Department of Computer Science and Engineering

Program Outcomes (POs):

It represents the knowledge, skills and attitudes the students should have at the end of a program completion of their respective engineering program.

a. Engineering knowledge: Ability to apply knowledge of mathematics, science and engineering for the solution of computer science & engineering problems.
b. Problem analysis: Ability to formulate and analyze complex computer science & engineering problems.
c. Design/development of solutions: Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, and public health.
d. Conduct investigations of complex problems: An ability to analyze a problem, and identify, formulate and use the appropriate computing and engineering requirements for obtaining its solution
e. Modern tool usage: Ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice.
f. The engineer and society: Ability to include social, cultural, ethical issues with engineering solutions.
g. Environment and sustainability: Ability to consider the impact of engineering solutions on environment and the need for sustainable development.
h. Ethics: Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of the computer science & engineering practice.
i. Individual and team work: Ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
j. Communication: Ability to communicate effectively. on complex engineering activities with the engineering community and with t h e 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.
k. Project management and finance: Ability to demonstrate knowledge and understanding of principles of management and finance in relation to engineering projects.
l. Life-long learning: Appreciation of technological change and the need for independent life-long learning.

Course Outcomes (COs):

It gives the resultant knowledge and skills the student acquires at the end of each course. It defines the cognitive processes a course provides. The course outcomes (COs) are framed by the individual faculty after discuss with respective HOD along with one subject area expert. The course outcomes and their mapping with program outcomes and program specific outcomes are elaborately discussed. Some of the course outcomes of departmental subjects are shown below:

Course Name: CS303 (Data Structures)

CS305.1	The student will be able to understand and implement arrays and recursive algorithms.
CS305.2	The student will be able to understand and implement stacks, queues and linked lists.
CS305.3	The student will be able to understand and implement tree data structure.
CS305.4	The student will be able to understand and implement sorting, searching and hashing techniques.
CS305.5	The student will be able to understand and implement graphs data structure.

Course Name: CS404 (Analysis and Design of Algorithms)

CS404.1	The student will be able to demonstrate the basic knowledge about various algorithms used in programming languages.
CS404.2	The student will be able to understand the use of greedy strategy and its applications.
CS404.3	The student will be able to apply dynamic programming for problem solving.
CS404.4	The student will be able to apply backtracking for problem solving.
CS404.5	The student will be able to algorithmically design tree data structures and use it in problem solving.

Course Name: CS501 (Theory of Computation)

CS505.1	The student will be able to gain basic knowledge about automata, regular sets and grammar.
CS505.2	The student will be able to understand Context Free Grammars and their applications.
CS505.3	The student will be able to design and develop Push Down Automata.
CS505.4	The student will be able to design and develop Turing Machines.
CS505.5	The student will be able to understand tractable and un-tractable problems and develop their solutions.

Course Name: CS7001 (Distributed System)

CS702.1	The student will be able to understand the history of various distributed systems.
CS702.2	The student will be able to understand about different types of distributed deadlock.
CS702.3	The student will be able to understand the concept of distributed scheduling.
CS702.4	The student will be able to understand the distributed shared memory architecture and its types.
CS702.5	The student will be able to differentiate among different distributed systems like MACH, AMOEBA and CHORUS.

Course Name: CS8001 (Soft Computing)

CS801.1	The student will be able to describe, argue for and critique the soft computing discipline and also be able to use at least two of the soft computing techniques.
CS801.2	The student will be able to demonstrate and analyze the need of Artificial Intelligence and Machine Learning to upgrade living standard of human beings using emerging technologies.
CS801.3	The student will be able to learn basic neural network architecture and algorithms.
CS801.4	The student will be able to explain the fundamental logic of Artificial Intelligence and Fuzzy system.
CS801.5	The student will be able to understand the relations between the Genetic Algorithms, Search and Optimization Techniques and evolutionary algorithms to multi-objective optimization problems.

Program Specific Outcomes (PSOs)

a. Apply standard Software Engineering practices and planning in software projects development to deliver quality product for the organization success.
b. Design and develop computer programs based on Algorithms, Web Designing, Internet of Things, and Machine Learning.
c. Design and develop Information System based on Database Management Systems.

NRI Institute of Research and Technology, Bhopal

Department of Electrical and Electronics Engineering

Program Outcomes (POs):

1. Fundamental Engineering Analysis Skill: .Ability to apply knowledge of mathematics, science, Computer Science, electronics and electrical engineering.
2. Information Retrieval Skills: Ability to design electrical and electronics circuits and conduct experiments with electrical engineering as well as to analyze and interpret data.
3. Creative Skills: Ability to design digital and analog system pertaining to electrical systems
4. Team Work: Ability to visualize and work on multi-disciplinary tasks.
5. Engineering Problem Solving Skills: Ability to identify, formulate and solve engineering problems.
6. Professional Integrity: An understanding of professional and ethical responsibility
7. Speaking / Writing Skills: Ability to communicate effectively in both verbal and written form
8. Continuing Education Awareness: Ability to develop confidence for self-education and to understand the value of life-long learning
9. Social Awareness: Ability to recognize the impact of engineering on society.
10. Practical Engineering Analysis Skills: Ability to acquire new knowledge to use modern engineering tools, software's and equipments to analyze problems necessary for engineering practice.
11. Innovative Skills :A Knowledge of contemporary issues to undertake innovative projects
12. Successful Career and Immediate Employment: Ability to use the techniques and skills to face and succeed in competitive examinations like GATE, GRE, TOEFL, GMAT etc.

