SGT UNIVERSITY
SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY
(UGC Approved) Gurugram, Delhi-NCR
Budhera, Gurugram-Badli Road, Gurugram (Haryana) – 122505 Ph. : 0124-2278183, 2278184, 2278185

Faculty of Engineering and Technology

Program Outcomes (POs)

B.Tech. Program Outcomes (POs)

At the end of the Bachelor of Technology students will be able to:

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization in computer science for the solution of complex engineering problems.

PO2: *Problem Analysis*: Identify, formulate, review research literature, and analyze complex electronics and telecommunication engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: *Design / Development of Solutions*: Design solutions for complex computer engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations.

PO4: *Conduct Investigations of Complex Problems*: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: *Modern Tools Usage*: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities in computer science and engineering with an understanding of the limitations.

PO6: *The Engineer and Society*: Apply reasoning inferred by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: *Environment and Sustainability*: Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: *Ethics*: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9: *Individual and Team work*: Function effectively as an individual, and as a member or leader in diverse teams, and multidisciplinary settings.

PO10: *Communication*: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend

and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: *Project Management and Finance*: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: *Lifelong Learning*: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Program Specific Outcomes(PSOs)

Bachelor of Technology(B Tech)

Computer Science & Engineering

Program Specific Outcomes (PSOs)

At the end of the Bachelor of computer science and Engineering program graduates will be able to:

PSO1: Demonstrate acquired knowledge and skills based on departmental level co-curricular and extra-curricular activities under the banner of professional students' forums.

PSO2: Demonstrate skills in writing and presenting technical papers at national and international level conferences / journals.

Civil Engineering

Program Specific Outcomes (PSOs)

PSO1: To enable the under studies to analyze, design, build & maintain, Civil Engineering projects in the context of environmental, economic, and social requirements.

PSO2: To empower the understudy so that they can use the techniques, skills, and modern engineering tools necessary for civil engineering practice and serve the community as ethical and responsible professionals.

PSO3: A capacity to function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary environment.

Mechanical Engineering

Program Specific Outcomes (PSOs)

PSO1:To enable the understudies to apply viable aptitudes, learning in significant streams, for example, Thermal, Design, Mechatronics, Manufacturing, Production and Industrial Engineering.

PSO2:To empower the understudy to take-up profession in ventures or to seek after higher investigations in mechanical and interdisciplinary projects with high respect for moral qualities, ecological and social issues.

PSO3:A capacity to discover, verbalize the neighborhood modern issues and settle with the utilization of Mechanical Engineering devices for practical results.

Electronics & Communication Engineering

Program Specific Outcomes (PSOs)

PSO 1 - Engineering Knowledge: Understand the theoretical foundations based on mathematics, science and engineering with a focus on applications in ECE.

PSO 2 - Problem analysis: To adapt existing models, tools and techniques etc. for efficiently solving problems related to ECE

PSO 3 - Modern tool usage: Understand the use of advanced hardware and software tools for development of new electronic systems.

PSO 4 - Design / development of solutions:

PSO 5 - Engineer and Society: Experimentally evaluate and carry out intelligent tradeoffs in design of electronic systems as per the needs of the industry and society.

PSO 6 - Conduct investigations of complex problems Undertake original research at the cutting edge of ECE & related areas.

PSO 7 - Individual and Team-work: Function effectively individually or as a part of a team to accomplish a stated goal.

PSO 8 - Ethics: Understand of professional and ethical responsibility.

PSO 9 - Communication: Communicate effectively with a wide range of audience.

PSO 10- Engineer and Society: Learn independently and engage in life-long learning.

PSO 11 - Environment and sustainability: Understand the impact of ECE based technologies in an economic, societal and environmental context.

PSO 12- Project management and finance: Demonstrate knowledge and understanding of the engineering finance and management principles as a member and leader in a team to manage projects in multi-disciplinary environments.

Masters of Technology (M Tech)

M. Tech. Mechanical Engineering: Program Specific Outcomes-

PSO1. Acquire knowledge in optimization techniques in manufacturing process.

PSO2. Face frontier technological research in thermal area.

PSO3. Undertake design of machines/components/process to meet desiredspecifications of need and constraints.

PSO4. Apply knowledge in industrial engineering to challenging problems in related domains.

M. Tech. Computer Science & Engineering: Program Specific Outcomes-

PSO1: An ability to use appropriate techniques, skills, and modern engineering tools necessary for engineering practice.

PSO2: Ability to interpret and apply research literature to investigate complex problems using research methodologies, techniques and tools.

PSO3: Function effectively individually or as a part of a team to accomplish a stated goal.

PSO4: ability to design, develop and evaluate new computer based systems for novel applications which meet the desired needs of industry and society.

BCA: Program Specific Outcomes

PSO1: Understand the concepts of key areas in computer science.

PSO2: Ability to apply knowledge of Computer Science and its Applications.

PSO3: focuses on preparing student for roles pertaining to computer applications and IT industry.

PSO4: Develop the software projects by understanding the client requirement.

CIVIL ENGINEERING

Program Specific Outcomes for M.Tech–Water Resource Engineering

PSO1 : To enable gaining of knowledge, new techniques in Water Resources Development and Management for development of the society.

PSO2 : To enable use of latest technologies in sewer systems for storms and wastewater, Irrigation network, River engineering, including ice covered rivers, Hydraulic structures, including dams, spillways, floodways and reservoirs, Seepage control, Hydrology, flow of mud and debris and Wave analysis.

PSO3 : To develop use of non-conventional methods for utilization of water such as cropping system modeling & planning, inter-basin transfer, ground water recharge through rainwater harvesting.

PSO4 : To develop trained manpower to undertake activities of Irrigation Water Management with Competence, Confidence, Commitment, Courage and Compassion for the welfare of mankind.

Program Specific Outcomes for M.Tech– Environmental Engineering

PSO1: To excel in the core areas of environmental engineering such as waste remediation's, clean development mechanism, design water treatment units, atmospheric dynamics etc.

PSO2: To develop and design sustainable infrastructure considering the global environmental challenges.

PSO3: To understand the problems associated with complex environmental activities and provide solutions through appropriate technologies.

PSO4: Understand the role legislation and policy drivers play in stakeholders' response to the environmental issues

Program Specific Outcomes for M.Tech– Transportation Engineering

PSO1 : Transportation engineering students should have the ability to solve problems related to in the field of Transportation Engineering by using tools and technique of transportation engineering.

PSO2 : Transportation engineering students should have the ability of design Roads, Traffic signals, Transportation planning and other component of infrastructure system considering environmental, safety and social aspects.

PSO3 : Transportation engineering students should have the ability to design a road network with maximum connectivity which should safe, environmental friendly and sustainable Infrastructure development.

PSO4 : Transportation engineering students should have the ability to compile DPR(Detailed Project Report) and give technical presentations acquiring good communication skills during course of study.

