learn programs of NC and CNC machines. **CO5.** The students will be able to perform part programming using various NC code. **CO6.** The students shall be able to generate various contours on various components on CNC lathe and CNC milling machines.
25	**ACME-16510**	**Design of Machine Elements-I Lab**	**CO1.** Develop the ability to understand the design processes and its implementation on real applications. **CO2.**Identify modes of failure and then correlate with real situations to gain practical knowledge. **CO3.** Able to learn about design of fasteners. **CO4.**Understand the design calculations for transmission shafts. **CO5**.To know various parameters of design of rigid and flexible coupling. **CO6.**Understand the failure of Keys and stresses related to it.

26	**ACME-16601**	**Design of Machine Elements-II**	**CO1.** Understanding the design modification belts, chain drives, sliding and roller bearings, clutches and brakes etc. **CO2.** Learn the assembly with different CAD techniques and also handle live projects effectively. **CO3.** Learn the working of flywheel, pulley, closed coil and helical spring. **CO4.** Design of spur, helical and bevel gears. **CO5.** Knowledge about lubrication in transmission systems. **CO6.** Ability to analyze the design and suggest suitable modifications. **CO7.** Select an appropriate learning for industrial applications.
27	**ACME-16602**	**Heat Transfer**	**CO1.** Able to explain modes of heat transfer **CO2.** Design and analyze various types of heat exchangers and other thermal systems **CO3.** Able to solve the heat transfer problems analytically. **CO4.** Able to determine coefficient of heat transfer for free/forced convection. **CO5.** Able to determine heat transfer coefficient by radiation. **CO6.** Basic design calculations regarding industrial furnaces, automobile components etc.
28	**ACME-16603**	**Fluid Machinery**	**CO1.** Understanding of different types of turbines like Centrifugal Pumps, Reciprocating Pumps, Pelton Turbine, Francis and Kaplan Turbines. **CO2.** Able to design fluid machines for given parameters/ requirements. **CO3.** Understanding of hydraulic press, lifts, ram, air lift, gear pump etc. **CO4.** Knowledge of different hydraulic devices like accumulator, intensifier, fluid coupling and torque converter. **CO5.** Understand different types of fluids used and path followed by the fluid. **CO6.** To learn about velocity triangles and work output for different turbines. **CO7.** Able to understand the conversion of hydraulic energy into mechanical energy and vice-versa with analytical approach.

29	**ACME-16604**	**Industrial Automation & Robotics**	**CO1.** Understanding of hard automation. **CO2.** Designing of logic circuits for given time displacement diagram. **CO3.** Understanding of programmable logic controllers. **CO4.** Able to decide the role of robot specifications as per requirement. **CO5.** Detailing of robot programming and their industrial applications. **CO6.** Demonstrate the working of valves and their applications in automations. **CO7.** Demonstrate the design of pneumatic and hydraulic circuits relevant to industrial applications. **CO8.** Able to work with various transfer devices and feeders in manufacturing industry. **CO9.** Able to program a robotic arm for industry application.
30	**ACME/DE-2.0**	**Product Design and Development**	**CO1.** To Learn the basic Principle of Visual design line color, balance proportion, Size shape mass, Unity and variety, Special relationships and composition in two and three dimensions. **CO2.** To know the elementary forms, colors combination and psychological effects of colors on customer. **CO3.** To learn the principle of product graphics, visual communication and designing of control panels. **CO4.** To learn about various types of fasteners, detailing of sheet metal and plastics products. **CO5.** To learn about the manufacturing and economics aspects of product development, role of designer.
31	**ACME-16606**	**Heat Transfer Lab**	**CO1.** To determine the thermal conductivity of solid insulating material and also of liquids. **CO2.** The students will learn to determine co-efficient of heat transfer for different modes of heat transfer. **CO3.** The students will be able to optimize fin efficiency with respect to shape factor. **CO4.** Draw the pool boiling curves to determine critical point for water. **CO5.** Calculate heat transfer co-efficient with respect to black body. **CO6.** To determine shape factor for various complex bodies.
32	**ACME-16607**	**Fluid Machinery Lab**	**CO1.** The students will learn about different turbines and draw their characteristics curves. **CO2.** The students will be able to draw the performance curves of various hydraulic machines. **CO3.** The students will be able to draw the performance curves of reciprocating pumps. **CO4.** The students shall be able to decide appropriate pump for industrial application and also draw performance curves of centrifugal pump. **CO5.** The students shall be able to decide appropriate vane shape and vane angle for optimum performance of centrifugal fane. **CO6.** The student shall be able to demonstrate the applications hydraulic ram.

33	**ACME-16608**	**Industrial Automation and Robotics Lab**	**CO1.** The students will be able to understand that how pneumatic circuits work in actual practice. **CO2.** Make the Pneumatic and Hydraulic circuits to understand the working of directional control valves. **CO3.** The students shall be able to understand the working of power steering mechanism. **CO4.** Use of directional control valve to operate double acting pneumatic cylinder. **CO5.** Understand the working of pneumatic grippers with directional control valve. **CO6.** Practical representation of robotics arm and its configuration.
34	**ACME-16701**	**Industrial Engineering & Management**	**CO1.** Apply industrial engineering techniques in an organization. **CO2.** Demonstrate his ability to recommend an appropriate layout in an industrial environment. **CO3.** Improve the plant productivity and safety. **CO4.** Improve the existing method by a new method. **CO5.** Calculate the standard time of process activities and rate the performance of workers/operators **CO6.** Perform job design considering the technological and behavior factors. **CO7.** Introduce ergonomic aspects in man-machine interface especially for design of displays and controls. **CO8.** Apply value engineering for practical applications.
35	**ACME-16702**	**Refrigeration & Air-Conditioning**	**CO1.** To enhance the understanding of different types of refrigeration & their selection. **CO2.** To understand the concept of different refrigeration cycles, different types of refrigerants **CO3.** To learn various refrigerants available and have knowledge of non-conventional refrigeration systems. **CO4.** Provide the knowledge about environment friendly refrigerants. **CO5.** Able to calculate refrigeration & air conditioning cooling/heating load. **CO6.** Knowledge to study the different conditions (e.g. humidity, etc) at different rates. **CO7.** To understand the Air Conditioning Concept, Psychometric Processes and Refrigeration and Air Conditioning Equipment. **CO8.** Suggest AC requirement for industrial processes.

36	**ACME-16703**	**Mechanical Vibrations**	**CO1.** Knowledge of vibration analysis, different types of vibrations. **CO2.** Understand alteration methods, Eigen values & Eigen vector and Euler's equation of motion for beam vibration. **CO3.** Learn concept of vibration control and principles of various vibration absorbing methods and equipment. **CO4.** To study of reduction in degree of freedom to restrict the movement in particular direction. **CO5.** Control on damping the undesired vibrations. **CO6.** To select the frequencies in practical components after considering its natural frequency. **CO7.** To use the appropriate instruments for measurements of amplitude & frequency of vibration sources.
37	**ACME-16704**	**Operations Research**	**CO1.** To solve problems related to Deterministic and Probabilistic Models. **CO2.** To undertake project related to queuing and inventory models. **CO3.** Recognize the importance of optimization techniques in engineering. **CO4.** Make transportation system better than the existing one. **CO5.** Handle the dynamic programming of the system. **CO6.** Apply project management on the basis of different phases in real life situation.
38	**ACME-16705**	**Refrigeration & Air-Conditioning Lab**	**CO1.** Understand various types of refrigeration systems used in industries. **CO2.** Calculate cooling loads for large buildings. **CO3.** Monitor the performance of various types of refrigerators air conditioners. **CO4.** Differentiate in load conditions according to environment. **CO5.** Recommend a particular refrigerant for industrial application.
39	**ACME-16706**	**Mechanical Vibration Lab**	**CO1.** Differentiate between free and forced, damped and undamped vibration systems. **CO2.** The students will be able to use a torsional pendulum for calculation of fluid viscosity. **CO3.** Determine modulus of elasticity from free vibration tests. **CO4.** Understand the use/performance of dynamic absorber. **CO5.** Calculate co-efficient of dry friction from natural frequency of a bar.
40	**ACME-101**	**Elements of Mechanical Engineering**	**CO1.** To find vide application in day to day life. **CO2.** To learn principles and fundamentals involved in the inter-conversion of thermal energy into mechanical energy and vice versa **CO3.** To know about the First and Second law of thermodynamics. **CO4.** Understand performance evaluation and design of gas power systems in different commercial applications. **CO5.** To understand the concept of centroid and centre of gravity. **CO6.** To understand the concept of MOI

41	**ACME-102**	**Engineering Drawing**	**CO1.** Read the blue prints with detail of dimension, section, tolerance and machining symbols. **CO2.** Draw the sectional views **CO3.** Draw the bill of material for engineering drawing of some mechanical components/assembly. **CO4.** Find the details of part after development of surfaces. **CO5.** Draw the isometric views of any drawing

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
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Department of Computer Science Engineering

The Program Outcomes (POs) of B.Tech Computer Science Engineering are:

- **a.** Graduates shall be able to demonstrate the knowledge of fundamentals of basic sciences, mathematics & logical reasoning, communication skills and implementing IT concepts while designing technological applications and innovative ideas.
- **b.** Graduates shall exhibit an ability to identify, formulate & select appropriate software & apply its use in solving complex problems.
- **c.** Graduates shall demonstrate an ability to develop programs which are useful in solving real life problems and analyze & interpret data for industry/entrepreneur excellence.
- **d.** Graduates shall be able to identify the various hardware components & design the assembly.
- **e.** Graduates shall possess the knowledge of design techniques, analysis, coding, testing, operation & maintenance of networks, databases, information & data security and computer systems.
- **f.** Graduates shall demonstrate the ability to understand & work on multi-disciplinary tasks.
- **g.** Graduates shall participate & pursue for the higher studies by passing the competitive exams.
- **h.** Graduates shall develop the habit of self-learning and self-motivation for taking their career to greater heights.
- **i.** Graduates shall demonstrate the ability of professionalism, ethical responsibilities and discipline as individual as well as in a team.
- **j.** Graduates shall be well versed with the existing cyber laws and IPR.
- **k.** Graduates shall demonstrate the knowledge of current issues & cutting edge technologies like Python, Big Data Analytics and Machine Learning etc. to meet the demands of new IT world.

Program Specific Outcomes

1. Graduates will be able to apply the theoretical and practical knowledge of computer science for developing software solutions to real-time problems.
2. Graduates will be able to demonstrate the acquired knowledge of emerging trends and contemporary technologies in the field of computer science and engineering.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes COs
1	**ACCS-16302**	**OBJECT ORIENTED PROGRAMMING**	**CO1.** Understand the concepts of structures and classes and differentiate between them and to design and develop programs with classes. **CO2.** Understand the principles of the object-oriented programming paradigm specifically including abstraction, encapsulation and polymorphism.

			CO3. Reuse the code using concept of inheritance. **CO4.** Implement the concept of generic programming using class and function templates. **CO5.** Implement the concept of file handling to store the contents of a program into the secondary storage. **CO6.** Clarify the logic for developing a program and to be able to discuss different data structures to represent real world problems.
2	**ACAM-16302**	**ENGINEERING MATHEMATICS III**	**CO1.** Recognize the importance of Fourier series & Fourier transforms in the field of signals and systems, communication and network theory signal and image processing, control theory, flow & heat transfer and theory of elasticity. **CO2.** Interpret the solution of one-dimensional wave, heat and Laplace equations with given initial and boundary conditions in the context of various engineering and technological applications. Develop the logic for problem solution identification with algorithms. **CO3.** Recall the distinctive characteristics of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data. **CO4.** Demonstrate various real world scenarios using concepts of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis, Algebraic Structures, Advanced graph Theory. **CO5.** To introduce mathematical notations and concepts in Engineering mathematics that is essential for computing.
3	**ACCS-16303**	**COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING**	**CO1.** Understand the organization of basic computer, its design and the design of control unit. **CO2.** Understand the bus structure and the various micro-operations. **CO3.** Demonstrate the working of central processing unit and RISC and CISC Architecture. **CO4.** Analyse instruction formats and general register organization. **CO5.** Understand the organization of memory and memory hardware. **CO6.** Elaborate advanced concepts of computer architecture, Parallel Processing, inter-processor communication and synchronization.
4	**ACEC-16302**	**DIGITAL**	**CO1.** To be well versed with number systems such as binary,

		CIRCUIT AND LOGIC DESIGN	octal, hexadecimal and able to perform various operation such as conversion, addition, subtraction etc. **CO2.** To have understanding of various logic gates such as AND, OR, NOR, NOT, XOR etc. along with knowledge of boolean minimization techniques like K - map and Q - M method. **CO3.** To be able to design combinational circuits such as encoder, decoder, code converters, adder, subtractor, multiplexer, demultiplexer and parity checker. **CO4.** To be able to design sequential circuits such as shift registers, counters etc. using flip flops, clocked flip flop, SR, JK, D , T and edge triggered flip flop. **CO5.** To have working knowledge of various types of digital to analog converters. **CO6.** To understand logic families such as RTL, DCTL, DTL, TTL, ECL, CMOS and their characteristics.
5	**ACCS-16301**	**DATA STRUCTURES**	**CO1.** Understand the concept of Dynamic memory management, data types, algorithms, Big O notation. **CO2.** Implementation of Data Structure like Arrays, Linked List, Stacks, Queues, Graphs. **CO3.** Develop the logic for problem solution identification with algorithms. **CO4.** Describe the hash function and concepts of collision and its resolution methods **CO5.** Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data. **CO6.** Implementation and analysis of algorithms with consideration to their respective complexities.
6	**ACCS-16304**	**DATA STRUCTURES LAB**	**CO1.** Implement basic data structures such as arrays and linked list. **CO2.** Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths. **CO3.** Implement various searching and sorting algorithms. **CO4.** Programs to demonstrate the implementation of various operations on stack and queue data structure.
7	**ACCS-16306**	**COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING LAB**	**CO1.** Understand the microprocessor operations. **CO2.** Understand the architecture of microprocessor **CO3.** Understand the instructions of 8085. **CO4.** Understand and design an assembly language programs . **CO5.** Design and implement microprocessor-based systems. **CO6.** Interfacemicroprocessor with different peripheral

			devices through interfacing chips and can handle data transfer in different ways for different applications.
8	**ACCS-16305**	**OBJECT ORIENTED PROGRAMMING LAB**	**CO1.** Develop solutions for a range of problems using object oriented programming.. **CO2.** Understand the principles of the object oriented programming paradigm specifically including abstraction, encapsulation and polymorphism and reuse the code using concept of inheritance. **CO3.** Develop scenarios to explain behavior and demonstrate correctness of programs. **CO4.** Familiarization with the critical thinking skills and creativity to solve the problems. **CO5.** Implement divide and conquer strategy to searching and sorting problems using iterative and/or recursive solutions. **CO6.** Store the contents of a program into the secondary storage as a file using file handling.
9	**ACEC-16305**	**DIGITAL CIRCUIT AND LOGIC DESIGN LAB**	**CO1.** To have practical understanding of logic gates IC's their input and output pins and logic levels. **CO2.** To be able to implement combinational logic circuits such as half/ full adders and subtractors. **CO3.** To practically design the various combinational circuits such as comparators, encoders, code convertors (binary to gray, gray to binary etc.) using logic gate IC's. **CO4.** To verify practically the truth table and working schematic of various sequential circuits such as RS, JK, D, T, JK master-slave flip flops. **CO5.** To implement sequential circuits such as counters using discrete logic. **CO6.** To verify theoretical details with practical observations.
10	**ACDS-16402**	**DISCRETE STRUCTURES**	**CO1.** To introduce mathematical notations and concepts in discrete mathematics that is essential for computing. **CO2.** To train on mathematical reasoning and proof strategies. **CO3.** To cultivate analytical thinking and creative problem solving skills. **CO4.** Apply the operations of sets and venn diagram to solve applied problems. **CO5.** Determine domain and range of functions. **CO6.** Use sets to solve problem in Boolean algebra.
11	**ACCS-16402**	**OPERATING SYSTEM**	**CO1.** Gain knowledge about concept of process and thread their creation and their resource management. **CO2.** Understand basics functionality of operating system, scheduling of CPU, process management. **CO3.** Understand the knowledge of deadlocks and its

			recovery. **CO4.** Gain knowledge of paging, page replacement algorithms. **CO5.** Gain knowledge of multiprocessor and distributed system. **CO6.** Understand the difference between physical and logical file system. **CO7.** Gain the knowledge of device management, device scheduling. **CO8.** Be familiar with protection and security mechanism. **CO9.** Mastering various process management concepts including scheduling, synchronization ,deadlocks.
12	**ACCS-16403**	**COMPUTER NETWORKS**	**CO1.** Clarity about various protocols, models in networks. **CO2.** Design, implement and analyze simple computer networks. **CO3.** Assemble the components of a PC and install one or more operating systems resulting in a functioning PC that is appropriate for a particular end user. **CO4.** Understand the concepts of network security and various network security standards. **CO5.** Implement basic tasks expected of a Network Administrator including management of user accounts, shared resources, and network security. **CO6.** Understand difference between Adhoc and cellular networks.
13	**ACCS-16404**	**PROGRAMMING IN PYTHON**	**CO1.** To Learn Syntax and Semantics and create Functions in Python. **CO2.** To Handle Strings and Files in Python. **CO3.** To Understand Lists, Dictionaries in Python. **CO4.** To Implement Object Oriented Programming concepts in Python **CO5.** To learn how to use exception handling in Python applications for error handling. **CO6.** To Build GUI applications
14	**ACCS-16405**	**RDBMS**	**CO1.** Understand the concept of Database Management system and its various applications in real life. **CO2.** Understand the concept of E-R diagrams for conceptual modeling. **CO3.** Understand the concept of normalizing tables for effective database design. **CO4.** Understand the different database languages i.e., (DDL, DML, DCL, and TCL). **CO5.** Understand the concept of concurrent transactions and handling deadlocks effectively. **CO6.** Understand the concept of database security and various ways to counter threats to vital data.

15	**ACCS-16406**	**OPERATING SYSTEM LAB**	**CO1.** Installation of operating system. **CO2.** Learn the general structure and any non-obvious aspect s of different Operating system. **CO3.** Understand various aspects of different Operating system. **CO4.** Implement various LINUX commands. **CO5.** Understand the basics of shell programming. **CO6.** Understand shell programming in conditional and loop statement.
16	**ACCS-16407**	**COMPUTER NETWORKS LAB**	**CO1.** Understand the practical base in computer network issues. **CO2.** Install and configure domain-based local area networks.. **CO3.** Students are expected to know the implantation of IPv4 address scheme on LAN. **CO4.** Students will be able to install open source packet capture software. **CO5.** Implement basic tasks expected of a Network Administrator including management of user accounts, shared resources, and network security. **CO6.** Students are able to configure Adhoc networks.
17	**ACCS-16409**	**RDBMS LAB**	**CO1.** Understand the setting up of a client server network Understand different database languages i.e., (DDL, DML, DCL). **CO2.** Understand the data mining concepts. **CO3.** Implement various commands of SQL and PL/SQL **CO4.** Understand the concept of triggers, cursors, procedures in PL/SQL. **CO5.** Connecting the database with a front end application
18	**ACCS-16409**	**PROGRAMMING IN PYTHON LAB**	**CO1.** Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python **CO2.** Express different Decision Making statements and Functions **CO3.** Interpret Object oriented programming in Python **CO4.** Implementation of data Structures in python. **CO5.** Understand and summarize different File handling operations **CO6.** Explain how to design GUI Applications in Python and evaluate different database operations

19	**ACCS-16501**	**PROGRAMMING IN JAVA**	**CO1.** Understand object oriented programming constructs, byte codes and basics of java console. **CO2.** Implementation of simple java programs using Classes, Inheritance, Exception handling and applets. **CO3.** Developing logic for problem solving with programming concepts. **CO4.** Developing simple java applications with JDBC connectivity. **CO5.** Understand and utilize Java Graphical User Interface in the program writing.
20	**ACCS-16502**	**DESIGN AND ANALYSIS OF ALGORITHM**	**CO1.** Understand the methods for analyzing the efficiency and correctness of algorithms (such as exchange arguments, recurrence, induction, and average case analysis) **CO2.** Design algorithms using the dynamic programming, greedy method, Backtracking strategy algorithms that employ this strategy. **CO3.** Compare, contrast, and choose appropriate algorithmic design techniques to present an algorithm that solves a given problem and can identify and analyze criteria and specifications appropriate to new problems. **CO4.** Develop the efficient algorithms for the new problem with suitable designing techniques. **CO5.** To classify the problem into class P or NP and to design the Non Deterministic algorithms
21	**ACCS-16503**	**BIG DATA ANALYTICS**	**CO1.** To provide an overview of an exciting growing field of big data analytics. **CO2.** To introduce the tools required to manage and analyze big data like Hadoop, Map Reduce and Pig. **CO3.** To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability. **CO4.** To enable students to have skills to solve complex real world problems in Data Analytics. **CO5.** To equip students with skills to analyze and design parallel and distributed applications. **CO6.** To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
22	**ACCS-16504**	**SOFTWARE ENGINEERING**	**CO1.** Describe the processes and models involved in SDLC lifecycle. **CO2.** Understand software requirements and the SRS document. **CO3.** Implementation of different coding standards and software testing approaches such as unit testing and integration testing. **CO4.** Understand the role of project management including planning, scheduling, risk management and some ethical and professional issues that are important for software engineers. **CO5.** Learn the basic software quality strategy.

23	**ACCS 16505**	**INFORMATION SECURITY**	**CO1.** Able to define what information is & appreciate the value of information to the modern organization. **CO2.** Understand the CIA triad of Confidentiality, Integrity and Availability. **CO3.** Appreciate the difficulties that arise when valuable information needs to be shared. **CO4.** Understands the various authentication protocols used for the protection of information. **CO5.** Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack. **CO6.** Ability to apply security based on IP, network, web & system.
24	**ACCS-16507**	**DAA Lab**	**CO1.** Analyze the complexities of various problems in different domains. **CO2.** Analyze the running time of the basic algorithms for those classic problems in various domains. **CO3.** Implement methods for analyzing the efficiency and correctness of algorithms (such as exchange arguments, recurrence, induction, and average case analysis) **CO4.** Compare, contrast, and choose appropriate algorithmic design techniques to present an algorithm that solves a given problem. **CO5.** Identify and analyze criteria and specifications appropriate to new problems.
25	**ACCS-16508**	**BIG DATA ANALYTICS LAB**	**CO1.** To install the relevant software for setting up a hadoop cluster. **CO2.** To introduce the tools required to manage and analyze big data like Hadoop, Map Reduce and Pig. **CO3.** To learn the concepts required for working with distributed file systems. **CO4.** To enable students to have skills to solve complex real world problems in Data Analytics. **CO5.** To equip students with skills to analyze and design parallel and distributed applications.
26	**ACCS-16506**	**PROGRAMMING IN JAVA LAB**	**CO1.** Implement and develop logics for different OOPS concep using basic syntaxes of control Structures, strings, arrays and function. **CO2.** Implementation of classes, objects and the relationships among them to solve specific problem. **CO3.** Develop and achieve reusability using inheritance, interfa and packages for efficient application development. **CO4.** Understanding different exception handling mechanisms concept of multithreading for developing robust application. **CO5.** Implementing connectivity of java applications with diffe databases like SQL, oracle etc.
27	**ACCS-16509**	**SOFTWARE ENGINEERING**	**CO1.** Preparation of SRS document, design document, test

		LAB	cases and software configuration management and risk management related document. **CO2.** Designing of object oriented and function oriented design using Microsoft Visio. **CO3.** Able to perform unit testing and integration testing. **CO4.** Apply various website testing techniques **CO5.** Usage of Openproj tool to track the progress of project.
28	**ACCS-16601**	**WEB TECHNOLOGIES**	**CO1.** Understanding the working of web page development. **CO2.** Understand design principles in CSS for dynamic changes. **CO3.** Understanding the form development and events related to them. **CO4.** Understanding the scripting language for developing the web page. **CO5.** Understanding the server side scripting language and its connectivity with database for storing the data into it.
29	**ACCS-16602**	**MOBILE APPLICATION DEVELOPMENT**	**CO1.** Demonstrate their understanding of the fundamentals of Android operating systems **CO2.** Demonstrate their skills of using Android software development tools · **CO3.** Demonstrate their ability to develop software with reasonable complexity on mobile platform · **CO4.** Demonstrate their ability to deploy software to mobile devices · **CO5.** Demonstrate their ability to debug programs running on mobile devices
30	**ACCS-16603**	**MACHINE LEARNING**	**CO1.** Recognize the characteristics of machine learning that make it useful to real-world problems. **CO2.** Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised. **CO3.** Be able to use support vector machines. **CO4.** Be able to use regularized regression algorithms. **CO5.** Understand algorithms for learning Bayesian networks. **CO6.** Understand Back propagation algorithms.
31	**ACIT-16501**	**CYBER SECURITY**	**CO1.** To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks. **CO2.** Understanding of online as well as offline application security, application threats & its mitigations and application security service provider. **CO3.** Demonstrate knowledge of security threats to computer systems, and perform countermeasures to secure a computer. **CO4.** An ability to apply security principles and practices to the environment, hardware, software, and human aspects of a system. **CO5.** The learner will understand key terms and concepts in

			cyber law, intellectual property and cyber crimes, trademarks and domain theft.
32	**ACCS-16604**	**WEB TECHNOLOGIES LAB**	**CO1.** Understanding the working of web page development. **CO2.** Understand design principles in CSS for dynamic changes. **CO3.** Understanding the form development and events related to them. **CO4.** Understanding the scripting language for developing the web page. **CO5.** Understanding the server side scripting language and it s connectivity with database for storing the data into it
33	**ACCS-16605**	**MOBILE APPLICATION DEVELOPMENT LAB**	**CO1.** Apply essential Android Programming concepts. **CO2.** Demonstrate and Understanding anatomy of an Android application **CO3.** Apply the android geo location based services **CO4.** Develop various Android applications related to layouts & rich uses interactive interfaces **CO5.** Develop various Android applications related to mobile
34	**ACCS-16606**	**MACHINE LEARNING LAB**	**CO1.** Gain knowledge about basic concepts of Machine Learning **CO2.** Identify machine learning techniques suitable for a given problem **CO3.** Solve the problems using various machine learning techniques **CO4.** Implement various machine learning techniques. **CO5.** Design application using machine learning techniques
35	**ACIT-16502**	**CYBER SECURITY LAB**	**CO1.** Students are expected to know the implementation of wired and wireless network **CO2.** Students are able to implement cyber attacks like DOS, Phishing. **CO3.** Students are expected to know packet filtering technique. **CO4.** Students are able to implement reverse engineering. **CO5.** Students are able to perform Brute Force Attack. **CO6.** Students are expected to perform cryptography and steganography techniques.
36	**ACCS-16706**	**THEORY OF COMPUTATIONS**	**CO1.** Understand the basic concepts of formal languages, automata and grammar types, as well as the use of formal languages and reduction in normal forms. **CO2.** Demonstrate the relation between regular expressions, automata, languages and grammar with formal mathematical methods **CO3.** Understand the principal models of computation such as finite automata, pushdown automata and Turing machines. **CO4.** Understand the correspondence of the different language classes to the models of computation. **CO5.** Design push down automata and Turing machines

			performing tasks of moderate complexity. **CO6.** Analyze the syntax and formal properties of LL (k) and LR (k) grammars.
37	**ACCS-16172**	**HAINA**	**CO1.** Understand and describe the devices and services used to support communications in data networks and the Internet. **CO2.** Understand and describe the role of protocol layers in data networks **CO3.** Understand and describe the importance of addressing and naming schemes at various layers of data networks in IPv4 and IPv6 environments. **CO4.** Understand the concepts of network security and vario us network security standards. **CO5.** Clear HCNA Routing and Switching certification exams.
38	**ACCS-16707**	**ARTIFICIAL INTELLIGENCE**	**CO1.** Identify problems from multidisciplinary fields that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem. **CO2.** Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, etc). **CO3.** Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming). **CO4.** Inference and reason out from the given facts that helps in decision making. **CO5.** Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.
39	**ACCS-16705**	**HAINA Lab**	**CO1.** Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks. **CO2.** Build a simple Ethernet network using routers and switches. **CO3.** Use eNSP software to perform basic router and switch configurations. **CO4.** Utilize common network utilities to verify small network operations and analyze data traffic. **CO5.** Configure and troubleshoot an Open Shortest Path First (OSPF) network. **CO6.** Understand, configure, and troubleshoot Dynamic Host Configuration Protocol (DHCP) for IPv4
40	**ACCS-16702**	**ARTIFICIAL INTELLIGENCE LAB**	**CO1.** To provide students with in-depth theoretical and practical base for the development of AI based systems in multidisciplinary fields. **CO2.** Formalize a given problem in the language/framework of different AI methods **CO3.** To learn control structures of functional, logic, and imperative programming language **CO4.** Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming) . **CO5.** To Understand how the basic program evaluation

			mechanism works by goal satisfaction

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department: Electronics and Communication Engineering

The Program Outcomes (POs) of B.Tech Electronics and Communication Engineering are:

a. Graduate will understand the basic knowledge of Mathematics and Science in Engineering, and their practical applications.
b. Graduate will be able to communicate effectively in both: oral and written form.
c. Graduate will have the skills to design analog and digital circuits for various applications.
d. Graduate will able to understand, design and implement the Communication Network, Mobile Network, guided and unguided wireless communication system.
e. Graduate will able to design and implement various programs on Microcontroller, embedded system and Arduino based systems.
f. Graduate will have functional skills to utilize software and other tools to analyze problems for their required solutions.
g. Graduate shall demonstrate the ability to understand and work on multidisciplinary tasks.
h. Graduates shall have the ability of to meet the expectations/demands of their potential Employers.
i. Graduate shall able to demonstrate the cutting-edge technologies like Phyton, Machine Learning etc. to meet the new demand of the Technology Era.
j. Graduate will be able to participate and succeed in competitive exams like GATE, GRE etc.
k. Graduate shall be able to handle various projects as Individual/ in a team for the societal upliftment

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	ACEC-16302	Digital Circuit and Logic Design	**CO1.** To be well versed with number systems such as binary , octal, hexadecimal and able to perform various operations such as conversion, addition, subtraction etc. **CO2.** To have understanding of various logic gates such as AND, OR, NOR, NOT, XOR etc. along with knowledge of Boolean minimization techniques like K-Map and Q-M Me thod. **CO3.** To be able to design combinational circuits such as en coder, decoder, code converters, adder, subtractor, multiple xer, de-multiplexer and parity checker. **CO4.** To be able to design sequential circuits such as shift re gisters, counters etc. using flip flops, clocked flip flop, SR, JK, D, T and edge triggered flip flop.

			CO5. To solve problems subjected to the simple as well as combined twisting and bending moments. **CO6.** To have working knowledge of various types of digita l to analog converters. **CO7.** To understand logic families such as RTL, DCTL, DT L, TTL, ECL, CMOS and their characteristics.
2	**ACEC-16301**	**Analysis and Synthesis of Networks**	**CO1.** Focus on the analysis of the circuits by using different techniques.. . **CO2.** Explore their knowledge about existing filter networks. **CO3.** Design different types of filter and their analysis **CO4.** Apply the knowledge gained in analysis and design of different types of circuits
3	**ACEC-16303**	**Electronic Devices and Circuits**	**CO1.** Basics of Electronic Devices like PN Diode, LED, LCD, Photodiode, Tunnel diode and Zener diodes, **CO2.** Basic knowledge about voltage regulator which is widely used in power supply design. **CO3.** Functioning of various transistors like BJT, JFET, UJT and MOSFETs **CO4.** Designing of different types of amplifiers. **CO5.** Familiarization with the feedback concepts and its effect on gain, stability, distortion, bandwidth and frequency response. **CO6.** Analysis of various oscillators like Hartley, Colpitt, crystal, wein bridge etc.
4	**ACCS-16302**	**OBJECT ORIENTED PROGRAMMI NG**	**CO-1.** Understand the concepts of structures and classes and differentiate between them and to design and develop programs with classes. **CO-2.** Understand the principles of the object-oriented programming paradigm specifically including abstraction, encapsulation and polymorphism. **CO-3.** Reuse the code using concept of inheritance. **CO-4.** Implement the concept of generic programming using class and function templates. **CO-5.** Implement the concept of file handling to store the contents of a program into the secondary storage. **CO-6.** Clarify the logic for developing a program and to be able to discuss different data structures to represent real world problems
5	**BTAM-301 / BTAM-16301**	**Engg Mathematics**	**CO1.** To enable the students to learn the basic laplace transfer , its properties and its application : **CO2.** To enable the students to concept of fourier series and different wave forms. **CO3.** To enable the students to learn the formation of partial differential equation and to apply these to solve various problems heat conduction and wave equation **CO4.** To enable the students to know the concept of complex differention, complex integration are its application

			CO5. To enable the students to find series solution , discuss legendre's polynomial, bessel's equation and its application
6	**ACEC- 16304**	**Lab Electronic Devices and circuits**	**CO1.** Setup any circuit on a bread board and consequently on PCB if required. **CO2.** Analyze it using electronic equipment and draw conclusions. **CO3.** Explore the practical implications after verifying various law and theorems. **CO4.** Design and develop various practical circuits using diodes, special purpose diodes, transistors. **CO5.** Prepare thyself for advanced electronics-based subjects and final year projects. **CO6.** Verification of various amplifiers
7	**ACCS-16305**	**OBJECT ORIENTED PROGRAMMING LAB**	**CO1.** Develop solutions for a range of problems using object oriented programming.. **CO2.** Understandtheprinciples of the object oriented programming paradigm specifically including abstraction, encapsulation and polymorphism and reuse the code using concept of inheritance. **CO3.** Develop scenarios to explain behavior and demonstrate correctness of programs. **CO4.** Familiarization with the critical thinking skills and creativity to solve the problems. **CO5.** Implement divide and conquer strategy to searching and sorting problems using iterative and/or recursive solutions. **CO6.** Store the contents of a program into the secondary storage as a file using file handling.
8	**ACEC-16305**	**Digital Circuit and Logic Design Lab.**	**CO1.** To be well versed with number systems such as binary , octal, hexadecimal and able to perform various operations s uch as conversion, addition, subtraction etc. **CO2.** To have understanding of various logic gates such as AND, OR, NOR, NOT, XOR etc. along with knowledge of Boolean minimization techniques like K-Map and Q-M Met hod. **CO3.** To be able to design combinational circuits such as en coder, decoder, code converters, adder, subtractor, multiplex er, de-multiplexer and parity checker. **CO4.** To be able to design sequential circuits such as shift re gisters, counters etc. using flip flops, clocked flip flop, SR, J K, D, T and edge triggered flip flop. **CO5.** To have working knowledge of various types of digita l to analog converters. **CO6.** To understand logic families such as RTL, DCTL, DT L, TTL, ECL, CMOS and their characteristics.