Course Outcomes (COs):

Course: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING BT104

CO1: The student shall be able to identify fundamental elements, sources and would be able to apply laws and theorems for solving DC/ AC networks
CO2: The learner would acquire the knowhow of magnetic materials and single phase transformer and would be able to reveal its working, testing and use the information for basic problem solving.
CO3: The student shall be able to differentiate between various electrical machines and would be able to state correct working and characteristics.
CO4: The learner shall be able to identify number systems, digital electronic devices and realize various functions using them
CO5: The students shall be able to identify and differentiate diodes, transistors and would be able to appropriately describe their outputs for various
Upon the successful completion of the subject the student shall be able to identify basic electrical and electronic devices and would be able to relate and comment on its principle and operation.

B.E.-ENGINEERING PHYSICS BT201

CO1: The student shall be able to quote Quantum physics concepts such as Uncertainty principle, Wave function and its properties, time dependent and time independent Schrödinger wave equation.
CO2: The student shall be able to identify the concepts relating physical phenomenon of wave theory such as Interference, Diffraction, polarization of light.
CO3: The learner shall gain insight of nuclear physics, nuclear reactors and its accessories shall be able to comment on the motion of charged particles in crossed electric and magnetic fields.
CO4: The learner shall be able to relate theories underlying development of Semiconductors & superconductors, and describe the operation of various diodes, solar-cells, Hall effect devices.
CO5: The student would be able to explain the production processes, devices, characteristics, principles, types, working and Applications of lasers and optical fibres.
The successful completion the course shall provide engineering students ample confidence to correlate and apply complex concepts of physics towards development of engineering solutions.

Course: NETWORK ANALYSIS EX-304

CO1:They understand the basic elements of electrical and their analysis with different laws.
CO2: They understand the topology of electrical circuit for solving the circuit in easy way.
CO3: They understand the time varying analysis of electrical elements.
CO4: They understand the frequency varying analysis of electrical elements.
CO5: They understand the port analysis with different technology for calculating the parameters.
Students learn different types of methods for solving the circuit as per the condition to find the required parameters.

Course: ELECTRICAL MACHINE – I EX 404

CO1: The students would be able to relate construction features of transformer, elaborate principle of operation, and use equivalent circuits for evaluation of parameters.
CO2: The students would be able to understand the concept of economically operated poly phase transformer in real power sector
CO3: To use a suitable transformer connection matching the characteristics source & load.
CO4: To identify and differentiate various rotating induction machines.
CO5: Able to describe the operation of induction machines in steady state that allows them to be controlled in induction-motor drives.

Course: Power System Protection (EX-603)

CO1: Student will acquire the knowledge of faults and can calculate the magnitude of fault current & MVA for symmetrical and unsymmetrical faults.
CO2: Students will be able to understand the concept of protective relaying and the functioning of various components involved mainly focusing on the relay.
CO3:Students will able to describe the circuit breaker and its types and operation along-with its application, advantages and disadvantaged over other.
CO4: After acquiring the knowledge of different protection system and scheme students will able to implement in real world.
CO5: Students will Students can analyze the power system under various fault conditions and able to decide the protection system and protection scheme as well considering all the desirable qualities of the protective relaying.

COURSE: ELECTRIC DRIVES (EX-7002)

CO1: The knowledge about thyristor controlled drives for different types of DC motor and speed-torque characteristics.
CO2: The knowledge about. Motoring action, braking , plugging, dynamic and regenerative braking and problems on chopper fed drives.
CO3: The knowledge about variable frequency control,CSI and VSI and its performance.
CO4:The knowledge about static control and effect of slip on the performance of induction machine.

CO5:The knowledge about self control of synchronous machine, CSI and VSI fed machine and its performance.
Student will become understand four quadrant operation of DC drives, stator and rotor side control of induction motor and CSI, VSI fed synchronous machine.

Course: Computer-Aided Design of Electrical Machines (EX-8001)

CO1- The learners shall develop a mathematical base for optimum variable selection and of solution techniques useful in electrical machine design.
CO2- The students shall develop a clear understanding of construction details, part specifications and parameter dependencies and shall be able to describe relationships for design of a direct current machine.
C03- The students shall gain insight of construction & parameters of a Transformer and shall be able to use them for extraction and determination of machine parameter for an optimal design of transformer assemblies.
C04- The learners shall get familiarized with construction, objective function and constraints of synchronous machines and shall be able to use empirical relations and characteristics to analyze and optimally design these machines.
C05-. The learners shall gain familiarity with constructions & specifications of induction machines and shall be able to use empirical relations and characteristics to analyze and design these machines
Upon the successful completion of course the student will be able to realize

Program Specific Outcomes

1. Able to utilize the knowledge of high voltage engineering in association with power systems in innovative, dynamic and challenging environment, for the research based teamwork.

2. Can explore the scientific theories, ideas, methodologies and the new cutting edge Technologies in renewable energy engineering, and use this erudition in their professional envelopment and gain sufficient competence to solve the current and future energy problems universally.

3. The understanding of technologies like PLC, process controllers, and microcontroller, one can analyze, design electrical and electronics principles to install, test, maintain power system and applications.