Program Specific Outcomes for M.Tech– Structural Engineering

PSO1: To provide proficiency in the basic principles and advanced courses of technology in Structural Engineering so that student can independently apply knowledge of materials and analyze for design of RCC, steel and masonry structures.

PSO2 : Exhibit managerial skills and professionalism in academics and can extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyze and interpret data in domains of structural engineering such as alternate construction materials, techniques and structural masonry.

PSO3 : Understand the ethical issues pertaining to engineering, adopt industry standards of ethical behavior, and apply appropriate communication and an understanding of responsibility to contribute to the society for sustainable development.

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Course Outcomes (COs)

Course Outcomes

Department of Civil Engineering

Sl. n	Course	Subject Name	Course Outcomes (COs)
1.	B.Tech	Aptitude Building	CO1. Students are trained to write the proposals and assigned projects CO2. Students are confident in Public Speaking CO3. Students write Presentations on different Industrial topics CO4. Improve arithmetic aptitude CO5. Learn tricks to solve Aptitude questions faster thereby saving time during competitive exams
2.	B.Tech	Universal Human Values	CO1. Understand the significance of value inputs in a classroom and start applying them in their life and profession CO2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. CO3. Understand the role of a human being in ensuring harmony in society and nature. CO4. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
3.	B.Tech	Numerical Methods & Computational Techniques	CO1. Apply various numerical methods and appreciate a trade off in using them. CO2. Understand the source of various types of errors and their effect in using these methods. CO3. To distinguish between Numerical and Analytical methods along with their Merits and demerits. CO4. Develop a code in C/C++ for the solution of problems that may not be solved by analytical methods.

			CO5. Understand the use of digital computers in implementation of these methods.
4.	B.Tech	Structural Analysis	CO1. Identify the method of analysis for determinate structures CO2. Understand the importance of various methods of slop and deflections for determinate structures. CO3. Use the influence line diagram. CO4. Understand the methods of analysis for multi-storeyed frames.
5.	B.Tech	Soil Mechanics	CO1. Give an engineering classification of a given soil. CO2. Understand the principle of effective stress, and then calculate stresses that influence soil behavior. CO3. Determine soil deformation parameters, and calculate settlement magnitude and rate of settlement. CO4. Specify soil compaction requirements. CO5. To arrive at safe bearing capacity for the design of substructure for Civil Projects
6.	B.Tech	Concrete Technology	CO1. To identify suitable materials to be used in the cement concrete by conducting various tests as per BIS code. CO2. Test all the concrete materials as per BIS code. CO3. Design the concrete mix using ACI and BIS code methods. CO4. Determine the properties of fresh and hardened of concrete. CO5. Design special concretes and their specific applications and use of admixtures. CO6. Ensure quality control while testing/ sampling and acceptance criteria for pre and post construction work. CO7. Use of non-destructive testing equipment.

7.	B.Tech	Engineering Geology	CO1. Characterize and classify various minerals and rocks on the basis of their engineering properties. CO2. Assess geological hazards and develop mitigation frameworks. CO3. Use seismic and electrical methods to investigate subsurface and develop a native construction plan incorporating all relevant aspects of geology.
8.	B.Tech	Structural Analysis Laboratory	CO1. Understand different methods used for finding slope and deflections. CO2. Determine the slope and deflection of indeterminate structures and will be able to calculate deflection of different types of structures. CO3. To understand structural behavior of structures like beam, column, truss, arches
9.	B.Tech	Concrete Technology Laboratory	CO1. Perform different tests conducted on cement, aggregate and concrete at site. CO2. Perform non-destructive test on concrete. CO3. Design the concrete mix as per the site conditions and specification of materials available there.
10.	B.Tech	Soil Mechanics Laboratory	CO1. Give an engineering classification of a given soil. CO2. Understand the principle of effective stress, and to calculate stresses that influence soil behavior. CO3. Determine soil deformation parameters, based on results of Tri- axial test
11.	B.tech	Numerical Methods Laboratory	CO1. Students will be able to solve problems of mathematics using computers and apply their knowledge gain solving real life problems appearing in various engineering applications that are often impossible to solve using analytical techniques.
12.	B.Tech	Engineering Geology	CO6. Characterize and classify various minerals and rocks on the basis of their engineering properties. CO7. Work in a multidisciplinary team to identify

		Laboratory	geological features of prospective civil engineering project sites with the help of model studies.
13.	B.Tech	Technical Skills for Civil Engineers-II	CO1. Apply the concepts of foundation engineering and structural analysis for designing the components of various structures. CO2. To teach students about the physical and mechanical properties of various construction materials
14.	B.Tech	Industrial Exposure-II	CO1. After the visit the students will have the knowledge of working procedure of the site visited by them.
15.	B.Tech	Foreign Language-II (German)	CO1. write simple sentences. CO2. use different words during communication in German Language. CO3. understand the application of this language in professional purposes.
16.	B.Tech	Campus to Corporate	CO1. Able to analyze self and make necessary corrections CO2. Able to recognize and make use of the strengths CO3. Able to structure and express their thoughts during interviews, GD and presentations CO4. Able to develop skills for career enhancement
17.	B.Tech	Probability & Statistics	CO1. Basics of Probability distributions CO2. Sampling theory and Theory of Estimation CO3. Various tests of Hypothesis and Significance CO4. Correlation and Regression and fitting of different types of curves
18.	B.Tech	Entrepreneurship Development	CO1. Explain the major concepts in the functional areas of accounting, marketing, finance, and management. CO2. Evaluate the legal, social, and economic environments of business. CO3. Describe the global environment of business. CO4. Describe and explain the ethical obligations and responsibilities of business. CO5. Apply decision-support tools to business decision making.
19.	B.Tech	Design of Steel Structures-I	CO1. Calculate load required on structure for the design of steel structure members.

			CO2. Design different type of joints and connections. CO3. Design of tension, compression and flexural members of the steel structures. CO4. Design beam-columns as a whole for different steel structural frame.
20.	B.Tech	Principles & Design of Waste water Treatment & Disposal Systems	CO1. Demonstrate an ability to recognize the type of unit operations and processes involved inwastewater treatment plants. CO2. Demonstrate an ability to choose the appropriate unit operations and processes required for satisfactory treatment of wastewater. CO3. Demonstrate an ability to design individual unit operation or process appropriate to the situation by applying physical chemical, biological and engineering principles. CO4. Demonstrate ability in design of wastewater treatments units in a cost effective and sustainable way and evaluate its performance to meet the desired health and environment related goals. CO5. Recognize the importance of wastewater treatment to protect the water resources.
21.	B.Tech	Geo -Technical Engineering	CO1. Comprehend and utilize the geotechnical literature to establish the framework for foundation design. CO2. Plan and implement a site investigation program including subsurface exploration to evaluate soil/structure behavior and to obtain the necessary design parameters. CO3. Carry out slope stability analysis for various fills and slopes. CO4. Determine allowable bearing pressures and load carrying capabilities of different foundation systems.
22.	B.Tech	Reinforced Concrete	CO1. Design above mentioned R.C.C structures on their own.