9	**ACEC- 16404**	**Electromagnetic Field Theory**	**CO-1**. An ability to apply knowledge of vector relations with help of solving numerical problems. **CO-2**. An ability to identify, formulates the relations between divergence, curl & gradient and their interpolation in different integral theorems. **CO-3**. An ability to analyze Electromagnetic Wave theory using wave propagation theory and develop them with help of Maxwell's equations for time varying fields. **CO-4**. Ability to analyze the working of transmission lines with effect to EM waves. **CO-5**. Ability to analyze the distortion less condition in transmission lines **CO-6.** Ability to analyze the low loss RF and UHF transmission lines
10	**ACEC-16401**	**Analog Communication System**	**CO1.** Student will be able to understand different Analog m odulation techniques. **CO2.** Students will able to study about the transmission of si gnal from transmitter to receiver. **CO3.** Students will understand the different AM receivers. **CO4.** Students will able to draft mathematically about AM c urrent, voltage, power. **CO5.** Students can professionally study the parameters of co mmercially used FM. **CO6.** Students can identify the practical advantages of digita l transmission and analog transmission. **CO7.** Students are expected to apply the knowledge gained f or their project work.
11	**ACEE - 16402**	**Linear Control Systems**	**CO1.** To introduce the fundamental concepts of control systems with emphasis on open loop and closed loop control system. **CO2.** Determining the transfer function of a control system using block diagram reduction technique and signal flow graph technique. **CO3.** To introduce the concept of analogies between different types of systems. **CO4.** Introduction to the transient and steady state response of 1^{st} and 2^{nd} order control systems. **CO5.** To demonstrate the use of root locus, bode plot and nyquist plot to determine the stability of a system which is very useful in designing of control system. **CO6.** Need of compensation in control system.

12	**ACEC-16402**	**Linear Integrated Circuit**	**CO1.** Designing of the differential amplifier **CO2.** Performance parameters of operational amplifier i. How op-amp can be used in various applications like Sawtooth wave generator, Summer/Scaling/Averaging Amplifier etc. ii. Designing of the integrator/differentiator, Log/Anti-Log circuit etc. which are useful in electronic circuits. **CO3.** Designing of various multivibrators using IC 555 **CO4.** Designing of Specialized IC's such as Fixed, Adjustable and Switching Regulators which are very useful in Linear Circuit Designs.
13	**ACEC-16407**	**Simulation lab for Electronic Engineers**	**CO1.** Generate discrete and continuous step signals. **CO2.** Generate exponential and ramp signals in continuous and discrete domain. **CO3.** Addition and Subtraction of two signals. **CO4.** To generate a random binary wave **CO5.** To develop program for discrete convolution and correlation
14	**ACEC-16405**	**Linear Integrated Circuit Lab**	**CO1.** To understand the differential amplifier configurations. **CO2.** Able to measure the performance parameters of an Op amp. **CO3.** To understand the Applications of Op amp as Inverting/Non Inverting amplifier. **CO4.** Able to use the Op-Amp as summing, scaling & averaging amplifier. **CO5.** Able to use the OP-Amp as Differentiator and Integrator. **CO6.** Application of Op Amp as Sawtooth wave generator. **CO7.** Understand the Applications of Op Amp as Schmitt Trigger.
15	**ACEC- 16901**	**Engineering Economics and Industrial management**	**CO1.** Ability to verify the breakeven analysis **CO2.** Will be able to understand replacement studies **CO3.** Will be able to differentiate between cost estimation and cost accounting **CO4.** Estimation of fixed and variable cost **CO5.** Will be able to understand management theories **CO6.** Will be able to understand organizational structures

16	**ACEC-16502**	**Digital Signal Processing**	**CO1.** Students will able to understand the difference between ASP & DSP. **CO2.** Students understand how to apply various algorithm to find the stability **CO3.** Students will able to explain various type of analog an d digital signal. **CO4.** Students will easily solve the Difference Equation. **CO5.** Students will explain Digital Signal processor application in practical life **CO6.** Students will able to design IIR & FIR Filters **CO7.** Students will analyze stability of the system by using DFT & Z transform.
17	**ACEC - 16501**	**Digital Communication**	**CO1.** To understand the building blocks of digital communication system. **CO2.** Basic knowledge about digital transmission and sampling techniques. **CO3.** Concepts of amount of information, entropy and various coding techniques. a. Designing of different line coding techniques and data formats. b. Familiarization about various modulation techniques. **CO4.** Analysis of coherent and non - coherent detectors.
18	**ACEC-16506**	**Hardware Programming Language Lab**	**CO1.** Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks. **CO2.** Build a simple Ethernet network using routers and switches. **CO3.** Use eNSP software to perform basic router and switch configurations. **CO4.** Utilize common network utilities to verify small network operations and analyze data traffic. **CO5.** Configure and troubleshoot an Open Shortest Path First (OSPF) network. **CO6.** Understand, configure, and troubleshoot Dynamic Host Configuration Protocol (DHCP) for IPv4
19	**ACEC- 16504**	**Lab Communication Systems**	**CO1.** Generate amplitude modulated wave and determine its percentage **CO2.** Generate frequency modulated signal and able to know about the modulation index **CO3.** Understand the TDM, PWM and PPM **CO4.** Know the Amplitude Shift Keying modulator and demodulator **CO5.** Generate the phase shift keying **CO6.** Decode techniques for various formats

20	**ACEC-16505**	**Lab Digital Signal Processing**	**CO1.**Students will be able to provide knowledge about MATLAB software **CO2** Students will able to Generate Graphical representation of Time & Frequency domain signal **CO3** It will easy for students to solve circular convolution **CO4** Students are expected to design FIR & IIR filters using MATLAB software. **CO5** Students will able to solve easily, DFT & FFT & Z transform **CO6** Students are expected to perform different operation on sequence like signal addition ,multiplication & shifting etc **CO7** Students are expected to apply the knowledge gained for their project work.
21	**ACCS-16404**	**Programming in Python**	**CO1.** To Learn Syntax and Semantics and create Functions in Python. **CO2.** To Handle Strings and Files in Python. **CO3.** To Understand Lists, Dictionaries in Python. **CO4.** To Implement Object Oriented Programming concepts in Python **CO5.** To learn how to use exception handling in Python applications for error handling. **CO6.** To Build GUI applications
22	**ACCS-16409**	**Programming in Python Lab**	**CO1.** Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python **CO2.** Express different Decision Making statements and Functions **CO3.** Interpret Object oriented programming in Python **CO4.** Implementation of data Structures in python. **CO5.** Understand and summarize different File handling operations **CO6.** Explain how to design GUI Applications in Python and evaluate different database operations

23	**ACEC-16503**	**Embedded System-I**	**CO1.** Student having the knowledge about the basic architecture of processors. **CO2.** Good awareness about the 8085 microprocessors and its applications. **CO3.** Designing of the various program by using 8085 instructions. **CO4.** Student will learn about the 8051 MCU and different input /output port programming. **CO5.** Design of the various Timer /Counter program by using 8051 **CO6.** Interfacing of the 8051 MCU with different modules like ADC,LCD etc.
24	**ACEC-16602**	**Embedded System-II**	**CO1.** Introduction to the ARM architecture and its family **CO2.** Student will help in developed the program by using different instruction **CO3.** Student will better understanding about the concept of the registers ,interrupts and processor mode. **CO4.** Introduction to the arduino and raspberry pi kits . **CO5.** Design of the various program by using basic arduino commands. **CO6.** Interfacing of the ARM proceesors with different modules like ADC, RFID etc.
25	**ACEC-16604**	**OPTICAL COMMUNICATION**	**CO1.** Introduction to the optical fiber and its types . **CO2.** How the dispersion effect on the different types of optical fiber. **CO3.** Student will understand the concept of losses in optical fiber **CO4.**Student will understand the different types of the Optical transmitters. **CO5**.Student will understand the different types of the Optical receviers. **CO6.**Analysis of the receiver noise mechanism in optical receivers.

26	**ACEC - 16601**	**Wireless Communication System**	**CO1.** Knowledge of the basics of wireless communication techniques. **CO2.** Issues related to the general description of the problem and frequency reuse channels and co - channel interference reduction factor. **CO3.** Demonstration of the importance of hand off's and dropped calls along with its characteristics. **CO4.** Basic concepts of fading and diversity in wireless communication. **CO5.** Introduction to the various multiple access techniques. **CO6.** Familiarization with different generations of cellular system such as 2G, 3G, 4G, 5G networks and its architectures.
27	**ACEC-16603**	**Microwave & Radar Engg**	**CO1.** Able to understand the ferrite devices in detail **CO2.** Able to apply and familiarize with microwave generators. **CO3.** Understands the difference between conventional tubes and microwave tubes. **CO4.** To familiarize with the basic power and VSWR measurement methods. **CO5.** Able to understand the monostatic and bistatic radar. **CO6.** To understand scanning and tracking techniques.
28	**ACEC- 16606**	**Lab Microwave & Optical Engineering**	**CO1.** To understand the various microwave components **CO2.** To understand Klystron characteristics **CO3.** Students will be able to design various antennas using HFSS software **CO4.** Students will be able to understand attenuation in optical fibers **CO5.** Students will be able to understand bending losses in optical fibers **CO6.** Students will be able to calculate the numerical aperture in optical fibers
29	**ACEC- 16605**	**Lab Wireless Communication System**	**CO1.** Students will be able to understand the basics of Lab view **CO2.** Students will be able to analyze various modulation techniques using labview **CO3.** Students will be able to analyze vector signal transceiver **CO4.** Students will be able to analyze VNA **CO5.** Students will be able to analyze various antennas using VNA **CO6.** Design of OFDM based system using VNA

30	**ACEC-16926**	**Antenna Wave Propagation**	**CO1.** To understand the performance parameters of Antenna **CO2.** To get familiar with Linear Wire and Aperture Antenna **CO3.** Able to understand the Microstrip Patch and Fractal Antenna **CO4.** To understand antenna array with its classifications which are useful in communication System **CO5.** To know about the ground and wave propagation
31	**ACCS-16603**	**MACHINE LARNING**	**CO1.** Recognize the characteristics of machine learning that make it useful to real-world problems. **CO2.** Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised. **CO3.** Be able to use support vector machines. **CO4.** Be able to use regularized regression algorithms. **CO5.** Understand algorithms for learning Bayesian networks. **CO6.** Understand Back propagation algorithms.
32	**ACEC - 16702**	**VLSI Design**	**CO1.** To introduce the student to hardware descriptive languages and design tools for digital systems. **CO2.** To enable the student in the semantics of VHDL and language usage. **CO3.** To understand working and realization of combinational circuits. **CO4.** To understand working flip-flops and use them in designing of sequential circuits. **CO5.** Introduction to FSM and ASM charts. **CO6.** To brief the students with various programmable logical devices for implementation
33	**ACCS-16606**	**MACHINE LEARNING LAB**	**CO1.** Gain knowledge about basic concepts of Machine Learning **CO2.** Identify machine learning techniques suitable for a given problem **CO3.** Solve the problems using various machine learning techniques **CO4.** Implement various machine learning techniques. **CO5.** Design application using machine learning techniques

34	**ACEC - 16703**	**Lab VLSI**	**CO1.** To introduce the student to hardware descriptive languages. **CO2.** To introduce the students to design tools for digital circuit design. **CO3.** . To enable the student in the semantics of VHDL and language usage. **CO4.** To allow the student to practically implement various logic gates. **CO5.** To enable the students in designing combinational logic circuits. **CO6.** To enable the students in designing and implementing sequential logic circuits.

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department of Electrical Engineering

The Program Outcomes (POs) of B.Tech Electrical Engineering are:

Programme Outcomes (POs)

a. Graduates will be demonstrated knowledge of differential equations, vector calculus, complex variables, matrix theory, probability theory, physics, chemistry and electrical and electronics engineering.

b. Graduates will be demonstrated an ability to identify, formulate and solve electrical engineering problems.

c. Graduate will be demonstrated an ability to design electrical and electronic circuits and conduct experiments with electrical systems, analyze and interpret data.

d. Graduates will be demonstrated an ability to design digital and analog systems and component.

e. Graduates will be demonstrated an ability to visualize and work on laboratory and multidisciplinary tasks.

f. Graduate will be demonstrated skills to use modern engineering tools, software and equipment to analyze problems.

g. Graduates will be demonstrated knowledge of professional and ethical responsibilities.

h Graduate will be able to communicate effectively in both verbal and written form.

i. Graduate will be shown the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.

j. Graduate will be developed confidence for self-education and ability for life-long learning.

k. Graduate will be able to explore the knowledge gained for participation and succeeding in competitive examinations like GATE, GRE.

l. Graduates will be demonstrated their knowledge in effective implementation during their practice of profession of Electrical Engineering with due regards to environmental and social concerns.

Program Specific Outcomes

1. Graduates will demonstrate their knowledge in effective implementation during their practice of profession of Electrical Engineering with due regard to environment and social concerns.
2. Graduates will demonstrate their knowledge in analysis, design, erection and laboratory experimentation regarding Electrical Engineering.
3. Graduates will be motivated for continuous self- learning in engineering practice and pursue research in advanced areas of Electrical Engineering in order to offer engineering services to the society, ethically.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	**ACEE-101**	**Basic Electrical and Electronics Engg**	**CO1.** To understand the basic concepts of AC and DC **CO2.** To understand the basic principles of magnetic fields, transformers and machines. **CO3.** To understand the concept of various electronic devices. **CO4.** To understand the concept of digital electronics.
2	**ACEE-16301**	**Circuit Theory**	**CO1.** Focus on the analysis of the circuits by using different techniques.. **CO2.** Design different types of filter and their analysis **CO3.** Explore their knowledge about existing filter networks. **CO4.** Apply the knowledge gained in analysis and design of different types of circuits.
3	**ACEE-16304**	**Electronic Devices and Circuits**	**CO1.** Basics of Electronic Devices like PN Diode, LED, LCD, Photodiode, Tunnel diode and Zener diodes. **CO2.** Basic knowledge about voltage regulator which is widely used in power supply design. **CO3.** Functioning of various transistors like BJT, JFET, UJT and MOSFETs **CO4.** Designing of different types of amplifiers. **CO5.** Familiarization with the feedback concepts and its effect on gain, stability, distortion, bandwidth and frequency response. **CO6.** Analysis of various oscillators like Hartley, Colpitt, crystal, wein bridge etc.
4	**ACEE- 16303**	**Electrical Measurements & Instrumentations**	**CO1.** An ability to gain knowledge of different types of analog measuring instruments and their applications. **CO2.** An ability to understand various types of bridges and related lab experiments. **CO3.** An ability to use transducers and various types of transducers in real life. **CO4.** An ability to use techniques, skills related to

			potentiometers in different field applications. **CO5.** Analysis of BH curve and hysteresis loop **CO6.** Analysis of various types of voltmeters and volt ratio box
5	**ACEE-16302**	**Transformer and DC Machines**	**CO1.** Describe how a transformer is constructed and how does it work. **CO2.** Perform testing on transformer and to evaluate efficiency and voltage regulation. **CO3.** Develop equivalent circuit, phasor diagram and circuit parameters. **CO4.** Comprehend the construction, working and characteristics of dc machines. **CO5.** Exploit knowledge in context of applications of dc generators and motors in industry.
6	**ACEE-16306**	**Laboratory-II (Electrical Machines-I)**	**CO1.** Students are primarily focuses on the energy conversion process. **CO2.** To promote curricula and assessment based on constructivist methods. **CO3.** Students are expected to gain the knowledge about various applications of d.c. machines. **CO4.** 4. Students are expected to apply the knowledge gained in their real life
7	**ACEE-16306**	**Laboratory-II (Electrical Machines-I)**	**CO1.** Students are primarily focuses on the energy conversion process. **CO2.** To promote curricula and assessment based on constructivist methods. **CO3.** Students are expected to gain the knowledge about various applications of d.c. machines. **CO4.** Students are expected to apply the knowledge gained in their real life.
8	**ACEE-16306**	**Laboratory-II (Electrical Machines-I)**	**CO1.** Students are primarily focuses on the energy conversion process. **CO2.** To promote curricula and assessment based on constructivist methods. **CO3.** Students are expected to gain the knowledge about various applications of d.c. machines. **CO4.** 4. Students are expected to apply the knowledge gained in their real life
9	**ACEE-16307**	**Lab Electrical Measurements & Instrumentations**	**CO1.** An ability to perform well for precision measurement of R, L, C, M, & F by different bridges. **CO2.** An ability to use various measuring instruments **CO3.** An ability to use potentiometers, CRO for measurement of frequency and phase angle. **CO4.** An ability to apply their knowledge to design various energy efficient electrical appliances for industrial applications. **CO5.** Ability to design various mini electronic projects **CO6.** Ability to use capacitive transducers.

10	**ACEE-16403**	**Electromagnetic fields**	**CO1.** An ability to apply knowledge of vector relations with help of solving numerical problems. **CO2.** An ability to identify, formulates the relations between divergence, curl & gradient and their interpolation in different integral theorems. **CO3.** An ability to analyze Electromagnetic Wave theory using wave propagation theory and develop them with help of Maxwell's equations for time varying fields
11	**ACEE - 16402**	**Linear Control Systems**	**CO1.** To introduce the fundamental concepts of control systems with emphasis on open loop and closed loop control system. **CO2.** Determining the transfer function of a control system using block diagram reduction technique and signal flow graph technique. **CO3.** To introduce the concept of analogies between different types of systems. **CO4.** Introduction to the transient and steady state response of 1^{st} and 2^{nd} order control systems. **CO5.** To demonstrate the use of root locus, bode plot and nyquist plot to determine the stability of a system which is very useful in designing of control system. **CO6.** Need of compensation in control system.
12	**ACEE-16401**	**Asynchronous Machines**	**CO1.** Understand the basis of induction machines mostly used in industry. **CO2.** Learn and analyze different types of fractional horse power motors. **CO3.** Identify equivalent circuit and parameters after testing. **CO4.** Comprehend and solve industry related problems in context of induction motors.
13	**ACEE-16404**	**Power System-I**	**CO1.** Students are exposed to the power supply system and for this a visit to nearby substation arranged. **CO2.** Students know the types of conductors and their relative merits and demerits. **CO3.** Students gain the knowledge of transmission line parameters and thereby the knowledge of design parameters for substation. **CO4.** Students apply the knowledge gained for their project work.
14	**ACEE-16404**	**Power Plant Engineering**	**CO1.** Understand several systems available for power generation along with their advances and disadvantages. **CO2.** Knowledge of non-conventional power plants. **CO3.** Understand Load division and tariff methods.

15	**ACEE-16408**	**Lab. Electrical Estimation & Costing**	**CO1.** The students are able to demonstrate the knowledge of Indian electricity rules. **CO2.** The students are able to draw single line diagram of an electrical installation. **CO3.** The students are able to estimate the cost of the various electrical fittings including lighting fixtures, fans, switches, wires, MCBs etc. required in an electrical installation. **CO4.** The students are able to make an estimate the cost of repair and maintenance of domestic appliances.
16	**ACEE-16406**	**Electrical Practice and Maintenance Lab**	**CO1.** Students gain knowledge regarding the application and extensive utility of various electrical appliances **CO2.** Students learn about the modern systems being used in domestic applications **CO3.** Students apply the knowledge in related lab experiments.
17	ACEE - 16407	Laboratory - II Control System	**CO1.** The students are aware of various types of control systems. **CO2.** Use of synchros as an error detector. **CO3.** To study the speed - torque characteristics of an AC servomotor and to explore its applications. **CO4.** Determination the transfer function of a control system using matlab. **CO5.** Finding the time and frequency response of a control system. **CO6.** Implementation and finding stability of control system using root loci, bode plot and nyquist plot in MATLAB
18	ACEE-16503	Digital Electronics and Microprocessor	**CO1.** To be well versed with number systems and binary code **CO2.** To undertand various logic gates along with knowl edge of Boolean minimization techniques **CO3.** To be able to design combinational circuits such as encoder, decoder, code converters, adder, subtractor, multiplex, DE multiplexer and parity generator. **CO4.** To be able to design sequential circuits such as shift registers, counters etc. using flip flops, clocked flip flop, SR, JK, D and T **CO5.** To have working knowledge of various types of di gital to analog converters. **CO6.** To understand the architecture 8085 along with various instructions required in programming **CO7.** To know about the architecture of 8086
19	**ACEE-16502**	**Electric Generation and Economics**	**CO1.** Focus on the resources that are available for electric power generation. **CO2.** Estimate load requirements using various factors and load curves. **CO3.** Explore their knowledge about existing tariff plans. **CO4.** Apply the knowledge gained in analysis of economic scheduling.

20	**ACEE-16501**	**Synchronous Machine**	**CO1.** Students gain knowledge regarding the application and extensive utility of alternators in power generation. **CO2.** Students learn about the modern excitation systems being used in alternators. **CO3.** Students apply the knowledge in related lab experiments
21	**ACEE-16507**	**Lab. Digital Electronics and Microprocessor**	**CO1.** Understand the Designing and verification of the truth tables of half/full : adder/subtractor **CO2.** Verify the truth table of the Multiplexer and De-Multiplexer **CO3.** Designing and testing of an S-R , J-K , D and T flip-flop using NOR/NAND gates. **CO4.** Designing of counter using Flip Flops/IC's. **CO5.** Study of 8085 Microprocessor Kit. **CO6.** Write the program for addition/subtration using 8085. **CO7.** Write the program for multiplication two 8 bit numbers using 8085.
22	**ACEE-16504**	**Power Electronics**	**CO1.** Understand the importance of power electronics and its applications **CO2.** Identify and resolve the problems using techniques **CO3.** Understand the operation, function and interaction between various components and subsystems **CO4.** Apply the knowledge gained for project work **CO5.** Understand, analyse, design, model and synthesize power converter based systems used for conversion of electric energy
23	**ACEE-16506**	**Lab-VII (Electrical Machine Lab)**	**CO1.** Students perform field testing in the industries. **CO2.** Students analyze the results and outcomes of the observations in the lab.
24	**ACEE-16607**	**Laboratory-XI (Power System-II Lab)**	**CO1.** The students are able to determine A,B,C,D parameters of transmission line. **CO2.** The students are able to apprehend various protective devices used in power system. **CO3.** The students are able to recognize the application of operating characteristics of various power system protective devices. **CO4.** The students are able to find the breakdown strength of transformer oil.

25	**ACEE - 16608A**	**Laboratory - III Microcontroller, PLC and Scada**	**CO1.** Develop programs in assembly level language. **CO2.** Analyze and do interfacing of microcontroller with peripherals and outside world. **CO3.** Apply the knowledge gained to develop microcontroller based practical projects. **CO4.** Develop arduino based practical projects. **CO5.** Design and develop various practical circuits using 8051 microcontroller and PLC's. **CO6.** Application of scada in the field of electrical engineering
26	**ACEE - 16604A**	Microcontroller, PLC and Scada	**CO1.** Understand the need and importance of microcontrollers and how they differ from microprocessor. **CO2.** Develop logic so that they are able to develop their programming skills and make assembly language programs. **CO3.** Interface external devices with 8051 microcontroller and able to analyze how they interact with each other. **CO4.** Introduction to arduino concepts. **CO5.** Understand PLC's and develop simple applications using ladder logic. **CO6.** Understanding of basics of scada.
27	**ACEE-16601**	**Electric Power Utilization**	**CO1.** Focus on the different types of traction systems available in India. **CO2.** Estimate about different illumination requirements and to provide that by different types of sources. **CO3.** Explore their knowledge about existing refrigeration and air conditioning systems. **CO4.** Apply the knowledge gained in analysis of different problems of speed-time curve.
28	**ACEE-16603**	**Non Linear & Digital Control System**	**CO1.** Focus on the study of different types of non-linearity and their effects on the system. **CO2.** Estimate stability of digital control system. **CO3.** Explore their knowledge for analysis and design of different types of digitally control system. **CO4.** Apply the knowledge gained in analysis of different types of non-linearity.

29	**ACEE-16602**	**Power System-II**	**CO1.** Students apply the knowledge while working in the industry, electrical utilities (erstwhile state electricity boards) for the protection of electrical equipments. **CO2.** With the knowledge of this subject, students are expected to perform well in the interviews of various manufacturing units. **CO3.** 3. Students apply the knowledge to install lightening arrestors in commercial, industrial and domestic fields.
30	ACEE-16605	Signal and System	**CO1.** Student will able to identify the continuous time and discrete time si gnals. · **CO2.** Student will able to analyze the CT and DT systems. **CO3.** Student will able to evaluate the Power Spectral Density and Energy spectral density of the signals. **CO4.** CO4 Student will able to study the Linear Time invariant Systems and the ir properties. **CO5.** CO5 Student will able to study Fourier Transform and DTFT. **CO6.** CO6 Student will able to study the convolution theorem
31	**ACEE-16606**	**S&S Lab**	**CO1.** Generate discrete and continuous step signals. **CO2.** Generate exponential and ramp signals in continuous and discrete domain. **CO3.** Addition and Subtraction of two signals **CO4.** To generate a random binary wave **CO5.** To develop program for discrete convolution and correlation **CO6.** To develop programs for various signal operations.
32	**ACEE-16702**	**High Voltage Engineering**	**CO1.** An ability to apply knowledge on the resources that are available for H.V. transmission. **CO2.** An ability to analyze losses due to corona in all weather conditions. **CO3.** An ability to elaborate the applications of insulating materials. **CO4.** To implement the knowledge gained in government sector and private organizations by working and designing transmission systems according to field requirement

33	**ACEE-16704A**	**HVDC Transmission**	**CO1.** Focus on the different types of available power electronics devices used for HVDC Transmission. **CO2.** Estimate and design different types of converter station for HVDC power Transmission. **CO3.** Explore their knowledge for analysis of different pulses converter station. **CO4.** Apply the knowledge gained in analysis of different semiconductor circuits.
34	**ACEE-16701**	**Power System Analysis**	**CO1.** Students gain the knowledge of structure of power system. **CO2.** Students are able to apply the knowledge gained for development of computer programs for the effective operation of power system. **CO3.** Students gain knowledge of Load flow, Short Circuit Study & Stability of Power System **CO4.** Students apply the knowledge gained for their project work & field work.
35	**ACEE-16703A**	**Non-Conventional Energy Sources**	**CO1.** Focus on the non-conventional resources that are available for electric power generation. **CO2.** Estimate and compare requirements for running of different types of non-conventional plants. **CO3.** Explore their knowledge about existing non-conventional plants in India. **CO4.** 4. Apply the knowledge gained in comparing of different types of conventional and non-conventional plants
36	**ACEE-16705**	**Lab-XIII (PSA Lab)**	**CO1.** The students use MATLAB for development of computer programs for Y-bus and Z-bus formation, load flow studies, economic operation of power plants. **CO2.** The students use SIMULINK for power system stability study. **CO3.** The Students demonstrate the ability of converting algorithms in MATLAB programs. **CO4.** The Students demonstrate the ability of relating theoretical concepts of power system analysis with actual power system operation.

Department: Civil Engineering

The Program Outcomes (POs) of B.Tech Civil Engineering are:

a. Graduates are expected to build up communication skills for sharing innovative ideas effectively.

b. Graduates are expected to be ethically responsible citizens.

c. Graduates are expected to put civil engineering knowledge in practical.

d. Graduates are expected to apply knowledge of science and mathematics in civil engineering problems.

e. Graduates will be able to function individually as well as member of multidisciplinary teams to solve engineering and multidisciplinary problems with leadership qualities.

f. Graduates will be able to create awareness on contemporary issues and impact of engineering solutions on society.

g. Graduates will be able to recognize the need for new engineering tools from experience and problems faced by civil engineers in the past.

h. Graduates will be able to provide the engineering solutions in effective and ingenious ways by making use of graphs and tables etc.

i. Graduates will be able to use modern engineering softwares, skills and computing tools required for solving various civil engineering problems.

j. Graduates will be able to analyse and design the structures as well as conduct experiments and interpret observations for reporting the results.

Program Specific Outcomes (PSO)

1. Understanding

Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.

2. Broadness and Diversity

Graduates will have a broad understanding of economic, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage

3. Self-Learning and Service

Graduates will be motivated for continuous self-learning in engineering practice and/or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	**ACCE-16301**	Strength of Materials	**CO1:** To determine the stresses, strains, and displacements in structures and their components due to the loads acting on them. **CO2:** Students are able to draw shear force and bending moment diagrams. **CO3:** To help students understand various fundamental issues of elasto-mechanics, i. e. the mechanics of solids, and deformable bodies. **CO4:** To analyse columns under various supporting conditions with the help of Euler theory. **CO5:** Students will be able to understand various theories regarding failure of any column or beam in building.
2	**ACCE-16302**	Fluid Mechanics	**CO1:** Students will be able to define the nature of a fluid. **CO2:** Students are expected to understand the concept of floating and submerged bodies. **CO3:** To introduce viscosity effects on flow and characteristics of Newtonian and non-Newtonian fluids. **CO4:** To help students in measuring the flow through various weirs and notches. **CO5:** To help students in understanding the pressure drag and lift produced around submerged bodies of various shapes
3	**ACCE-16303**	Survey-I	**CO1:** To learn principal of working from whole to part. **CO2:** To help students in deciding the position of any point, its reference relative to least two permanent objects or stations whose position have already been well defined. **CO3:** Students will be able to calculate various types of errors involved in measuring distance and angles between different stations on ground. **CO4:** To help students in understanding basic terminology used in surveying **CO5:** Students are expected to draw contour maps and find out reduced levels at various points on ground.
4	**ACCE-16304**	Environmental Engineering-I	**CO1:** To impart broad knowledge of ecology and the environment. **CO2:** Students will be able to emphasize on the Indian natural environment and major issues facing the world **CO3:** To assist in collecting water from various sources and supplying for domestic usage after proper treatment. **CO4:** Students will be able to know about various quality parameters required to determine the purity of water for drinking purpose. **CO5:** Students will be able to forecast the water demand in particular area for proper design of water distribution network.

5	**ACCE-16305**	Building Materials	**CO1:** To promote development, production, standardisation and large-scale application of cost- effective innovative building materials and construction technologies in housing and building sector. **CO2:** To promote new waste-based building materials and components through technical support and encouraging entrepreneurs to set up production units in urban and rural regions. **CO3:** To develop and promote methodologies and technologies for natural disaster mitigation & management and retrofitting. **CO4:** Students will be able to know various terminology used in case of different components of building **CO5:** To help students in selecting different materials used for construction based on type of load coming and climatic conditions.
6	**ACCE-16306**	Fluid Mechanics Lab	**CO1:** To determine discharge coefficient in case of flow over weirs and notches. **CO2:** To demonstrate losses in pressure of flow due to bends, sudden change in size of pipes in water distribution network. **CO3:** Students are expected to know the velocity distribution inside pipes.
7	**ACCE-16307**	Strength of Materials Lab	**CO1:** Students will be able to draw stress strain curves for various materials in tension and compression **CO2:** To demonstrate hardness, impact strength of various materials by different methods. **CO3:** Students are expected to test mild steel bars required to be used as building material.
8	**ACCE-16308**	Survey-I Lab	**CO1:** The students are able to understand the use of different surveying instruments and their use **CO2:** To help students in carrying out plane table surveying for drawing plan of particular region accurately. **CO3:** To demonstrate use of total station and its applications in traversing the fields/aerial photographs and stereoscopic analysis.
9	**ACCE-16401**	Survey-II	**CO1:** To learn principal of working from whole to part. **CO2:** To help students in deciding the position of any point, its reference relative to least two permanent objects or stations whose position have already been well defined. **CO3:** Students will be able to calculate various types of errors involved in measuring distance and angles between different stations on ground. **CO4:** To help students in understanding basic terminology used in surveying **CO5:** Students are expected to draw contour maps and find out reduced levels at various points on ground.
10	**ACCE-16402**	Structural Analysis-I	**CO1:** To apply basic knowledge of bending moment and shear force in analyzing various elements of buildings **CO2:** Students will be able to identify determinate, indeterminate, stable and unstable structures. **CO3:** To determine forces and deflections in determinate trusses, beams and frames. **CO4:** Students are expected to analyze various structures like cables and suspension bridges, dams and retaining walls. **CO5:** To help students in drawing influence line diagrams required for fast and accurate analysis of beams.
11	**ACCE-16403**	Design of Concrete	**CO1:** To learn the fundamentals of design, analysis, and proportioning of reinforced concrete members and structures.