NRI Institute of Research and Technology, Bhopal

Department of Mechanical Engineering

PROGRAM OUTCOMES (POs):-

By the culmination of this BE/B.Tech programme, the graduate acquires the ability to

S.NO	PROGRAM OUTCOMES (POs)
PO 1	The graduates will be able to apply knowledge of basic sciences (math's, physics, chemistry etc.) and engineering (core and elective subjects) in getting solutions to mechanical engineering related problems
PO 2	The graduates will be able to design and conduct experiments as well as analyze and interpret data.
PO 3	The graduates will be able to design a system or a component of a system for a specific task within realistic constraints
PO 4	The graduates will be able to test, evaluate and execute engineering solutions to problems and projects that are practical and of a complexity encountered in professional practice.
PO 5	The graduates will be able to formulate and apply the knowledge of mathematical techniques in solving the governing equations of a system under consideration
PO 6	The graduates will be able to develop industrial and professional ethics and managerial skills and can communicate effectively their point of views.
PO 7	The graduates will be able to study the impact of mechanical systems on the global, economic, environmental and societal context.
PO 8	The graduates will acquire attitude for life- long learning
PO 9	The graduate will be able to use modern tools, software's, equipments etc. to analyze and obtain solution to the problems.
PO 10	The graduates will be able to participate in competitive examinations for success.

PROGRAM SPECIFIC OUTCOMES (PSOs):-

By the end of the educational experience our students should have learned to:

1. Apply current knowledge and adapt to emerging applications of mathematics, science and technology.
2. Conduct, analyze and interpret experiments concerning mechanical engineering technology
3. Identify, analyze and solve technical problems associated with mechanical engineering technology.
4. Use creativity in the design, development, implementation and use of advanced mechanical systems and processes.
5. Develop industrial & professional ethics and managerial skills, also they will able to communicate effectively their point of views.

COURSE OUTCOMES (COs):-

Course objectives are broadly classified as follows:

S.NO	TYPE OF COURSES	COURSE OUTCOMES COs
1	Core courses	After acquiring requisite credits from the core courses, students will be equipped with the basic and fundamental knowledge of mechanical engineering and will be able to apply it to real life problems.
2	Elective courses	Depending on their interests, students will be able to acquire detailed knowledge in the selected areas of mechanical engineering.
3	Projects	Students will be able to apply knowledge gained through the above courses to real life problems on a specific topic. Also students will be able to exhibit their soft skills and ability to work in team.

Course outcomes for each individual subject as prescribed in the scheme of RGPV University are as follows:

S.NO	SEM	CODE	SUBJECTS	COURSE OUTCOMES
1	I SEM	BT-101	Engineering Chemistry	1. Solve quantitative chemistry problems and Demonstrate reasoning clearly and completely. 2. Describe, explain, and model chemical and physical processes at the molecular level in order to explain macroscopic properties. 3. Clearly explain qualitative chemical concepts and trends. 4. Demonstrate an understanding of the impact of engineering solutions in a global and societal context
2		BT-102	Engineering Mathematics -I	1. Develop a fundamental understanding of Matrix, Eigen values, Eigen vectors, diagonalized form of a given matrix and also reduce the quadratic form of a matrix to its canonical form. 2. Understand the application of derivatives in more than one variable and also find the derivatives higher orders. 3. Have a fundamental understanding of double integration, triple integration and visualize the concept of volume in 3-dimensional space. 4. Understand the concept of linear differential equation of the second order and modeling a differential equation from their applications. 5. Find the Laplace transform and its inverse Laplace transform of a function and to solve a differential equation using Laplace transform
3		BT-103	Communication Skills	1.Upon graduation, students will be able to use language to critique ideas and concepts. 2. Upon graduation, students will be able to analyse and interpret ideas, concepts and texts through their own written work. 3.Upon graduation, students will be able to write sophisticated research-based documents, including term papers 4. Analyze communication variables in personal, professional, and community settings and propose competent communication strategies
4		BT-104	Basic Electricals & Electronics Engg.	1. Understand basics of electrical networks and methods to solve them. 2. Understand the elementary concepts of electromagnetism and electromagnetic induction. 3. Understand generation of AC voltage and other fundamentals of AC circuits. 4. Understand the working principles of DC and AC machines. 5. Understand the relevance of energy management and Green energy.
5		BT-105	Engineering Graphics	1. Students will be able to prepare and understand drawings. 2. The drawing skills of students will be improved. 3. Students will get an idea about various curves used in Engineering and their applications. 4. Students can understand and use the principles of

				orthographic projections. 5. By studying about projections of solids students will be able to visualize three dimensional objects and that will enable them to design new products. 6. By studying about the sections of solids students will be able to describe the internal details of objects, machine parts etc. 7. Development of surfaces enables the student to design and fabricate surfaces of different shapes. 8. With a good knowledge in isometric and perspective projections the student will be able to represent the objects in three dimensional appearances. 9. The knowledge of intersection of surfaces helps the students in the applications like pipe fittings, boiler fittings, Automobile body works, air conditioning ducts etc.
6		BT-106	Manufacturing Practice	1. Have complete awareness on the functioning of basic mechanical workshops which include, Smithy, Foundry,Carpentry and Fittings
7	II SEM	BT-201	Engineering Physics	1.Find Innovative solutions to real world issues in Physics and Computer Science. 2. To design, fabricate, produce test and supervise the manufacture the complex products and systems for a no. of industries like computer industry. 3. Supervise manufacturing process and oversee installation and maintenance. 4. To work with microprocessors, fibre optics and in telecommunication, television and radio.
8		BS301	Energy, Environment, Ecology & Society	1.Demonstrate an understanding of the impact of engineering solutions in a global and societal context 2. Demonstrate a knowledge of contemporary environmental issues.
9		BT-203	Basic Mechanical Engg.	1. Student becomes interested in the field of mechanical engineering and understands the relevance in industry. 2. By studying the basics the student will be able to appreciate the importance of this subject. 3. Student gets a better idea about automobile. 4. Students gets a better idea about mechanical power transmission equipment. 5. The student will understand the theories behind turbine working and different types of turbine. 6. Students can understand the working of pumps using in day to day life. 7. Students can understand the working of machine