		Structures-II	CO2. Use relevant BIS codes related to above mentioned R.C.C structures respectively.
23.	B.Tech	Geo -Technology Laboratory	CO1. The Knowledge of site specific field investigations including collection of soil samples for testing. CO2. To determine various soil parameters by penetration test required for the bearing capacity of sub soil strata. CO3. Be able to identify and classify soil based on standard geotechnical engineering practice. CO4. Be able to perform laboratory compaction and in-place density tests for fill quality control
24.	B.Tech	Waste Water Treatment Laboratory	CO1. On completion of this course the students will be able to determine the BOD, COD, DO, chlorine concentration etc.
25.	B.Tech	Industrial Training	CO1. Apply engineering knowledge in solving real-life problems. CO2. Attain new skills and be aware of the state-of-art in engineering disciplines of their own interest. CO3. Get exposure to real-life-working environment & practices, and to attain the professionalisms. CO4. Work with multi-tasking professionals and multidisciplinary team. CO5. Prepare a technical report, to improve presentation and other soft skills.
26.	B.Tech	Technical Skills for Civil Engineers-IV	CO1. Solve the conceptual problems asked in IES and other competitive exams. CO2. It shall inculcate confidence in the students to appear in the various competitive examinations.
27.	B.Tech	Pre-Stressed Concrete	CO1. At the end of this course the student shall have a knowledge of methods of prestressing, advantages of prestressing concrete, the losses

			involved and the design methods for prestressed concrete elements under codal provisions.
28.	B.Tech	Non-Conventional Energy Sources	CO1. Identify the forms of energy and then use as energy resource CO2. Implement the methods involved in converting different source to energy CO3. Design the plant, based on the principles and form of resources.
29.	B.Tech	Quantitative Techniques in Construction Management	CO1. On completion of this course the students will be able to know operations research, production management, and financial management and cost concepts.
30.	B.Tech	Mass Transport Management	CO1. Do transport modelling and traffic forecasting. CO2. Plan and model urban mass transport.
31.	B.Tech	Building Services	CO1. Identify building services equipment and explain its function CO2. Describe how building services are integrated into a building interpret building services drawings CO3. Explain how building services modify the indoor environment CO4. Determine how building performance & regulatory requirements affect the design&commissioning of building services
32.	B.Tech	Natural Disaster Mitigation and Management	CO1. The types of natural and environmental disasters and its causes. CO2. About organizational and Administrative strategies for managing disasters. CO3. About the early warning systems, monitoring of disasters effect and necessity of rehabilitation. CO4. About the engineering and non-engineering controls of mitigating various natural disasters. CO5. Learn methodologies for disaster risk assessment with the help of latest tools like GPS, GIS, Remote sensing, information technologies,

			etc.
33.	B.Tech	Urban Water Resources Management	CO1. Apply appropriate management techniques for planning, operating and maintaining the different components of urban and drainage system.
34.	B.Tech	Architecture and Town Planning	CO2. Understand fundamentals of architecture & town planning and its principles.

Department of Electronics & Communication Engineering

Sl. n	Course	Subject Name	Course Outcomes (COs)
1.	**B.Tech**	Digital Communication	CO1. Explain the meaning and significance of the following: Shannon's channel capacity theorem, super-heterodyne receiver, multiplexing and multiple access CO2. Apply the sampling theorem to quantify the fundamental relationships between channel "bandwidth" (in hertz), digital symbol rate, and bit rate (in bits/sec). CO3. Understand the concept of Spread Spectrum techniques and Multiple Access Techniques
2.	**M.Tech**	Optical Communication	CO1. Should be able to write code for relevant algorithms. CO1. Should be able to write a secure access client for access to a server CO2. Should be able to send and receive secure mails
3.	**B.Tech**	**Power Electronics**	CO1. illustrate the construction, characteristics of thyristor family and understand the basic principle of operation of SCR. CO2. illustrate the operation of various triggering circuits for series and parallel operation of SCR's and various protection circuits of thyristors. CO3. Analysis and design AC/DC rectifier circuit. CO4. Analysis and design DC/AC inverter circuit. CO5. Analysis and design DC/DC converter circuit. CO6. Examine different applications of power converters

4.	**B.Tech**	**Electrical Machine – I**	CO1. Understand electrical principle, laws, and working of DC machines. CO2. Analyze the construction and characteristics and application of various type of DC generators. CO3. Analyze the construction and characteristics and application of various type of DC motors and testing of motors according to Indian standard. CO4. Understand electrical principle , laws, working of 1 phase transformer, losses and also conduct various test on the transformer. CO5. 5. Understand electrical principle , laws, working of 3 phase transformer, losses, and also conduct various test on the transformer. CO6. 6. Analyze the transformer and convert 3 phase transformer to multi phase transformer.
5.	**M.Tech**	**Wireless Mobile Communication**	CO1. Should be able to write code for relevant cryptographic algorithms. CO2. Should be able to write a secure access client for access to a server CO3. Should be able to send and receive secure mails
6.	**B.Tech**	**Fundamentals of Electronics**	CO1. Explain the structure and working of various types of diodes, BJT and FETs. CO2. Demonstrate the different applications of diodes. CO3. Explain the working principle and limitations of various measuring instruments. CO4. Explain the process of minimizing Boolean functions & differentiate between types of flip-flops
7.	**B.Tech**	**Digital Image Processing**	CO1. Know basics of Image formation and transformation using sampling and quantization. CO2. Define different types of signal processing techniques used for image sharpening and smoothing. CO3. Perform and demonstrate the compression and coding techniques used for image data.
8.	**M.Tech**	**Switching System**	CO1. Should be able to write code for relevant cryptographic algorithms. CO2. Should be able to write a secure access client for access to a server

			CO3. Should be able to send and receive secure mails
9.		**MICROWAVE & RADAR**	CO1. Knowledge about Microwave Solid State Devices. CO2. Ability to identify and study the performance of Wave Guides and Resonators CO3. Study the performance of Microwave Components. CO4. Study the comparative performance analysis of Microwave Tubes and Circuits. CO5. Knowledge about Microwave Measurements. CO6. Study the measurement of impedance using smith chart.
10.	**B.tech**	**VLSI Design**	CO1. Develop analog VLSI IC's for the use of analog circuits in compact form. CO2. Design the digital circuits using VLSI technologies. CO3. Develop the semiconductor memories using VLSI technologies
11.	**M.Tech**	Electronics System Design	CO1. To identify combinational sequential devices. CO2. Student can design state machine for a given problem
12.	**M.Tech**	**VLSI Design**	CO1. Create models of moderately sized CMOS circuits that realize specified digital functions. CO2. Have an understanding of the characteristics of CMOs circuit construction.