		Structures-I	**CO2:** Students will be able to design various members of buildings like columns, beams, slabs etc. **CO3:** Students will be able to apply various methods for analysis and design of these elements under flexure, shear, and axial loads. **CO4:** To understand various properties of different ingredients used for manufacturing concrete. **CO5:** Students will be able to mix different ingredients in proper ratio as defined by Indian Standards for getting proper strength of concrete prior to usage in construction to take up loads safely.
12	**ACCE-16404**	Building Construction	**CO1:** Students are able to understand the property , use , advantage and disadvantage of different material used in construction **CO2:** Students are able to understand the component of building with their function **CO3:** Students are able to understand construction procedure of different components
13	**ACCE-16405**	Building Construction Drawing	**CO1:** After completion of this students will able to understand basic principles of building design and planning. **CO2:** They will explore building drawing as a way of discovering and developing ideas for designing residential, commercial and public buildings. **CO3:** The student develops basic drawing skills; create multilayer architectural and working drawing drawings.
14	**ACCE-16406**	Concrete Technology Lab	**CO1:** To calculate various properties of cement like setting time, specific gravity etc required for smooth working of construction projects. **CO2:** Students will be able to perform various tests on concrete that is most important material in construction. **CO3:** Students will be able to design concrete mix according to prescribed Indian standards for taking different types of loading safely.
15	**ACCE-16407**	Survey-II Lab	**CO1:** Students are expected to measure distance and angles between various stations on ground by theodolite, chain and tape **CO2:** Students are able to calculate compute the area and earthwork for different works by using surveying instruments **CO3:** Students are expected to draw contour maps and find out reduced levels at various points on ground.
16	**ACCE-16501**	Structural Analysis-II	**CO1:** Students will be able to identify determinate, indeterminate, stable and unstable structures. **CO2:** To help students in determining forces in indeterminate trusses, beams and frames by the force method. **CO3:** Students will be able to understand various methods for analyzing indeterminate structures and selecting suitable method. **CO4:** To help students in drawing influence line diagrams required for fast and accurate analysis of beams.
17	**ACCE-16502**	Design of Concrete Structures-II	**CO1:** To learn the fundamentals of design, analysis, and proportioning of reinforced concrete members and structures. **CO2:** Students will be able to design various members of buildings like footings, retaining walls, slender columns, slabs etc.

			CO3: Students will be able to apply various methods for analysis and design of these elements under flexure, shear, and axial loads. **CO4:** To understand various properties of different ingredients used for manufacturing concrete. **CO5:** Students will be able to mix different ingredients in proper ratio as defined by Indian Standards for getting proper strength of concrete prior to usage in construction to take up loads safely.
18	**ACCE-16503**	Transportation Engineering-I	**CO1:** To introduce students to transportation engineering principles for streets and highways with emphasis on the safe and efficient operation of roadways. **CO2:** Students will be able to understand the basic elements of the transportation delivery system **CO3:** To make students learn both quantitative and computerized techniques for planning, designing, and operating transportation systems. **CO4:** To impart knowledge of different materials required in construction of roads regarding their properties and usage. **CO5:** Students will be able to design horizontal and vertical curves on roads for efficient and safe working of highways.
19	**ACCE-16504**	Professional Practices	**CO1:** To impart knowledge regarding cost analysis of building by various methods. **CO2:** Students will be able to maintain measurement books required for smooth and efficient working of civil engineering projects. **CO3:** Students will have in-depth knowledge regarding tenders, various acts and legal formalities required in any civil engineering project. **CO4:** Students will be able to calculate exact current rates of earthwork, concrete work, plastering etc. for proper evaluation of building. **CO5:** Students will get to know about proper hierarchy of accounts division to help clients with correct information in future.
20	**ACCE-16505**	Irrigation Engineering-I	**CO1:** To introduce importance and necessity of irrigation for welfare of society. **CO2:** Students will be imparted knowledge regarding various terms in irrigation engineering for effective working **CO3:** To help students for investigating and preparing various irrigation projects to be cost effective. **CO4:** Students will learn about various methods for irrigating fields. **CO5:** Students will be able to gain knowledge how to divert the rivers to control floods and use water in most effective manner.
21	**ACCE-16506**	CADD Lab-I	**CO1:** To allow the use of software for the preparation of drawings for different engineering works and their design.
22	**ACCE-16507**	Transportation Engineering Lab	**CO1:** To carry out various tests on aggregates for checking their various properties like impact strength, crushing strength etc. **CO2:** Students will be demonstrated about various tests of bitumen for checking their properties required to be used in road construction. **CO3:** Various field tests are conducted for checking the deflections on road pavements due to heavy vehicular traffic coming on it.
23	**ACCE-16508**	Structural Analysis Lab	**CO1:** To demonstrate the working of two-hinged and three-hinged arch under varying loads. **CO2:** Students will be able to calculate deflections in various

			members of building under various loading and supporting conditions. **CO3:** To determine behavior of columns and struts under different end conditions.
24	**ACCE-16601**	Design of Steel Structures-I	**CO1:** To determine behaviour of columns and struts under different end conditions. **CO2:** Define and contrast the material properties of steel **CO3:** Determine the ultimate tensile capacity of steel members considering both yielding and tensile fracture **CO4:** Determine the ultimate bending moment capacity of steel members considering both yielding and lateral buckling.
25	**ACCE-16602**	Soil Mechanics & Foundation Engineering	**CO1:** To build on the knowledge and understanding of soil behavior, pertaining to different types of foundations. **CO2:** To introduce students to detailed design issues related to both deep and shallow foundations. **CO3:** Students will be able to understand the role of modern soil mechanics and numerical modeling. **CO4:** To help in the design of machine foundations, and deep and shallow foundations. **CO5:** To provide safety to people by designing effective footings for various domestic and commercial buildings
26	**ACCE-16603**	Transportation Engineering-II	**CO1:** To impart knowledge regarding Indian Railway System, history and its hierarchy. **CO2:** Students will be able to design railway track like super elevation , horizontal curves for safe working of Railway System **CO3:** Students will be able to select site for making stations keeping in view economic and environment factors. **CO4:** Students will be introduced to basics of airport engineering and terminology used at airports **CO5:** To make students aware of latest technology and modifications in existing components in railway and airport engineering respectively.
27	**ACCE-16604**	Hydrology	**CO1:** Student will know the different terminologies related with hydrology . **CO2:** Students will analyze hydrological parameters required for water resource management. **CO3:** Student will assess ground water potential . **CO4:** Students will identify suitable method of irrigation and drainage of waterlogged area .
28	**ACCE-16605**	Environmental Engineering-II	**CO1:** Students will be able to know about the importance of sewerage system and its necessity in keeping our surroundings clean. **CO2:** Students will be able to design effective sewerage system that will help in providing required service to society. **CO3:** To help students in knowing different properties of sewage so that accordingly different treatment can be provided. **CO4:** Students will be able to design various units required in Wastewater Treatment Plant. **CO5:** Students will be able to choose proper system of plumbing depending on quantity and quality of wastewater for constructing cost-effective house drainage.
29	**ACCE-16606**	Geotechnical Engineering Lab	**CO1:** To provide ability of determining different soil properties and classification of soil. **CO2:** Students will be able to determine seepage through soil by different methods. **CO3:** To carry out grain size analysis of fine particles for choosing proper size of grains in different projects like retaining

			walls, foundations, roads etc.
30	**ACCE-16607**	Environmental Engineering Lab	**CO1:** To help students in calculating content of various elements present in water sample so as to apply proper treatment. **CO2:** Students will be demonstrated about various physical properties of water so that they can affirm just by visualizing whether it is suitable for drinking or not.
31	**ACCE-16608**	Computer Applications Lab	**CO1:** To allow the use of software for the preparation of drawings for different engineering works and their design.
32	**ACCE-16801**	Design of Steel Structures-II	**CO1:** Analyze indeterminate frames and trusses using approximate methods of analysis **CO2:** Define and contrast the material properties of steel **CO3:** Determine the ultimate tensile capacity of steel members considering both yielding and tensile fracture for designing safe structures **CO4:** Students will be able to design steel members by determining the ultimate bending moment capacity of steel members considering both yielding and lateral buckling. **CO5:** Students will be able to use Indian Standard codes effectively so that steel structures are designed as per Indian Standards for their long life.
33	**ACCE-16802**	Irrigation Engineering-II	**CO1:** To introduce importance and necessity of irrigation for welfare of society. **CO2:** Students will be imparted knowledge regarding various theories of seepage so as to construct canals that will be safe even during flood kind situation. **CO3:** To help students for investigating and preparing various irrigation projects to be cost effective. **CO4:** Students will learn about various methods for irrigating fields. **CO5:** Students will be able to design different kinds of weirs for effective and continuous flow in canals so as to provide continue supply of water in fields.
34	**ACCE-16814**	Disaster Management	**CO1:** Students will be able to know about different kinds of hazards that can occur and thus can design any structure to withstand that hazard. **CO2:** Students will learn about Emergency Management System to carry out any emergency operation in case of any mishappening. **CO3:** To give information to students regarding any disaster that has happened in the past so that new structures should be designed accordingly to withstand those disasters. **CO4:** Students will be able to learn about various agencies in India like NDMA, SDMA etc. and various new techniques like remote sensing, GIS for early warning system.
35	**ACCE-16812**	Bridge Engineering	**CO1:** Students will be able to know about various investigations that are required to select suitable site which is technically and economically feasible. **CO2:** Students will get to learn about various standard specifications provided by Indian Road Congress for road bridges. **CO3:** Students will learn to design and construct Concrete and Steel bridges along with various components of bridges. **CO4:** Students will learn about various bearings and appurtenances for safety such that constructed bridges can safely transfer the load to the sub-structure. **CO5:** Students will gain the knowledge regarding inspection

			and maintenance of bridges that will help in increasing the durability of structures.
36	**ACCE-16803**	CADD Lab	**CO1:** To allow the use of software for the preparation of drawings for different engineering works and their design.
37	**ACCE-16804**	Irrigation Engineering Drawing	**CO1:**Students will learn to design various structures related to Irrigation Engineering

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12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department: Applied Sciences

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	ACAM-101	Engg. Mathematics-I	**CO1:** To understand the basic difference between differentiation and partial differentiation. **CO2:** Analyze real world scenarios to recognize when partial derivatives or multiple integrals of multivariate and vector valued functions are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results. **CO3:** Recognize partial derivative and multiple integral concepts that are encountered in the real world, understand and be able to communicate the underlying mathematics involved to help another person gain insight into the situation. **CO4:** To Evaluate partial derivatives and can implement to estimate maxima and minima of multivariable function. **CO5:** To understand the applications of partial differentiation. **CO6:** Apply partial derivative equation techniques to predict the behavior of certain phenomena. **CO7:** To set up and evaluate multiple integrals for regions in the plane. To find Area of the region bounded by curves and to find volume, surface area **CO8:** Establish the relationship between position functions, velocity functions, acceleration functions, and speed functions. **CO9:** Demonstrate various real world scenarios using concepts of Vectors. **CO10:** To find maxima and minima, critical points and inflection points of functions and to determine the concavity of curves **CO11:** To introduce how to use vectors in real world. Vector calculus motivates the study of vector differentiation and integration in two and three dimensional spaces. It is widely accepted as a prerequisite in various fields of science and engineering. **CO12:** Partial differential equations help the students of mechanical engineering to solve the problems based on heat flow and Fluid mechanics.
2	ACHU-101	Communicative English - I	**CO1:** It will help the students to develop their creativity in expressing their thoughts

			CO2: The students will be able to reproduce their understanding of concepts/ principles of Communicative English **CO3:** The students will be able to think accurately, clearly and deeply to perform well in all communicative contexts **CO4:** It will bring about a real understanding in the students of the need to use English in their everyday life **CO5:** The students would be able to organize the material and present in a concrete and interesting manner before the audience **CO6:** Will Become independent users of English Language **CO7:** Show awareness of appropriate format and the capacity of explaining the views in a rational manner **CO8:** Converse fluently, without strain with international speakers of English in an accent and lexis that is widely understood across the globe
3	**ACCH-101**	**Engg. Chemistry**	**CO1:** Analyse the need, design and perform a set of experiments. **CO2:** Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life. **CO3:** Understand the causes of corrosion, its consequences and methods to minimize Corrosion to improve industrial designs **CO4:** Explain the properties, separation techniques of natural gas and crude oil along with potential applications and role of petrochemicals in national economy. **CO5:** Acquire Basic knowledge of Nano chemistry to appreciate its applications in the field of Medicine, data storage devices and electronics. **CO6:** Equipped with basic knowledge of polymer reinforced composites, applications of semiconductor photochemistry in energy harnessing and optical sensors. **CO7:** To acquire knowledge about desalination of brackish water and treatment of municipal water.

4	**ACHV-101**	**Human Values & Professional Ethics**	**CO1:** The students will understand the need and process for value education **CO2:** The students will be able to differentiate between values and skill and further they will learn the complementarily of values and skills **CO3:** The students will understand the difference between the needs of self and body and how to create harmony of self with body **CO4:** The students will understand the different values which are required in the family, difference between respect and attention **CO5:** The students will understand the harmony nature, interconnectedness and the mutual fulfillment in nature, develop holistic perspective towards life and profession as well as towards happiness and prosperity **CO6:** The students will understand natural acceptance of human values, competence in professional ethics **CO7:** The students will learn to know the meaning of coexistence and their participation in this universe.
5	**ACPH-101**	**Engg. Physics**	**CO1:** Understand components of a laser system, various types of lasers and their applications. **CO2:** Understand the applications of fiber optics in daily life. **CO3:** Understand the various Types of Polarization **CO4:** Understand equations of Electromagnetic Waves and Electromagnetic Spectrum. **CO5:** Understand the concept of X-rays. **CO6:** Differentiate Dia, Para and Ferromagnetic materials. **CO7:** Understand the applications of Superconductors and ultrasonic waves. **CO8:** Understand de Broglie concept, significance and normalization of wave function, Schrodinger wave equation. **CO9:** Basics of Nano-technology. **CO10:** Explanation of the properties of nano materials, synthesis of nano materials and CNTs.
6	**ACEE-101**	**Basic Electrical and Electronics Engg**	**CO1:** To understand the basic concepts of AC and DC **CO2:** To understand the basic principles of magnetic fields,

			transformers and machines. **CO3:** To understand the concept of various electronic devices. **CO4:** To understand the concept of digital electronics.
7	**ACFC-101**	**Fundamentals of Computer Application & Information Technology**	**CO1:** To provide knowledge about the hardware, software and basic computer organization **CO2:** To provide students basic ideas of programming language in C **CO3:** To make students understand problem solving and planning program **CO4:** To make the students understand the concept of file handling **CO5:** To make the students understand the use of IT enabled services
8	**ACAM-102**	**Engg. Mathematics-II**	**CO1:** Determine whether or not real series are convergent by comparison with standard series or using the ratio test. **CO2:** Solve a homogeneous linear system by the eigenvalue method. **CO3:** To understand the formation of Differential equation from the given physical problems and to solve first order ordinary differential equation by various methods. **CO4:** To be able to apply the knowledge of first order ordinary differential equation in different engineering applications. **CO5:** To Perform matrix operations. Solve the matrix equation using elementary matrix operations. To use systems of linear equations and matrix equations to determine linear dependency or independency. To find the Eigen values and corresponding eigenvectors for a linear transformation. **CO6:** To understand how quadratic equations lead to complex numbers. To write complex numbers in polar form, compute exponential and integrals powers of complex numbers. To apply De-Moivre's theorem to determine roots of polynomial and can express hyperbolic, inverse hyperbolic functions. **CO7:** To understand the convergence and divergence of infinite series.
9	**ACHU-102**	**Communicative English - II**	**CO1:** Know the process of beginning and growth of English language through comprehension passages based on Technology, Medical Sciences, Politics, Economics **CO2:** Know about various innovative ways of using English language in verbal and non-verbal communications **CO3:** Write clearly, effectively and creatively and adjust writing style appropriately to the content, the context and nature of the subject. **CO4:** Understand the relation between language and literature. **CO5:** Know about grammar and its application in different contexts

Department: Agriculture

The Program Outcomes (POs) of B.Sc Agriculture (Hons.) are:

a. To provide the sound knowledge in the Agriculture and allied science subjects required to solve common problems in management of crop cultivation, improvement, livestock rearing and their marketing

b. To develop a good teaching-learning environment for higher studies and help in selection of professional careers in government and private organization, agro- based industries, educational/ research/extension, institutes etc

c. To develop the skills for leadership, ethical integrity, and professional engagement in agriculture and allied science

d. To provide adequate information about natural and other resources through a course curriculum for the betterment of life.

e. To produce highly skilled professionals in field of various branches of agriculture to meet the need of various scientific agriculture institutions as well as farmers demand for agriculture professional.

f. Understand the basic knowledge of agriculture and related subjects in the current scenario of Indian and world Agriculture.

g. Develop an understanding of communication methods, resources utilization, cultivation of crops, management of crops, and value addition of agricultural produces.

h. Develop the skills to manage agricultural farms, enhance quality of farm- produces and their commercial utilization.

i. Demonstrate the methods used in collection, presentation of data and analysis of results of experiments in laboratories and fields and their validation.

j. Understand all related methods in agriculture to increase the profit from crop fields and livestock

k. Learn to make optimum decision at various levels that enhances the success as an agricultural enterprise.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	**BSAG-201-19**	**Fundamentals of Genetics**	**CO1:** Acquaint with concepts, scope, and importance of genetics in the **CO2:** Develop the understanding of Mendelian principles and their significance in heredity and inheritance of Qualitative & Quantitative traits **CO3:** To interpret the process and purpose of cell division, linkage,crossing over, gene interaction, sex determination, and blood group genetics
2	**BSAG-202-19**	**Agricultural Microbiology**	**CO1:** Acquaint with concepts, scope, and importance of Agricultural Microbiology **CO2:** Acquaint with basic terms of microorganisms, prokaryotic and eukaryotic microbes, microbial growth, pure culture, microbial association, soil fertility, symbiotic, associative and asymbiotic of microbes, bio-fertilizers, biopesticides, bio-degradation, **CO3**: Develop the understanding of the role of microbes in soil fertility **CO4:** Develop the skills in utilization of various methods, equipment,
3	**BSAG-203-19**	**Soil and Water Conservation Engineering**	**CO1:**Acquaint with concepts, scope, and importance of field of Soil and Water Conservation Engineering **CO2:** To know about different practices of controlling soil erosion. **CO3:** Crop production and human welfare. **CO4:** Laboratory tools, glassware, etc. for isolation, identification, preservation.
4	**BSAG-204-19**	**Fundamentals of Crop Physiology**	**CO1:** To make students familiar with all the life processes of plant **CO2:** To investigate the processes responsible for the primary productivity of crop communities **CO3:** To investigate how the products of various processes are converted to economic yield **CO4:** Classification and utilization of useful microbes. **CO5:** Significance in heredity and inheritance of Qualitative & Quantitative traits
5	**BSAG-205-19**	**Fundamentals of Agricultural Economics**	**CO1:** Agricultural economics examines how a farmer chooses various enterprises e.g., production of crops or rising of cattle and how he chooses various activities in the same enterprise. E.g., which crop to grow and which crop to drop; how the costs are to be minimized; what combination of inputs for an activity are to be selected. **CO2:** To study how development of agriculture helps the development of the other sectors of the economy; how can labour and capital flow into the non-agricultural sectors; how agricultural development initiates and sustains the development of other sectors of the economy. **CO3:** To cover all -what to produce, how to produce, how

			much to produce, what to sell, where to sell and at what price to sell; what to distribute, among whom to distribute and on what basis to distribute; and what to consume and how much to consume. **CO4:** To examines the principles (a) regarding the out flow of scare resources to other sectors of the economy and (b) about the flow of these resources from other sectors into the agricultural sector itself. **CO5:** problems of agricultural growth and the problems like those concerning tenurial systems and tenurial arrangements, research and extension services
6	**BSAG-206-19**	**Fundamentals of Plant Pathology**	**CO1:** Students learn about how a disease develop in the host plant and how disease affects the plant mechanisms **CO2:** To know about various causes of the disease **CO3:** To study about different causal organisms, their morphological characteristics and disease cycle caused by them. **CO4:** To understand the controlling the disease via Integrated Plant Disease Management by using different methods. **CO5:** To understand the nature, chemical composition, classification, mode of actiona nd formulations of Fungicides and antibiotics.
7	**BSAG-207-19**	**Fundamentals of Entomology**	**CO1:**To learn about the animal kingdom and type of reproduction in insect **CO2:** Classification of phylum Arthropoda upto classes **CO3**: Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors **CO4:** Systematics: Taxonomy and its importance, history and development and binomial nomenclature. **CO5:** Classification of class Insecta upto Orders, basic groups
8	**BSAG-208-19**	**Fundamentals of Agricultural Extension Education**	**CO1:**overall development of rural people **CO2:** To bring the scientific closer to the farmer **CO3:** To bring about desirable changes in the human behavior which includes change in knowledge, skill and attitude **CO4:** To dissemination of useful and practical information relating to agriculture including improved seeds, fertilizers, **CO5:** To provide appropriate solution to the fare mere
9	**BSAG-209-19**	**Communication Skills and Personality Development**	**CO1:** The students acquire the significance of proficiency, both in spoken (oral)and written language. **CO2:** The student learn the ways to develop comprehension skills, improved vocabulary, significant use of grammar, acquired understanding on writing skills, corresponded with others and enhanced skills in spoken English. Acquainted knowledge in the field of agriculture and its allied branches by incorporation of Comprehension & Communication Skills in English. **CO3:** Develop the understanding on the significance of communication and compared different types of communication with their use. **CO4:** Develop the skills in different categories of writing styles, their implications in various areas,

			formats to be followed under these styles of writing and their significance
10	**BSAG-210-19**	**Fundamentals of Genetics (Practical)**	**CO1:** Acquaint with concepts, scope, and importance of genetics in the field of agriculture **CO2:** Develop the understanding of Mendelian principles and their significance in heredity and inheritance of Qualitative & Quantitative traits **CO3:** To interpret the process and purpose of cell division, linkage, crossing over, gene interaction, sex determination, and blood group genetics **CO4:** To analyze the possible genotypes that could occur in an offspring, according to the genotype of the two parents with help of Probability and Chi-square test
11	**BSAG-211-19**	**Agricultural Microbiology (Practical)**	**CO1:** Acquaint with basic terms of microorganisms, prokaryotic and eukaryotic microbes, microbial growth, pure culture, microbial association, soil fertility, symbiotic, associative and asymbiotic of microbes, bio-fertilizers, bio pesticides, bio-degradation, etc. **CO2:** Develop the understanding of the role of microbes in soil fertility, crop production and human welfare. **CO3:** Develop the skills in utilization of various methods, equipment, laboratory tools, glassware, etc. for isolation, identification, preservation, classification and utilization of useful microbes. **CO4:** Develop the ability to differentiate useful, virulent and non-useful microbes.
12	**BSAG-212-19**	**Soil and Water Conservation Engineering (Practical)**	**CO1:**To identify erosion problems and conservation of land and water resources under different land use system **CO2:** students are able to know about Erosion Index method and its calculation procedure **CO3:** To study the estimation and measurement of soil loss equation. **CO4:** Students learn about the preparation of contour maps and designing of grassed water ways and contour bunds and graded bunds. **CO5:** Students know about various problems of wind erosion and able to learn its control measures.
13	**BSAG-213-19**	**Fundamentals of Crop Physiology (Practical)**	**CO1:** Impart the knowledge of physiological phenomenon in plant cells, absorption of water, transpiration, diffusion, osmosis, imbibitions, mineral nutrition of plants, plant growth and regulators, etc. **CO2:** Develop the understanding of mechanisms of various metabolic processes in plants - Photosynthesis, respiration, fat metabolism, plant growth, nutrient absorption, etc **CO3:** Develop the skills in preparation of temporary slides for morphological studying plant cells, measurement of distribution of stomata, estimation of potential of imbibitions, osmosis, plasmolysis, determination of rate of transpiration, root pressure, separation of photosynthetic pigments, estimation of relative water content, measurement of photosynthetic CO2 assimilation, etc. Determination of rate of transpiration, root pressure, separation of photosynthetic pigments, estimation of relative water content,

			measurement of photosynthetic CO2 assimilation, etc. **CO4:** Develop an ability to identify C3, C4 and CAM plants, analyze the physical and chemical factors regulate plant growth, evaluate visual symptoms of nutrients deficiency in plants, etc.
14	**BSAG-214-19**	**Fundamentals of Plant Pathology (Practical)**	**CO1:** Students able to get the knowledge about various laboratory equipments and their working procedures. **CO2:** Students learn practically about the identification of major plant pathogens such as bacteria, fungi, nematodes **CO3:** To know about the Koch's postulates and study the procedure of preparation of media used in development of pathogens. **CO4:** To learn the different morphological characteristics and transmission of plant pathogens. **CO5:** To know about the sampling and extraction procedure of nematodes from soil and plant material.
15	**BSAG-215-19**	**Fundamentals of Entomology (Practical)**	**CO1:** Methods of collection and preservation of insects including immature stages **CO2:** Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus **CO3:** Types of insect larvae and pupae; Dissection of digestive system in insects **CO4:** Dissection of male and female reproductive systems in insects **CO5:** Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Hymenoptera, Diptera and their families of agricultural importance.
16	**BSAG-216-19**	**Fundamentals of Agricultural Extension Education (Practical)**	**CO1:** Acquaint the knowledge on concept, objectives, principles and philosophy of extension management **CO2:** Develop an understanding on the process, steps, principles and monitoring and evaluation involved in agricultural extension programme development for transfer of technology. **CO3:** Develop the skills about genesis of agricultural extension, extension efforts in pre- and post independence era along with specific agricultural programmes **CO4:** Apply new trends in agricultural extension like private extension, market led extension, expert systems, farmer led extension and cyber extension **CO5:** Evaluate different facets of rural development programmes, community development programmes, rural leadership for capacity development of extension clienteles.
17	**BSAG-217-19**	**Communication Skills and Personality Development (Practical)**	**CO1:** The students acquire the significance of proficiency, both in spoken (oral)and written language. **CO2:** The student learn the ways to develop comprehension skills, improved vocabulary, significant use of grammar, acquired understanding on writing skills, corresponded with others and enhanced skills in spoken English. Acquainted knowledge in the field of agriculture and its allied branches by incorporation of Comprehension & Communication Skills in English. **CO3:** Develop the understanding on the significance of communication and compared different types of communication with their use.

			CO4: Develop the skills in different categories of writing styles, their implications in various areas, formats to be followed under these styles of writing and their significance
18	**BSAG-401-19**	**Crop Production Technology –II (Rabi Crops)**	**CO1:** To learn about the geographic and origin of rabi cerals **CO2**: To learn about the economic importance of rabi fodder crops **CO3:** To know about the importance of medicinal and aromatic plant **CO4**: To understand the cultural practice of oilseed crops **CO5:** Explain the importance of pulses and its cultivation
19	**BSAG-402-19**	**Production Technology for Ornamental Crops, MAP and Landscaping**	**CO1:** Define concepts of ornamental crop production, medicinal and aromatic plants and landscaping, Importance of medicinal and aromatic plants in national economy, etc **CO2:** Discuss various principles of landscaping, uses of landscape trees, shrubs and climbers, production technology of important ornamental crops, etc. **CO3:** Demonstrate various Package of practices for loose flowers and their transportation, storage house and required condition for cut and loose flower, etc **CO4:** Investigate the various problems with the production technology of medicinal and aromatic plants, etc.
20	**BSAG-403-19**	**Renewable Energy and Green Technology**	**CO1:** To learn the present energy scenario and need for energy conservation **CO2:** Explain the concept of various forms of energy **CO3:** Analyse the environmental aspects of renewable energy sources **CO4:** Outline division aspects and utilisation of renewable energy for both domestic and industrial applications **CO5:** To understand the concept of biomass energy sources and their classification, types of biogas plants.
21	**BSAG-404-19**	**Problematic Soils and their Management**	**CO1:** study of soil structure **CO2:** study of geographical soil problems **CO3:** learning reclamation of soil **CO4:** learning growing specific plants in problemaic soil **CO5:** study of remoting sensing based finding of soil problem's
22	**BSAG-405-19**	**Production Technology for Fruit and Plantation Crop**	**CO1:** To know abiut the importance of plantation crops **CO2:** Processing and post management of fruit crop **CO3:** To learn about the areal distribution of fruit crops across India **CO4:** To make the students familiar with various aspects related to fruit crops and plantation crops **CO5:** To learn about the plant development from various technique
23	**BSAG-406-19**	**Principles of Seed Technology**	**CO1:** To make students familiar with various aspects related to Seed like Sees quality, certification, genetic purity etc. **CO2:** It aims to improve the genetic and physical characteristics of seed **CO3:** It act as a carrier for new technologies **CO4:** To provide secure crop yield in less favorable area

			production **CO5:** It aims at rapid rehabilitation of Agriculture in case of natural disaster
24	**BSAG-407-19**	**Farming System & Sustainable Agriculture**	**CO1:** To know the combination of one or more enterprises with cropping **CO2:** To understand farm INPUTS, PROCESSES and OUTPUTS**.** **CO3:** To know other activities such as dairying, poultry, sericulture, apiculture, fisheries etc. assume critical importance in supplementing their farm income. **CO4:** Time concept relates to increasing crop intensification in situation where there is no constraint for inputs. **CO5:** To ensure optional optional utilization utilization and conservation conservation of available available resources and effective recycling of farm residues within system**.**
25	**BSAG-408-19**	**Agricultural Marketing Trade & Prices**	**CO1:** To widen the producty range **CO2:** Increase in productivity of economy **CO3:** To help in planning for sucessful operations leading to better quality of products and customer satisfaction **CO4:** To bring in good marketing practices which helps to cope up with environmental changes **CO5:** To help farmers sell their produce at favourable time, place and price
26	**BSAG-409-19**	**Introductory Agro-meteorology & Climate Change**	**CO1:** To learn about structure and components of atmosphere **CO2:** To introduce the agrometeorology and some general terms used in agrometeorology like weather, climate, precipitation, solar radiation, humidity etc**.** **CO3:** To get vast knowledge about the atmospheric pressure, wind, solar ratdiation, temperature **CO4:** Students able to learn about the atmospheric humidity, its types; precipitation and monsoon **CO5:** Students get to know about the different weather hazards and also know how weather forecasting be done. They also learn about the climate change and its causes,
27	**BSAG-410-19**	**Crop Production Technology –II (Rabi Crops) (Practical)**	**CO1:** To study about the various method of sowing and plantiing **CO2:** To study about the yeild countibuting characters in fruit crops **CO3:** Study of rabi forage experiments, oil extraction of medicinal crops **CO4:** Quality improving methods in fodder for better outcomes **CO5:** Improving the agronomic practice in plantation crops
28	**BSAG-411-19**	**Production Technology for Ornamental Crops, MAP and Landscaping (Practical)**	**CO1:** To know importance of Ornamental crops, Medicinal and aromatic crops**.** **CO2:** Understand the scientific cultivation methods of Medicinal crops. **CO3**: To know more about origin, area, climate, soil, improved varieties and cultivation practices such as time and methods of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed

			management, harvesting and yield. **CO4:** To study the crops like aromatic crops like lemongrass, rose geranium, palmarosa, ocimum and vetiver**.** **CO5:** Know about landscaping and its feature**s.**
29	**BSAG-412-19**	**Renewable Energy and Green Technology (Practical)**	**CO1:** Familiarization with renewable energy gadgets and solar energy gadgets. **CO2:** To study biogas plants, gasifiers. **CO3**: To study the production process of biodiesel **CO4:** To study the production process of bio-fuels**..** **CO5:** To study solar cooker
30	**BSAG-413-19**	**Production Technology for Fruit and Plantation Crops (Practical)**	**CO1:** To study the various method of plant propagation **CO2:** To study about the physical disorder of fruit crops **CO3:** To study the seed development method by minimal inputs **CO4:** Crop improvement by various Agronomy methods **CO5:** Maintain the flowering in plantion crops for better yield and outputs
31	**BSAG-414-19**	**Principles of Seed Technology (Practical)**	**CO1:** Study of soil structure **CO2:** Study of geographical soil problem**s** **CO3:** learning reclamation of soil **CO4:** learning growing specific plants in problemaic soil **CO5:** Study of remoting sensing based finding of soil problem's
32	**BSAG-415-19**	**Agricultural Marketing Trade & Prices (Practical)**	**CO1:**To study the demand & suplly of agriculture products **CO2:** to study the relationship between market arrivals & prices of some selected commodities **CO3:** To compute the marketable and marketed surplus of imported commodities **CO4:** To study the various market functions perform by different agencies **CO5:** To measure the changes in the value of the money
33	**BSAG-416-19**	**Introductory Agro-meteorology & Climate Change (Practical)**	**CO1:** Visit to agrometeorological observatory at nearby location to know about the site selection and working of different **CO2:** To study about the solar radiation. **CO3:** To learn about air and soil temperature and the working of different thermometers for weather data recording **CO4:** To estimate vapour pressure, relative humidity, atmospheric pressure and its analysis. **CO5:** To measure the wind speed, wind direction,
34	**BSAG-417-19**	**Protected Cultivation**	**CO1:** To introduce the agrometeorology and some general terms used in agrometeorology like weather, climate, precipitation, solar radiation, humidity etc. **CO2:** To impart knowledge on agro-technique and management of different horticultural crops under protected environmental conditions**.** **CO3:** To know about different green house structures, their design and the material used for making them. **CO4:** Students will able to know about the greenhouse cultivation of horticultural crops, medicinal and aromatic plant**s** **CO5:** Students also learn about the insect pest and disease management for protected cultivation.