				tools and manufacturing processes.
10		BT-204	Basic Civil Engg. & Engg. Mechanics	1. Analyze a system of forces and find the direction of the resultant motion of the particle or body upon which it acts 2. Analyze any system which is in equilibrium by considering each body separately and apply the equilibrium analysis. 3. Analyze any beam, truss or framed structure. 4. Locate the centroid, centre of mass and gravity and moment of inertia of areas and physical bodies. 5. Given a problem in Engineering Dynamics, identify the most appropriate solution technique. 6. Apply equations for straight line motion to solve problems with variable acceleration 7. Solve plane curvilinear motion problems in 3 different coordinate systems. 8. Analyze dynamic problems using work energy and impulse momentum techniques.
11		BT-205	Basic Computer Engg.	1. Understand the basic concepts of operation of a computer, and fundamentals of C Programming. 2. Get a strong foundation in the basics of C-Programming so that students can develop its own functions. 3. Master the knowledge of arrays and strings in real time applications. 4. Get idea about structures and union 5. Identify the importance of files in different applications
12		BT-206	Language Lab	1.Enhance spoken skills through various computer programs. 2.Communicative fluency through Skype and other interactive programs. 3.To develop interactive approach in learning the foreign language. 4.To enable effective learning and motivation in learning foreign language. 5.Enhance student's/researcher's knowledge and achievement. 6.Access to authentic study material. 7.Provide every individual enough time to practice or drilling. 8.Base to make a high tech environment for teaching and learning process. 9.Experience of exploring the global standards.
13		BT-202	Mathematics -II	1. To do problems related to vector differentiation and have an idea about the physical meaning of divergence and curl. 2. To evaluate line integrals and surface integrals, understand and use the major theorems in vector calculus (the Fundamental Theorem of Line Integral, Green's Theorem, Stokes' Theorem, and the Divergence theorem).
14	III SEM	ME-303	Manufacturing Process	1. Graduates will have the knowledge of the fundamental techniques of metal cutting and dimensional measurements. 2. Graduates will have the knowledge of the mechanism of chip formation. 3. Graduates will be able to estimate the forces involved and power required during metal cutting.

				4. Graduates will be able to design and conduct experiments as well as to analysis and interpret the metal cutting processes of manufacturing engineering component. 5. Graduates will have an ability to compute the most economical method of metal cutting to manufacture a particular engineering component. 6. Graduates will have an ability to measure the dimensions of an engineering component. 7. Graduates will have the knowledge of various types of limits and fits. Graduates will have an ability to compute the limits for a typical type of fits
15		ME-304	Strength & Mechanics of Materials	1. Sketch the shear force and bending moment diagrams for beams with different support conditions and different load conditions. 2. Determine the stresses and strains in the bars with varying sections, tapering sections, composite members etc. 3. Determine the stresses on oblique sections when the direct stresses and shear stresses are given. 4. Analyze both symmetrical and unsymmetrical sections subjected to bending stress. Understand the shear stress distribution for beam sections of different cross-sections. 5. Analyze both solid and hollow shafts subjected to torsion. 6. Solve problems of columns and struts using different methods such as Rankine's formula, Euler's theory
16		ME-302	Thermodynamics	1 Impart the basic concepts of thermodynamics. 2 By studying thermodynamics, students will be able to solve different thermal problems. 3 Understand and analyze the thermal and mechanical behavior of the materials and systems
17		ME-305	Machine drawing & design	1. Produce orthographic drawings of different machine parts 2. Produce Assembly drawings 3. Draw machine parts from assembly drawing and the appropriate uses of each class of instrument. 4. Students understand how to manage the job floor of an industry or a research organization efficiently and effectively by the optimized utilization of the resources for the maximum output. 5. Students understand and analyze the thermal and mechanical behavior of the materials and systems. 6. Students Identify and apply the most suitable process to manufacture the components
18		ME-306	Computer Programming (Java)	1. Solve simple problems using the fundamental syntax and semantics of the Java programming language 2. Apply elementary techniques in Java programming 3. Use generally accepted principals of good programming style 4. Write Java programs that use selection (if, switch, conditional operator) 5. Write Java programs that use loops (while, do while, for)