Department of Mechanical Engineering

Sl. n	Course	Subject Name	Course Outcomes (COs)
1	**B.Tech**	**Professional Communication**	CO1. To speak confidently before the audience CO2. To be able to convey their ideas in an expressive and effective way CO3. Get a holistic industry perspective
2	**B.Tech**	**Complex Analysis & Programming**	CO1. Understand concepts of Partial Differential Equations and techniques to solve them. CO2. Understand the behavior of complex variable function and importance of a special class of function, analytic functions in evaluating complex and real integrals. CO3. Understand the application of Z-Transform in solving difference equation
3	**B.Tech**	**Psychology and**	CO1. Be able to understand and deal with personal and

		Sociology	organization phenomenon. CO2. Be able to deal with common psychological aspects related to an Engineer's life. CO3. Be able to understand the impact of social environment on individuals, groups and communities. CO4. Be able to utilize the knowledge of Sociology and to improve the quality of living of self and social relationship at large.
4	**B.Tech**	**Engineering Mechanics**	CO1. Solve the engineering problems in case of equilibrium conditions. CO2. Calculate the reaction forces of various supports of different structures. CO3. Solve the problems involving dry friction. CO4. Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids. CO5. Calculate the forces acting on the rigid body, structures using the principle of virtual work.
5	**B.Tech**	**Materials Engineering and Technology**	CO1. Understand how materials are formed and their classification based on atomic arrangement. CO2. Describe the mechanical behaviour of metallic systems and its importance. CO3. Evaluate system for fatigue failures. CO4. Gain knowledge on different class of materials and their applications.
6	**B.Tech**	**Engineering Thermodynamics**	CO1. Differentiate between closed and open systems and analyze related problems. CO2. Apply the concept of second law to design thermodynamic systems. CO3. Analyze the performance of gas and vapour power cycles and identify methods to improve thermodynamic performance. CO4. Solve problems of combustion and stoichiometry.
7	**B.Tech**	**Fundamentals of Manufacturing Processes**	CO1. Use the principles of foundry and casting. CO2. Choose materials in a manufacturing process based on their properties. CO3. Conduct experiments on various manufacturing processes. CO4. Demonstrate an ability to solve engineering problems in welding and powder metallurgy processes. CO5. Choose correct manufacturing process for a

			particular engineering application.
8	**B.Tech**	**Manufacturing Processes Laboratory**	CO1. Compare the microstructures of different metals. CO2. Know the procedures of different heat treatment process. CO3. Measure the different measurements using measuring instruments and analyse the errors
9	**B.Tech**	**Technical Skills for Mechanical Engineers-I**	CO1. Gain knowledge on different type of materials and their applications. CO2. Apply the concept of laws of thermodynamics to design thermodynamic systems. CO3. Describe the various principle of Traditional and non-traditional machining processes. CO4. Understand fundamental elements of instrumentation, measurement and control system and CAD modelling. CO5. Develop the basic knowledge to solve the multiple choice questions and focus the corporate interviews.
10	**B.Tech**	**Industrial Exposure -I**	CO1. Get exposure to real-life-working environment & practices, and to attain the professionalisms. CO2. Work with multi-tasking professionals and multidisciplinary team. CO3. To aware about portfolio of industry.
11	**B.Tech**	**Aptitude Building**	CO1. Students are trained to write the proposals and assigned projects CO2. Students are confident in Public Speaking CO3. Students write Presentations on different Industrial topics Improve arithmetic aptitude CO4. Learn tricks to solve Aptitude questions faster thereby saving time during competitive exams.
12	**B.Tech**	**Numerical Methods and Computational Techniques**	CO1. Understand the significance of value inputs in a classroom and start applying them in their life and profession CO2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. CO3. Understand the role of a human being in ensuring harmony in society and nature. CO4. Distinguish between ethical and unethical

			practices, and start working out the strategy to actualize a harmonious environment wherever they work.
13	**B.Tech**	**Fluid Mechanics**	CO1. Find frictional losses in a pipe for a flow between two places. CO2. Analyse the model and prototype. CO3. Find the dependent and independent parameters for a fluid flow. CO4. Explain various methods available for boundary layer separation.
14	**B.Tech**	**Strength of Materials**	CO1. Apply concepts of strength of materials to obtain solutions to real time Engineering problems. CO2. Able to analyze the different types of loading and the consequent deflection.
15	**B.Tech**	**Kinematics of Machinery**	CO1. Demonstrate an understanding of the concepts of various mechanisms and pairs. CO2. Conduct velocity and acceleration analysis of simple mechanisms. CO3. Design a layout of cam for specified motion. CO4. Synthesize simple mechanisms for function, path generation and body guidance. CO5. Demonstrate an understanding of principles of operation of gears.
16	**B.Tech**	**Machining Process and Metrology**	CO1. Explain the mechanism of chip formation in machining. CO2. Explain the various machining processes such as turning, drilling, boring, shaping, slotting, milling and grinding. CO3. Describe the principle of gear generation and non-traditional machining processes. CO4. Identify and suggest correct manufacturing process for particular application. CO5. Know the principle of different metrology instrument.
17	**B.Tech**	**Computer Aided Machine Drawing**	CO1. Explain various standards and specifications related to standard machine components. CO2. Make assembly drawings with the help of given part drawings.

			CO3. Select, configure and synthesize mechanical components into assemblies. CO4. Apply the knowledge of fits and tolerances for various applications. **CO5.** Model components of their choice using CAD software.
18	**B.Tech**	**Kinematics of Machinery Lab**	CO1. Demonstrate an understanding of the concepts of various mechanisms and pairs. CO2. Conduct velocity and acceleration analysis of simple mechanisms. CO3. Design a layout of cam for specified motion. CO4. Synthesize simple mechanisms for function, path generation and body guidance. CO5. Demonstrate an understanding of principles of operation of gears.
19	**B.Tech**	**Fluid Mechanics Lab**	CO1. Utilize basic measurement techniques of fluid mechanics. CO2. Discuss the differences among measurement techniques, their relevance and applications. CO3. Demonstrate practical understanding of friction losses in pipes.
20	**B.Tech**	**Numerical Methods Laboratory**	CO1. Students will be able to solve problems of mathematics using computers and apply their knowledge in solving real life problems appearing in various engineering applications that are often impossible to solve using analytical techniques.
21	**B.Tech**	**Technical skills for Mechanical Engineer-II**	CO1. Understand the machine components and know the applications of the various elements used. CO2. Identify and select suitable sensors, actuators and controllers to meet specific applications. CO3. Apply basic principles of heat transfer for designing heat and mass transfer systems. CO4. Perform static and dynamic balancing of high speed rotary and reciprocating machines and acquire knowledge in part programming. CO5. Develop the basic knowledge to solve the multiple choice questions and focus the corporate interviews. .
22	**B.Tech**	**Industrial**	CO1. Get exposure to real-life-working environment &