35	**BSAG-418-19**	**Protected Cultivation (Practical)**	**CO1:** Techniques of using protrays in quality planting material production. **CO2:** bed preparation methods **CO3:** inter-cultural operations under protected cultivation **CO4:** raising of seedlings and saplings under protected cultivation **CO5:** methods of regulating irrigation and fertilizers through drip and misting.
36	**BSAG-601**	**Crop Residue Management**	**CO1:** Significance of crop residue management **CO2:** On-site and off site rresiduue management **CO3:** To stuy about the beneficial effect of crop residue on soil health **CO4:** How crop residue improve the soil fertility **CO5:** Recent technology for agriculture conservation
37	**BSAG-602**	**Diseases of Horticultural Crops and their Management**	**CO1:** To learn about the economic importance and casual organism of pathogen **CO2:** To study about the disease of fruit crops and disease cycle **CO3:** To study about the disease of vegetable crops and disease cycle **CO4:** To study about the disease of flower crops and disease cycle **CO5:** Study about the epidemiology of disease causing orgaism
38	**BSAG-603**	**Flower Cultivation and Landscape Gradening**	**CO1**: floriculturist graduates can start their career in this profession after completing their degree programmes. **CO2:** Aspirants can apply in the floral industry in the various designations like floral designers, production managers, and sales representatives all work for florists, garden centers and nurseries in the design, production, and sales of flowers. **CO3:** To study the cultivation of plants that produce beautiful flowers, like rose, jasmine, chrysanthemum, gladiolus. Along with their marketing. **CO4:** To know about landscaping and garden planning. **CO5:** Besides beauty and aesthetic values of flowers, we came to know about their economic value as sale of flowers (loose as well as cut blooms), extraction of essential oils and making of economic products like gulkand.
39	**BSAG-604**	**Breeding of Field and Horticultural Crops**	**CO1:** to Skill the students about Breeding aspects, Selection Criteria. All the activities that strengthen the knowledge of students to produce a high yoelding variety **CO2:** It involves the purposeful manipulation of Plant species in order to create desired genotypes and phenotypes for specific purposes **CO3:** It ensures food security through the development of crop suitable for particular environment **CO4:** It aims at systemic improvement of plants through the application of genetic principles. **CO5:** It focus on interbreeding to produce new crop
40	**BSAG-605**	**Environmental Science and Disaster Management**	**CO1:** To conserve our environment in the face of increasing human population growth and anthropogenic activities that degrade natural resources and ecosystems**.** **CO2**: To study the interactions among the physical, chemical and biological components of the environment.

			CO3: Conservation of natural resources **CO4:** pollution of the surrounding natural resources, controlling the pollution, social issues connected to it, and impacts of human population on the environment**.** **CO5:** A true goal of development with an environmentally sound and sustainable development.
41	**BSAG-606**	**Fundamental of Agri-business Management**	**CO1:** Teach various aspects of marketing, agribusiness management and enterprise development **CO2:** To apply the acquired knowledge and practical skillsa to run an agribusiness, develop a business plan, process, analyse marketing and collaborate with others **CO3:** To make use of problem solving skills integrated in the agribusiness marketing and quality control **CO4:** To develop and build up the students practical knowledge, problem solving and teaching skills **CO5:** To improve the management and productivity of small and medium agribusiness enterprises and value chains
42	**BSAG-607**	**Protected Cultivation and Post-Harvest Technology**	**CO1:** To learn about the post harvest technique and how it can improve the yeild and qualty of products **CO2:** Study about the benefits of protected cultivation **CO3:** Features of Growing media and how they are beeefical **CO4:** Study about seed moisture and how it can effeet the harveted crop and its control **CO5:** Benefit of food grading and its marketing according to grade
43	**BSAG-608**	**Renewable Energy**	**CO1:** To describe the environmental aspects of non-conventional energy resources in Comparison with various conventional energy systems, their prospects and limitations. **CO2:** Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, power generation, drying, cooking etc. **CO3:** Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications **CO4:** Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations **CO5:** Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.
44	**BSAG-609**	**Post-harest Management of Fruits and Vegetables**	**CO1:** Explain the causes of post-harvest losses and prevention measures **CO2:** To maintain the quality in terms of appearance, texture, flavour and nutritive value **CO3:** To protect food safety **CO4:** To reduce losses between harvest and consumption **CO5:** Understand the work space, tool and equipment design for PHT and cold chain management
45	**BSAG-610**	**Crop Production - II (Rabi Crops) Practical**	**CO1:** What are the benefits of crop planing **CO2:** To learn about the multiple crop raising system **CO3:** Benefits of water management in nursery raising and seed treatment **CO4**: To study about the post harvest management in grain crops

			CO5: Insect pest management in crop production
46	**BSAG-611**	**Diseases of Horticultural crops and their Management (Prac.)**	**CO1**: To learn the plant pathogen relation **CO2:** To study the disease symptoms of horticulture crops **CO3:** Effect of hummidity on disease causing organism **CO4**: life cycle of causal organisms **CO5:** Symptoms of disease
47	**BSAG-612**	**Flower Cultivation and Landscape Gradening (Prac.)**	**CO1:** To identify trees, shrubs, houseplants, and seasonal flowers. **CO2:** To understand the layout of lawns and their maintenance. **CO3:** Training and pruning of flowers**.** **CO4:** Planning of gardens and their development. **CO5:** pinching and disbudding techniques.
48	**BSAG-613**	**Breeding of Field and Horticultural Crops(Prac.)**	**CO1:** It aims at Handling of Segregating generations **CO2:** It familiarizes with the Various Field trials **CO3:** It involves the various methods for of Heterosis **CO4:** It familiarizes with the Hardy Weinberg Law **CO5:** It aims at estimation of Inbreeding Depression
49	**BSAG-614**	**Protected Cultivation and Post -Harvest Technology (Prac.)**	**CO1:** To learn about the type of green house and its benefits **CO2:** Need of analysing water and soil sustainablity **CO3:** Implement needed after harvesting of grain seed crops and its benefit **CO4:** Benefit of soil less culturing in green house **CO5:** Air exchange rate in green house
50	**BSAG-615**	**Renewable Energy (Prac.)**	**CO1:** To study biogas plants, gasifiers **CO2:** To study and find the efficiency of solar cooker, dryers, domestic water heater k **CO3:** Performance of wind mills **CO4:** To study the production process of Bio-diesel preparation
51	**BSAG-616**	**Post-harest Management of Fruits and Vegetables (Prac.)**	**CO1:** Conservation of zero energy cool chambers for on farm storage **CO2:** Determination of physiological loss in weight, total soluble solids, total sugars, acidity and ascorbic acid content in fruits and vegetables **CO3:** Types of packing and importance of ventilation **CO4:** Understand the Pre cooling of horticultural crops **CO5:** To know the methods of prolonging storage life

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department: Management Studies

The Program Outcomes (POs)of Bechelor of Arts(Journalism & Mass Communication):

a. The students learn competencies and skills required by the media world.
b. They will be well-integrated in the industry, being industry-ready at the outset.
c. The students would have acquired great confidence by th end of the course, having had hands-on experience wit media software, intensive training in media writing and media exposuremin journalistic writing, through informal internships.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1.	BAJMC 101-18	Introduction to Journalism	**CO1.** It will provide a better understanding of the concept as well as formation of news. **CO2.** The students will get a thorough knowledge of print media from a historical point of view also. **CO3.** It will give an overview of various forms of journalism to the students. **CO4.** It will also provide an insight into the present issues related to media. **CO5.** The students will get knowledge about the different traditional and modern sources of news.
2	BAJMC 102-18	Introduction to Media & Communication	**CO1.** It will provide an overview of the various types of media around us.. **CO2.** The students will get an insight into the various models and theories applicable to press. **CO3.** It will also give knowledge about the various paradigms applicable to mass communication. **CO4.** The effects of mass media on society can be well understood after the study of various theories. **CO5.** The concept of mass communication in context of society will be interpreted in a coherent way.
3	BAJMC 103-18	Indian Political & Social System	**CO1.** The course will help the students in understanding the working of Indian politicalsystem. **CO2.** It will provide knowledge about the different concepts related to constitution. **CO3.** A deep insight into the interrelationship of various social sciences can also be gained through this course. **CO4.** An overview of the Indian economy can also be understood through the study of this paper. **CO5.** The students will get all the basic skills required for covering different types of news.

4	**BAJMC 104-18**	**Communication Lab**	**CO1.** The students will be in a better position to write different types of journalistic pieces. **CO2.** The writing skills of the students will be improved and polished through this course. **CO3.** It will provide a strong base to the future journalists of the country. **CO4.** They will learn to form their own view point on various current and significant issues. **CO5.** The basics of computer and its applicability and usage in media world will be understood in better way.
5	**BTHU 103-18**	**English**	**CO1.** The objective of this course is to introduce students to the theory,fundamentals and tools of Communication. **CO2.** To help the students become the independent users of English language. **CO3.** To develop in them vital communication skills which are integral to their personal,social and professional interactions. **CO4.** The syllabus shall address the issues relating to the Language of communication. **CO5.** Students will become proficient in professional communication such as interviews, group discussions, office environments, important reading skills as well as writing skills such as report writing, note taking.
6	**BTHU 104-18**	**English Practical**	**CO1.** The objective of this course is to introduce students to the theory, fundamentals and tools of communication. **CO2.** To help the students become the independent users of English language. **CO3.** To develop in them vital communication skills which are integral to personal, social and professional interactions. **CO4.** The syllabus shall address the issues relating to the Language of communication. **CO5.** Students will become proficient in professional communication such as interviews, group discussions and business office environments, important reading skills as well as writing skills such as report writing, note taking etc.

7	**BAJMC 201-18**	**Reporting and Editing for Print**	**CO1.** The course will provide students with the concept of beat and basics of different types of reporting. **CO2.** The students will be in a position to write stories in proper format as required in newspaper organizations. **CO3.** It will also help students in editing the news according to different criteria. **CO4.** The students will also become aware of the latest trends followed in news. **CO5.** Photojournalism and its usage will also increase among the future journalists.
8	**BAJMC202-18**	**Media and Cultural Studies**	**CO1.** The course will make the students aware of the concept of mass culture and its variousforms. **CO2.** Various School of thoughts will also become popular amongst the students. **CO3.** It will equip students with the applicability of various theories of mass media. **CO4.** The students will know the representation of various issues in media. **CO5.** The importance of different types of audience will become more clear through this course.
9	**BAJMC203-18**	**Global Media and Politics**	**CO1.** The course will provide an overview of media industry at international level. **CO2.** The students will better understand the global issues after getting aware of its historical perspective. **CO3.** It will provide them knowledge about the global media channels. **CO4.** A better understanding of different concepts related to global media will be gained. **CO5.** Relationship between world war and media will become more clear to the students.
10	**BAJMC204-18**	**Media Ethics and Law**	**CO1.** The course will provide a better understanding of the ethical issues related to media. **CO2.** A broader view to ethical issues related to media technology will be gained. **CO3.** The students will be in a better position to work with social media after knowing its ethical concerns. **CO4.** Information on Laws related to media will help them in avoiding case of defamation while working. **CO5.** Coverage on sensitive issues will be done in a more responsible manner.

11	**BAJMC205-18**	**Media Lab**	**CO1.** It will become easy to work as PRO with any organization. **CO2.** The basics of ad making will become more clear after practically making them in lab. **CO3.** The students will have an option to work as researcher with any media organization. **CO4.** The art of reporting will prepare them for actual field work assignments. **CO5.** They will be in a better position to write creative piece of writings.
12	**EVS 102-18**	**Environmental Studies**	**CO1.** Students will enable to understand environmental problems at local and national level through literature and general awareness. **CO2.** The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues. **CO3.** The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to **CO4.** Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
13	**BAJMC-301**	**Introduction to Broadcast Media**	**CO1.** The students will provide students with the concept of sound and types of sound. **CO2.** The students will get the basic skills of writing radio news. **CO3.** The students will be in position to write stories and news for television. **CO4.** It will equip the students with the basics of camera and its Various parts of television.
14	**BAJMC-302**	**History of the Media**	**CO1.** The course will help the students in understanding the traditional media of mass communication. **CO2.** It will provide the knowledge about the history of print media. **CO3.** An overview of sound media can also be understood through this study of this paper. **CO4.** The students will understand the importance of sound and images for programmingand communication. **CO5.** The students will also become aware how television sets their agenda.

15	**BAJMC-303**	**Advertising**	**CO1.**How to Design an ad copy for a product. **CO2.**Students will earn Scriptwriting for electronic media(Radio jingle ,TV Commercial). **CO3.** Planning and designing advertising campaigns. **CO4.** Critical evaluation of advertisements. **CO5.** The students will also become aware about the ethics while preparing the Advertisement.
16	**BAJMC-304**	**Public Relations**	**CO1.** Employ PR for event management. **CO2.** Students will learn how to write Press release. **CO3.** Develop the skills of handling situation in crisis**.** **CO4.** It will also help students how to organize press conference**.** **CO5.** Employ PR effectively to create goodwill and convey a positive brand image.
16	**BAJMC-305**	**Inter Personal Communication Skills**	**CO1.** Self-Awareness. **CO2.** Personality development. **CO3.** How to handle stress and anxiety. **CO4.** The students will learns the importance of listening. **CO5.** Learn how to write email's letters, memos and resume.
17	**BAJMC-401**	**Advanced New Media**	**CO1.** The course will provide a better understanding of new media technologies. **CO2.** A broader view to ethical issues related to new media technology will be gained. **CO3.** The students will be in a better position to work with new media after knowingits ethical concerns. **CO4.** The students will learn how to create a blog and importance of blogging. **CO5.** The students will learn the concept of web writing.
18	**BAJMC-402**	**Development Communication**	**CO1.** The course will make the students aware of the concept of various model of mass communication. **CO2.** It will also help the students to know the role of media in development. **CO3.** The students will know the role of new media in development. **CO4.** The students will also become aware about all the communication programmes run by the government. **CO5.** It will provide them knowledge about the RTI.

19	**BAJMC-403**	**Communication Research and Methods**	**CO1.** This course will provide the students with the concept of research and various types of research. **CO2.** The students will also learn various types of research. **CO3.** The importance of library and internet in the research will become clear through this course. **CO4.** The students will get an insight into the various tools of data collection. **CO5.** It will provide knowledge how to write a research report.
20	**BAJMC-404**	**Advance Broadcast Media**	**CO1.** It will provide an overview of the community radio. **CO2.** The students will get an insight into the various laws and policy of private broadcasting. **CO3.** The will learn the various broadcast genres. **CO4.** The students will be in a better position to write for radio. **CO5.** The students will learn the basic of documentary.
21	**BAJMC-405**	**New Media Writing and Publishing**	**CO1.** Students will learn to use the cyberspace for journalism. **CO2.** Use the internet to their advantage and avoid pitfall of information gathered fromt the unreliable source. **CO3.** Learn to write for online media. **CO4.** Learn to operate blog. **CO5.** Students will have the knowledge of all the new media tools.
22	**BAJMC-501-18**	**Computer Application & Mass Media**	**CO1.** The student will get the basic knowledge of various components of computer. **CO2.** The students will be in a better position to use the computer properly. **CO3.** The basics of computer and its applicability and usage in media world will be understood in a better way. **CO4.** They will learn how to create blogs and use of social network sites. **CO5.** The typing skill of the students will be improved through this course.

23	**BAJMC-502-18**	**Global Media**	**CO1.** It will provide an overview of International media. **CO2.** The students will get an insight how global media work. **CO3.** The course will help the students in understanding the role of market in media. **CO4.** The students will be in better position to understand the role of media in promotion harmony and peace. **CO5.** They will get the knowledge about various global technologies.
24	**BAJMC-503 -18**	**Introduction to Community Media**	**CO1.** The course will help the students in understanding Community media as an alternative voice. **CO2.** It will provide the knowledge of Alternative media. **CO3.** A deep insight into folk media can also be gained through this course. **CO4.** An overview of folk media of Punjab can also be understood through the study of paper. **CO5.** The students will get the potential of using community based traditional, new and folk media.
25	**BAJMC-504-18**	**Newspaper Organization and Functioning**	**CO1.** It will provide an overview of all the departments of newspaper organization. **CO2.**It will also give the knowledge of roles and responsibilities of key personnel working in a various department of newspaper organization. **CO3.** The course will provide the knowledge of working of advertisement department. **CO4.** The students will be in position to understand the relation of all the departments. **CO5**. The students will understand the concept of printing process.
27	**BAJMC-602**	**Principles of Communication**	**CO1.** The students will learn the concept of communication. **CO2.** The course will help the students in learning the various function of communication. **CO3.** They will learn the process and barriers to communication. **CO4.** It will provide the knowledge of various communication theories. **CO5.** A deep insight into various communication models will be understood.

28	**BAJMC-603-18**	**Visual Communication Basics**	**CO1.** The course will help the students in understanding basic concept of visual communication. **CO2.** It will provide the knowledge of Psychological processing. **CO3.** A deep insight cultural codes can also be gained through this course **CO4.** An overview of visual culture can also be understood through the study of paper **CO5.** The students will get to know the relations between various signs and their users.
29	**BAJMC-604**	**Photo Journalism**	**CO1.** It will provide an overview of all the types and parts of camera. **CO2.** It will also give the knowledge of roles and responsibilities of photojournalist. **CO3.** The course will provide the knowledge of technology and creative rules used in photography. **CO4.** The students will be in position to understand the difference between photojournalist and photographer. **CO5.** The skills of photography will be enhanced.
30	**BAJMC-605**	**Media Internship**	**CO1.** To Learn the basic Principle of Visual design line color, balance proportion, Size shape mass, Unity and variety, Special relationships and composition in two and three dimensions. **CO2.** To know the elementary forms, colors combination and psychological effects of colors on customer. **CO3.** To learn the principle of product graphics, visual communication and designing of control panels. **CO4.** To learn about various types of fasteners, detailing of sheet metal and plastics products. **CO5.** To learn about the manufacturing and economics aspects of product development, role of designer.

Department: Mechanical Engineering

The Program Outcomes (POs) of B.Tech Mechanical Engineering are:

- **a.** Graduates will be able to apply knowledge of applied sciences, mathematics and engineering fundamentals to mechanical engineering applications.
- **b.** Graduates will be able to outline, design and conduct experiments as well as analyze and interpret observations and report the results.
- **c.** Graduates will be able to conceptualize and design the mechanical systems that meet desired specifications and requirements.
- **d.** Graduates will be able to identify, formulate, evaluate and solve engineering problems and have the confidence to optimize the available resources.
- **e.** Graduates will be able to function individually as well as a member of multidisciplinary teams to solve engineering and multidisciplinary problems with leadership qualities.
- **f.** Graduates will have the ability to work professionally with ethical responsibility at all times.
- **g.** Graduates will be able to communicate effectively in oral, written, visual and graphic forms.
- **h.** Graduates will be having the knowledge to understand the impact of engineering solutions on society and demonstrate awareness of contemporary issues.
- **i.** Graduates will be able to recognize of the need for new engineering tools and knowledge acquired through lifelong learning.
- **j.** Graduates will be able to deliver the engineering fundamentals in effective and innovative ways.
- **k.** Graduates will be able to use modern engineering softwares, skills and computing tools necessary for engineering problems.

Program Specific Outcomes (PSO)

1. Will be able to apply the acquired theoretical and practical skills to solve the industrial and research problems in the major streams such as thermal, design, manufacturing and industrial engineering.
2. Will be able to take up their career in government, public, private sector industrial/research organizations, start enterprises and pursue higher studies with high regard for social and professional ethics.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	ACME-16301	Strength of Materials-I	**CO1.** Understand the basic concepts of stress, strain and their variations due to different type of loading. **CO2.** Formulate the mechanics problems using calculus and differential equations. **CO3.** Know design considerations of structures subject

			to wide range of loading including thermal loads. **CO4.** Predict shear forces (SF) and bending moments (BM) in beams when subjected to various types of concentrated, distributed loads and external moments. **CO5.** To solve problems subjected to the simple as well as combined twisting and bending moments. **CO6.** To design the columns with appropriate slenderness ratio to get minimum deflections. **CO7.** Calculate slope and deflection under different loading and supporting conditions.
2	**ACME-16302**	**Theory of Machines - I**	**CO1.** Draw velocity and acceleration diagrams of various mechanisms (including coriolis component).. **CO2.** Understand the working of various primitive components of machine. Know design considerations of structures subject to wide range of loading including thermal loads. **CO3.** Determine the physical parameters of power transmission devices, friction devices and different dynamometers. To solve problems subjected to the simple as well as combined twisting and bending moments. **CO4.** Compute the essential parameters like fluctuation of speed and energy of a flywheel in a vehicle, moment of governor, dynamometers etc. **CO5.** Understand the parameters involved in the working and application of different types of brakes and clutches of vehicle. **CO6.** Recommend various types of belts, chains and rope drives for power transmission.
3	**ACME-16303**	**Applied Thermodynamics-I**	**CO1.** To identify, track and solve various combustion problems. **CO2.** To recognize and understand the working of devices involved in steam power generation system. **CO3.** To evaluate theoretically the performance of various components involved in steam power plants and reciprocating compression machines. **CO4.** To design some components of steam power plants and reciprocating compression machines. **CO5.** To suggest and design different types of boilers for different commercial applications. **CO6.** To design different parameters of steam turbines (impulse/reaction) for various industrial applications. **CO7.** To find out the various losses from different thermal systems and can suggest various preventative measures.
4	**ACME-16304**	**Engineering Materials, Metallurgy and Manufacturing-1**	**CO1.** To develop the ability to understand the concepts of crystal structure of ferrous and non-ferrous materials. **CO2.** To understand the transformations at atomic levels in a engineering material with respect to time-temperature transformations. **CO3.** To learn the role of Time temperature transformation

			curves (TTT curves) and Fe_3C diagram for controlling the structure and properties of materials. **CO4.** Knowledge about classification, composition of alloys, effect of alloying elements. **CO5.** To understand the various heat treatment processes like annealing, hardening, stress-relieving etc. **CO6.** Knowledge of mechanical properties of various alloys over pure metals and their applications
5	**ACME-16305**	**Machine Drawing**	**CO1.** Read the blue prints with detail of dimension, section, tolerance and machining symbols. **CO2.** Find the appropriate thread for nut and bolt as per the application. **CO3.** Draw the bill of material for engineering drawing of some mechanical components/assembly. **CO4.** Find the details of various components from the assembly drawing. **CO5.** Draw the views of assembly with the given details of various components. **CO6.** Recommend the appropriate pipe joint as per position and application. **CO7.** Concept of limits, fits and tolerances in various mating parts.
6	**ACME-16306**	**Engineering Materials, Metallurgy and Manufacturing Lab-1**	**CO1.** The students are expected to develop the ability to understand the concepts of crystal structure, microstructure and deformation. **CO2.** The students will determine hardenability of steel specimen by conducting Jominy End Quench Test. **CO3.** The students shall be able to prepare specimen of various materials in the lab. **CO4.** The students are able to identify the various constituents in given specimen of mild steel **CO5.** The students will be able to select appropriate heat treatment processes for the desired properties in steel. **CO6.** The students will understand the principles of phase transformation in alloys, phase rule and equilibrium diagrams.

7	**ACME-16307**	**Strength of Materials-I Lab**	**CO1.** Student will be able to understand behavior of ductile and brittle materials from stress strain curve. **CO2.** Students will be able to find the impact strength and shear stress by performing impact test and torsion test. **CO3.** Students will determine the fatigue strength on circular test piece. **CO4.** Students will be able to determine Bucking loads of long columns with different end conditions. **CO5.** Students will be able to calculate stiffness and modulus of rigidity of helical coil spring **CO6.** Students will be able to determine the Young's modulus of elasticity and modulus of rigidity.
8	**ACAM-16401**	**Mathematics-III**	**CO1.** In Mathematics a transform is usually a device that converts one type into another type presumably easier. **CO2.** To solve Laplace transformation helpful for the students for the application of Network analysis and synthesis. **CO3.** Fourier series helps the students to understand the application of integral of Fourier integral and Fourier transformation. **CO4.** Fourier series helps the students to understand the application of integral of Fourier integral and Fourier transformation. **CO5.** Partial Differential equation helps the students of mechanical engineering to solve the problems based on heat flow and Fluid mechanics. **CO6.** It is representation of a function as a series of constants times sine and cosine functions of different frequencies in order to see periodic phenomenon have long fascinating mankind. **CO7.** Mathematical models of physical phenomenon involving more than one independent variable often include partial differential equations. They also arise in such diverse area as epidemiology, traffic flow studies and the analysis of economics. **CO8.** There have not only a rich theory, but the application are sometime surprising the derivates and integral of complex numbers. **CO9.** Primary motivation for studying certain special function is that they arise in solving ordinary partial differential that model may physical phenomenon they constitute necessary items in the tool kit of anyone who wishes to understand the work with such models. **CO10.** Solve the laplace heat of wave equations for a variety of Boundary condition in domain of simple metry and within simple BCS technique available with include separation of variable Laplace method. **CO11.** To calculate Laplace transform for a variety of function – students will then be able to use these to

			solve ordinary differential equations. **CO12.** Partial Differential equation helps the students of to solve the problems based on integrated circuits. **CO13.** Partial Differential equation helps the students of to solve the problems based on application of Digital Electronic like gates flip flops.
9	**ACME-16402**	**Strength of Materials-II**	**CO1.** To analyze strain energy in beam under different types of loads. **CO2.** To analyze rotational stresses in various sections. **CO3.** To analyze stresses in thick pressure vessels. **CO4.** To pre-design different types of elements of machine. **CO5.** To analyze and design beams under bending. **CO6.** To analyze shear stress distribution in various sections. **CO7.** To understand the principles of designing springs and cylinders while analyzing the aspects of stresses and strains.
10	**ACME-16403**	**Theory of Machines-II**	**CO1.** To analyze the static and dynamic balancing of forces acting on machine members and also balancing of these forces. **CO2.** To have knowledge of gears, gear trains, gyroscopic motion and couples. **CO3.** To understand the methods of static force analysis of simple mechanisms. **CO4.** To understand the analytical and graphical method for Dynamic force analysis. **CO5.** Select the proper arrangement for power transmission system. **CO6.** To ensure balancing of various dynamic parts like rotating and reciprocating masses as in case of V-engines etc.
11	**ACME-16404**	**Applied Thermodynamics-II**	**CO1.** To understand analytical concepts used in turbo machines involved in power generation. **CO2.** Understand thermodynamic working as well as performance/evaluation of reciprocating/rotary/centrifugal compressors. **CO3.** Understand performance evaluation and design of gas power systems in different commercial applications. **CO4.** To understand principles of jet propulsion and Description of different types of jet propulsion systems. **CO5.** To understand the concept of Surging, Choking and Stalling and to derive isentropic, polytropic and isothermal efficiencies of a compressor. **CO6.** To understand Blade materials, selection criteria for these materials and its requirement and Gas turbine fuels.

12	**ACME-16405**	**Engineering Materials, Metallurgy and Manufacturing-II**	**CO1.** Fundamental principles related to different types of casting and welding processes. **CO2.** Identify various defects during casting and welding processes. **CO3.** Knowledge of Destructive and nondestructive testing viz. visual inspection, x-ray radiography, magnetic particle inspection, dye penetrate test, ultrasonic inspection, eddy current testing, hardness testing, and micro hardness testing. **CO4.** Knowledge to select a suitable metal casting and metal joining processes to fabricate an engineering product. **CO5.** To identify and suggest equipment tools and accessories required for casting and welding processes. **CO6.** Latest technologies in casting and welding processes.
13	**ACME-16406**	**Engineering Materials, Metallurgy and Manufacturing –II Lab**	**CO1.** The students will learn to prepare moulding sand samples to determine clay content, moisture content, shatter index, permeability and grain fineness number as per requirement. **CO2.** The students will bear knowledge of various welding processes/joints and select them as per requirement. **CO3.** The students will have complete knowledge of various machine tools. **CO4.** The students will Use of milling machines for generation of various gears and plane surfaces. **CO5.** The students will be able to apply limits and tolerance in the job performed on lathe machines, shapers and milling machines foe preparing jobs. **CO6.** The students will determine cutting forces with dynamometer for turning, drilling and milling operations

14	**ACME-16407**	**Theory of Machines-II Lab**	**CO1.** The students will be able to draw velocity & acceleration diagrams for four bar mechanism, and various inversions of kinematic chains. **CO2.** The students will understand various types of governors and flywheels. **CO3.** The students will learn balancing of rotating masses and demonstrate a balanced system. **CO4.** Calculate gear train value for compound gear train &epicyclical gear train. **CO5.** Able to demonstrate gyroscope and its concepts in ships, cars, aero planes, etc. **CO6.** Calculate gear train value for compound gear train &epicyclic gear train. **CO7.** Able to draw pressure profile for journal bearings.
15	**ACME-16408**	**Applied Thermodynamics –II Lab**	**CO1.** Demonstrate the principle & working of 2 stroke/4 stroke engines. **CO2.** Demonstrate the principle & working of single/multicylinder Petrol/Diesel engines. **CO3.** To calculate brake power, indicated power, friction power & mechanical efficiency of engine by Morse Test. **CO4.** To find the value of dryness fraction and its impact on steam turbines. **CO5.** To recognize various mountings and accessories of boilers and their practical applications. **CO6.** To select an appropriate steam condenser and cooling tower as per requirement in an industry. **CO7.** To analyze the performance of engines from no load to full load by power consumption and exhaust emission curves.
			CO8. Able to prepare on heat balance sheet for various single/multicylinder engines.
16	**ACME-16501**	**Automobile Engineering**	**CO1.** Knowledge of general layout and type of automotive vehicles. **CO2.** Know the necessity of lubrication and purpose of cooling system. **CO3.** Understand the requirements of transmission systems, steering geometry and braking requirements. **CO4.** Knowledge about Preventive maintenance and other maintenance practices. **CO5.** Knowledge of trouble shooting and rectification in different power supply units. **CO6.** Aware of pollution standards, comfort of drivers while driving, types of tyres, aerodynamics etc. **CO7.** Aware of octane/cetane number of fuels and their impact on performance of vehicles.

17	**ACME-16502**	**Design of Machine Elements -I**	**CO1.** Develop the ability to understand the design processes, various criteria of design. **CO2.** Predict reasons of failure and then correlate it to the theoretical knowledge. **CO3.** Able to learn about design of fasteners, transmission shafts, rigid and flexible coupling and pipe joints **CO4.** Understand the failure of Keys and stresses related to it. **CO5.** Understand the Stress Concentration in case of Stepped shafts. **CO6.** Identify the reasons responsible for failure of components of the machinery during working. **CO7.** Select appropriate factor of safety for designing a mechanical component.
18	**ACME-16503**	**Fluid Mechanics**	**CO1.** To understand the concept of statics and dynamics **CO2.** To derive and apply Bernoulli's equation and Euler's equation of motion. **CO3.** To apply the analytical tools to solve different types of problems related to fluid flow in pipes, design the experiments effectively. **CO4.** To understand the working of various Pressure and Flow Measurement equipments **CO5.** To calculate the flow measurement using manometers, orificemeter, pitot tube etc.
19	**ACME-16504**	**Mechanical Measurement & Metrology**	**CO1.** Understand the need of instruments and learn how they work, design and planning of experiments. **CO2.** 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. **CO3.** Understand the concepts behind sensors and transducers involved in measurements of various physical units. **CO4.** Understanding of flow measurement, flow visualization techniques, speed, force, torque and shaft power. **CO5.** Be aware of types of errors while measuring and how to eliminate their effects. **CO6.** Demonstrate various types of measurements ad standards used in industry. **CO7.** Understand the process and importance of calibration.