				6. Write Java programs that make use of methods for program modularization 7. Write Java programs that use one-dimensional arrays and the ArrayList class 8. Apply simple searching and sorting algorithms 9. Work with String data
19	IV SEM	ME-401	Mathematics III	1. Have a fundamental understanding of Fourier series and their properties and be able to give Fourier expansions and half range Fourier series representation for a function of one variable 2. Understand Fourier Transform, the convergence issues, relation to Fourier Series and properties of Fourier Transform, and use these to derive Fourier Transforms and / or inverse Fourier Transform of functions of one variable 3. Solve first and higher order differential equations selecting from a variety of techniques covered in the syllabus 4. Demonstrate an understanding of basic principles of probability, and random variables, Work with the basic discrete distributions (Binomial, and Poisson) and the basic continuous distributions (Uniform, Exponential and Normal,) and Calculate resulting probabilities 5. Define null and alternative hypotheses know when to use a single or two tailed test and evaluate a null hypothesis using the appropriate model
20		ME-402	Material Science and Metallurgy	1. Summarize significance of material science and its role in manufacturing. 2. Classify different engineering material (metals, ceramics, polymers, Semi-conductor). 3. Develop concept of crystal structure and its defects. 4. Describe phase diagram and heat treatment processes. 5. Develop concept of diffusion, mechanical properties and high temperature material problems. 6. Select a material for a specific use based on consideration of cost and performance.
21		ME-403	Theory of M/C and Mechanism	1. To understand the basic components and layout of linkages in the assembly of a system / machine 2. To understand the principle involved in assembly, the displacement, velocity and acceleration at any point in a link of a mechanism. 3. To understand the motion resulting from specified set of linkages. 4. To understand and to design few linkage mechanisms and cam mechanisms for specified output motions. 5. To understand the basic concepts of toothed gearing and kinematics of gear trains.
22		ME-404	Thermal Engg and gas	1. Students will be able to get an idea about the basic concepts of different types of engines. 2. Knowledge of various thermal systems.

			dynamics	3. Students will get an idea about the subject and well informed about the practical application of different formulae from an engineering point of view
23		ME-405	Fluid Mechanics	1. Be able to convert units of any parameter between three systems of units, understand the physical properties and characteristic behavior of fluids, and the basic principles of fluid mechanics. 2. Be able to describe and interpret the behavior and performance of fluid at rest. 3. Be able to describe and interpret the behavior and performance of fluid in motion. 4. Be able to describe the behavior and performance of fluid when the fluid is flowing through the pipe. 5. Be able to derive the dimensions of different fluid parameters. 6. Be able to apply similitude and modelling principles and techniques to solve problems in
24		ME-406	Dot Net	1. Successfully install Visual Studio 2. Describe the difference between server-side and client-side programming and name one advantage and disadvantage of each. 3. List and describe the components of the .NET Framework. 4. Locate and describe the purpose of the Visual Studio IDE elements 5. Explain the three sections of a basic web page: page directive, doctype, and XHTML with ASP web controls. 6. Distinguish between XHTML elements and attributes. 7. Describe the three ways to add an event handler for a control. 8. Create, build and run a simple Web application.
25	V SEM	ME-501	Entrepreneurship and Management Concepts.	1. Understanding various management concepts 2. Duties and functions of an individual in an Organization. Graduates will develop their entrepreneur's quality. 3. Gives a general awareness about marketing and marketing management. 4. Helps in strategic planning of a business. 5. Helps to understand consumer behavior and organizational buying behavior. 6. Helps to Analyze, identify and solve various problems related to sales management.
26		ME-502	Turbo Machinery	1. Operate every hydraulic machines 2. Analyze and identify various factors affecting the performance of machine 3. Design Protection of every hydraulics machine. 4. Ability to solve flow problems through the hydraulics machines and use of appropriate equations. 5. Ability to apply principles of fluid mechanics to the operation, design, and selection of fluid machinery such as pumps and turbines. 6. Ability to select and evaluate performances of hydropower plants.

27		ME-503	Mechanical Measurement & Control	1. Students will be able to understand basic concepts of mechatronics and control systems 2. Understand the application of those principles in practice. 3. To apply the concepts in design and manufacture of systems
28		ME-504	Machine Component Design	1 Helps the students to Analyze various designs related problems of machine elements 2 Helps to apply proper engineering tools to solve the problems 3 Provides basic knowledge on the design consideration of various machine elements 3. List design practices involved in considering various aspects in designing machine component. 4. Design machine elements under various loading types with various material designations. 5. Apply the knowledge of mathematics, mechanics, theory of machines, material science, etc. during solving a design problem. 6. Judge fatigue strength, construct S-N diagrams and design machine element under fluctuating loads. 7. Predict the phenomena of fatigue in parts subjected to cyclic loads and will be able to estimate and communicate 8. The fatigue strength of the component in actual working condition 9. The fluctuating loads that will cause failure in real parts using the Soderberg, Gerber and Goodman techniques. 10. Design shafts under various loading conditions. 11. Design bolted joints
29		ME-505	Dynamics of Machines	1 Helps to understand basic principles involved in dynamics of machines. 2 Helps to identify and analyze various problems related to balancing of masses. 3 Helps to understand basic concepts of vibration. 4 With a good knowledge of the subject, student will be able to interpret problems related to dynamics of machineries faced in industries
30		ME-506	RDBMS Lab	1. Create and maintaining a database 2. Create simple and advanced queries 3. Create forms and reports 4. Enhance table design 5. Reinforce basic database concepts 6. Illustrate the concept of data types and their role in developing table structures 7. Demonstrate the concept of referential integrity 8. Construct tables with proper key definition 9. Illustrate relationships among database tables 10. Create queries, forms and reports using custom methods 11. Import and export data between Office applications