		Exposure -II	practices, and to attain the professionalisms. CO2. Work with multi-tasking professionals and multidisciplinary team. CO3. To aware about portfolio of industry.
23	**B.Tech**	**Personality Development & Career Building**	CO1. Get an idea of industry perspective CO2. Give the Effective Presentation CO3. Able to develop a logical thought process related to every aspect of life CO4. Able to widen the horizon of one's thought process and data analysis skills CO5. Able to interpret Data and convert into information.
24	**B.Tech**	**Probability and Statistics**	CO1. Basics of Probability distributions CO2. Sampling theory and Theory of Estimation CO3. Various tests of Hypothesis and Significance Correlation and Regression and fitting of different types of curves.
25	**B.Tech**	**Dynamics of Machinery**	CO1. Demonstrate skills to design flywheel for an IC engine and punching press with the consideration of geometrical and economical constraints. CO2. Perform static and dynamic balancing of high speed rotary and reciprocating machines. CO3. Analyse free and forced vibrations of machines, engines and structures. CO4. Calculate gyroscopic couple find its effect on various vehicles and apply concept of governors for speed control.
26	**B.Tech**	**Design of Machine Elements**	CO1. Analyze and select machine elements/components. CO2. To know the applications of the various elements, materials used to make them, and methods used CO3. Integrate various machine elements and components into the design of a machine or mechanical system through a design project.
27	**B.Tech**	**Heat and Mass Transfer**	CO1. Apply basic principles of fl uid mechanics, thermodynamics, heat transfer for designing heat and mass transfer systems. CO2. Model heat, mass and momentum transport systems and develop predictive correlation. CO3. Assess and evaluate various designs for heat and mass transfer and optimize the solution
28	**B.Tech**	**Industrial Economics and**	CO1. Apply the concept of demand. CO2. Estimate production and cost function.

		Management	CO3. Formulate appropriate pricing strategies.
29	**B.Tech**	**Production Planning and Control**	CO1. Identify and suggest correct type of production planning technique. CO2. Analyze the concepts of production planning. CO3. Control and implement PPC methods in crucial areas of the industry. CO4. Implement the knowledge of ERP systems and shop floor scheduling.
30	**B.Tech**	**Advanced Machining Processes**	CO1. Identify and suggest the suitable manufacturing process for advanced materials and critical finishing. CO2. Select a process for a given application such as IBM, EBM, PAM etc.
31	**B.Tech**	**Fuel and Combustion**	CO1. Analyze the composition of various types of fuels and their properties. CO1. Estimate the possible pollution of fossil fuels and its control. CO2. Demonstrate the knowledge of combustion thermodynamics.
32	**B.Tech**	**Refrigeration and Air Conditioning**	CO1. Possess the knowledge of system components of refrigeration and air conditioning. CO2. Design and implement refrigeration and air conditioning systems using standards. CO3. Apply the knowledge of psychrometry in calculating cooling load and heating load calculations.
33	**B.Tech**	**Dynamics of Machinery Laboratory**	CO1. Understand kinematics of various mechanisms, balancing of rotating systems. CO2. Study the performance of different types of governors, gyroscopic effect. CO3. Plot profile of cam. CO4. Determine frequency of the vibrating systems.
34	**B.Tech**	**Heat and Mass Transfer Laboratory**	CO1. Determine thermal conductivity of slab, composite wall, insulating power and the given liquid. CO2. Measure heat transfer co-efficient of cylinder and pipe under natural and forced convection. CO3. Evaluate the heat transfer through parallel flow and counter flow heat exchangers.
35	**B.Tech**	**Technical skills for Mechanical**	CO1. Acquire skills to differentiate the various types of gas cycles, engine cycles, refrigeration cycles and power cycles.

		Engineer-III	CO2. Gain the ability to apply the concepts of heat engineering and applied thermodynamics CO3. Know the applications of the various systems, materials used to make them, and methods used. CO4. Use commercial FEA packages like ANSYS and modern CAD tools for solving real life problems. CO5. Develop the basic knowledge to solve the multiple type questions and focus the corporate interviews.
36	**B.Tech**	**Industrial Training -I**	CO1. Apply engineering knowledge in solving real-life problems. CO2. Attain new skills and be aware of the state-of-art in engineering disciplines of their own interest. CO3. Get exposure to real-life-working environment & practices, and to attain the professionalisms. CO4. Work with multi-tasking professionals and multidisciplinary team. CO5. Prepare a technical report, to improve presentation and other soft skills.
37	**B.Tech**	**Campus - to - Corporate**	CO1. Students are confident to give independent presentations professionally. CO2. Prepare for the interviews.
38	**B.Tech**	**Power Plant Engineering**	CO1. Understand basic power generation types and steam cycles. CO2. Know about the kind of boilers being used in various industries and their applicability. CO3. Solve problems related to gas turbine and Rankine cycles. CO4. Distinguish between various power generation Modules and choose one that meets desired economic, environmental and social requirements.
39	**B.Tech**	**Instrumentation & Control Engineering**	CO1. Understand fundamental elements of instrumentation, measurement and control systems. CO2. Build mathematical models of simple physical systems using transfer functions. CO3. Will be able to design a control system for any required objective by using the theory of control system and implementing

			CO4. it with various sensors and transducers.
40	**B.Tech**	**Turbo machines**	CO1. Solve analytical problems in fluid machines for both compressible and incompressible fluid flows. CO2. Calculate performance parameters, governing and selection of fluid machines.
41	**B.Tech**	**Entrepreneurship Development**	CO1. To inculcate entrepreneurship skills to students. CO2. To aware about industry structure and how to start up a company
42	**B.Tech**	**Automobile Engineering**	CO1. Develop chassis and identify suitable engine for different applications. CO2. Formulate steering, braking and suspension systems. CO3. Select a suitable conventional and automatic transmission system. CO4. Identify the usage of Electrical vehicles / Hybrid vehicles and power plants.
43	**B.Tech**	**Rapid Manufacturing Technologies**	CO1. Demonstrate the concepts of various types of rapid prototyping/manufacturing Technologies. CO2. Show the application and benefits of rapid prototyping **CO3.** Do modeling of the components through CAD tools.
44	**B.Tech**	**Composite Materials**	CO1. Design and manufacture composite materials for various applications. CO2. Conduct mechanical testing of composite structures and analyze failure modes. CO3. Analyze economic aspects of using composites. CO4. Explain the relevance and limitations of the destructive and non-destructive test methods used for composites. CO5. Demonstrate the ability to use appropriate design and analysis tools and techniques.
45	**B.Tech**	**Product Design for Manufacturing**	CO1. Apply customer-oriented, manufacturing and life cycle sensitive approach to product design and development with product design principles and structured design methodologies. CO2. Possess methods and approaches for developing, implementing and nurturing an effective DFM process within the firm.