20	**ACME-16505**	**Computer Aided Design & Manufacturing**	**CO1.** Able to practice various functions of a graphics package. **CO2.** Understand the concept of geometric transformations, representations of curves and surfaces, concepts and characteristics in geometric modeling. **CO3.** Analyze the components and systems of NC and CNC machine tools. **CO4.** Able to classify various CAPP systems, understand FMS and CIMS with reference to components, advantages and applications. **CO5.** Adapting CIMS in Manufacturing under various controllers. **CO6.** Able to write art-programs for various trajectories.
21	**ACME-16506**	**Automobile Engineering Lab**	**CO1.** Understand the Construction, working and other details about Internal Combustion Engines used in automobiles. **CO2.** Identify Construction, working, preventive maintenance, trouble shooting and diagnosis of various Automobile Systems. **CO3.** Understand importance and features of different systems like axle, differential, brakes, steering, suspension, and balancing etc. **CO4.** Identify Modern technology and safety measures used in Automotive Vehicles.
22	**ACME-16507**	**Mechanical Measurements & Metrology Lab**	**CO1.** Select the approximate standard of length, weight, angle and other quantities. **CO2.** Use sine bar, profile projector, tool maker microscope and stroboscope. **CO3.** Use thermo couples and measure the temperature. **CO4.** Recommend appropriate threads for various industrial applications. **CO5.** Understand Reynolds's number for fluid flow. **CO6.** Understand the working of Pressure measuring devices and select an approximate device for industrial applications.

23	**ACME-16508**	**Fluid Mechanics Lab**	**CO1.** Student will be able to find Metacentric concept and their application for ships/boats. **CO2.** Students are expected to understand Bernoulli's energy equation and their applications. **CO3.** Students are expected to understand head loss in a pipe line. **CO4.** Student will be able to determine the velocity distribution for pipeline flow with a pitot static probe. **CO5.** Students will be able to calculate discharge coefficient, hydraulic coefficients and friction coefficients **CO6.** Student will be able to evaluate Reynold's no., Prandet no., Nusset's no., Froude's no., etc to find different types of flows in actual situation.
24	**ACME-16509**	**Computer Aided Design &Manufacturing Lab**	**CO1.** The students will be able to make 2D and 3D Drawings using AutoCAD software. **CO2.** The students will be able to draw mechanical components like crane hook, bench vice, screw jack in 3D. **CO3.** The students shall be able to demonstrate limits, fits and tolerances for proper mating of components in the assembly. **CO4.** The students will learn programs of NC and CNC machines. **CO5.** The students will be able to perform part programming using various NC code. **CO6.** The students shall be able to generate various contours on various components on CNC lathe and CNC milling machines.
25	**ACME-16510**	**Design of Machine Elements-I Lab**	**CO1.** Develop the ability to understand the design processes and its implementation on real applications. **CO2.**Identify modes of failure and then correlate with real situations to gain practical knowledge. **CO3.** Able to learn about design of fasteners. **CO4.**Understand the design calculations for transmission shafts. **CO5**.To know various parameters of design of rigid and flexible coupling. **CO6.**Understand the failure of Keys and stresses related to it.

26	**ACME-16601**	**Design of Machine Elements-II**	**CO1.** Understanding the design modification belts, chain drives, sliding and roller bearings, clutches and brakes etc. **CO2.** Learn the assembly with different CAD techniques and also handle live projects effectively. **CO3.** Learn the working of flywheel, pulley, closed coil and helical spring. **CO4.** Design of spur, helical and bevel gears. **CO5.** Knowledge about lubrication in transmission systems. **CO6.** Ability to analyze the design and suggest suitable modifications. **CO7.** Select an appropriate learning for industrial applications.
27	**ACME-16602**	**Heat Transfer**	**CO1.** Able to explain modes of heat transfer **CO2.** Design and analyze various types of heat exchangers and other thermal systems **CO3.** Able to solve the heat transfer problems analytically. **CO4.** Able to determine coefficient of heat transfer for free/forced convection. **CO5.** Able to determine heat transfer coefficient by radiation. **CO6.** Basic design calculations regarding industrial furnaces, automobile components etc.
28	**ACME-16603**	**Fluid Machinery**	**CO1.** Understanding of different types of turbines like Centrifugal Pumps, Reciprocating Pumps, Pelton Turbine, Francis and Kaplan Turbines. **CO2.** Able to design fluid machines for given parameters/ requirements. **CO3.** Understanding of hydraulic press, lifts, ram, air lift, gear pump etc. **CO4.** Knowledge of different hydraulic devices like accumulator, intensifier, fluid coupling and torque converter. **CO5.** Understand different types of fluids used and path followed by the fluid. **CO6.** To learn about velocity triangles and work output for different turbines. **CO7.** Able to understand the conversion of hydraulic energy into mechanical energy and vice-versa with analytical approach.

29	**ACME-16604**	**Industrial Automation & Robotics**	**CO1.** Understanding of hard automation. **CO2.** Designing of logic circuits for given time displacement diagram. **CO3.** Understanding of programmable logic controllers. **CO4.** Able to decide the role of robot specifications as per requirement. **CO5.** Detailing of robot programming and their industrial applications. **CO6.** Demonstrate the working of valves and their applications in automations. **CO7.** Demonstrate the design of pneumatic and hydraulic circuits relevant to industrial applications. **CO8.** Able to work with various transfer devices and feeders in manufacturing industry. **CO9.** Able to program a robotic arm for industry application.
30	**ACME/DE-2.0**	**Product Design and Development**	**CO1.** To Learn the basic Principle of Visual design line color, balance proportion, Size shape mass, Unity and variety, Special relationships and composition in two and three dimensions. **CO2.** To know the elementary forms, colors combination and psychological effects of colors on customer. **CO3.** To learn the principle of product graphics, visual communication and designing of control panels. **CO4.** To learn about various types of fasteners, detailing of sheet metal and plastics products. **CO5.** To learn about the manufacturing and economics aspects of product development, role of designer.
31	**ACME-16606**	**Heat Transfer Lab**	**CO1.** To determine the thermal conductivity of solid insulating material and also of liquids. **CO2.** The students will learn to determine co-efficient of heat transfer for different modes of heat transfer. **CO3.** The students will be able to optimize fin efficiency with respect to shape factor. **CO4.** Draw the pool boiling curves to determine critical point for water. **CO5.** Calculate heat transfer co-efficient with respect to black body. **CO6.** To determine shape factor for various complex bodies.
32	**ACME-16607**	**Fluid Machinery Lab**	**CO1.** The students will learn about different turbines and draw their characteristics curves. **CO2.** The students will be able to draw the performance curves of various hydraulic machines. **CO3.** The students will be able to draw the performance curves of reciprocating pumps. **CO4.** The students shall be able to decide appropriate pump for industrial application and also draw performance curves of centrifugal pump. **CO5.** The students shall be able to decide appropriate vane shape and vane angle for optimum performance of centrifugal fane. **CO6.** The student shall be able to demonstrate the applications hydraulic ram.

33	**ACME-16608**	**Industrial Automation and Robotics Lab**	**CO1.** The students will be able to understand that how pneumatic circuits work in actual practice. **CO2.** Make the Pneumatic and Hydraulic circuits to understand the working of directional control valves. **CO3.** The students shall be able to understand the working of power steering mechanism. **CO4.** Use of directional control valve to operate double acting pneumatic cylinder. **CO5.** Understand the working of pneumatic grippers with directional control valve. **CO6.** Practical representation of robotics arm and its configuration.
34	**ACME-16701**	**Industrial Engineering & Management**	**CO1.** Apply industrial engineering techniques in an organization. **CO2.** Demonstrate his ability to recommend an appropriate layout in an industrial environment. **CO3.** Improve the plant productivity and safety. **CO4.** Improve the existing method by a new method. **CO5.** Calculate the standard time of process activities and rate the performance of workers/operators **CO6.** Perform job design considering the technological and behavior factors. **CO7.** Introduce ergonomic aspects in man-machine interface especially for design of displays and controls. **CO8.** Apply value engineering for practical applications.
35	**ACME-16702**	**Refrigeration & Air-Conditioning**	**CO1.** To enhance the understanding of different types of refrigeration & their selection. **CO2.** To understand the concept of different refrigeration cycles, different types of refrigerants **CO3.** To learn various refrigerants available and have knowledge of non-conventional refrigeration systems. **CO4.** Provide the knowledge about environment friendly refrigerants. **CO5.** Able to calculate refrigeration & air conditioning cooling/heating load. **CO6.** Knowledge to study the different conditions (e.g. humidity, etc) at different rates. **CO7.** To understand the Air Conditioning Concept, Psychometric Processes and Refrigeration and Air Conditioning Equipment. **CO8.** Suggest AC requirement for industrial processes.

36	**ACME-16703**	**Mechanical Vibrations**	**CO1.** Knowledge of vibration analysis, different types of vibrations. **CO2.** Understand alteration methods, Eigen values & Eigen vector and Euler's equation of motion for beam vibration. **CO3.** Learn concept of vibration control and principles of various vibration absorbing methods and equipment. **CO4.** To study of reduction in degree of freedom to restrict the movement in particular direction. **CO5.** Control on damping the undesired vibrations. **CO6.** To select the frequencies in practical components after considering its natural frequency. **CO7.** To use the appropriate instruments for measurements of amplitude & frequency of vibration sources.
37	**ACME-16704**	**Operations Research**	**CO1.** To solve problems related to Deterministic and Probabilistic Models. **CO2.** To undertake project related to queuing and inventory models. **CO3.** Recognize the importance of optimization techniques in engineering. **CO4.** Make transportation system better than the existing one. **CO5.** Handle the dynamic programming of the system. **CO6.** Apply project management on the basis of different phases in real life situation.
38	**ACME-16705**	**Refrigeration & Air-Conditioning Lab**	**CO1.** Understand various types of refrigeration systems used in industries. **CO2.** Calculate cooling loads for large buildings. **CO3.** Monitor the performance of various types of refrigerators air conditioners. **CO4.** Differentiate in load conditions according to environment. **CO5.** Recommend a particular refrigerant for industrial application.
39	**ACME-16706**	**Mechanical Vibration Lab**	**CO1.** Differentiate between free and forced, damped and undamped vibration systems. **CO2.** The students will be able to use a torsional pendulum for calculation of fluid viscosity. **CO3.** Determine modulus of elasticity from free vibration tests. **CO4.** Understand the use/performance of dynamic absorber. **CO5.** Calculate co-efficient of dry friction from natural frequency of a bar.
40	**ACME-101**	**Elements of Mechanical Engineering**	**CO1.** To find vide application in day to day life. **CO2.** To learn principles and fundamentals involved in the inter-conversion of thermal energy into mechanical energy and vice versa **CO3.** To know about the First and Second law of thermodynamics. **CO4.** Understand performance evaluation and design of gas power systems in different commercial applications. **CO5.** To understand the concept of centroid and centre of gravity. **CO6.** To understand the concept of MOI

41	**ACME-102**	**Engineering Drawing**	**CO1.** Read the blue prints with detail of dimension, section, tolerance and machining symbols. **CO2.** Draw the sectional views **CO3.** Draw the bill of material for engineering drawing of some mechanical components/assembly. **CO4.** Find the details of part after development of surfaces. **CO5.** Draw the isometric views of any drawing

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
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Department of Computer Science Engineering

The Program Outcomes (POs) of B.Tech Computer Science Engineering are:

- **a.** Graduates shall be able to demonstrate the knowledge of fundamentals of basic sciences, mathematics & logical reasoning, communication skills and implementing IT concepts while designing technological applications and innovative ideas.
- **b.** Graduates shall exhibit an ability to identify, formulate & select appropriate software & apply its use in solving complex problems.
- **c.** Graduates shall demonstrate an ability to develop programs which are useful in solving real life problems and analyze & interpret data for industry/entrepreneur excellence.
- **d.** Graduates shall be able to identify the various hardware components & design the assembly.
- **e.** Graduates shall possess the knowledge of design techniques, analysis, coding, testing, operation & maintenance of networks, databases, information & data security and computer systems.
- **f.** Graduates shall demonstrate the ability to understand & work on multi-disciplinary tasks.
- **g.** Graduates shall participate & pursue for the higher studies by passing the competitive exams.
- **h.** Graduates shall develop the habit of self-learning and self-motivation for taking their career to greater heights.
- **i.** Graduates shall demonstrate the ability of professionalism, ethical responsibilities and discipline as individual as well as in a team.
- **j.** Graduates shall be well versed with the existing cyber laws and IPR.
- **k.** Graduates shall demonstrate the knowledge of current issues & cutting edge technologies like Python, Big Data Analytics and Machine Learning etc. to meet the demands of new IT world.

Program Specific Outcomes

1. Graduates will be able to apply the theoretical and practical knowledge of computer science for developing software solutions to real-time problems.
2. Graduates will be able to demonstrate the acquired knowledge of emerging trends and contemporary technologies in the field of computer science and engineering.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes COs
1	**ACCS-16302**	**OBJECT ORIENTED PROGRAMMING**	**CO1.** Understand the concepts of structures and classes and differentiate between them and to design and develop programs with classes. **CO2.** Understand the principles of the object-oriented programming paradigm specifically including abstraction, encapsulation and polymorphism.

			CO3. Reuse the code using concept of inheritance. **CO4.** Implement the concept of generic programming using class and function templates. **CO5.** Implement the concept of file handling to store the contents of a program into the secondary storage. **CO6.** Clarify the logic for developing a program and to be able to discuss different data structures to represent real world problems.
2	**ACAM-16302**	**ENGINEERING MATHEMATICS III**	**CO1.** Recognize the importance of Fourier series & Fourier transforms in the field of signals and systems, communication and network theory signal and image processing, control theory, flow & heat transfer and theory of elasticity. **CO2.** Interpret the solution of one-dimensional wave, heat and Laplace equations with given initial and boundary conditions in the context of various engineering and technological applications. Develop the logic for problem solution identification with algorithms. **CO3.** Recall the distinctive characteristics of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data. **CO4.** Demonstrate various real world scenarios using concepts of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis, Algebraic Structures, Advanced graph Theory. **CO5.** To introduce mathematical notations and concepts in Engineering mathematics that is essential for computing.
3	**ACCS-16303**	**COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING**	**CO1.** Understand the organization of basic computer, its design and the design of control unit. **CO2.** Understand the bus structure and the various micro-operations. **CO3.** Demonstrate the working of central processing unit and RISC and CISC Architecture. **CO4.** Analyse instruction formats and general register organization. **CO5.** Understand the organization of memory and memory hardware. **CO6.** Elaborate advanced concepts of computer architecture, Parallel Processing, inter-processor communication and synchronization.
4	**ACEC-16302**	**DIGITAL**	**CO1.** To be well versed with number systems such as binary,

		CIRCUIT AND LOGIC DESIGN	octal, hexadecimal and able to perform various operation such as conversion, addition, subtraction etc. **CO2.** To have understanding of various logic gates such as AND, OR, NOR, NOT, XOR etc. along with knowledge of boolean minimization techniques like K - map and Q - M method. **CO3.** To be able to design combinational circuits such as encoder, decoder, code converters, adder, subtractor, multiplexer, demultiplexer and parity checker. **CO4.** To be able to design sequential circuits such as shift registers, counters etc. using flip flops, clocked flip flop, SR, JK, D , T and edge triggered flip flop. **CO5.** To have working knowledge of various types of digital to analog converters. **CO6.** To understand logic families such as RTL, DCTL, DTL, TTL, ECL, CMOS and their characteristics.
5	**ACCS-16301**	**DATA STRUCTURES**	**CO1.** Understand the concept of Dynamic memory management, data types, algorithms, Big O notation. **CO2.** Implementation of Data Structure like Arrays, Linked List, Stacks, Queues, Graphs. **CO3.** Develop the logic for problem solution identification with algorithms. **CO4.** Describe the hash function and concepts of collision and its resolution methods **CO5.** Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data. **CO6.** Implementation and analysis of algorithms with consideration to their respective complexities.
6	**ACCS-16304**	**DATA STRUCTURES LAB**	**CO1.** Implement basic data structures such as arrays and linked list. **CO2.** Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths. **CO3.** Implement various searching and sorting algorithms. **CO4.** Programs to demonstrate the implementation of various operations on stack and queue data structure.
7	**ACCS-16306**	**COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING LAB**	**CO1.** Understand the microprocessor operations. **CO2.** Understand the architecture of microprocessor **CO3.** Understand the instructions of 8085. **CO4.** Understand and design an assembly language programs . **CO5.** Design and implement microprocessor-based systems. **CO6.** Interfacemicroprocessor with different peripheral

			devices through interfacing chips and can handle data transfer in different ways for different applications.
8	**ACCS-16305**	**OBJECT ORIENTED PROGRAMMING LAB**	**CO1.** Develop solutions for a range of problems using object oriented programming.. **CO2.** Understand the principles of the object oriented programming paradigm specifically including abstraction, encapsulation and polymorphism and reuse the code using concept of inheritance. **CO3.** Develop scenarios to explain behavior and demonstrate correctness of programs. **CO4.** Familiarization with the critical thinking skills and creativity to solve the problems. **CO5.** Implement divide and conquer strategy to searching and sorting problems using iterative and/or recursive solutions. **CO6.** Store the contents of a program into the secondary storage as a file using file handling.
9	**ACEC-16305**	**DIGITAL CIRCUIT AND LOGIC DESIGN LAB**	**CO1.** To have practical understanding of logic gates IC's their input and output pins and logic levels. **CO2.** To be able to implement combinational logic circuits such as half/ full adders and subtractors. **CO3.** To practically design the various combinational circuits such as comparators, encoders, code convertors (binary to gray, gray to binary etc.) using logic gate IC's. **CO4.** To verify practically the truth table and working schematic of various sequential circuits such as RS, JK, D, T, JK master-slave flip flops. **CO5.** To implement sequential circuits such as counters using discrete logic. **CO6.** To verify theoretical details with practical observations.
10	**ACDS-16402**	**DISCRETE STRUCTURES**	**CO1.** To introduce mathematical notations and concepts in discrete mathematics that is essential for computing. **CO2.** To train on mathematical reasoning and proof strategies. **CO3.** To cultivate analytical thinking and creative problem solving skills. **CO4.** Apply the operations of sets and venn diagram to solve applied problems. **CO5.** Determine domain and range of functions. **CO6.** Use sets to solve problem in Boolean algebra.
11	**ACCS-16402**	**OPERATING SYSTEM**	**CO1.** Gain knowledge about concept of process and thread their creation and their resource management. **CO2.** Understand basics functionality of operating system, scheduling of CPU, process management. **CO3.** Understand the knowledge of deadlocks and its

			recovery. **CO4.** Gain knowledge of paging, page replacement algorithms. **CO5.** Gain knowledge of multiprocessor and distributed system. **CO6.** Understand the difference between physical and logical file system. **CO7.** Gain the knowledge of device management, device scheduling. **CO8.** Be familiar with protection and security mechanism. **CO9.** Mastering various process management concepts including scheduling, synchronization ,deadlocks.
12	**ACCS-16403**	**COMPUTER NETWORKS**	**CO1.** Clarity about various protocols, models in networks. **CO2.** Design, implement and analyze simple computer networks. **CO3.** Assemble the components of a PC and install one or more operating systems resulting in a functioning PC that is appropriate for a particular end user. **CO4.** Understand the concepts of network security and various network security standards. **CO5.** Implement basic tasks expected of a Network Administrator including management of user accounts, shared resources, and network security. **CO6.** Understand difference between Adhoc and cellular networks.
13	**ACCS-16404**	**PROGRAMMING IN PYTHON**	**CO1.** To Learn Syntax and Semantics and create Functions in Python. **CO2.** To Handle Strings and Files in Python. **CO3.** To Understand Lists, Dictionaries in Python. **CO4.** To Implement Object Oriented Programming concepts in Python **CO5.** To learn how to use exception handling in Python applications for error handling. **CO6.** To Build GUI applications
14	**ACCS-16405**	**RDBMS**	**CO1.** Understand the concept of Database Management system and its various applications in real life. **CO2.** Understand the concept of E-R diagrams for conceptual modeling. **CO3.** Understand the concept of normalizing tables for effective database design. **CO4.** Understand the different database languages i.e., (DDL, DML, DCL, and TCL). **CO5.** Understand the concept of concurrent transactions and handling deadlocks effectively. **CO6.** Understand the concept of database security and various ways to counter threats to vital data.

15	**ACCS-16406**	**OPERATING SYSTEM LAB**	**CO1.** Installation of operating system. **CO2.** Learn the general structure and any non-obvious aspect s of different Operating system. **CO3.** Understand various aspects of different Operating system. **CO4.** Implement various LINUX commands. **CO5.** Understand the basics of shell programming. **CO6.** Understand shell programming in conditional and loop statement.
16	**ACCS-16407**	**COMPUTER NETWORKS LAB**	**CO1.** Understand the practical base in computer network issues. **CO2.** Install and configure domain-based local area networks.. **CO3.** Students are expected to know the implantation of IPv4 address scheme on LAN. **CO4.** Students will be able to install open source packet capture software. **CO5.** Implement basic tasks expected of a Network Administrator including management of user accounts, shared resources, and network security. **CO6.** Students are able to configure Adhoc networks.
17	**ACCS-16409**	**RDBMS LAB**	**CO1.** Understand the setting up of a client server network Understand different database languages i.e., (DDL, DML, DCL). **CO2.** Understand the data mining concepts. **CO3.** Implement various commands of SQL and PL/SQL **CO4.** Understand the concept of triggers, cursors, procedures in PL/SQL. **CO5.** Connecting the database with a front end application
18	**ACCS-16409**	**PROGRAMMING IN PYTHON LAB**	**CO1.** Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python **CO2.** Express different Decision Making statements and Functions **CO3.** Interpret Object oriented programming in Python **CO4.** Implementation of data Structures in python. **CO5.** Understand and summarize different File handling operations **CO6.** Explain how to design GUI Applications in Python and evaluate different database operations

19	**ACCS-16501**	**PROGRAMMING IN JAVA**	**CO1.** Understand object oriented programming constructs, byte codes and basics of java console. **CO2.** Implementation of simple java programs using Classes, Inheritance, Exception handling and applets. **CO3.** Developing logic for problem solving with programming concepts. **CO4.** Developing simple java applications with JDBC connectivity. **CO5.** Understand and utilize Java Graphical User Interface in the program writing.
20	**ACCS-16502**	**DESIGN AND ANALYSIS OF ALGORITHM**	**CO1.** Understand the methods for analyzing the efficiency and correctness of algorithms (such as exchange arguments, recurrence, induction, and average case analysis) **CO2.** Design algorithms using the dynamic programming, greedy method, Backtracking strategy algorithms that employ this strategy. **CO3.** Compare, contrast, and choose appropriate algorithmic design techniques to present an algorithm that solves a given problem and can identify and analyze criteria and specifications appropriate to new problems. **CO4.** Develop the efficient algorithms for the new problem with suitable designing techniques. **CO5.** To classify the problem into class P or NP and to design the Non Deterministic algorithms
21	**ACCS-16503**	**BIG DATA ANALYTICS**	**CO1.** To provide an overview of an exciting growing field of big data analytics. **CO2.** To introduce the tools required to manage and analyze big data like Hadoop, Map Reduce and Pig. **CO3.** To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability. **CO4.** To enable students to have skills to solve complex real world problems in Data Analytics. **CO5.** To equip students with skills to analyze and design parallel and distributed applications. **CO6.** To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
22	**ACCS-16504**	**SOFTWARE ENGINEERING**	**CO1.** Describe the processes and models involved in SDLC lifecycle. **CO2.** Understand software requirements and the SRS document. **CO3.** Implementation of different coding standards and software testing approaches such as unit testing and integration testing. **CO4.** Understand the role of project management including planning, scheduling, risk management and some ethical and professional issues that are important for software engineers. **CO5.** Learn the basic software quality strategy.

23	**ACCS 16505**	**INFORMATION SECURITY**	**CO1.** Able to define what information is & appreciate the value of information to the modern organization. **CO2.** Understand the CIA triad of Confidentiality, Integrity and Availability. **CO3.** Appreciate the difficulties that arise when valuable information needs to be shared. **CO4.** Understands the various authentication protocols used for the protection of information. **CO5.** Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack. **CO6.** Ability to apply security based on IP, network, web & system.
24	**ACCS-16507**	**DAA Lab**	**CO1.** Analyze the complexities of various problems in different domains. **CO2.** Analyze the running time of the basic algorithms for those classic problems in various domains. **CO3.** Implement methods for analyzing the efficiency and correctness of algorithms (such as exchange arguments, recurrence, induction, and average case analysis) **CO4.** Compare, contrast, and choose appropriate algorithmic design techniques to present an algorithm that solves a given problem. **CO5.** Identify and analyze criteria and specifications appropriate to new problems.
25	**ACCS-16508**	**BIG DATA ANALYTICS LAB**	**CO1.** To install the relevant software for setting up a hadoop cluster. **CO2.** To introduce the tools required to manage and analyze big data like Hadoop, Map Reduce and Pig. **CO3.** To learn the concepts required for working with distributed file systems. **CO4.** To enable students to have skills to solve complex real world problems in Data Analytics. **CO5.** To equip students with skills to analyze and design parallel and distributed applications.
26	**ACCS-16506**	**PROGRAMMING IN JAVA LAB**	**CO1.** Implement and develop logics for different OOPS concep using basic syntaxes of control Structures, strings, arrays and function. **CO2.** Implementation of classes, objects and the relationships among them to solve specific problem. **CO3.** Develop and achieve reusability using inheritance, interfa and packages for efficient application development. **CO4.** Understanding different exception handling mechanisms concept of multithreading for developing robust application. **CO5.** Implementing connectivity of java applications with diffe databases like SQL, oracle etc.
27	**ACCS-16509**	**SOFTWARE ENGINEERING**	**CO1.** Preparation of SRS document, design document, test

		LAB	cases and software configuration management and risk management related document. **CO2.** Designing of object oriented and function oriented design using Microsoft Visio. **CO3.** Able to perform unit testing and integration testing. **CO4.** Apply various website testing techniques **CO5.** Usage of Openproj tool to track the progress of project.
28	**ACCS-16601**	**WEB TECHNOLOGIES**	**CO1.** Understanding the working of web page development. **CO2.** Understand design principles in CSS for dynamic changes. **CO3.** Understanding the form development and events related to them. **CO4.** Understanding the scripting language for developing the web page. **CO5.** Understanding the server side scripting language and its connectivity with database for storing the data into it.
29	**ACCS-16602**	**MOBILE APPLICATION DEVELOPMENT**	**CO1.** Demonstrate their understanding of the fundamentals of Android operating systems **CO2.** Demonstrate their skills of using Android software development tools · **CO3.** Demonstrate their ability to develop software with reasonable complexity on mobile platform · **CO4.** Demonstrate their ability to deploy software to mobile devices · **CO5.** Demonstrate their ability to debug programs running on mobile devices
30	**ACCS-16603**	**MACHINE LEARNING**	**CO1.** Recognize the characteristics of machine learning that make it useful to real-world problems. **CO2.** Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised. **CO3.** Be able to use support vector machines. **CO4.** Be able to use regularized regression algorithms. **CO5.** Understand algorithms for learning Bayesian networks. **CO6.** Understand Back propagation algorithms.
31	**ACIT-16501**	**CYBER SECURITY**	**CO1.** To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks. **CO2.** Understanding of online as well as offline application security, application threats & its mitigations and application security service provider. **CO3.** Demonstrate knowledge of security threats to computer systems, and perform countermeasures to secure a computer. **CO4.** An ability to apply security principles and practices to the environment, hardware, software, and human aspects of a system. **CO5.** The learner will understand key terms and concepts in

			cyber law, intellectual property and cyber crimes, trademarks and domain theft.
32	**ACCS-16604**	**WEB TECHNOLOGIES LAB**	**CO1.** Understanding the working of web page development. **CO2.** Understand design principles in CSS for dynamic changes. **CO3.** Understanding the form development and events related to them. **CO4.** Understanding the scripting language for developing the web page. **CO5.** Understanding the server side scripting language and it s connectivity with database for storing the data into it
33	**ACCS-16605**	**MOBILE APPLICATION DEVELOPMENT LAB**	**CO1.** Apply essential Android Programming concepts. **CO2.** Demonstrate and Understanding anatomy of an Android application **CO3.** Apply the android geo location based services **CO4.** Develop various Android applications related to layouts & rich uses interactive interfaces **CO5.** Develop various Android applications related to mobile
34	**ACCS-16606**	**MACHINE LEARNING LAB**	**CO1.** Gain knowledge about basic concepts of Machine Learning **CO2.** Identify machine learning techniques suitable for a given problem **CO3.** Solve the problems using various machine learning techniques **CO4.** Implement various machine learning techniques. **CO5.** Design application using machine learning techniques
35	**ACIT-16502**	**CYBER SECURITY LAB**	**CO1.** Students are expected to know the implementation of wired and wireless network **CO2.** Students are able to implement cyber attacks like DOS, Phishing. **CO3.** Students are expected to know packet filtering technique. **CO4.** Students are able to implement reverse engineering. **CO5.** Students are able to perform Brute Force Attack. **CO6.** Students are expected to perform cryptography and steganography techniques.
36	**ACCS-16706**	**THEORY OF COMPUTATIONS**	**CO1.** Understand the basic concepts of formal languages, automata and grammar types, as well as the use of formal languages and reduction in normal forms. **CO2.** Demonstrate the relation between regular expressions, automata, languages and grammar with formal mathematical methods **CO3.** Understand the principal models of computation such as finite automata, pushdown automata and Turing machines. **CO4.** Understand the correspondence of the different language classes to the models of computation. **CO5.** Design push down automata and Turing machines

			performing tasks of moderate complexity. **CO6.** Analyze the syntax and formal properties of LL (k) and LR (k) grammars.
37	**ACCS-16172**	**HAINA**	**CO1.** Understand and describe the devices and services used to support communications in data networks and the Internet. **CO2.** Understand and describe the role of protocol layers in data networks **CO3.** Understand and describe the importance of addressing and naming schemes at various layers of data networks in IPv4 and IPv6 environments. **CO4.** Understand the concepts of network security and vario us network security standards. **CO5.** Clear HCNA Routing and Switching certification exams.
38	**ACCS-16707**	**ARTIFICIAL INTELLIGENCE**	**CO1.** Identify problems from multidisciplinary fields that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem. **CO2.** Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, etc). **CO3.** Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming). **CO4.** Inference and reason out from the given facts that helps in decision making. **CO5.** Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.
39	**ACCS-16705**	**HAINA Lab**	**CO1.** Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks. **CO2.** Build a simple Ethernet network using routers and switches. **CO3.** Use eNSP software to perform basic router and switch configurations. **CO4.** Utilize common network utilities to verify small network operations and analyze data traffic. **CO5.** Configure and troubleshoot an Open Shortest Path First (OSPF) network. **CO6.** Understand, configure, and troubleshoot Dynamic Host Configuration Protocol (DHCP) for IPv4
40	**ACCS-16702**	**ARTIFICIAL INTELLIGENCE LAB**	**CO1.** To provide students with in-depth theoretical and practical base for the development of AI based systems in multidisciplinary fields. **CO2.** Formalize a given problem in the language/framework of different AI methods **CO3.** To learn control structures of functional, logic, and imperative programming language **CO4.** Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming) . **CO5.** To Understand how the basic program evaluation

			mechanism works by goal satisfaction

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department: Electronics and Communication Engineering

The Program Outcomes (POs) of B.Tech Electronics and Communication Engineering are:

a. Graduate will understand the basic knowledge of Mathematics and Science in Engineering, and their practical applications.
b. Graduate will be able to communicate effectively in both: oral and written form.
c. Graduate will have the skills to design analog and digital circuits for various applications.
d. Graduate will able to understand, design and implement the Communication Network, Mobile Network, guided and unguided wireless communication system.
e. Graduate will able to design and implement various programs on Microcontroller, embedded system and Arduino based systems.
f. Graduate will have functional skills to utilize software and other tools to analyze problems for their required solutions.
g. Graduate shall demonstrate the ability to understand and work on multidisciplinary tasks.
h. Graduates shall have the ability of to meet the expectations/demands of their potential Employers.
i. Graduate shall able to demonstrate the cutting-edge technologies like Phyton, Machine Learning etc. to meet the new demand of the Technology Era.
j. Graduate will be able to participate and succeed in competitive exams like GATE, GRE etc.
k. Graduate shall be able to handle various projects as Individual/ in a team for the societal upliftment

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	ACEC-16302	Digital Circuit and Logic Design	**CO1.** To be well versed with number systems such as binary , octal, hexadecimal and able to perform various operations such as conversion, addition, subtraction etc. **CO2.** To have understanding of various logic gates such as AND, OR, NOR, NOT, XOR etc. along with knowledge of Boolean minimization techniques like K-Map and Q-M Me thod. **CO3.** To be able to design combinational circuits such as en coder, decoder, code converters, adder, subtractor, multiple xer, de-multiplexer and parity checker. **CO4.** To be able to design sequential circuits such as shift re gisters, counters etc. using flip flops, clocked flip flop, SR, JK, D, T and edge triggered flip flop.