31	VI SEM	ME-601	Operations Management	1 Gives an introduction to operations management. 2 Helps to understand scheduling maintenance planning and control in an industry. 3 Gives awareness of modern concept in techniques in operations management. 4 Helps the students to familiarize the main decision making scenarios (Strategic tactical and operative) that operations manager may come across. 5 Developments and understanding of main principles, techniques and tools to Analyze, diagnose and then to improve process
32		ME-602	Power Plant Engg	1. Calculate Equivalence ratio and Adiabatic flame temperature. 2. Explain methods of improving Rankine cycle efficiency. Analyse Reheat, Regeneration and Binary vapor cycles. 3. Calculate Critical pressure and Critical temperature. Draw Performance curves of convergent –divergent nozzles. Explain Super-saturated expansion. 4. Evaluate Force, Power, Efficiency through Graphical as well as Analytical methods for Steam turbines. 5. Calculate Make-up water required in Cooling towers, Number of Tubes and Passes in Surface Condensers.
33		ME-603	Metal Cutting and CNC machines	1. Students will be able to understand and appreciate the importance of basic principles of traditional material removal processes. 2. Understand the application of those principles in practice.
34		ME-604	IC engines	1. Impart the basic concepts of IC engines 2. To study different parts of an engine and process 3. Understand and analyze the engine parameters
35		ME-605	Heat and Mass Transfer	1. Students will be able to get a useful foundation and basic knowledge of heat transfer. 2. Knowledge of the subject required for innovative work and advanced studies. 3. Students will get an idea about the subject and well informed about the practical application of different formulae from an engineering point of view.
36		ME-606	Computer Aided Engg	1. Students will get an idea about comprehensive concepts of the design aspects and its importance in Computer assisted design and manufacture. 2. Students can understand and use the principles of Computer aided part programming.
37	VII	ME-701(D)	Elective –I (Work Study & Ergonomics)	1. Describe the best combinations of man, machine and working stations in industries to enhance production and efficiency. 2. Outline different communication systems like Man-Man and Man-Machine systems and different information processes. 3. List different software for the analysis. 4. Recite the human physiology like Muscles, tendons and ligaments etc. 5. Design workstation and work surface etc.

	SEM			6. Control the effect of Environmental stressors like Noise, vibration, Heat and illuminations etc. 7. Explain the Human factors in Automobiles like Human errors in accidents and safety against them. 8. Accept the engineering challenges regarding the needs of human beings in daily life about machines and systems which are possible for the discomforts in machines and systems. 9. Explain the processes, methods and develop experimental setups for the measurements of working conditions, environment, postures and space etc. 10. List different materials, their properties as well as their applications according to the requirement. 11. Minimize the discomforts and provide the maximum possible comforts to the working conditions, workstations and best suited postures etc. 12. Paraphrase International standards used in ergonomics.
38		ME-702(A)	Elective –II (Renewable Energy System)	1. Describe the conventional and non-conventional sources of energy, role of energy in the development of society and its impact on the environment and economy. 2. Calculate direct and diffuse radiation on different dates, times and locations. 3. Formulate flat plate collectors for air and water heaters. 4. Explain concepts, working principles and use of solar heating and cooling in buildings, solar refrigeration, power generation from solar energy, solar ponds and solar stills, solar energy storage, photovoltaic and solar cells 5. Propose site selection for wind energy resources and aerodynamic design of wind turbines. 6. Outline the potential and utilization of biomass, geothermal, Ocean and tidal energies and principles of MHD Power generation.
39		ME-703	Mechanical Vibration & Noise Engineering	1. Discuss the importance of vibrations in mechanical design of machine parts that operate in vibratory conditions. 2. Compose linear vibratory models of dynamic systems with changing complexities (SDOF, MDOF), and of real life engineering systems. 3. Formulate free and forced (harmonic, periodic, non-periodic) vibration response of single and multi-degree of freedom systems. 4. Use and Design various vibration measuring instruments. 5. Predict free and forced (harmonic, periodic, non-periodic) vibration of continuous systems. 6. Design machines which should not vibrate or vibrate within limits. 7. Design machines which should use vibration for useful purposes

40		ME-704	Automobile Engg	1. List different types of Engine and their classifications. 2. Judge firing order for multi-cylinder engines for igniting of fuels. 3. Develop concept and define working of Automobile Engine cooling and lubrication system. 4. Describe functioning of Transmission train, conventional and non-conventional drives, Clutches, Gear boxes, Synchromesh device, Propeller shaft, Differential axle, braking system and Suspension systems. 5. Calculate fuel air ratio in Carburetor and knowledge & describe working of different types of fuel injection and fuel ignition systems for modern gasoline and diesel engine. 6. Describe functioning of steering system, steering geometry wheel alignment and wheel angles for modern Automobile. 7. Explain the need of Catalytic converter and their functioning.
41		ME-705	O R & Supply Chain	1. Identify necessity and development of mathematical models for various industries. 2. Describe basic optimization and simulation techniques applied to various industries. 3. Recall investment analysis and game theory. 4. Predict the industrial systems under the conditions of certainty, uncertainty and risk. 5. Propose a queuing model based upon given data. 6. Derive the network models and understanding of reliability concept.
42		ME-706	Minor Project and seminar	1. Students will be able to have an idea about the basic concepts of Project selection. 2. Students will be able to develop an understanding of tools, techniques and software available for Project Management.
43	VIII SEM	ME-801(A)	Elective –III (Energy Management & Audit.)	1.Demonstrate an understanding of energy management approaches 2.Discuss the need for energy audit Propose analysis methodology for energy management audit 3.Implement financial analysis and cost prediction for energy saving 4.Analyze energy performance 5.Set up energy audit investigation and collection of measurements using different tools Assessment Strategies
44		ME-802	Machine Design	1. Apply your design problem solving methodology. 2. Apply a working knowledge of common machine elements including their fundamental design, their modes of failure, the scientific concepts behind them, their selection and their installation and successful use. 3. Design simple systems using these common mechanical components. 4. Graduates will be able to design & analyze IC