			CO3. Demonstrate the knowledge of DFMA software for case studies. CO4. Develop a new product as per the requirement.
46	**B.Tech**	**Mechatronics**	CO1. Identify the elements of mechatronics system. CO2. Select suitable sensors, actuators and controllers to meet specific requirements. CO3. Demonstrate intelligent mechatronics system for engineering applications.
	B.Tech		
47		**Mechanical Vibrations**	CO1. Develop mathematical model of dynamic systems with single degree of freedom. CO2. Develop mathematical model of dynamic systems with multiple degrees of freedom. CO3. Calculate natural frequency and period of simple vibrating mechanical systems. CO4. Obtain the analytical solution for system's time response. CO5. Deal with engineering systems involving vibration isolation and rotating imbalance.
48	**B.Tech**	**Modeling and Simulation of Manufacturing Systems**	CO1. Develop the practical skills necessary to design, implement and analyze discrete-event simulation systems. CO2. Cover the basic theory underlying discrete-event simulation methodologies in order to enable a critical understanding of simulation output in managerial environments. CO3. Build the foundations necessary to quickly adapt for future advances in simulation technology.
49	**B.Tech**	**Lean Enterprises and New Manufacturing Technology**	CO1. Identify value in all walks of their life CO2. Use of process mapping and Group Technology in the industry CO3. Enhance the productivity through applications of modern management techniques
50	**B.Tech**	**Instrumentation Laboratory**	CO1. Demonstrate the various parameter measurements using instruments. CO2. Determine the magnitude of parametric measurements such as load, speed and torque CO3. Measure pressure and temperature.
51	**B.Tech**	**Fluid and Turbo Machinery**	CO1. Utilize basic measurement techniques of fluid mechanics. CO2. Discuss the differences among measurement

		laboratory	techniques, their relevance and applications. CO3. Demonstrate practical understanding of friction losses in pipes. CO4. Carryout the performance analysis of pumps and turbines.
52	**B.Tech**	**Technical skills for Mechanical Engineer-IV**	CO1. Acquire skills to differentiate the various types of thermodynamic systems. CO2. Gain the ability to apply the concepts of heat engineering and applied thermodynamics CO3. Describe the various principle of Traditional and non-traditional machining processes. CO4. Understand fundamental elements of instrumentation, measurement and control system and CAD modelling. CO5. Develop the basic knowledge to solve the multiple type questions and focus the corporate interviews.
53	**B.Tech**	**Industrial Training -II**	CO1. Apply engineering knowledge in solving real-life problems. CO2. Attain new skills and be aware of the state-of-art in engineering disciplines of their own interest. CO3. Get exposure to real-life-working environment & practices, and to attain the professionalisms. CO4. Work with multi-tasking professionals and multidisciplinary team. CO5. Prepare a technical report, to improve presentation and other soft skills.
54	**B.Tech**	**Professional Ethics for Mechanical Engineering**	CO1. Understand the significance of value inputs in a classroom and start applying them in their professional life. CO2. Understand the role of a human being in ensuring harmony in society and nature. CO3. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
55	**B.Tech**	**Operation Research Techniques**	CO1. Apply operations research techniques in industrial optimization problems. CO2. Solve transportation problems using various OR methods. Illustrate the use of OR tools in a wide range of applications in industries. CO3. Explain current topics and advanced techniques of Operations Research for industrial solutions.

56	**B.Tech**	**Design of Transmission Systems**	CO1. Design pulleys, chain drives, rope drives and belt drives. Determine performance requirements in the selection of commercially available transmission drives. CO2. Design Brakes and Clutches CO3. Design various types of gear boxes. CO4. Know the applications of the various systems, materials used to make them, and methods used.
57	**B.Tech**	**CAD/CAM**	CO1. To understand the importance of CAD/CAM principles in the Product development. CO2. To develop programs related to manufacturing using codes. CO3. To analyze the importance of networking in manufacturing environment.
58	**B.Tech**	**Fluid Power System**	CO1. Find the importance of fluid power technology in industries and to obtain knowledge on hydraulic and pneumatic components. CO2. Get exposure to the basics of fluid flow including the physical laws affecting fluid standards and symbols used in industrial applications. CO3. Gain knowledge of the various components in fluid power industry and solve problems related to pumps.
59	**B.Tech**	**Finite Element Analysis**	CO1. Apply the knowledge of mathematics and engineering to solve problems in structural and thermal engineering by approximate and numerical methods. CO2. Design a new component or improve the existing components using FEA. CO3. Solve the problems in solid mechanics and heat transfer using FEM. CO4. Use commercial FEA packages like ANSYS and modern CAD/CAE tools for solving real life problems.
60	**B.Tech**	**Computational Fluid Dynamics**	CO1. Use the knowledge of CFD techniques, basic aspects of discretization and grid generation. CO2. Solve fluid flow fields using CFD methods. CO3. Model fluid flow problems and heat transfer.
61	**B.Tech**	**Introduction to Biomaterial Science**	CO1. Explain the basic knowledge on the subject of Biomaterials Science. CO2. Apply new researches in the field.

62	**B.Tech**	**Nuclear Power Engineering**	CO1. Know the nuclear fission and fusion processes CO2. Understand the working of a nuclear reactors CO3. Understand power generation and safety aspects
63	**B.Tech**	**Robotics**	CO1. Know the basics of robotics. CO2. Do robot programming. CO3. Appreciate the applications of robotics and apply economic measures to justify advantages of robots in industry.
64	**B.Tech**	**Gas Dynamics And Jet Propulsion**	CO1. Demonstrate the knowledge of major elements in a jet engine and calculate the overall performance of a jet engine. CO2. Apply the concepts of gas dynamics for applications related to compressible flows and jet propulsion. CO3. Possess the knowledge of jet engines and aircraft propulsion theories.
65	**B.Tech**	**Nano Materials**	CO1. Use Nanomaterials for various industrial applications. CO2. Design MEMS / NEMS devices for various applications. CO3. Demonstrate the knowledge of devices used in MEMS/NEMS.
66	**B.Tech**	**CAD / CAM Laboratory**	CO1. Gain practical experience in handling 2D drafting and 3D modelling software systems. CO2. Understand and handle design problems in a systematic manner. CO3. Understand the concepts of G and M codes and manual part programming. **CO4.** To know the application of various CNC machines.
67	**B.Tech**	**Transmission Systems Laboratory**	CO1. Identify the different transmission components. CO2. Understand function of car body and safety. CO3. Understand the working of steering, braking and suspension systems.

68	**B.Tech**	**Industrial / Research Project (Phase-I)**	CO1. Submit a project synopsis comprising of the application and feasibility of the project. CO2. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health care, safety and sustainability. CO3. Work and communicate efficiently in multidisciplinary teams CO4. Identify, formulate, and solve engineering problems. CO5. Develop an understanding of professional and ethical responsibility.
69	**B.Tech**	**Industrial / Research Project (Phase-II)**	CO1. Submit a project synopsis comprising of the application and feasibility of the project. CO2. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health care, safety and sustainability. CO3. Work and communicate efficiently in multidisciplinary teams CO4. Identify, formulate, and solve engineering problems. CO5. Develop an understanding of professional and ethical responsibility.