			CO5. To solve problems subjected to the simple as well as combined twisting and bending moments. **CO6.** To have working knowledge of various types of digita l to analog converters. **CO7.** To understand logic families such as RTL, DCTL, DT L, TTL, ECL, CMOS and their characteristics.
2	**ACEC-16301**	**Analysis and Synthesis of Networks**	**CO1.** Focus on the analysis of the circuits by using different techniques.. . **CO2.** Explore their knowledge about existing filter networks. **CO3.** Design different types of filter and their analysis **CO4.** Apply the knowledge gained in analysis and design of different types of circuits
3	**ACEC-16303**	**Electronic Devices and Circuits**	**CO1.** Basics of Electronic Devices like PN Diode, LED, LCD, Photodiode, Tunnel diode and Zener diodes, **CO2.** Basic knowledge about voltage regulator which is widely used in power supply design. **CO3.** Functioning of various transistors like BJT, JFET, UJT and MOSFETs **CO4.** Designing of different types of amplifiers. **CO5.** Familiarization with the feedback concepts and its effect on gain, stability, distortion, bandwidth and frequency response. **CO6.** Analysis of various oscillators like Hartley, Colpitt, crystal, wein bridge etc.
4	**ACCS-16302**	**OBJECT ORIENTED PROGRAMMI NG**	**CO-1.** Understand the concepts of structures and classes and differentiate between them and to design and develop programs with classes. **CO-2.** Understand the principles of the object-oriented programming paradigm specifically including abstraction, encapsulation and polymorphism. **CO-3.** Reuse the code using concept of inheritance. **CO-4.** Implement the concept of generic programming using class and function templates. **CO-5.** Implement the concept of file handling to store the contents of a program into the secondary storage. **CO-6.** Clarify the logic for developing a program and to be able to discuss different data structures to represent real world problems
5	**BTAM-301 / BTAM-16301**	**Engg Mathematics**	**CO1.** To enable the students to learn the basic laplace transfer , its properties and its application : **CO2.** To enable the students to concept of fourier series and different wave forms. **CO3.** To enable the students to learn the formation of partial differential equation and to apply these to solve various problems heat conduction and wave equation **CO4.** To enable the students to know the concept of complex differention, complex integration are its application

			CO5. To enable the students to find series solution , discuss legendre's polynomial, bessel's equation and its application
6	**ACEC- 16304**	**Lab Electronic Devices and circuits**	**CO1.** Setup any circuit on a bread board and consequently on PCB if required. **CO2.** Analyze it using electronic equipment and draw conclusions. **CO3.** Explore the practical implications after verifying various law and theorems. **CO4.** Design and develop various practical circuits using diodes, special purpose diodes, transistors. **CO5.** Prepare thyself for advanced electronics-based subjects and final year projects. **CO6.** Verification of various amplifiers
7	**ACCS-16305**	**OBJECT ORIENTED PROGRAMMING LAB**	**CO1.** Develop solutions for a range of problems using object oriented programming.. **CO2.** Understandtheprinciples of the object oriented programming paradigm specifically including abstraction, encapsulation and polymorphism and reuse the code using concept of inheritance. **CO3.** Develop scenarios to explain behavior and demonstrate correctness of programs. **CO4.** Familiarization with the critical thinking skills and creativity to solve the problems. **CO5.** Implement divide and conquer strategy to searching and sorting problems using iterative and/or recursive solutions. **CO6.** Store the contents of a program into the secondary storage as a file using file handling.
8	**ACEC-16305**	**Digital Circuit and Logic Design Lab.**	**CO1.** To be well versed with number systems such as binary , octal, hexadecimal and able to perform various operations s uch as conversion, addition, subtraction etc. **CO2.** To have understanding of various logic gates such as AND, OR, NOR, NOT, XOR etc. along with knowledge of Boolean minimization techniques like K-Map and Q-M Met hod. **CO3.** To be able to design combinational circuits such as en coder, decoder, code converters, adder, subtractor, multiplex er, de-multiplexer and parity checker. **CO4.** To be able to design sequential circuits such as shift re gisters, counters etc. using flip flops, clocked flip flop, SR, J K, D, T and edge triggered flip flop. **CO5.** To have working knowledge of various types of digita l to analog converters. **CO6.** To understand logic families such as RTL, DCTL, DT L, TTL, ECL, CMOS and their characteristics.

9	**ACEC- 16404**	**Electromagnetic Field Theory**	**CO-1**. An ability to apply knowledge of vector relations with help of solving numerical problems. **CO-2**. An ability to identify, formulates the relations between divergence, curl & gradient and their interpolation in different integral theorems. **CO-3**. An ability to analyze Electromagnetic Wave theory using wave propagation theory and develop them with help of Maxwell's equations for time varying fields. **CO-4**. Ability to analyze the working of transmission lines with effect to EM waves. **CO-5**. Ability to analyze the distortion less condition in transmission lines **CO-6.** Ability to analyze the low loss RF and UHF transmission lines
10	**ACEC-16401**	**Analog Communication System**	**CO1.** Student will be able to understand different Analog m odulation techniques. **CO2.** Students will able to study about the transmission of si gnal from transmitter to receiver. **CO3.** Students will understand the different AM receivers. **CO4.** Students will able to draft mathematically about AM c urrent, voltage, power. **CO5.** Students can professionally study the parameters of co mmercially used FM. **CO6.** Students can identify the practical advantages of digita l transmission and analog transmission. **CO7.** Students are expected to apply the knowledge gained f or their project work.
11	**ACEE - 16402**	**Linear Control Systems**	**CO1.** To introduce the fundamental concepts of control systems with emphasis on open loop and closed loop control system. **CO2.** Determining the transfer function of a control system using block diagram reduction technique and signal flow graph technique. **CO3.** To introduce the concept of analogies between different types of systems. **CO4.** Introduction to the transient and steady state response of 1^{st} and 2^{nd} order control systems. **CO5.** To demonstrate the use of root locus, bode plot and nyquist plot to determine the stability of a system which is very useful in designing of control system. **CO6.** Need of compensation in control system.

12	**ACEC-16402**	**Linear Integrated Circuit**	**CO1.** Designing of the differential amplifier **CO2.** Performance parameters of operational amplifier i. How op-amp can be used in various applications like Sawtooth wave generator, Summer/Scaling/Averaging Amplifier etc. ii. Designing of the integrator/differentiator, Log/Anti-Log circuit etc. which are useful in electronic circuits. **CO3.** Designing of various multivibrators using IC 555 **CO4.** Designing of Specialized IC's such as Fixed, Adjustable and Switching Regulators which are very useful in Linear Circuit Designs.
13	**ACEC-16407**	**Simulation lab for Electronic Engineers**	**CO1.** Generate discrete and continuous step signals. **CO2.** Generate exponential and ramp signals in continuous and discrete domain. **CO3.** Addition and Subtraction of two signals. **CO4.** To generate a random binary wave **CO5.** To develop program for discrete convolution and correlation
14	**ACEC-16405**	**Linear Integrated Circuit Lab**	**CO1.** To understand the differential amplifier configurations. **CO2.** Able to measure the performance parameters of an Op amp. **CO3.** To understand the Applications of Op amp as Inverting/Non Inverting amplifier. **CO4.** Able to use the Op-Amp as summing, scaling & averaging amplifier. **CO5.** Able to use the OP-Amp as Differentiator and Integrator. **CO6.** Application of Op Amp as Sawtooth wave generator. **CO7.** Understand the Applications of Op Amp as Schmitt Trigger.
15	**ACEC- 16901**	**Engineering Economics and Industrial management**	**CO1.** Ability to verify the breakeven analysis **CO2.** Will be able to understand replacement studies **CO3.** Will be able to differentiate between cost estimation and cost accounting **CO4.** Estimation of fixed and variable cost **CO5.** Will be able to understand management theories **CO6.** Will be able to understand organizational structures

16	**ACEC-16502**	**Digital Signal Processing**	**CO1.** Students will able to understand the difference between ASP & DSP. **CO2.** Students understand how to apply various algorithm to find the stability **CO3.** Students will able to explain various type of analog an d digital signal. **CO4.** Students will easily solve the Difference Equation. **CO5.** Students will explain Digital Signal processor application in practical life **CO6.** Students will able to design IIR & FIR Filters **CO7.** Students will analyze stability of the system by using DFT & Z transform.
17	**ACEC - 16501**	**Digital Communication**	**CO1.** To understand the building blocks of digital communication system. **CO2.** Basic knowledge about digital transmission and sampling techniques. **CO3.** Concepts of amount of information, entropy and various coding techniques. a. Designing of different line coding techniques and data formats. b. Familiarization about various modulation techniques. **CO4.** Analysis of coherent and non - coherent detectors.
18	**ACEC-16506**	**Hardware Programming Language Lab**	**CO1.** Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks. **CO2.** Build a simple Ethernet network using routers and switches. **CO3.** Use eNSP software to perform basic router and switch configurations. **CO4.** Utilize common network utilities to verify small network operations and analyze data traffic. **CO5.** Configure and troubleshoot an Open Shortest Path First (OSPF) network. **CO6.** Understand, configure, and troubleshoot Dynamic Host Configuration Protocol (DHCP) for IPv4
19	**ACEC- 16504**	**Lab Communication Systems**	**CO1.** Generate amplitude modulated wave and determine its percentage **CO2.** Generate frequency modulated signal and able to know about the modulation index **CO3.** Understand the TDM, PWM and PPM **CO4.** Know the Amplitude Shift Keying modulator and demodulator **CO5.** Generate the phase shift keying **CO6.** Decode techniques for various formats

20	**ACEC-16505**	**Lab Digital Signal Processing**	**CO1.**Students will be able to provide knowledge about MATLAB software **CO2** Students will able to Generate Graphical representation of Time & Frequency domain signal **CO3** It will easy for students to solve circular convolution **CO4** Students are expected to design FIR & IIR filters using MATLAB software. **CO5** Students will able to solve easily, DFT & FFT & Z transform **CO6** Students are expected to perform different operation on sequence like signal addition ,multiplication & shifting etc **CO7** Students are expected to apply the knowledge gained for their project work.
21	**ACCS-16404**	**Programming in Python**	**CO1.** To Learn Syntax and Semantics and create Functions in Python. **CO2.** To Handle Strings and Files in Python. **CO3.** To Understand Lists, Dictionaries in Python. **CO4.** To Implement Object Oriented Programming concepts in Python **CO5.** To learn how to use exception handling in Python applications for error handling. **CO6.** To Build GUI applications
22	**ACCS-16409**	**Programming in Python Lab**	**CO1.** Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python **CO2.** Express different Decision Making statements and Functions **CO3.** Interpret Object oriented programming in Python **CO4.** Implementation of data Structures in python. **CO5.** Understand and summarize different File handling operations **CO6.** Explain how to design GUI Applications in Python and evaluate different database operations

23	**ACEC-16503**	**Embedded System-I**	**CO1.** Student having the knowledge about the basic architecture of processors. **CO2.** Good awareness about the 8085 microprocessors and its applications. **CO3.** Designing of the various program by using 8085 instructions. **CO4.** Student will learn about the 8051 MCU and different input /output port programming. **CO5.** Design of the various Timer /Counter program by using 8051 **CO6.** Interfacing of the 8051 MCU with different modules like ADC,LCD etc.
24	**ACEC-16602**	**Embedded System-II**	**CO1.** Introduction to the ARM architecture and its family **CO2.** Student will help in developed the program by using different instruction **CO3.** Student will better understanding about the concept of the registers ,interrupts and processor mode. **CO4.** Introduction to the arduino and raspberry pi kits . **CO5.** Design of the various program by using basic arduino commands. **CO6.** Interfacing of the ARM proceesors with different modules like ADC, RFID etc.
25	**ACEC-16604**	**OPTICAL COMMUNICATION**	**CO1.** Introduction to the optical fiber and its types . **CO2.** How the dispersion effect on the different types of optical fiber. **CO3.** Student will understand the concept of losses in optical fiber **CO4.**Student will understand the different types of the Optical transmitters. **CO5**.Student will understand the different types of the Optical receviers. **CO6.**Analysis of the receiver noise mechanism in optical receivers.

26	**ACEC - 16601**	**Wireless Communication System**	**CO1.** Knowledge of the basics of wireless communication techniques. **CO2.** Issues related to the general description of the problem and frequency reuse channels and co - channel interference reduction factor. **CO3.** Demonstration of the importance of hand off's and dropped calls along with its characteristics. **CO4.** Basic concepts of fading and diversity in wireless communication. **CO5.** Introduction to the various multiple access techniques. **CO6.** Familiarization with different generations of cellular system such as 2G, 3G, 4G, 5G networks and its architectures.
27	**ACEC-16603**	**Microwave & Radar Engg**	**CO1.** Able to understand the ferrite devices in detail **CO2.** Able to apply and familiarize with microwave generators. **CO3.** Understands the difference between conventional tubes and microwave tubes. **CO4.** To familiarize with the basic power and VSWR measurement methods. **CO5.** Able to understand the monostatic and bistatic radar. **CO6.** To understand scanning and tracking techniques.
28	**ACEC- 16606**	**Lab Microwave & Optical Engineering**	**CO1.** To understand the various microwave components **CO2.** To understand Klystron characteristics **CO3.** Students will be able to design various antennas using HFSS software **CO4.** Students will be able to understand attenuation in optical fibers **CO5.** Students will be able to understand bending losses in optical fibers **CO6.** Students will be able to calculate the numerical aperture in optical fibers
29	**ACEC- 16605**	**Lab Wireless Communication System**	**CO1.** Students will be able to understand the basics of Lab view **CO2.** Students will be able to analyze various modulation techniques using labview **CO3.** Students will be able to analyze vector signal transceiver **CO4.** Students will be able to analyze VNA **CO5.** Students will be able to analyze various antennas using VNA **CO6.** Design of OFDM based system using VNA

30	**ACEC-16926**	**Antenna Wave Propagation**	**CO1.** To understand the performance parameters of Antenna **CO2.** To get familiar with Linear Wire and Aperture Antenna **CO3.** Able to understand the Microstrip Patch and Fractal Antenna **CO4.** To understand antenna array with its classifications which are useful in communication System **CO5.** To know about the ground and wave propagation
31	**ACCS-16603**	**MACHINE LARNING**	**CO1.** Recognize the characteristics of machine learning that make it useful to real-world problems. **CO2.** Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised. **CO3.** Be able to use support vector machines. **CO4.** Be able to use regularized regression algorithms. **CO5.** Understand algorithms for learning Bayesian networks. **CO6.** Understand Back propagation algorithms.
32	**ACEC - 16702**	**VLSI Design**	**CO1.** To introduce the student to hardware descriptive languages and design tools for digital systems. **CO2.** To enable the student in the semantics of VHDL and language usage. **CO3.** To understand working and realization of combinational circuits. **CO4.** To understand working flip-flops and use them in designing of sequential circuits. **CO5.** Introduction to FSM and ASM charts. **CO6.** To brief the students with various programmable logical devices for implementation
33	**ACCS-16606**	**MACHINE LEARNING LAB**	**CO1.** Gain knowledge about basic concepts of Machine Learning **CO2.** Identify machine learning techniques suitable for a given problem **CO3.** Solve the problems using various machine learning techniques **CO4.** Implement various machine learning techniques. **CO5.** Design application using machine learning techniques

34	**ACEC - 16703**	**Lab VLSI**	**CO1.** To introduce the student to hardware descriptive languages. **CO2.** To introduce the students to design tools for digital circuit design. **CO3.** . To enable the student in the semantics of VHDL and language usage. **CO4.** To allow the student to practically implement various logic gates. **CO5.** To enable the students in designing combinational logic circuits. **CO6.** To enable the students in designing and implementing sequential logic circuits.

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department of Electrical Engineering

The Program Outcomes (POs) of B.Tech Electrical Engineering are:

Programme Outcomes (POs)

a. Graduates will be demonstrated knowledge of differential equations, vector calculus, complex variables, matrix theory, probability theory, physics, chemistry and electrical and electronics engineering.

b. Graduates will be demonstrated an ability to identify, formulate and solve electrical engineering problems.

c. Graduate will be demonstrated an ability to design electrical and electronic circuits and conduct experiments with electrical systems, analyze and interpret data.

d. Graduates will be demonstrated an ability to design digital and analog systems and component.

e. Graduates will be demonstrated an ability to visualize and work on laboratory and multidisciplinary tasks.

f. Graduate will be demonstrated skills to use modern engineering tools, software and equipment to analyze problems.

g. Graduates will be demonstrated knowledge of professional and ethical responsibilities.

h Graduate will be able to communicate effectively in both verbal and written form.

i. Graduate will be shown the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.

j. Graduate will be developed confidence for self-education and ability for life-long learning.

k. Graduate will be able to explore the knowledge gained for participation and succeeding in competitive examinations like GATE, GRE.

l. Graduates will be demonstrated their knowledge in effective implementation during their practice of profession of Electrical Engineering with due regards to environmental and social concerns.

Program Specific Outcomes

1. Graduates will demonstrate their knowledge in effective implementation during their practice of profession of Electrical Engineering with due regard to environment and social concerns.
2. Graduates will demonstrate their knowledge in analysis, design, erection and laboratory experimentation regarding Electrical Engineering.
3. Graduates will be motivated for continuous self- learning in engineering practice and pursue research in advanced areas of Electrical Engineering in order to offer engineering services to the society, ethically.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	**ACEE-101**	**Basic Electrical and Electronics Engg**	**CO1.** To understand the basic concepts of AC and DC **CO2.** To understand the basic principles of magnetic fields, transformers and machines. **CO3.** To understand the concept of various electronic devices. **CO4.** To understand the concept of digital electronics.
2	**ACEE-16301**	**Circuit Theory**	**CO1.** Focus on the analysis of the circuits by using different techniques.. **CO2.** Design different types of filter and their analysis **CO3.** Explore their knowledge about existing filter networks. **CO4.** Apply the knowledge gained in analysis and design of different types of circuits.
3	**ACEE-16304**	**Electronic Devices and Circuits**	**CO1.** Basics of Electronic Devices like PN Diode, LED, LCD, Photodiode, Tunnel diode and Zener diodes. **CO2.** Basic knowledge about voltage regulator which is widely used in power supply design. **CO3.** Functioning of various transistors like BJT, JFET, UJT and MOSFETs **CO4.** Designing of different types of amplifiers. **CO5.** Familiarization with the feedback concepts and its effect on gain, stability, distortion, bandwidth and frequency response. **CO6.** Analysis of various oscillators like Hartley, Colpitt, crystal, wein bridge etc.
4	**ACEE- 16303**	**Electrical Measurements & Instrumentations**	**CO1.** An ability to gain knowledge of different types of analog measuring instruments and their applications. **CO2.** An ability to understand various types of bridges and related lab experiments. **CO3.** An ability to use transducers and various types of transducers in real life. **CO4.** An ability to use techniques, skills related to

			potentiometers in different field applications. **CO5.** Analysis of BH curve and hysteresis loop **CO6.** Analysis of various types of voltmeters and volt ratio box
5	**ACEE-16302**	**Transformer and DC Machines**	**CO1.** Describe how a transformer is constructed and how does it work. **CO2.** Perform testing on transformer and to evaluate efficiency and voltage regulation. **CO3.** Develop equivalent circuit, phasor diagram and circuit parameters. **CO4.** Comprehend the construction, working and characteristics of dc machines. **CO5.** Exploit knowledge in context of applications of dc generators and motors in industry.
6	**ACEE-16306**	**Laboratory-II (Electrical Machines-I)**	**CO1.** Students are primarily focuses on the energy conversion process. **CO2.** To promote curricula and assessment based on constructivist methods. **CO3.** Students are expected to gain the knowledge about various applications of d.c. machines. **CO4.** 4. Students are expected to apply the knowledge gained in their real life
7	**ACEE-16306**	**Laboratory-II (Electrical Machines-I)**	**CO1.** Students are primarily focuses on the energy conversion process. **CO2.** To promote curricula and assessment based on constructivist methods. **CO3.** Students are expected to gain the knowledge about various applications of d.c. machines. **CO4.** Students are expected to apply the knowledge gained in their real life.
8	**ACEE-16306**	**Laboratory-II (Electrical Machines-I)**	**CO1.** Students are primarily focuses on the energy conversion process. **CO2.** To promote curricula and assessment based on constructivist methods. **CO3.** Students are expected to gain the knowledge about various applications of d.c. machines. **CO4.** 4. Students are expected to apply the knowledge gained in their real life
9	**ACEE-16307**	**Lab Electrical Measurements & Instrumentations**	**CO1.** An ability to perform well for precision measurement of R, L, C, M, & F by different bridges. **CO2.** An ability to use various measuring instruments **CO3.** An ability to use potentiometers, CRO for measurement of frequency and phase angle. **CO4.** An ability to apply their knowledge to design various energy efficient electrical appliances for industrial applications. **CO5.** Ability to design various mini electronic projects **CO6.** Ability to use capacitive transducers.

10	**ACEE-16403**	**Electromagnetic fields**	**CO1.** An ability to apply knowledge of vector relations with help of solving numerical problems. **CO2.** An ability to identify, formulates the relations between divergence, curl & gradient and their interpolation in different integral theorems. **CO3.** An ability to analyze Electromagnetic Wave theory using wave propagation theory and develop them with help of Maxwell's equations for time varying fields
11	**ACEE - 16402**	**Linear Control Systems**	**CO1.** To introduce the fundamental concepts of control systems with emphasis on open loop and closed loop control system. **CO2.** Determining the transfer function of a control system using block diagram reduction technique and signal flow graph technique. **CO3.** To introduce the concept of analogies between different types of systems. **CO4.** Introduction to the transient and steady state response of 1^{st} and 2^{nd} order control systems. **CO5.** To demonstrate the use of root locus, bode plot and nyquist plot to determine the stability of a system which is very useful in designing of control system. **CO6.** Need of compensation in control system.
12	**ACEE-16401**	**Asynchronous Machines**	**CO1.** Understand the basis of induction machines mostly used in industry. **CO2.** Learn and analyze different types of fractional horse power motors. **CO3.** Identify equivalent circuit and parameters after testing. **CO4.** Comprehend and solve industry related problems in context of induction motors.
13	**ACEE-16404**	**Power System-I**	**CO1.** Students are exposed to the power supply system and for this a visit to nearby substation arranged. **CO2.** Students know the types of conductors and their relative merits and demerits. **CO3.** Students gain the knowledge of transmission line parameters and thereby the knowledge of design parameters for substation. **CO4.** Students apply the knowledge gained for their project work.
14	**ACEE-16404**	**Power Plant Engineering**	**CO1.** Understand several systems available for power generation along with their advances and disadvantages. **CO2.** Knowledge of non-conventional power plants. **CO3.** Understand Load division and tariff methods.

15	**ACEE-16408**	**Lab. Electrical Estimation & Costing**	**CO1.** The students are able to demonstrate the knowledge of Indian electricity rules. **CO2.** The students are able to draw single line diagram of an electrical installation. **CO3.** The students are able to estimate the cost of the various electrical fittings including lighting fixtures, fans, switches, wires, MCBs etc. required in an electrical installation. **CO4.** The students are able to make an estimate the cost of repair and maintenance of domestic appliances.
16	**ACEE-16406**	**Electrical Practice and Maintenance Lab**	**CO1.** Students gain knowledge regarding the application and extensive utility of various electrical appliances **CO2.** Students learn about the modern systems being used in domestic applications **CO3.** Students apply the knowledge in related lab experiments.
17	ACEE - 16407	Laboratory - II Control System	**CO1.** The students are aware of various types of control systems. **CO2.** Use of synchros as an error detector. **CO3.** To study the speed - torque characteristics of an AC servomotor and to explore its applications. **CO4.** Determination the transfer function of a control system using matlab. **CO5.** Finding the time and frequency response of a control system. **CO6.** Implementation and finding stability of control system using root loci, bode plot and nyquist plot in MATLAB
18	ACEE-16503	Digital Electronics and Microprocessor	**CO1.** To be well versed with number systems and binary code **CO2.** To undertand various logic gates along with knowl edge of Boolean minimization techniques **CO3.** To be able to design combinational circuits such as encoder, decoder, code converters, adder, subtractor, multiplex, DE multiplexer and parity generator. **CO4.** To be able to design sequential circuits such as shift registers, counters etc. using flip flops, clocked flip flop, SR, JK, D and T **CO5.** To have working knowledge of various types of di gital to analog converters. **CO6.** To understand the architecture 8085 along with various instructions required in programming **CO7.** To know about the architecture of 8086
19	**ACEE-16502**	**Electric Generation and Economics**	**CO1.** Focus on the resources that are available for electric power generation. **CO2.** Estimate load requirements using various factors and load curves. **CO3.** Explore their knowledge about existing tariff plans. **CO4.** Apply the knowledge gained in analysis of economic scheduling.

20	**ACEE-16501**	**Synchronous Machine**	**CO1.** Students gain knowledge regarding the application and extensive utility of alternators in power generation. **CO2.** Students learn about the modern excitation systems being used in alternators. **CO3.** Students apply the knowledge in related lab experiments
21	**ACEE-16507**	**Lab. Digital Electronics and Microprocessor**	**CO1.** Understand the Designing and verification of the truth tables of half/full : adder/subtractor **CO2.** Verify the truth table of the Multiplexer and De-Multiplexer **CO3.** Designing and testing of an S-R , J-K , D and T flip-flop using NOR/NAND gates. **CO4.** Designing of counter using Flip Flops/IC's. **CO5.** Study of 8085 Microprocessor Kit. **CO6.** Write the program for addition/subtration using 8085. **CO7.** Write the program for multiplication two 8 bit numbers using 8085.
22	**ACEE-16504**	**Power Electronics**	**CO1.** Understand the importance of power electronics and its applications **CO2.** Identify and resolve the problems using techniques **CO3.** Understand the operation, function and interaction between various components and subsystems **CO4.** Apply the knowledge gained for project work **CO5.** Understand, analyse, design, model and synthesize power converter based systems used for conversion of electric energy
23	**ACEE-16506**	**Lab-VII (Electrical Machine Lab)**	**CO1.** Students perform field testing in the industries. **CO2.** Students analyze the results and outcomes of the observations in the lab.
24	**ACEE-16607**	**Laboratory-XI (Power System-II Lab)**	**CO1.** The students are able to determine A,B,C,D parameters of transmission line. **CO2.** The students are able to apprehend various protective devices used in power system. **CO3.** The students are able to recognize the application of operating characteristics of various power system protective devices. **CO4.** The students are able to find the breakdown strength of transformer oil.

25	**ACEE - 16608A**	**Laboratory - III Microcontroller, PLC and Scada**	**CO1.** Develop programs in assembly level language. **CO2.** Analyze and do interfacing of microcontroller with peripherals and outside world. **CO3.** Apply the knowledge gained to develop microcontroller based practical projects. **CO4.** Develop arduino based practical projects. **CO5.** Design and develop various practical circuits using 8051 microcontroller and PLC's. **CO6.** Application of scada in the field of electrical engineering
26	**ACEE - 16604A**	Microcontroller, PLC and Scada	**CO1.** Understand the need and importance of microcontrollers and how they differ from microprocessor. **CO2.** Develop logic so that they are able to develop their programming skills and make assembly language programs. **CO3.** Interface external devices with 8051 microcontroller and able to analyze how they interact with each other. **CO4.** Introduction to arduino concepts. **CO5.** Understand PLC's and develop simple applications using ladder logic. **CO6.** Understanding of basics of scada.
27	**ACEE-16601**	**Electric Power Utilization**	**CO1.** Focus on the different types of traction systems available in India. **CO2.** Estimate about different illumination requirements and to provide that by different types of sources. **CO3.** Explore their knowledge about existing refrigeration and air conditioning systems. **CO4.** Apply the knowledge gained in analysis of different problems of speed-time curve.
28	**ACEE-16603**	**Non Linear & Digital Control System**	**CO1.** Focus on the study of different types of non-linearity and their effects on the system. **CO2.** Estimate stability of digital control system. **CO3.** Explore their knowledge for analysis and design of different types of digitally control system. **CO4.** Apply the knowledge gained in analysis of different types of non-linearity.

29	**ACEE-16602**	**Power System-II**	**CO1.** Students apply the knowledge while working in the industry, electrical utilities (erstwhile state electricity boards) for the protection of electrical equipments. **CO2.** With the knowledge of this subject, students are expected to perform well in the interviews of various manufacturing units. **CO3.** 3. Students apply the knowledge to install lightening arrestors in commercial, industrial and domestic fields.
30	ACEE-16605	Signal and System	**CO1.** Student will able to identify the continuous time and discrete time si gnals. · **CO2.** Student will able to analyze the CT and DT systems. **CO3.** Student will able to evaluate the Power Spectral Density and Energy spectral density of the signals. **CO4.** CO4 Student will able to study the Linear Time invariant Systems and the ir properties. **CO5.** CO5 Student will able to study Fourier Transform and DTFT. **CO6.** CO6 Student will able to study the convolution theorem
31	**ACEE-16606**	**S&S Lab**	**CO1.** Generate discrete and continuous step signals. **CO2.** Generate exponential and ramp signals in continuous and discrete domain. **CO3.** Addition and Subtraction of two signals **CO4.** To generate a random binary wave **CO5.** To develop program for discrete convolution and correlation **CO6.** To develop programs for various signal operations.
32	**ACEE-16702**	**High Voltage Engineering**	**CO1.** An ability to apply knowledge on the resources that are available for H.V. transmission. **CO2.** An ability to analyze losses due to corona in all weather conditions. **CO3.** An ability to elaborate the applications of insulating materials. **CO4.** To implement the knowledge gained in government sector and private organizations by working and designing transmission systems according to field requirement

33	**ACEE-16704A**	**HVDC Transmission**	**CO1.** Focus on the different types of available power electronics devices used for HVDC Transmission. **CO2.** Estimate and design different types of converter station for HVDC power Transmission. **CO3.** Explore their knowledge for analysis of different pulses converter station. **CO4.** Apply the knowledge gained in analysis of different semiconductor circuits.
34	**ACEE-16701**	**Power System Analysis**	**CO1.** Students gain the knowledge of structure of power system. **CO2.** Students are able to apply the knowledge gained for development of computer programs for the effective operation of power system. **CO3.** Students gain knowledge of Load flow, Short Circuit Study & Stability of Power System **CO4.** Students apply the knowledge gained for their project work & field work.
35	**ACEE-16703A**	**Non-Conventional Energy Sources**	**CO1.** Focus on the non-conventional resources that are available for electric power generation. **CO2.** Estimate and compare requirements for running of different types of non-conventional plants. **CO3.** Explore their knowledge about existing non-conventional plants in India. **CO4.** 4. Apply the knowledge gained in comparing of different types of conventional and non-conventional plants
36	**ACEE-16705**	**Lab-XIII (PSA Lab)**	**CO1.** The students use MATLAB for development of computer programs for Y-bus and Z-bus formation, load flow studies, economic operation of power plants. **CO2.** The students use SIMULINK for power system stability study. **CO3.** The Students demonstrate the ability of converting algorithms in MATLAB programs. **CO4.** The Students demonstrate the ability of relating theoretical concepts of power system analysis with actual power system operation.

Department: Civil Engineering

The Program Outcomes (POs) of B.Tech Civil Engineering are:

a. Graduates are expected to build up communication skills for sharing innovative ideas effectively.

b. Graduates are expected to be ethically responsible citizens.

c. Graduates are expected to put civil engineering knowledge in practical.

d. Graduates are expected to apply knowledge of science and mathematics in civil engineering problems.

e. Graduates will be able to function individually as well as member of multidisciplinary teams to solve engineering and multidisciplinary problems with leadership qualities.

f. Graduates will be able to create awareness on contemporary issues and impact of engineering solutions on society.

g. Graduates will be able to recognize the need for new engineering tools from experience and problems faced by civil engineers in the past.

h. Graduates will be able to provide the engineering solutions in effective and ingenious ways by making use of graphs and tables etc.

i. Graduates will be able to use modern engineering softwares, skills and computing tools required for solving various civil engineering problems.

j. Graduates will be able to analyse and design the structures as well as conduct experiments and interpret observations for reporting the results.

Program Specific Outcomes (PSO)

1. Understanding

Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.

2. Broadness and Diversity

Graduates will have a broad understanding of economic, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage

3. Self-Learning and Service

Graduates will be motivated for continuous self-learning in engineering practice and/or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	**ACCE-16301**	Strength of Materials	**CO1:** To determine the stresses, strains, and displacements in structures and their components due to the loads acting on them. **CO2:** Students are able to draw shear force and bending moment diagrams. **CO3:** To help students understand various fundamental issues of elasto-mechanics, i. e. the mechanics of solids, and deformable bodies. **CO4:** To analyse columns under various supporting conditions with the help of Euler theory. **CO5:** Students will be able to understand various theories regarding failure of any column or beam in building.
2	**ACCE-16302**	Fluid Mechanics	**CO1:** Students will be able to define the nature of a fluid. **CO2:** Students are expected to understand the concept of floating and submerged bodies. **CO3:** To introduce viscosity effects on flow and characteristics of Newtonian and non-Newtonian fluids. **CO4:** To help students in measuring the flow through various weirs and notches. **CO5:** To help students in understanding the pressure drag and lift produced around submerged bodies of various shapes
3	**ACCE-16303**	Survey-I	**CO1:** To learn principal of working from whole to part. **CO2:** To help students in deciding the position of any point, its reference relative to least two permanent objects or stations whose position have already been well defined. **CO3:** Students will be able to calculate various types of errors involved in measuring distance and angles between different stations on ground. **CO4:** To help students in understanding basic terminology used in surveying **CO5:** Students are expected to draw contour maps and find out reduced levels at various points on ground.
4	**ACCE-16304**	Environmental Engineering-I	**CO1:** To impart broad knowledge of ecology and the environment. **CO2:** Students will be able to emphasize on the Indian natural environment and major issues facing the world **CO3:** To assist in collecting water from various sources and supplying for domestic usage after proper treatment. **CO4:** Students will be able to know about various quality parameters required to determine the purity of water for drinking purpose. **CO5:** Students will be able to forecast the water demand in particular area for proper design of water distribution network.