				Engine parts. 5. Graduates will be able to design & analyze bearings
45		ME-803	Refrigeration & Air Conditioning	1 Imparts the basic concepts of Refrigeration and Air conditioning in students. 2 Gives the ability to design refrigeration or air-conditioning equipment that meets the required specification 3 Helps to solves simple problems related to refrigeration. 4 Gives an awareness of basic principles and thermodynamics of refrigeration. 5 Helps to understand various refrigeration components. 6 Helps to design the various components associated with a refrigeration system
46		ME-804	CAD/CAM/CIM	1. Describe contemporary graphics hardware. 2. Select and use appropriate engineering computer graphics and geometric modeling techniques for mechanical engineering applications. 3. Write programs that demonstrate geometrical transformations, computer aided analysis and synthesis of mechanisms. 4. List various applications of FEM in Engineering. Investigate; understand new and ongoing developments in the area of numerical control of machine tool. 5. Understand basic concepts of machines operated through numerical control. 6. Understand the principles of computer numerical control (CNC) and machine Structures. 7. Be able to interpret a component specification and produce an operational plan for its manufacture. 8. Develop simple part programs with the help of programming languages and manufacture a component
47		ME-805	Major Project	1. Students will be able to have an idea about the basic concepts of Project selection. 2. Students will be able to develop an understanding of tools, techniques and software available for Project Management.
48	III TO VIII		GD SEMINAR	1. To challenge ideas – both their own and others with the goal of arriving at a more complete understanding 2. To develop ideas – using the ideas of others to improve their own thinking 3. To acquire ideas – using discussion as a way of collecting ideas 4. To check ideas – making sure that their ideas were the right ones; that they were learning the right things

49			SELF STUDY	1. Graduates will learn to assesss themselves. 2. They will develop self learning techniques.

NRI Institute of Research and Technology, Bhopal

Department of Civil Engineering

VISION

To produce a new generation of Civil Engineers by providing state-of-the-art education in Civil Engineering recognized worldwide for excellence. This would be guided by extensive research in technology and management for industrial and social needs for sustainable development.

MISSION

To offer assured quality programs in Civil Engineering including education, research guidance, training, leadership and team spirit. To inculcate the quality of entrepreneurship among graduating students. To be a centre of excellence in civil engineering programme.

NRI INSTITUTE OF INFORMATION SCIENCE AND TECHNOLOGY, BHOPAL
DEPARTMENT OF CIVIL ENGINEERING

Program Objective (PO) :-

1. An ability to apply knowledge of mathematics, science, and engineering to problem solving.

2. An ability to design and conduct experiments, as well as to analyze and interpret data.

3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, maneuverability and sustainability.

4. An ability to function on multidisciplinary teams.

5. An ability to identify, formulates, and solves engineering problems.

6. An understanding of professional and ethical responsibility.

7. An ability to communicate effectively.

8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

9. Recognition of the need for, and an ability to engage in life-long learning.

10. Knowledge of contemporary issues.

11. An ability to use the techniques, skills and engineering tools necessary for engineering practice.

12. An ability to work for the infrastructural development, to pursue teaching, research & development activities and to work effectively in a group.

Course outcomes :

Fluid Mechanics- 1 (CE3002)

3002.1 Determine pressures and forces on submerged bodies.
3002.2 Analyze flow rates, velocities, energy losses and momentum flux for fluid system
3002.3 Measure and describe fluid flow phenomena.
3002.4 Set up a relation among various parameters based on dimensional analysis and model study.

Rock Mechanics & Engineering Geology (CE405)

405.1 Learn geology and its types, various features like fault, fissures, weathering etc., minerals, rocks, and rock formations in relation to civil engineering structures.
405.2 Understand various techniques to determine engineering properties of rocks etc.
405.3 Understand various techniques to analyze and to made possible solutions for various Geological Engineering problems.

Strength of Material (CE305)

305.1 Apply the linear laws of elasticity as related to stress and strain.
305.2 Understand the concept of a complex stress system.
305.3 Understand of the behavior of columns and struts under axial loading.
305.4 Analyze the bending stress on different types of sections.
305.5 Determine the effect of combined axial and bending stress.

305.6 Demonstrate the use of critical thinking and problem solving techniques as applied to mechanical and structural systems.

Surveying (CE 303)

303.1 Understand various methods and techniques of surveying and its applications (leveling, compass survey, and contouring and curve settings etc.)

303.2 Apply the concept of Tachometry in surveying difficult and hilly terrains to obtain the topographical map of area.

303.3 Ability to use survey instruments in carrying out survey, collect data, writes reports and able to perform required calculations to achieve the objective.