Department of Computer Science &Engineering

Sl. n	Course	Subject name	Course Outcomes (COs)
1	**B.Tech**	**Professional Skills**	CO1. Able to convey their ideas in an expressive and effective way CO2. Able to speak confidently before the audience CO3. Able to get a holistic industry perspectives CO4. Able to think out of the box and express CO5. Able to write effectively
2	**B.Tech**	**Data Structures using C**	CO1. Use and implement appropriate data structure for the required problems using a programming language such as C/C++. CO2. Analyze step by step and

			develop algorithms to solve real world problems. CO3. Implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs. CO4. Understand various searching & sorting techniques.
3	**B.Tech**	**Computer Architecture and Organization**	**CO1.** To understand the basic knowledge of Computer system and its component and functioning of each components. **CO2.** To understand and analyze computer architecture and organization, computer arithmetic, and CPU design. **CO3.** To understand I/O system and interconnection structures of computer system **CO4.** To understand and analyze I/O techniques and functioning of memory. **CO5.** To understand various types of buses in a computer system and illustrate how data transfers is performed.
4	**B.Tech**	**Operating System**	CO1. Understand and identify the System calls, protection, interrupts. CO2. Understand Input/ Output, Process, disk accesses, file systems. CO3. Understand the concepts of Virtual memory and how it is realized in system CO4. Implement Concurrency & synchronization Semaphores/monitors, shared memory, mutual exclusion Process scheduling services
5	**B.Tech**	**Digital Electronics**	CO1. Verify and analyze the input/output data of each logic gate and circuits such as adders, counters, coders, etc. CO2. Analyze the basic operation of memory cell and its limitations in circuit designing CO3. Apply the digital circuit design concept in developing basic component of computer organization, projects or experiments.
6	**B.Tech**	**Aptitude Building**	CO1. Able to write the proposals and assigned projects CO2. Confident in Public Speaking CO3. Can write

			Presentations on different Industrial topics CO4. Improve arithmetic aptitude CO5. Learn tricks to solve Aptitude questions faster thereby saving time during competitive exams
7	**B.Tech**	**Computer graphics**	CO1. To develop a facility with the relevant mathematics of computer graphics CO2. Apply principles and techniques of computer graphics, e.g., the graphics pipeline, and Bresenham's algorithm for speedy line and circle generation CO3. Apply computer graphics concepts in the development of computer games, information CO4. visualization, and business applications
8	**B.Tech**	**Object Oriented programming using C++**	CO1. Knowledge of programming language. CO2. Be aware about OOP's concept CO3. Basic understanding on programming
9	**B.Tech**	**Database Management System**	CO1. Understand the relational database theory, and be able to write relational algebra expressions for queries, logical design of databases, including the E-R method and normalization approach. CO2. Illustrate commercial relational database system by writing SQL CO3. Understand the relational database theory, and be able to write relational algebra expressions for queries, logical design of databases, including the E-R method and normalization approach. CO4. Understand and analyze the database storage structures and access techniques like file and page organizations, indexing methods including B-tree, hashing, query evaluation techniques and and query optimization CO5. Understand various issues of transaction processing and concurrency control by designing and development of a database application system as part of a team

10	**B.Tech**	**Computer Networks**	CO1. Examine and analyze various protocols like transport-layer concepts: Transport-Layer services -Reliable vs. un-reliable data transfer -TCP protocol -UDP protocol CO2. Examine and analyze the network-layer concepts like Network-Layer services –Routing -IP protocol -IP addressing CO3. Examine and analyze the different link-layer and local area network concepts like Link-Layer services –Ethernet -Token Ring -Error detection and correction -ARP protocol CO4. Analyze and implement application of network system.
11	**B.Tech**	**Discrete Mathematics**	CO1. Construct proofs using direct proof, proof by contraposition, proof by contradiction, proof by cases CO2. Construct mathematical arguments using logical connectives and quantifiers and verify the correctness of an argument using propositional and predicate logic and truth tables. CO3. Demonstrate the ability to solve problems using counting techniques and combinatory in the context of discrete probability CO4. Solve problems involving recurrence relations and generating functions
12	**B.Tech**	**Numerical Methods and Random process**	CO1. Apply various numerical methods and appreciate a trade off in using them. CO2. Understand the source of various types of errors and their effect in using these methods. CO3. To distinguish between Numerical and Analytical methods along with their Merits and demerits. CO4. Understand the use of digital computers in implementation of these methods.
13	**B.Tech**	**Personality and Career Building**	CO1. **able to get an idea of industry perspective** CO2. **able to Able to develop a logical thought process related to every aspect of life** CO3. **to interpret data and convert it into information**

			CO4. **able to hold meaningful group discussions** CO5. **able to develop and respond to daily situations using critical thinking**
14	**B.Tech**	**Theory of Automata & Formal Language**	CO1. Understand the importance of automata as a modelling tool of computational problems CO2. Understand the role of context-free languages and their limitations CO3. Understand the basis of theory of computation, in particular the role of key problems in defining classes of equivalent problems from a computational perspective CO4. Understand the limitations of computational procedures
15	**B.Tech**	**Software Engineering**	CO1. To apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science and mathematics, to the development and maintenance of complex software systems. CO2. To design and validate various software prototypes and to develop quality software metrics. CO3. To participate, productively in software project teams involving students from both software engineering and other majors streams of computer science & engineering. CO4. To design and develop standard procedures through oral and written reports and software documentation evaluated by both peers and faculty.
16	**B.Tech**	**Analysis and Design of Algorithm**	CO1. Analyze algorithms and determine efficiency of algorithm. CO2. Understand advanced abstract data type (ADT), data structures and their implementations CO3. Design algorithms using the brute force, greedy, divide and conquer, branch and bound etc. methodologies. CO4. Prove problems of P, NP, or NP-Complete. CO5. Develop and implement learned/new algorithm using appropriate techniques to solve problems.

17	**B.Tech**	**Python Programming**	CO1. To utilize high-level data types such as lists and dictionaries **CO2.** To import and utilize a module • read from and write to a text file. CO3. understand the difference between mutable and immutable types CO4. To demonstration of IDE"s: IDLE, IPython, IPython Notebook, hosted environments.
18	**B.Tech**	**Distributed Database Management System**	CO1. understand and analyze distributed database CO2. understand I/O system and interconnection structures of DDBMS CO3. understand and analyze different query processing and data control.
19	**B.Tech**	**Campus to Corporate**	CO1. **able to make formal presentations using basic business communication** CO2. **able to hold formal business conversations confidently** CO3. **able to conduct business meetings with right etiquettes** CO4. **able to hold meaningful group discussions and ace interviews**
20	**B.Tech**	**Compiler Design**	CO1. Understand fundamentals of compiler and identify the relationships among different phases of the compiler. CO2. Understand the application of finite state machines, recursive descent, production rules, parsing, and language semantics. CO3. Analyze & implement required module, which may include front-end, back-end, and a small set of middle-end optimizations. CO4. Use modern tools and technologies for designing new compiler.