5	**ACCE-16305**	Building Materials	**CO1:** To promote development, production, standardisation and large-scale application of cost- effective innovative building materials and construction technologies in housing and building sector. **CO2:** To promote new waste-based building materials and components through technical support and encouraging entrepreneurs to set up production units in urban and rural regions. **CO3:** To develop and promote methodologies and technologies for natural disaster mitigation & management and retrofitting. **CO4:** Students will be able to know various terminology used in case of different components of building **CO5:** To help students in selecting different materials used for construction based on type of load coming and climatic conditions.
6	**ACCE-16306**	Fluid Mechanics Lab	**CO1:** To determine discharge coefficient in case of flow over weirs and notches. **CO2:** To demonstrate losses in pressure of flow due to bends, sudden change in size of pipes in water distribution network. **CO3:** Students are expected to know the velocity distribution inside pipes.
7	**ACCE-16307**	Strength of Materials Lab	**CO1:** Students will be able to draw stress strain curves for various materials in tension and compression **CO2:** To demonstrate hardness, impact strength of various materials by different methods. **CO3:** Students are expected to test mild steel bars required to be used as building material.
8	**ACCE-16308**	Survey-I Lab	**CO1:** The students are able to understand the use of different surveying instruments and their use **CO2:** To help students in carrying out plane table surveying for drawing plan of particular region accurately. **CO3:** To demonstrate use of total station and its applications in traversing the fields/aerial photographs and stereoscopic analysis.
9	**ACCE-16401**	Survey-II	**CO1:** To learn principal of working from whole to part. **CO2:** To help students in deciding the position of any point, its reference relative to least two permanent objects or stations whose position have already been well defined. **CO3:** Students will be able to calculate various types of errors involved in measuring distance and angles between different stations on ground. **CO4:** To help students in understanding basic terminology used in surveying **CO5:** Students are expected to draw contour maps and find out reduced levels at various points on ground.
10	**ACCE-16402**	Structural Analysis-I	**CO1:** To apply basic knowledge of bending moment and shear force in analyzing various elements of buildings **CO2:** Students will be able to identify determinate, indeterminate, stable and unstable structures. **CO3:** To determine forces and deflections in determinate trusses, beams and frames. **CO4:** Students are expected to analyze various structures like cables and suspension bridges, dams and retaining walls. **CO5:** To help students in drawing influence line diagrams required for fast and accurate analysis of beams.
11	**ACCE-16403**	Design of Concrete	**CO1:** To learn the fundamentals of design, analysis, and proportioning of reinforced concrete members and structures.

		Structures-I	**CO2:** Students will be able to design various members of buildings like columns, beams, slabs etc. **CO3:** Students will be able to apply various methods for analysis and design of these elements under flexure, shear, and axial loads. **CO4:** To understand various properties of different ingredients used for manufacturing concrete. **CO5:** Students will be able to mix different ingredients in proper ratio as defined by Indian Standards for getting proper strength of concrete prior to usage in construction to take up loads safely.
12	**ACCE-16404**	Building Construction	**CO1:** Students are able to understand the property , use , advantage and disadvantage of different material used in construction **CO2:** Students are able to understand the component of building with their function **CO3:** Students are able to understand construction procedure of different components
13	**ACCE-16405**	Building Construction Drawing	**CO1:** After completion of this students will able to understand basic principles of building design and planning. **CO2:** They will explore building drawing as a way of discovering and developing ideas for designing residential, commercial and public buildings. **CO3:** The student develops basic drawing skills; create multilayer architectural and working drawing drawings.
14	**ACCE-16406**	Concrete Technology Lab	**CO1:** To calculate various properties of cement like setting time, specific gravity etc required for smooth working of construction projects. **CO2:** Students will be able to perform various tests on concrete that is most important material in construction. **CO3:** Students will be able to design concrete mix according to prescribed Indian standards for taking different types of loading safely.
15	**ACCE-16407**	Survey-II Lab	**CO1:** Students are expected to measure distance and angles between various stations on ground by theodolite, chain and tape **CO2:** Students are able to calculate compute the area and earthwork for different works by using surveying instruments **CO3:** Students are expected to draw contour maps and find out reduced levels at various points on ground.
16	**ACCE-16501**	Structural Analysis-II	**CO1:** Students will be able to identify determinate, indeterminate, stable and unstable structures. **CO2:** To help students in determining forces in indeterminate trusses, beams and frames by the force method. **CO3:** Students will be able to understand various methods for analyzing indeterminate structures and selecting suitable method. **CO4:** To help students in drawing influence line diagrams required for fast and accurate analysis of beams.
17	**ACCE-16502**	Design of Concrete Structures-II	**CO1:** To learn the fundamentals of design, analysis, and proportioning of reinforced concrete members and structures. **CO2:** Students will be able to design various members of buildings like footings, retaining walls, slender columns, slabs etc.

			CO3: Students will be able to apply various methods for analysis and design of these elements under flexure, shear, and axial loads. **CO4:** To understand various properties of different ingredients used for manufacturing concrete. **CO5:** Students will be able to mix different ingredients in proper ratio as defined by Indian Standards for getting proper strength of concrete prior to usage in construction to take up loads safely.
18	**ACCE-16503**	Transportation Engineering-I	**CO1:** To introduce students to transportation engineering principles for streets and highways with emphasis on the safe and efficient operation of roadways. **CO2:** Students will be able to understand the basic elements of the transportation delivery system **CO3:** To make students learn both quantitative and computerized techniques for planning, designing, and operating transportation systems. **CO4:** To impart knowledge of different materials required in construction of roads regarding their properties and usage. **CO5:** Students will be able to design horizontal and vertical curves on roads for efficient and safe working of highways.
19	**ACCE-16504**	Professional Practices	**CO1:** To impart knowledge regarding cost analysis of building by various methods. **CO2:** Students will be able to maintain measurement books required for smooth and efficient working of civil engineering projects. **CO3:** Students will have in-depth knowledge regarding tenders, various acts and legal formalities required in any civil engineering project. **CO4:** Students will be able to calculate exact current rates of earthwork, concrete work, plastering etc. for proper evaluation of building. **CO5:** Students will get to know about proper hierarchy of accounts division to help clients with correct information in future.
20	**ACCE-16505**	Irrigation Engineering-I	**CO1:** To introduce importance and necessity of irrigation for welfare of society. **CO2:** Students will be imparted knowledge regarding various terms in irrigation engineering for effective working **CO3:** To help students for investigating and preparing various irrigation projects to be cost effective. **CO4:** Students will learn about various methods for irrigating fields. **CO5:** Students will be able to gain knowledge how to divert the rivers to control floods and use water in most effective manner.
21	**ACCE-16506**	CADD Lab-I	**CO1:** To allow the use of software for the preparation of drawings for different engineering works and their design.
22	**ACCE-16507**	Transportation Engineering Lab	**CO1:** To carry out various tests on aggregates for checking their various properties like impact strength, crushing strength etc. **CO2:** Students will be demonstrated about various tests of bitumen for checking their properties required to be used in road construction. **CO3:** Various field tests are conducted for checking the deflections on road pavements due to heavy vehicular traffic coming on it.
23	**ACCE-16508**	Structural Analysis Lab	**CO1:** To demonstrate the working of two-hinged and three-hinged arch under varying loads. **CO2:** Students will be able to calculate deflections in various

			members of building under various loading and supporting conditions. **CO3:** To determine behavior of columns and struts under different end conditions.
24	**ACCE-16601**	Design of Steel Structures-I	**CO1:** To determine behaviour of columns and struts under different end conditions. **CO2:** Define and contrast the material properties of steel **CO3:** Determine the ultimate tensile capacity of steel members considering both yielding and tensile fracture **CO4:** Determine the ultimate bending moment capacity of steel members considering both yielding and lateral buckling.
25	**ACCE-16602**	Soil Mechanics & Foundation Engineering	**CO1:** To build on the knowledge and understanding of soil behavior, pertaining to different types of foundations. **CO2:** To introduce students to detailed design issues related to both deep and shallow foundations. **CO3:** Students will be able to understand the role of modern soil mechanics and numerical modeling. **CO4:** To help in the design of machine foundations, and deep and shallow foundations. **CO5:** To provide safety to people by designing effective footings for various domestic and commercial buildings
26	**ACCE-16603**	Transportation Engineering-II	**CO1:** To impart knowledge regarding Indian Railway System, history and its hierarchy. **CO2:** Students will be able to design railway track like super elevation , horizontal curves for safe working of Railway System **CO3:** Students will be able to select site for making stations keeping in view economic and environment factors. **CO4:** Students will be introduced to basics of airport engineering and terminology used at airports **CO5:** To make students aware of latest technology and modifications in existing components in railway and airport engineering respectively.
27	**ACCE-16604**	Hydrology	**CO1:** Student will know the different terminologies related with hydrology . **CO2:** Students will analyze hydrological parameters required for water resource management. **CO3:** Student will assess ground water potential . **CO4:** Students will identify suitable method of irrigation and drainage of waterlogged area .
28	**ACCE-16605**	Environmental Engineering-II	**CO1:** Students will be able to know about the importance of sewerage system and its necessity in keeping our surroundings clean. **CO2:** Students will be able to design effective sewerage system that will help in providing required service to society. **CO3:** To help students in knowing different properties of sewage so that accordingly different treatment can be provided. **CO4:** Students will be able to design various units required in Wastewater Treatment Plant. **CO5:** Students will be able to choose proper system of plumbing depending on quantity and quality of wastewater for constructing cost-effective house drainage.
29	**ACCE-16606**	Geotechnical Engineering Lab	**CO1:** To provide ability of determining different soil properties and classification of soil. **CO2:** Students will be able to determine seepage through soil by different methods. **CO3:** To carry out grain size analysis of fine particles for choosing proper size of grains in different projects like retaining

			walls, foundations, roads etc.
30	**ACCE-16607**	Environmental Engineering Lab	**CO1:** To help students in calculating content of various elements present in water sample so as to apply proper treatment. **CO2:** Students will be demonstrated about various physical properties of water so that they can affirm just by visualizing whether it is suitable for drinking or not.
31	**ACCE-16608**	Computer Applications Lab	**CO1:** To allow the use of software for the preparation of drawings for different engineering works and their design.
32	**ACCE-16801**	Design of Steel Structures-II	**CO1:** Analyze indeterminate frames and trusses using approximate methods of analysis **CO2:** Define and contrast the material properties of steel **CO3:** Determine the ultimate tensile capacity of steel members considering both yielding and tensile fracture for designing safe structures **CO4:** Students will be able to design steel members by determining the ultimate bending moment capacity of steel members considering both yielding and lateral buckling. **CO5:** Students will be able to use Indian Standard codes effectively so that steel structures are designed as per Indian Standards for their long life.
33	**ACCE-16802**	Irrigation Engineering-II	**CO1:** To introduce importance and necessity of irrigation for welfare of society. **CO2:** Students will be imparted knowledge regarding various theories of seepage so as to construct canals that will be safe even during flood kind situation. **CO3:** To help students for investigating and preparing various irrigation projects to be cost effective. **CO4:** Students will learn about various methods for irrigating fields. **CO5:** Students will be able to design different kinds of weirs for effective and continuous flow in canals so as to provide continue supply of water in fields.
34	**ACCE-16814**	Disaster Management	**CO1:** Students will be able to know about different kinds of hazards that can occur and thus can design any structure to withstand that hazard. **CO2:** Students will learn about Emergency Management System to carry out any emergency operation in case of any mishappening. **CO3:** To give information to students regarding any disaster that has happened in the past so that new structures should be designed accordingly to withstand those disasters. **CO4:** Students will be able to learn about various agencies in India like NDMA, SDMA etc. and various new techniques like remote sensing, GIS for early warning system.
35	**ACCE-16812**	Bridge Engineering	**CO1:** Students will be able to know about various investigations that are required to select suitable site which is technically and economically feasible. **CO2:** Students will get to learn about various standard specifications provided by Indian Road Congress for road bridges. **CO3:** Students will learn to design and construct Concrete and Steel bridges along with various components of bridges. **CO4:** Students will learn about various bearings and appurtenances for safety such that constructed bridges can safely transfer the load to the sub-structure. **CO5:** Students will gain the knowledge regarding inspection

			and maintenance of bridges that will help in increasing the durability of structures.
36	**ACCE-16803**	CADD Lab	**CO1:** To allow the use of software for the preparation of drawings for different engineering works and their design.
37	**ACCE-16804**	Irrigation Engineering Drawing	**CO1:**Students will learn to design various structures related to Irrigation Engineering

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department: Applied Sciences

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	ACAM-101	Engg. Mathematics-I	**CO1:** To understand the basic difference between differentiation and partial differentiation. **CO2:** Analyze real world scenarios to recognize when partial derivatives or multiple integrals of multivariate and vector valued functions are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results. **CO3:** Recognize partial derivative and multiple integral concepts that are encountered in the real world, understand and be able to communicate the underlying mathematics involved to help another person gain insight into the situation. **CO4:** To Evaluate partial derivatives and can implement to estimate maxima and minima of multivariable function. **CO5:** To understand the applications of partial differentiation. **CO6:** Apply partial derivative equation techniques to predict the behavior of certain phenomena. **CO7:** To set up and evaluate multiple integrals for regions in the plane. To find Area of the region bounded by curves and to find volume, surface area **CO8:** Establish the relationship between position functions, velocity functions, acceleration functions, and speed functions. **CO9:** Demonstrate various real world scenarios using concepts of Vectors. **CO10:** To find maxima and minima, critical points and inflection points of functions and to determine the concavity of curves **CO11:** To introduce how to use vectors in real world. Vector calculus motivates the study of vector differentiation and integration in two and three dimensional spaces. It is widely accepted as a prerequisite in various fields of science and engineering. **CO12:** Partial differential equations help the students of mechanical engineering to solve the problems based on heat flow and Fluid mechanics.
2	ACHU-101	Communicative English - I	**CO1:** It will help the students to develop their creativity in expressing their thoughts

			CO2: The students will be able to reproduce their understanding of concepts/ principles of Communicative English **CO3:** The students will be able to think accurately, clearly and deeply to perform well in all communicative contexts **CO4:** It will bring about a real understanding in the students of the need to use English in their everyday life **CO5:** The students would be able to organize the material and present in a concrete and interesting manner before the audience **CO6:** Will Become independent users of English Language **CO7:** Show awareness of appropriate format and the capacity of explaining the views in a rational manner **CO8:** Converse fluently, without strain with international speakers of English in an accent and lexis that is widely understood across the globe
3	**ACCH-101**	**Engg. Chemistry**	**CO1:** Analyse the need, design and perform a set of experiments. **CO2:** Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life. **CO3:** Understand the causes of corrosion, its consequences and methods to minimize Corrosion to improve industrial designs **CO4:** Explain the properties, separation techniques of natural gas and crude oil along with potential applications and role of petrochemicals in national economy. **CO5:** Acquire Basic knowledge of Nano chemistry to appreciate its applications in the field of Medicine, data storage devices and electronics. **CO6:** Equipped with basic knowledge of polymer reinforced composites, applications of semiconductor photochemistry in energy harnessing and optical sensors. **CO7:** To acquire knowledge about desalination of brackish water and treatment of municipal water.

4	**ACHV-101**	**Human Values & Professional Ethics**	**CO1:** The students will understand the need and process for value education **CO2:** The students will be able to differentiate between values and skill and further they will learn the complementarily of values and skills **CO3:** The students will understand the difference between the needs of self and body and how to create harmony of self with body **CO4:** The students will understand the different values which are required in the family, difference between respect and attention **CO5:** The students will understand the harmony nature, interconnectedness and the mutual fulfillment in nature, develop holistic perspective towards life and profession as well as towards happiness and prosperity **CO6:** The students will understand natural acceptance of human values, competence in professional ethics **CO7:** The students will learn to know the meaning of coexistence and their participation in this universe.
5	**ACPH-101**	**Engg. Physics**	**CO1:** Understand components of a laser system, various types of lasers and their applications. **CO2:** Understand the applications of fiber optics in daily life. **CO3:** Understand the various Types of Polarization **CO4:** Understand equations of Electromagnetic Waves and Electromagnetic Spectrum. **CO5:** Understand the concept of X-rays. **CO6:** Differentiate Dia, Para and Ferromagnetic materials. **CO7:** Understand the applications of Superconductors and ultrasonic waves. **CO8:** Understand de Broglie concept, significance and normalization of wave function, Schrodinger wave equation. **CO9:** Basics of Nano-technology. **CO10:** Explanation of the properties of nano materials, synthesis of nano materials and CNTs.
6	**ACEE-101**	**Basic Electrical and Electronics Engg**	**CO1:** To understand the basic concepts of AC and DC **CO2:** To understand the basic principles of magnetic fields,

			transformers and machines. **CO3:** To understand the concept of various electronic devices. **CO4:** To understand the concept of digital electronics.
7	**ACFC-101**	**Fundamentals of Computer Application & Information Technology**	**CO1:** To provide knowledge about the hardware, software and basic computer organization **CO2:** To provide students basic ideas of programming language in C **CO3:** To make students understand problem solving and planning program **CO4:** To make the students understand the concept of file handling **CO5:** To make the students understand the use of IT enabled services
8	**ACAM-102**	**Engg. Mathematics-II**	**CO1:** Determine whether or not real series are convergent by comparison with standard series or using the ratio test. **CO2:** Solve a homogeneous linear system by the eigenvalue method. **CO3:** To understand the formation of Differential equation from the given physical problems and to solve first order ordinary differential equation by various methods. **CO4:** To be able to apply the knowledge of first order ordinary differential equation in different engineering applications. **CO5:** To Perform matrix operations. Solve the matrix equation using elementary matrix operations. To use systems of linear equations and matrix equations to determine linear dependency or independency. To find the Eigen values and corresponding eigenvectors for a linear transformation. **CO6:** To understand how quadratic equations lead to complex numbers. To write complex numbers in polar form, compute exponential and integrals powers of complex numbers. To apply De-Moivre's theorem to determine roots of polynomial and can express hyperbolic, inverse hyperbolic functions. **CO7:** To understand the convergence and divergence of infinite series.
9	**ACHU-102**	**Communicative English - II**	**CO1:** Know the process of beginning and growth of English language through comprehension passages based on Technology, Medical Sciences, Politics, Economics **CO2:** Know about various innovative ways of using English language in verbal and non-verbal communications **CO3:** Write clearly, effectively and creatively and adjust writing style appropriately to the content, the context and nature of the subject. **CO4:** Understand the relation between language and literature. **CO5:** Know about grammar and its application in different contexts

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department: Management Studies

The Program Outcomes (POs)of Bechelor of Arts(Journalism & Mass Communication):

a. The students learn competencies and skills required by the media world.
b. They will be well-integrated in the industry, being industry-ready at the outset.
c. The students would have acquired great confidence by th end of the course, having had hands-on experience wit media software, intensive training in media writing and media exposuremin journalistic writing, through informal internships.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1.	BAJMC 101-18	Introduction to Journalism	**CO1.** It will provide a better understanding of the concept as well as formation of news. **CO2.** The students will get a thorough knowledge of print media from a historical point of view also. **CO3.** It will give an overview of various forms of journalism to the students. **CO4.** It will also provide an insight into the present issues related to media. **CO5.** The students will get knowledge about the different traditional and modern sources of news.
2	BAJMC 102-18	Introduction to Media & Communication	**CO1.** It will provide an overview of the various types of media around us.. **CO2.** The students will get an insight into the various models and theories applicable to press. **CO3.** It will also give knowledge about the various paradigms applicable to mass communication. **CO4.** The effects of mass media on society can be well understood after the study of various theories. **CO5.** The concept of mass communication in context of society will be interpreted in a coherent way.
3	BAJMC 103-18	Indian Political & Social System	**CO1.** The course will help the students in understanding the working of Indian politicalsystem. **CO2.** It will provide knowledge about the different concepts related to constitution. **CO3.** A deep insight into the interrelationship of various social sciences can also be gained through this course. **CO4.** An overview of the Indian economy can also be understood through the study of this paper. **CO5.** The students will get all the basic skills required for covering different types of news.

4	**BAJMC 104-18**	**Communication Lab**	**CO1.** The students will be in a better position to write different types of journalistic pieces. **CO2.** The writing skills of the students will be improved and polished through this course. **CO3.** It will provide a strong base to the future journalists of the country. **CO4.** They will learn to form their own view point on various current and significant issues. **CO5.** The basics of computer and its applicability and usage in media world will be understood in better way.
5	**BTHU 103-18**	**English**	**CO1.** The objective of this course is to introduce students to the theory,fundamentals and tools of Communication. **CO2.** To help the students become the independent users of English language. **CO3.** To develop in them vital communication skills which are integral to their personal,social and professional interactions. **CO4.** The syllabus shall address the issues relating to the Language of communication. **CO5.** Students will become proficient in professional communication such as interviews, group discussions, office environments, important reading skills as well as writing skills such as report writing, note taking.
6	**BTHU 104-18**	**English Practical**	**CO1.** The objective of this course is to introduce students to the theory, fundamentals and tools of communication. **CO2.** To help the students become the independent users of English language. **CO3.** To develop in them vital communication skills which are integral to personal, social and professional interactions. **CO4.** The syllabus shall address the issues relating to the Language of communication. **CO5.** Students will become proficient in professional communication such as interviews, group discussions and business office environments, important reading skills as well as writing skills such as report writing, note taking etc.

7	**BAJMC 201-18**	**Reporting and Editing for Print**	**CO1.** The course will provide students with the concept of beat and basics of different types of reporting. **CO2.** The students will be in a position to write stories in proper format as required in newspaper organizations. **CO3.** It will also help students in editing the news according to different criteria. **CO4.** The students will also become aware of the latest trends followed in news. **CO5.** Photojournalism and its usage will also increase among the future journalists.
8	**BAJMC202-18**	**Media and Cultural Studies**	**CO1.** The course will make the students aware of the concept of mass culture and its variousforms. **CO2.** Various School of thoughts will also become popular amongst the students. **CO3.** It will equip students with the applicability of various theories of mass media. **CO4.** The students will know the representation of various issues in media. **CO5.** The importance of different types of audience will become more clear through this course.
9	**BAJMC203-18**	**Global Media and Politics**	**CO1.** The course will provide an overview of media industry at international level. **CO2.** The students will better understand the global issues after getting aware of its historical perspective. **CO3.** It will provide them knowledge about the global media channels. **CO4.** A better understanding of different concepts related to global media will be gained. **CO5.** Relationship between world war and media will become more clear to the students.
10	**BAJMC204-18**	**Media Ethics and Law**	**CO1.** The course will provide a better understanding of the ethical issues related to media. **CO2.** A broader view to ethical issues related to media technology will be gained. **CO3.** The students will be in a better position to work with social media after knowing its ethical concerns. **CO4.** Information on Laws related to media will help them in avoiding case of defamation while working. **CO5.** Coverage on sensitive issues will be done in a more responsible manner.

11	**BAJMC205-18**	**Media Lab**	**CO1.** It will become easy to work as PRO with any organization. **CO2.** The basics of ad making will become more clear after practically making them in lab. **CO3.** The students will have an option to work as researcher with any media organization. **CO4.** The art of reporting will prepare them for actual field work assignments. **CO5.** They will be in a better position to write creative piece of writings.
12	**EVS 102-18**	**Environmental Studies**	**CO1.** Students will enable to understand environmental problems at local and national level through literature and general awareness. **CO2.** The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues. **CO3.** The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to **CO4.** Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
13	**BAJMC-301**	**Introduction to Broadcast Media**	**CO1.** The students will provide students with the concept of sound and types of sound. **CO2.** The students will get the basic skills of writing radio news. **CO3.** The students will be in position to write stories and news for television. **CO4.** It will equip the students with the basics of camera and its Various parts of television.
14	**BAJMC-302**	**History of the Media**	**CO1.** The course will help the students in understanding the traditional media of mass communication. **CO2.** It will provide the knowledge about the history of print media. **CO3.** An overview of sound media can also be understood through this study of this paper. **CO4.** The students will understand the importance of sound and images for programmingand communication. **CO5.** The students will also become aware how television sets their agenda.

15	**BAJMC-303**	**Advertising**	**CO1.**How to Design an ad copy for a product. **CO2.**Students will earn Scriptwriting for electronic media(Radio jingle ,TV Commercial). **CO3.** Planning and designing advertising campaigns. **CO4.** Critical evaluation of advertisements. **CO5.** The students will also become aware about the ethics while preparing the Advertisement.
16	**BAJMC-304**	**Public Relations**	**CO1.** Employ PR for event management. **CO2.** Students will learn how to write Press release. **CO3.** Develop the skills of handling situation in crisis**.** **CO4.** It will also help students how to organize press conference**.** **CO5.** Employ PR effectively to create goodwill and convey a positive brand image.
16	**BAJMC-305**	**Inter Personal Communication Skills**	**CO1.** Self-Awareness. **CO2.** Personality development. **CO3.** How to handle stress and anxiety. **CO4.** The students will learns the importance of listening. **CO5.** Learn how to write email's letters, memos and resume.
17	**BAJMC-401**	**Advanced New Media**	**CO1.** The course will provide a better understanding of new media technologies. **CO2.** A broader view to ethical issues related to new media technology will be gained. **CO3.** The students will be in a better position to work with new media after knowingits ethical concerns. **CO4.** The students will learn how to create a blog and importance of blogging. **CO5.** The students will learn the concept of web writing.
18	**BAJMC-402**	**Development Communication**	**CO1.** The course will make the students aware of the concept of various model of mass communication. **CO2.** It will also help the students to know the role of media in development. **CO3.** The students will know the role of new media in development. **CO4.** The students will also become aware about all the communication programmes run by the government. **CO5.** It will provide them knowledge about the RTI.

19	**BAJMC-403**	**Communication Research and Methods**	**CO1.** This course will provide the students with the concept of research and various types of research. **CO2.** The students will also learn various types of research. **CO3.** The importance of library and internet in the research will become clear through this course. **CO4.** The students will get an insight into the various tools of data collection. **CO5.** It will provide knowledge how to write a research report.
20	**BAJMC-404**	**Advance Broadcast Media**	**CO1.** It will provide an overview of the community radio. **CO2.** The students will get an insight into the various laws and policy of private broadcasting. **CO3.** The will learn the various broadcast genres. **CO4.** The students will be in a better position to write for radio. **CO5.** The students will learn the basic of documentary.
21	**BAJMC-405**	**New Media Writing and Publishing**	**CO1.** Students will learn to use the cyberspace for journalism. **CO2.** Use the internet to their advantage and avoid pitfall of information gathered fromt the unreliable source. **CO3.** Learn to write for online media. **CO4.** Learn to operate blog. **CO5.** Students will have the knowledge of all the new media tools.
22	**BAJMC-501-18**	**Computer Application & Mass Media**	**CO1.** The student will get the basic knowledge of various components of computer. **CO2.** The students will be in a better position to use the computer properly. **CO3.** The basics of computer and its applicability and usage in media world will be understood in a better way. **CO4.** They will learn how to create blogs and use of social network sites. **CO5.** The typing skill of the students will be improved through this course.

23	**BAJMC-502-18**	**Global Media**	**CO1.** It will provide an overview of International media. **CO2.** The students will get an insight how global media work. **CO3.** The course will help the students in understanding the role of market in media. **CO4.** The students will be in better position to understand the role of media in promotion harmony and peace. **CO5.** They will get the knowledge about various global technologies.
24	**BAJMC-503 -18**	**Introduction to Community Media**	**CO1.** The course will help the students in understanding Community media as an alternative voice. **CO2.** It will provide the knowledge of Alternative media. **CO3.** A deep insight into folk media can also be gained through this course. **CO4.** An overview of folk media of Punjab can also be understood through the study of paper. **CO5.** The students will get the potential of using community based traditional, new and folk media.
25	**BAJMC-504-18**	**Newspaper Organization and Functioning**	**CO1.** It will provide an overview of all the departments of newspaper organization. **CO2.**It will also give the knowledge of roles and responsibilities of key personnel working in a various department of newspaper organization. **CO3.** The course will provide the knowledge of working of advertisement department. **CO4.** The students will be in position to understand the relation of all the departments. **CO5**. The students will understand the concept of printing process.
27	**BAJMC-602**	**Principles of Communication**	**CO1.** The students will learn the concept of communication. **CO2.** The course will help the students in learning the various function of communication. **CO3.** They will learn the process and barriers to communication. **CO4.** It will provide the knowledge of various communication theories. **CO5.** A deep insight into various communication models will be understood.

28	**BAJMC-603-18**	**Visual Communication Basics**	**CO1.** The course will help the students in understanding basic concept of visual communication. **CO2.** It will provide the knowledge of Psychological processing. **CO3.** A deep insight cultural codes can also be gained through this course **CO4.** An overview of visual culture can also be understood through the study of paper **CO5.** The students will get to know the relations between various signs and their users.
29	**BAJMC-604**	**Photo Journalism**	**CO1.** It will provide an overview of all the types and parts of camera. **CO2.** It will also give the knowledge of roles and responsibilities of photojournalist. **CO3.** The course will provide the knowledge of technology and creative rules used in photography. **CO4.** The students will be in position to understand the difference between photojournalist and photographer. **CO5.** The skills of photography will be enhanced.
30	**BAJMC-605**	**Media Internship**	**CO1.** To Learn the basic Principle of Visual design line color, balance proportion, Size shape mass, Unity and variety, Special relationships and composition in two and three dimensions. **CO2.** To know the elementary forms, colors combination and psychological effects of colors on customer. **CO3.** To learn the principle of product graphics, visual communication and designing of control panels. **CO4.** To learn about various types of fasteners, detailing of sheet metal and plastics products. **CO5.** To learn about the manufacturing and economics aspects of product development, role of designer.

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Department: Computer Applications

The Program Outcomes (POs) of Bachelor of Computer Applications are:

a. To prepare graduates to use their knowledge to provide and meet the ever increasing demands of computer H/W and S/W professional.
b. To prepare graduate to pursue organization computerization & innovation based development process for in society as knowledge achievers, expressers, and implementers.
c. To prepare graduates to demonstrate computing, analyzing, and designing software application, and database.
d. To prepare graduate students to pursue post graduate education in field of computer applications, business management, etc.
e. To prepare graduate to develop the programs that are useful in solving real life problems by analyzing data.
f. To prepare graduate to demonstrate the ability to understand and work on multidisciplinary tasks.
g. Graduates will be able to apply knowledge of software development fundamentals in software applications, mobile applications, artificial intelligence, etc.
h. Graduates will be able to identify, formulate, evaluate and solve software develpment problems and have the confidence to optimize the available resources.
i. Graduates will be able to function individually as well as a member of multidisciplinary teams to solve software designing, analyzing, development, testing problems with leadership qualities.
j. Graduates will be able to use talent and skills with modern software development applications tools for solving application problems.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	UGCA 1902	Fundamentals of Computer and IT	**CO1.** Understanding the concept of input and output devices of Computers **CO2.** Learn the functional units and classify types of computers, how they process information and how individual computers interact with other computing systems and devices. **CO3.** Understand an operating system and its working, and solve common problems related to operating systems **CO4.** Learn basic word processing, Spreadsheet and Presentation Graphics Software skills. **CO5.** Study to use the Internet safely, legally, and responsibly
2	UGCA1908	Computer	**CO1.** Know about the basic functioning of various parts

		System Architecture	of computer system from hardware point of view and interfacing of various peripheral devices used with the system. **CO2.** Learn number system and various types of micro-operations of processor. **CO3.** Learn the communication of various components through common bus. **CO4.** Learn how to design Combinational & Sequential circuits
3	**UGCA1909**	**Object Oriented Programming using C++**	**CO1.** To learn programming from real world examples **CO2.** To understand Object oriented approach for finding solutions to various problems with the help of C++ language. **CO3.** To create computer based solutions to various real-world problems using C++ **CO4.** To learn various concepts of object oriented approach towards problem solving.
4	**UGCA 1910**	**Object Oriented Programming using C++ Laboratory**	**CO1.** To learn programming from real world examples **CO2.** To understand Object oriented approach for finding solutions to various problems with the help of C++ language **CO3.** To create computer based solutions to various real-world problems using C++ **CO4.** To learn various concepts of object oriented approach towards problem solving
	UGCA1911	**Fundamentals of Statistics Laboratory**	**CO5.** Represent data using various Frequency table and Graphs **CO6.** Apply various operations/ formulas using any software/package to solve statistical problems
5	**UGCA1913**	**Computer Networks**	**CO1.** Students will be able to familiar with the different Network Models. **CO2.** Students will be able to Understand different network technologies and their application. **CO3.** Students will be able to update with different advanced network technologies that can be used to connect different networks. **CO4.** Students will be able to familiar with various hardware and software that can help run a smooth network.
6	**UGCA-1914**	**Programming in Python**	**CO1.** Familiar with Python environment, data types, operators used in Python. **CO2.** Compare and contrast Python with other programming languages. **CO3.** Learn the use of control structures and numerous native data types with their methods **CO4.** Design user defined functions, modules, and packages
7	**UGCA-1915**	**Data Structures**	**CO1.** Understand the basic concepts of algorithm, flowchart, and various types of data structures used in software programming. **CO2.** Formulate the software development problems using arrays, pointers, string, . **CO3.** Understand the concept of stacks, queues, and implement on applications development. **CO4.** Solve the sorting and searching problems by

			inherited properties of Trees. **CO5.** Solve the problem with least time or shortest path by sing the graph applications. **CO6.** Calculate best and worst time complexity to select the algorithm for sorting or searching.
8	**UGCA1917**	**Programming in Python Laboratory**	**CO1.** Solve simple to advanced problems using Python language. **CO2.** Develop logic of various programming problems using numerous data types and control structures of Python. **CO3.** Implement different data structures using Python. **CO4.** Implement modules and functions using Python. **CO5.** Design and implement the concept of object oriented programming structures. **CO6.** Implement file handling
9	**UGCA1918**	**Data Structures Lab**	**CO1.** Confidently Design algorithm, flowchart before programming. **CO2.** Formulate the software development problems using arrays, pointers, string, . **CO3.** Understand the concept of stacks, queues, and implement on applications development. **CO4.** Solve the sorting and searching problems by inherited properties of Trees. **CO5.** Solve the problem with least time or shortest path by sing the graph applications. **CO6.** Calculate best and worst time complexity to select the algorithm for sorting or searching.
10	**UGCA1919**	**PC Assembly & Troubleshooting**	**CO1.** Assemble and set up computer systems. **CO2.** Configure and install computers **CO3.** Install, connect and configure various peripheral devices **CO4.** Diagnose and Troubleshoot issues in Computer Systems
11	**UGA-1921**	**Software Engineering**	**CO1.** Implement Software development models for designing and developing software applications **CO2.** Understand the requirements of software by scheming software requirement analysis. **CO3.** Understand the software logics with designing Decision Tree and Decision Table. **CO4.** Calculate the software development cost by implementing COCOMO models. **CO5.** Understand the software structure with coupling and cohesion. **CO6.** Verify and validate the success of software with software testing and testing metrics.
12	**UGCA1922**	**Database Management Systems**	**CO1.** Understand the basic concepts of DBMS. **CO2.** Formulate, using SQL, solutions to a broad range of query and data update problems. **CO3.** Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database

			CO4. Understand the concept of Transaction and Query processing in DBMS
13	**UGA-1924**	**Software Engineering Lab**	**CO1.** Understand the requirements of software by scheming software requirement analysis. **CO2.** Understand the software logics with designing UML diagrams. **CO3.** Calculate the software development cost by implementing COCOMO models. **CO4.** Clearly understand the flow of data in application by implementing DFD. **CO5.** Confidently design the SDLC models.
14	**UGCA1925**	**Database Management Systems Laboratory**	**CO1.** Able to understand various queries and their execution **CO2.** Populate and query a database using SQL DML/DDL commands. **CO3.** Declare and enforce integrity constraints on a database **CO4.** Programming PL/SQL including stored procedures, stored functions, cursors, packages. **CO5.** Able to design new database and modify existing ones for new applications and reason about the efficiency of the result
15	**UGCA1927**	**Web Designing**	**CO1.** Understand the core concepts of Internet and Web Services. **CO2.** Describe and differentiate Programming Language and Markup Language. **CO3.** List various web pages and web sites together. **CO4.** Learn connectivity concepts of Front End and Back End process.