21	**B.Tech**	**Web Security**	CO1. Construct proofs using direct proof, proof by contraposition, proof by contradiction, proof by cases CO2. Construct mathematical arguments using logical connectives and quantifiers and verify the correctness of an argument using propositional and predicate logic and truth tables. CO3. Demonstrate the ability to solve problems using counting techniques and combinatory in the context of discrete probability. CO4. Solve problems involving recurrence relations and generating functions.
22	**B.Tech**	**Java**	**CO1.** Design a desktop application which can be used by clients **CO2.** Design a web application which can work as a dynamic web with the help of JDBC **CO3.** Develop an application which can also be connected with the database **CO4.** Understand the concepts of Networking and Multi-threading
23	**B.Tech**	**Artificial Intelligence**	CO1. understand the principles of problem solving and be able to apply them successfully CO2. be familiar with techniques for computer-based representation and manipulation of complex information, knowledge, and uncertainty CO3. gain awareness of several advanced AI applications and topics such as intelligent agents, planning and scheduling, ma-chine learning, etc. CO4. understand the principles of problem solving and be able to apply them successfully
24	**B.Tech**	**Wireless and Mobile Communication**	CO1. Understand principles of wireless communication and, various mobile network architecture. CO2. Understand various Modulation techniques for Mobile Radio. CO3. Understand the information theoretical aspects (such as the capacity) of wireless channels CO4. Realize various wireless and mobile cellular communication systems CO5. Implement practical mobile applications

25	**B.Tech**	**Distributed System**	CO1. Verify and analyze the time complexity of the algorithms related to distributed computing. CO2. Design and develop various algorithms for problems in distributed computing CO3. Compare various resource allocation stratagies.
26	**B.Tech**	**Data Warehouse and Data Mining**	CO1. Design a data warehouse or data mart to present information needed by the and can be utilized for managing clients. CO2. Design and implement a quality data warehouse or data mart effectively and administer the data resources in such a way that it will truly meet management's requirements. CO3. Evaluate standards and new technologies to determine their potential impact on your information resource for a large complex data warehouse/data mart. CO4. Use data mining tools for projects and to build reliable products as per demand.
27	**B.Tech**	**Microprocessor and Interfacing**	CO1. Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system. CO2. Identify a detailed s/w & h/w structure of the Microprocessor. CO3. Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.
28	**B.Tech**	**Web Technology**	CO1. Apply various numerical methods and appreciate a trade off in using them. CO2. Understand the source of various types of errors and their effect in using these methods. CO3. To distinguish between Numerical and Analytical methods along with their Merits and demerits. CO4. Understand the use of digital computers in implementation of these methods.

29	**B.Tech**	**NEURAL NETWORKS**	CO1. Learn Basic Neural Network architecture and basic learning algorithms CO2. Learn training, verification and validation of neural network models CO3. Design single and multi-layer feed-forward neural networks CO4. Understand training of recurrent Hopfield networks and associative memory concepts.
30	**B.Tech**	**Human Value & Professional Ethics**	**CO1. Understand the significance of value inputs in a classroom and start applying them in their professional life.** **CO2. Understand the role of a human being in ensuring harmony in society and nature.** **CO3. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.**
31	**B.Tech**	**Software Project Management**	CO1. Use the appropriate methods and tools for estimating software cost. CO2. Understand the difference between different software design models and techniques and how to apply them. CO3. Recognize the importance of software reliability and how we can design dependable software, and what measures are used. CO4. Understand the principles and techniques underlying the process of inspecting and testing software and making it free of errors and tolerable. CO5. Recognize the importance of software standards and quality assurance.

32	**B.Tech**	**Image Processing & Pattern Recognition**	CO1. Understand Basics of Image formation and transformation using sampling and quantization CO2. Understand different types of signal processing techniques used for image sharpening and smoothing. CO3. Perform and apply compression and coding techniques used for image data. CO4. Understand the nature and inherent difficulties of the pattern recognition problems. CO5. Understand Concepts, trade-offs and appropriateness of the different types and classification techniques such as Bayesian, Maximum-likelihood,etc.
33	**B.Tech**	**Cloud Computing**	CO1. Understand the concepts of virtualization CO2. Understand Cloud delivery models in details CO3. Understand briefly Cloud Computing Reference Architecture CO4. Understand how Cloud Computing Architecture can enable transformation, business development and agility in an organization

Department of CLC

Sr. n	Course	Subject Name	Course Outcomes (COs)
1.	German (CSE/ME/EEE/ ECE/CE)	German Language (FL)	CO1. To be able to pronounce in German language CO2. To be able to do self introduction in German language CO3. To be able to understand simple sentences
2.	German (CSE/ME/EEE/ ECE/CE)	German Language (FL)	CO1. To be able to understand simple German conversation CO2. To be able to speak simple sentences CO3. To be able to write in German languages easily
3.	B. Tech (CSE/ME/EEE/ ECE/CE)	Communication skills-I	CO1. To be able to communicate and expand the knowledge of communication CO2. To be able to communicate in English confidently CO3. To be able to improve pronunciation and accent CO4. To be able to improve listening and writing skills
4.	B. Tech (CSE/ME/EEE/ ECE/CE)	Communication skills-II	CO1. To be able to get an idea of industry perspective CO2. To be able to develop a logical thought process related to every aspect of life CO3. To be able to interpret data and convert it into information CO4. To be able to develop and respond to daily situations using critical thinking
5	BCA	Communication & Soft Skills	CO1. To able to communicate more effectively and efficiently CO2. To be able to improve reading and writing skills CO3. To be able to work in teams CO4. To be able to demonstrate clear briefing and listening skills
6.	B. Tech (CSE/ME/EEE/ ECE/CE)	Professional Communication Skills	CO1. To be able to convey their ideas in an expressive and effective way CO2. To be able to speak confidently before the audience CO3. To be able to get a holistic industry perspectives CO4. To be able think out of the box and express
7.	MCA	Colloquium	CO1. To be able to convey their ideas in an expressive and effective way CO2. To be able to speak confidently before the audience CO3. To be able to get a holistic industry perspectives To be able think out of the box and express
8.	B. Tech (CSE/ME/EEE/ ECE/CE)	Aptitude Building	CO1. To be able to get an idea of industry perspective CO2. To be able to communicate more confidently CO3. To be able to make Presentations on different Industrial topics CO4. To be able to improve arithmetic aptitude
9.	BCA	Colloquium	CO1. To be able to present themselves more confidently and overcome nerves CO2. To be able to engage the audience using a variety of physical and verbal techniques. CO3. To be able to structure the presentation to suit the

			audience. CO4. To be able to handle the questions
10.	B. Tech (CSE/ME/EEE/ ECE/CE))	Personality Development	CO1. To be able to get an idea of industry perspective CO2. To be able to develop a logical thought process related to every aspect of life CO3. To be able to interpret data and convert it into information CO4. To be able to develop and respond to daily situations using critical thinking
11.	B. Tech (CSE/ME/EEE/ ECE/CE)	Campus to Corporate	CO1. To be able to make formal presentations using basic business communication CO2. To be able hold formal business conversations confidently CO3. To be able to Conduct business meetings with right etiquettes CO4. To be able to hold meaningful group discussions and ace interviews