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY

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Department: Hotel Management and Catering Technology

The Program Outcomes (POs) of Hotel Management and Catering Technology are:

a) There are four core subjects in the course, which are directly related to the management and operational works in the hotel.
b) These subjects are –
   i. Front Office,
   ii. Housekeeping,
   iii. Food & Beverage Service and
   iv. Food & Beverage Production.
c) The core subjects have two parts: theory and practical.
d) There are several non-core subjects which are essential for the students as they help them to understand the core subjects better.
e) These subjects are spread over for years.
f) Performs work activities effectively and efficiently to the standards expected in the operation required in the tourism industry/hospitality sectors.
g) Graduate of Hotel Management Undertakes task, functions, duties and activities in the operation of the hotels, restaurants, travel, government and non-government agencies in accordance with the competency standards.
h) Student will be trained as per the International Standards of Hospitality Education imparting:
   i. Knowledge,
   ii. Skill and
   iii. Attitude for providing suitable manpower in hospitality and service industry.
b) Student analyses situation, identifies problems, formulates solutions and implements corrective and/or mitigating measures and action management into foodservice and lodging operations.
c) Graduate of Hotel Management understanding the skills necessary to live and work in a diverse world.
i) Graduates will get the opportunities for Research and field work in Hospitality and Tourism.
j) Graduates will be trained accordingly to be the manpower to Hospitality and Tourism industry.
k) Students will complete the curriculum of Hospitality Education and Tourism as per the standards.
l) Students will be facilitating in entrepreneurship.
m) Students will be trained accordingly to assist the Ministry of Tourism in providing a major helping hand in the operations of the Hospitality industry.

n) Graduates will be trained to get placed in other allied industries.
o) Interested Graduates can be the part of higher education and research in hospitality sector.
p) Graduate of Hotel Management practice professional ethics, provide leadership, demonstrate personal and global responsibility, and work effectively as a team member.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1.	BHMCT 101-18	FOOD PRODUCTION FOUNDATION I (THEORY)	**CO1.** This paper will give the basic knowledge of cooking to the beginners. **CO2.** They will get versed with below points: a. Meaning, aims, b. Objectives of Kitchen, c. Kitchen organization structure, d. Different kinds of ingredients, e. Techniques of pre-preparation and cooking, f. Knowledge of various stocks, sauces and soups, g. Various cuts of vegetables
2.	BHMCT 102-18	FOOD PRODUCTION FOUNDATION I (PRACTICALS)	**CO1.** The Student will get knowledge about: a. Use knives and kitchen equipment safely to cut meat, vegetables and other ingredients. b. Define and use cooking terms accurately. c. Use and convert recipes to produce desired quantities. d. Weigh and measure ingredients and portions accurately. e. Season food to achieve desired product outcomes. f. Prepare a variety of protein, vegetable, starch, and dessert items in a professional kitchen
3.	BHMCT 103-18	FOOD & BEVERAGE SERVICE FOUNDATION I (THEORY)	**CO1.** The Student will get knowledge about: a. Develop an insight into the growth of Catering Industry In the world from medieval period till recent times.

			b. Understand the different components of the catering industry) the functions of various departments of a hotel, and their relationship with Food & Beverage service department, in order to acquire professional Competence at basic levels in the principles of Food service and its related activities. c. Acquire the requisite technical skills for competent service of Food and Beverage d. Understand different non-alcoholic beverages with their preparation and services.
4.	**BHMCT 104-18**	**FOOD & BEVERAGE SERVICE FOUNDATION I (PRACTICAL)**	**CO1.** To understand the development of the food service industry **CO2.** To identify various types of restaurants and understand their features. **CO3.** To comprehend various equipment used in the restaurant **CO4.** To learn and create various napkin folds **CO5.** To learn the various cover setup for food and beverage service. **CO6.** To understand the procedure of taking a guest's order and service of water
5.	**BHMCT 105-18**	**FRONT OFFICE FOUNDATION I (THEORY)**	**CO1.** The Student will get knowledge about: a. Classification and categorization of Hotels and its Evolution. b. Duties & responsibilities of the staff in the different sections. c. Types of rooms, food plan, Tariff and room rent. d. Importance, Modes, Tools of reservation. e. 5. Basic Terminologies of front office
6.	**BHMCT 106-18**	**FRONT OFFICE FOUNDATION I (PRACTICAL)**	**CO1.** Analyses hotel front office positions and the procedures involved in reservation, registration, accounting for and checking our guests, and principles and practices of night auditing. **CO2.** Covers the complete guest operation in both traditional and computerized operations.
7.	**BHMCT 107-18**	**ACCOMODATIO N OPERATIONS I (THEORY)**	**CO1.** The students will get knowledge about: a. Organization, function of Housekeeping department and its different sections. b. Different departments Housekeeping co-ordinates with. c. Procedure of cleaning different status of room. d. Cleaning equipment and cleaning agent.

8.	**BHMCT 108-18**	**ACCOMODATION OPERATIONS I (PRACTICAL)**	**CO1.** Knowledge of cleaning equipment and cleaning agents **CO2.** Public Area Cleaning Procedures (Cleaning of various surfaces) **CO3.** Procedures to be followed to Daily Room Cleaning Chamber Maid trolley setup **CO4.** Bed Making Procedures
9.	**BTHU 103-18**	**ENGLISH THEORY**	**CO1.** The objective of this course is to introduce students to the theory, fundamentals and tools of communication. **CO2.** To help the students become the independent users of English language. **CO3.** To develop vital communication skills that is integral to their personal, social and professional interactions. **CO4.** The syllabus shall address the issues relating to the Language of communication. **CO5.** Students will become proficient in professional communication such as a. Interviews, b. Group discussions, c. Office environments, **CO6.** Important reading skills as well as writing skills such as a. Report writing, b. Note taking etc.
10.	**BTHU 104-18**	**ENGLISH PRACTICAL**	**CO1.** The objective of this course is to buildup confidence by learning, speaking and writing the English language. **CO2.** Student will practice the skills of communicating with Management, Colleagues and Guests. **CO3.** To help the students become the independent users of English language. **CO4.** To develop in them vital communication skills which are integral to personal, social and professional interactions. **CO5.** The syllabus shall address the issues relating to the Language of communication. Students will become proficient in professional communication such as interviews, group discussions and business office environments, important reading skills as well as writing skills such as report writing, note taking etc.
11.	**HVPE 101-18**	**Ability Enhancement Compulsory Course (AECC) Human Values, De-addiction and Traffic Rules**	**CO1.** This introductory course input is intended To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. **CO2.** To facilitate the development of a Holistic perspective among students towards

			life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way. **CO3.** To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature. **CO4.** Thus, this course is intended to provide a much needed orientation input in Value Education to the young enquiring minds.
12.	**HVPE 102-18**	**Ability Enhancement Compulsory Course (AECC) Human Values, De-addiction and Traffic Rules**	One each seminar will be organized on Drug De-addiction and Traffic Rules. Eminent scholar and experts of the subject will be called for the Seminar at least once during the semester. It will be binding for all the students to attend the seminar
13.	**BHMCT 201-18**	**FOOD PRODUCTION FOUNDATION –II (THEORY)**	**CO1.** This paper will give the basic knowledge of cooking to the beginners. **CO2.** They will get versed with different kinds of ingredients, techniques of pre-preparation and cooking, knowledge of various stocks, sauces and soups, cereals, pulses, various cuts of vegetables and meats with their cookery. **CO3.** The various commodities required for food production, their market forms, selection, storage and use. **CO4.** 2. The fundamentals of menu planning & standard recipes **CO5.** 3. The basic culinary skills **CO6.** 4. The bread& cake making process and various pastes **CO7.** 5.Basic preparation soup and Sauce
14.	**BHMCT 202-18**	**FOOD PRODUCTION FOUNDATION-II (PRACTICAL)**	**CO1.** At the end of course the student should know about:- a. Various commodities. b. Menu planning and standard recipe. c. Culinary skills. d. Bakery science.
15.	**BHMCT 203-18**	**FOOD & BEVERAGE SERVICETION FOUNDA –II (THEORY)**	**CO1.** The Student will get knowledge about: a. Understand various restaurant services. b. Understand type of meal and menu. c. Develop knowledge of the restaurant control system. d. 4. Understand the processing

			manufacturing and service of cigar and cigarettes
16.	**BHMCT 204-18**	**FOOD & BEVERAGE SERVICE FOUNDATION-II (PRACTICAL)**	**CO1.** To understand the development of the food service industry **CO2.** To identify various types of restaurants and understand their features. **CO3.** To comprehend various equipment used in the restaurant **CO4.** To learn and create various napkin folds **CO5.** To learn the various cover setup for food and beverage service. **CO6.** To understand the procedure of taking a guest's order and service of water **CO7.** To understand the service skills involved using Service Spoon and Fork
17.	**BHMCT 205-18**	**FRONT OFFICE FOUNDATION II (THEORY)**	**CO1.** The Student will get knowledge about: 1. Registration, its types, importance and other aspects. 2. Check in procedure for various categories of guest. 3. Meaning and Procedure of Night Auditing. 4. Room Tariff Fixation**.**
18.	**BHMCT 206-18**	**FRONT OFFICE FOUNDATION II (PRACTICAL)**	**CO1.** The aim is to provide the student with basic skills required at the reception, management of customer service operations and front-office operations from the Opera PMS point of view, and the basics of security and safety in accommodation business.
19.	**BHMCT 207-18**	**ACCOMODATION OPERATIONS-II (THEORY)**	**CO1.** The students will get knowledge about: a) The public area cleaning task. b) Floors – types of floor finishes, methods of cleaning. c) Learn about inspection of guest room. **CO2.** Cleaning and care of metals: Brass, silver etc. and their compositions.
20.	**BHMCT 208-18**	**ACCOMODATION OPERATIONS-II (PRACTICAL)**	**CO1.** The main objectives of the course are to: Help to prepare students to meet the challenges associated with the housekeeping department **CO2.** Provide an overview of the key issues of housekeeping and maintenance management. **CO3.** To understand the theoretical and practical knowledge that constitutes the work of housekeeping **CO4.** To illustrate the complexities and

			demands of working in the industry through the scope of housekeeping**.**
21.	**EVS 102-18**	**ENVIRONMENTAL STUDIES**	**CO1.** Students will enable to understand environmental problems at local and national level through literature and general awareness. **CO2.** 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. 1. The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems. **CO3.** Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world
22.	**BHMCT 301-18**	**FOOD PRODUCTION OPERATIONS-INDUSTRY EXPOSURE-1**	**CO1.** Each candidate will have to prepare a log book and training report of the day to day activities of his 22 Weeks on the job training duly supported by charts, diagrams, photos and tables. **CO2.** The report will be submitted in duplicate copy to the head of department within one month of the completion of the training supported by the certificate of competent authority of the training institute for the evaluation by a panel of experts comprising of one internal and one external. **CO3.** The viva-voce of the 4th semester would be based on the training report as well as other applied assignments, the candidate has undertaken during on the job training.
23.	**BHMCT 302-18**	**FOOD & BEVERAGE SERVICE OPERATIONS-INDUSTRY EXPOSURE-1**	**CO1.** Each candidate will have to prepare a log book and training report of the day to day activities of his 22 Weeks on the job training duly supported by charts, diagrams, photos and tables. **CO2.** The report will be submitted in duplicate copy to the head of department within one month of the completion of the training supported by the certificate of competent authority of the training institute for the evaluation by a panel of experts comprising of one internal and one external. **CO3.** The viva-voce of the 4th semester would be based on the training report as well as other applied assignments, the candidate has undertaken during on the job training.
24.	**BHMCT 303-18**	**FRONT OFFICE**	**CO1.** Each candidate will have to prepare a

		OPERATIONS-INDUSTRY EXPOSURE-1	log book and training report of the day to day activities of his 22 Weeks on the job training duly supported by charts, diagrams, photos and tables. **CO2.** The report will be submitted in duplicate copy to the head of department within one month of the completion of the training supported by the certificate of competent authority of the training institute for the evaluation by a panel of experts comprising of one internal and one external. **CO3.** The viva-voce of the 4th semester would be based on the training report as well as other applied assignments, the candidate has undertaken during on the job training.
25.	**BHMCT 304-18**	**ACCOMMODATION OPERATIONS INDUSTRY EXPOSURE- I**	**CO1.** Each candidate will have to prepare a log book and training report of the day to day activities of his 22 Weeks on the job training duly supported by charts, diagrams, photos and tables. **CO2.** The report will be submitted in duplicate copy to the head of department within one month of the completion of the training supported by the certificate of competent authority of the training institute for the evaluation by a panel of experts comprising of one internal and one external. **CO3.** The viva-voce of the 4th semester would be based on the training report as well as other applied assignments, the candidate has undertaken during on the job training.
26.	**BHMCT 305-18**	**LOG BOOK & TRAINING REPORT ON INDUSTRY EXPOSURE**	**CO1.** Each candidate will have to prepare a log book and training report of the day to day activities of his 22 Weeks on the job training duly supported by charts, diagrams, photos and tables. **CO2.** The report will be submitted in duplicate copy to the head of department within one month of the completion of the training supported by the certificate of competent authority of the training institute for the evaluation by a panel of experts comprising of one internal and one external. **CO3.** The viva-voce of the 4th semester would be based on the training report as well as other applied assignments, the candidate has undertaken during on the job training.
27.	**BHMCT 401-18**	**INTRODUCTION TO INDIAN COOKERY (THEORY)**	**CO1.** This paper will give the knowledge of Indian cooking to the students. **CO2.** They will get versed with Indian regional cuisine, basic Indian spices **CO3.** basic Indian gravies, traditional Indian cooking methods **CO4.** Cooking equipment used and required for Indian cuisine and specific

			cooking ingredients.
28.	**BHMCT 402-18**	**INTRODUCTION TO INDIAN COOKERY (PRACTICAL)**	**CO1.** This paper will give the practical knowledge of Indian cooking to students. **CO2.** They will get versed with Indian regional cuisine, basic Indian spices, and basic Indian gravies, traditional **CO3.** Indian cooking methods, cooking equipment used and required for Indian cuisine and specific cooking ingredients.
29.	**BHMCT 403-18**	**FOOD AND BEVERAGESERVICE OPERATIONS-II (THEORY)**	**CO1.** The students will be well versed with viticulture and viniculture **CO2.** Beer production **CO3.** Types of wines and beers **CO4.** Brands and introduction to cheeses
30.	**BHMCT 404-18**	**FOOD AND BEVERAGE SERVICE OPERATIONS-II (PRACTICAL)**	**CO1.** The performance of the students will be evaluated on the basis of class participation, house test, regularity and assignments carrying 20 percent of the total credit and rest through semester end examination of 4hoursduration
31.	**BHMCT 405-18**	**FRONT OFFICE OPERATIONS - ll (THEORY)**	**CO1.** The course is aimed at familiarizing the students with various functions of Night Auditing & Accounting. **CO2.** Students will learn about the various Software being used in the Hospitality Industry.
32.	**BHMCT 406-18**	**FRONT OFFICE OPERATIONS-II (PRACTICAL)**	**CO1.** The course is aimed at familiarizing the students with various functions of Night Auditing & Accounting. **CO2.** Students will learn about the various software being used in the Hospitality Industry. **CO3.** Student will get the knowledge about Property Management System.
33.	**BHMCT 407-18**	**ACCOMODATION OPERATIONS - III (THEORY)**	**CO1.** The students will be well versed with the supervisory responsibility, Linen handling process, Laundry Operations, need of special cleaning and also learn about Textiles or garments
34.	**BHMCT 408-18**	**ACCOMODATION OPERATIONS - III (PRACTICAL)**	**CO1.** The students will be well versed with the supervisory responsibility **CO2.** Linen handling process **CO3.** Laundry Operations **CO4.** Need of special cleaning and also learn about Textiles or garments.
35.	**BHMCT 409-18**	**ACCOUNTINGSK**	**CO1.** The aim is to provide an

		ILLSFOR HOSPITALITY (THEORY)	understanding of the basic principles of accounting and their application in the hospitality industry. **CO2.** The course is designed to make the student familiar with generally accepted accounting principles of accounting and their applications.
36.	**BHMCT 501-18**	**LARDER & KITCHEN PRACTICES (THEORY)**	**CO1.** To provide an in-depth knowledge of purchasing and kitchen management **CO2.** Important knowledge of hot and cold desserts
37.	**BHMCT 502-18**	**LARDER & KITCHEN PRACTICES (PRACTICAL'S)**	**CO1.** To provide an in-depth knowledge of purchasing and kitchen management **CO2.** Important knowledge of hot and cold desserts
38.	**BHMCT 503-18**	**BAR OPERATIONS & MANAGEMENT (THEORY)**	**CO1.** The primary objective of this course is: a) Get to Know the Food and Beverage Division. b) Demonstrate Knowledge of Menus and Point-of-Sale Equipment. c) Will get the Knowledge of all alcoholic beverages such as: d) Spirits e) Aperitifs f) Liqueurs g) Bitters
39.	**BHMCT 504-18**	**BAR OPERATIONS & MANAGEMENT (PRACTICAL)**	**CO1.** The primary objective of this course is: a) Get to Know the Food and Beverage Division. b) Demonstrate Knowledge of Menus and Point-of-Sale Equipment **CO2.** Get to Know the Job of a Banquet. **CO3.** Will get the skills of setting Buffet for various numbers of gatherings. **CO4.** Student will learn the art of buffet setups for different occasions such as: a. Conferences b. Meetings c. Seminars **CO5.** Student will practice the service techniques of Alcoholic beverages.
40.	**BHMCT 505-18**	**FRONT OFFICE OPERATIONS & MANAGEMENT (THEORY)**	**CO1.** This course aims to feminize students with the operational and managerial prospect of the front office department in the hotel industry. **CO2.** Introduction to property management system (PMS), front office accounting; planning and evaluating operations, front office budgeting, visitors tabular ledger (VTL), sales record and control of sale of room and food, settlement of bills, night

			audit, credit control, occupancy ratios and yield management.
41.	**BHMCT 506-18**	**FRONT OFFICE OPERATIONS & MANAGEMENT (PRACTICAL)**	**CO1.** This course aims to feminize students with the operational and managerial prospect of the front office department in the hotel industry. **CO2.** Introduction to property management system (PMS), front office accounting; planning and evaluating operations, front office budgeting, visitors tabular ledger (VTL), sales record and control of sale of room and food, settlement of bills, night audit, credit control, occupancy ratios and yield management.
42.	**BHMCT 507-18**	**ACCOMMODATION OPERATIONS AND MANAGEMENT (THEORY)**	**CO1.** In this course, we look at lodging as a set of products and services that have evolved out of guest needs and preferences. **CO2.** We begin with the evolution of lodging to fit transportation and destination patterns and individual guest preferences. **CO3.** We then delineate different types of lodging properties, discussing the distinguishing characteristics of each. **CO4.** Emphasis is given to ensure the efficient managing and functioning of hotel housekeeping department. a. To Identify and understand the business of rooms division department in hotels. b. Figure out the trends in the housekeeping department in various size hotels and design specifications.
43.	**BHMCT 508-18**	**ACCOMMODATION OPERATIONS AND MANAGEMENT (PRACTICAL)**	**CO1.** Products and services that have evolved out of guest needs and preferences. **CO2.** We begin with the evolution of lodging to fit transportation and destination patterns and individual guest preferences. **CO3.** We then delineate different types of lodging properties, discussing the distinguishing characteristics of each. **CO4.** Emphasis is given to ensure the efficient managing and functioning of hotel housekeeping department. a. To Identify and understand the business of rooms division department in hotels. b. Figure out the trends in the housekeeping department in various size hotels and design specifications.
44.	**BHMCT 509-18**	**FOOD AND BEVERAGE CONTROL AND MANAGEMENT**	**CO1.** Student will learn the costing skills. **CO2.** Budgeting will be taught in this course. **CO3.** Menu Planning will be there for the students.

		(THEORY)	**CO4.** Student will understand the Bill Handling. **CO5.** Students will learn the skills to maximize the profit by minimize the food cost.
45.	**BHMCT 601-18**	**INTERNATIONAL CUISINE- AN EXPLORATION (THEORY)**	**CO1.** This paper will give the basic knowledge about International cooking's and get well versed with terminology, use of ingredients, techniques of cooking of various countries. **CO2.** They will also learn Management aspects of Food Production.
46.	**BHMCT 602-18**	**INTERNATIONAL CUISINE- AN EXPLORATION (PRACTICAL)**	**CO1.** This paper will give the basic knowledge about International cooking's and get well versed with terminology, use of ingredients, techniques of cooking of various countries. **CO2.** They will also learn Management aspects of Food Production
47.	**BHMCT 603-18**	**BANQUET AND RESTAURANT OPERATIONS & MANAGEMENT (THEORY)**	**CO1.** The course aims to inculcate knowledge of food service principles, functions, and procedures among students. **CO2.** The students will learn the importance, planning execution of Food and beverage functions and events.
48.	**BHMCT 604-18**	**BANQUET AND RESTAURANT OPERATIONS & MANAGEMENT (PRACTICAL)**	**CO1.** The course aims to inculcate knowledge of food service principles, functions, and procedures among students. **CO2.** The students will learn the importance, planning execution of Food and beverage functions and events.
49.	**BHMCT 605-18**	**FRONT OFFICE MANAGEMENT (THEORY)**	**CO1.** This paper will give the basic knowledge about Management aspects and get well versed with terminology. **CO2.** The course is aimed at familiarizing the students with various management functions of front office and to develop work ethics towards customer care and satisfaction. **CO3.** They will also learn basics of Airlines industry.
50.	**BHMCT 606-18**	**FRONT OFFICE MANAGEMENT (PRACTICAL)**	**CO1.** This paper will give the basic knowledge about Management aspects and get well versed with terminology. **CO2.** The course is aimed at familiarizing the students with various management functions of front office and to develop work ethics towards customer care and satisfaction. **CO3.** They will also learn basics of Airlines industry.
51.	**BHMCT 607-18**	**ACCOMMODATION MANAGEMENT**	**CO1.** The course familiarizes students with the Management aspects of housekeeping, its systems and functions.

		(THEORY)	**CO2.** A blend of theory and practical will be used to develop sensitivity and high work ethics towards guest care and cleanliness as well as eco-friendly practices used in housekeeping
52.	**BHMCT 608-18**	**ACCOMMODATION MANAGEMENT (PRACTICAL)**	**CO1.** The course familiarizes students with the Management aspects of housekeeping, its systems and functions. **CO2.** A blend of theory and practical will be used to develop sensitivity and high work ethics towards guest care and cleanliness as well as eco-friendly practices used in housekeeping.
53.	**BHMCT 609-18**	**PRINCIPLES OF MANAGEMENT (THEORY)**	**CO1.** To familiarize the students to the basic concepts of management in order to aid in understanding how an organization functions **CO2.** In understanding the complexity and wide variety of issues managers face in today's business firms

AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
12 km Stone, Amritsar-Jalandhar G.T. Road, Amritsar

Department: Computer Application

The Program Outcomes (POs) of Masters of Computer Application are:

- **a.** Apply the knowledge of mathematics and computing fundamentals to various real life applications for any given requirement
- **b.** Design and develop applications to analyze and solve all computer science related problems
- **c.** Design applications for any desired needs with appropriate considerations for any specific need on societal and environmental aspects
- **d.** Analyze and review literatures to invoke the research skills to design, interpret and make inferences from the resulting data
- **e.** Integrate and apply efficiently the contemporary IT tools to all computer applications
- **f.** Solve and work with a professional context pertaining to ethics, social, cultural and cyber regulations
- **g.** Involve in perennial learning for a continued career development and progress as a computer professional
- **h.** Function effectively both as a team leader and team member on multi disciplinary projects to demonstrate computing and management skills
- **i.** Communicate effectively and present technical information in oral and written reports
- **j.** Utilize the computing knowledge efficiently in projects with concern for societal, environmental, and cultural aspects
- **k.** Function competently as an individual and as a leader in multidisciplinary Projects.

Course Outcomes (COs)

On completion of this course, the students will be able to:

Sr. No.	Course Code	Course Name	Course Outcomes (Cos)
1	**PGCA -B1**	Computer Programming Using C	**CO1.** Student should be able to understand the logic building used in Programming. **CO2.** Students should be able to write algorithms for solving various real life problems. **CO3.** To convert algorithms into programs using C.
2	**PGCA- B2**	Computer Science Essentials	**CO1.** Understanding the concept of input and output devices of Computers.. **CO2.** Learn the basic concepts of Operating Systems and Database Systems. **CO3.** Learn basic word processing, Spreadsheet and Presentation Graphics Software skills.
3	**PGCA 1917**	Discrete Structures& Optimization	**CO1.**Apply the operations of sets and use Venn diagrams to solve applied problems; solve **CO2.** Apply rules of inference, proof by contradiction,

			proof by cases, and write proofs using symbolic logic and Boolean Algebra **CO3.**Solve counting problems by applying elementary counting techniques using the product and sum rules, permutations, combinations, the pigeon-hole principle. **CO4**.Determine if a given graph is simple or a multigraph, directed or undirected, cyclic or acyclic, and determine the connectivity of a graph.
4	**PGCA 1951**	Programming In python	**CO1.** Familiar with Python environment, data types, operators used in Python. **CO2.** Compare and contrast Python with other programming languages. **CO3.** Learn the use of control structures and numerous native data types with their methods. **CO4.** Design user defined functions, modules, and packages and exception handling **CO5.** Create and handle files in Python and learn Object Oriented Programming Concepts.
5	**PGCA1952**	Advanced Data Structures	**CO1.** Choose appropriate data structures and algorithms and use it to design solution for a specific problem. **CO2.** Execute the operations of hashing to retrieve data from data structure. **CO3.** Design and analyze programming problem statements **CO4.** Come up with analysis of efficiency and proofs of correctness **CO5.** Comprehend and select algorithm design approaches in a problem specific manner.
6	**PGCA1953**	Advanced Database Management System	**CO1.** Express the basic concepts of DBMS and RDBMS. **CO2.** Apply normalization theory to the normalization of a database **CO3.** Apply the concept of Transaction Management & Recovery techniques in RDBMS. **CO4.** Analyze various advanced databases prevailing in market, Big Data, Temporal **CO5.** Databases, Parallel and Distributed Databases, XML Database and multidimensional Databases **CO6.** Demonstrate No SQL databases (Open Source)
7	**PGCA1905**	Technical Communication	**CO1**.The objective of the course is to help the students become the independent users of English users **CO2.**Students will acquire basic proficiency in reading & listening, comprehension, writing and speaking skills. **CO3.** Students will be able to understand spoken and written English language, particularly the language of their chosen technical field. **CO4.** They will be able to converse fluently. **CO5.** They will be able to produce on their own clear and coherent texts.

8	**PGCA1954**	Data Structures Using Python Laboratory	**CO1.**Understand the concept of data structures, python and apply algorithm for solving problems like Sorting, searching, insertion and deletion of data. **CO2.** Implement linear and non-linear data structures for processing of ordered or unordered data. **CO3.**Analyze various algorithms based on their time and space complexity.
9	**PGCA1955**	Advanced Database Management System Laboratory	**CO1.** Implement query a database using SQL DML/DDL commands. **CO2.** Analyze integrity constraints on a database **CO3.** Develop PL/SQL programs including stored procedures, stored functions, cursors **CO4.** Design new database and modify existing ones for new applications and reason about the efficiency of the result. **CO5.** Implement various DBA roles/techniques
10	**PGCA1908**	Technical Communication Laboratory	**CO1**.The objective of the course is to help the students become the independent users of English language. **CO2.**Students will acquire basic proficiency in listening and speaking skills. **CO3**.Students will be able to understand spoken English language, particularly the language of their chosen technical field. **CO4.**They will be able to converse fluently **CO5**.They will be able to produce on their own clear and coherent texts.
11	**PGCA1909**	Web Technologies	**CO1.** Understand the basics of Internet and Web Services. **CO2.** Describe and differentiate Programming Language and Markup Language. **CO3.** Connect various web pages and web sites together. **CO4.** Capture user input from the remote users. **CO5.** Learn connectivity concepts of Front End and Back End.
12	**PGCA1920**	Design& Analysis of Algorithms	**CO1.** Categorize problems based on their characteristics and practical importance **CO2.** Develop Algorithms using iterative/recursive approach **CO3.** Design algorithm using an appropriate design paradigm for solving a given problem **CO4.** Classify problems as P, NP or NP Complete

13	**PGCA1918**	Advanced Java	**CO1.** Learn the advanced features of Java and write the programs. **CO2.** Work with API and implement Serialization concept of Java. **CO3.** Learn Java Generics and develop Projects.
14	**PGCA1956**	Linux Administration	**CO1.** Understand the technical details of Linux operating system **CO2.** Work with various Linux command and understand file hierarchical structuring **CO3.** Administrate user, manage and configure packages in Linux. **CO4.** Know and configure the various internet services.
15	**PGCA1932**	Information Security & Cyber Law.	**CO1.** Acquire knowledge about various Information Systems. **CO2**.Understand the key security requirements of Confidentiality, Integrity &Availability. **CO3**. Demonstrate the concept of Intrusion Detection & Intrusion Prevention. **CO4**. Apply Symmetric Encryption techniques. **CO5**. Describe the concept of Security policies and Cyber Laws.
16	**PGCA1914**	Web Technologies Laboratory	**CO1.** Understand Static and Dynamic concepts of web designing. **CO2.** Develop ability to retrieve data from a database and present it online. **CO3.** Design web pages that apply various dynamic effects on the web site. **CO4.** Solve complex and large problems using Scripting Language & Markup Language.
17	**PGCA1922**	Advanced Java Laboratory	**CO1.** Learn the advanced features of Java and write the programs. **CO2.** Work with API and implement Serialization concept of Java. **CO3.** Learn Java Generics and develop Projects. **CO4.** Understand to use digital marketing for developing effective digital and social media strategies

18	**PGCA1957**	Linux Administration Laboratory	**CO1.** Install Linux desktop and Linux server operating system. **CO2.** Use various commands for performing different operations **CO3.** Work with various Linux administration commands **CO4.** Install and configure various servers in Linux environment