Building Planning & Architecture (CE 304)

304.1 Extend the knowledge about the characteristics, sources and defects in various materials.

304.2 Design and test the materials either in the laboratory or in the field before their actual use at the site.

304.3 Attain the knowledge of different components of building, their classification, materials and methods of construction and causes of their failures.

304.4 Know the various services to be provided and the defects in the buildings along with the remedial measures for proper maintenance of the buildings.

GIS and Remote Sensing (CE 8004)

8004.1 Develop firm understanding of remote sensing and data analysis from aircraft and satellite sensors. Manipulate and represent geographical data.

8004.2 Demonstrate a firm understanding of GPS for navigation and resolving the location related problems.

8004.3 Apply the electronic technology for surveying work.

Concrete Technology (CE 4002)

4002.1 Understand the properties and role of various constituent materials used in concrete making.

4002.2 Understand the properties of concrete and various design mix techniques for concrete.

4002.3 Apply the fundamental concepts, techniques in analysis and design of reinforced concrete elements i.e. beam & slab.

4002.4 Apply the design principles by undertaking simple design examples.

4002.5 Apply the various codal requirements related to RC members i.e. slab & beam.

Design of Steel Structures-I (CE 7001)

7001.1 Understand and appreciate various aspects of steel construction like different types of steel sections, their specifications, advantages of steel construction etc.

7001.2 Analyze and design various types of steel connections using rivets, bolts and weld.

7001.3 Design basic elements of a steel building like beam, column, and column bases etc. for given conditions and loading.

7001.4 Estimate 'design loads' for a roof truss and then be able to design its various components like top chord members, bottom chord members, web members, purlins etc

Geotechnical Engineering (CE 6003)

6003.1 To understand the origin of soil and to identify different types of soil.

6003.2 To understand the various physical and engineering characteristics of different types ofsoil.

6003.3 To understand the concept of slopes ability.

6003.4 To appreciate the use of modern technology in the field of geotechnical engineering.

Structural Analysis-II (CE 5003)

5003.1 Distinguish statically determinate and redundant structural systems.

5003.2 Choose a suitable method for the analysis of structural system (pin-jointed as well as rigid jointed) while designing.

5003.3 Visualize the effect of loads and/or reactions, support displacements and temperature on the structural response.

5003.4 Utilize the concept of influence lines for deciding the critical forces and sections while designing.

Program Specific Outcomes

1. Able to utilize the knowledge of civil engineering in innovative, dynamic and challenging environment, for the research based teamwork.

2. Can explore the scientific theories, ideas, methodologies and the new cutting edge Technologies in engineering, and use this erudition in their professional envelopment and gain sufficient competence to solve the current and future problems universally.

Program Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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

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

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

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

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

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse exams, and in 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: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (CO):

ENGINEERING MATHEMATICS III (BT-301)	
CO1:	Student will be able to solve and analyze the problem of algebraic and transdental equation through various numerical analysis method
CO2:	Student will be able to solve numerical integration and differentiation through various method
CO3:	Student will be able to solve the various problem of laplace transform and fourier transform and also able to understand how to apply in practical problem
CO4:	Student will be able to understand the concept of simultaneous equation and solve the problem through the various numberical analysis method
CO5:	Student will be able to understand and solve the problems of probality through various distribution method
ELECTRONIC MEASUREMENT AND INSTRUMENTATION (EC 302)	
CO1:	Design a system, component or process to meet desired needs in electrical and electronics engineering.
CO2:	Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy
CO3:	Ability to balance Bridges to find unknown values.
CO4:	Ability to measure frequency, phase with Oscilloscope
CO5:	Ability to measure strain, displacement, Velocity, Angular Velocity, temperature, Pressure Vacuum and flow.
DIGITAL SYSTEM DESIGN (EC 303)	
CO1:	1. Logic level models, including Boolean algebra, finite state machines, arithmetic circuits, and hardware description languages.
CO2:	Logic gates, memory, including CMOS gates, flip-flops, arrays, and programmable logic
CO3:	Design tools, both manual and computerized, for design, optimization, and test of logic circuits
CO4:	Design criteria, including area, speed, power consumption, and testability
CO5:	implementation of logic circuits in designing the embedded systems and IOT Projects
Electronics Devices (EC-304)	
CO1:	After successful completion of the course student will be able to Understand the current voltage characteristics of semiconductor devices.
CO2:	Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation and design and analyze of electronic circuits,
CO3:	Design and analyze the basic operations of MOSFET.
CO4:	Know about the multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain.
CO5:	Know the concept of feedback amplifier and their characteristics and able to design the different oscillator circuits for various frequencies.
NETWORK ANALYSIS (EC305)	
CO1:	Articulate in working of various components of a circuit.
CO2:	Analyze the RLC circuit behavior in detail.
CO3:	Solve the circuits with the help of various theorems and methods.
CO4:	Analyze the performance of periodic waveforms
CO5:	Solve the problems of two port network parameters (Z, Y, ABCD, h & g)
EEES Subject ES 401	
CO1:	To demonstrate knowledge of new and renewable energy and their relationship with ecology & environment.
CO2:	To describe conventional and non-conventional energy scenario with respect to environment.
CO3:	To analyze Synergy between energy and environment, global environment issues.
CO4:	To explain the Environmental Pollution and their effects on environment
CO5:	To apply awareness regarding environmental protection and application of renewable energy.
SIGNALS AND SYSTEMS EC-402	
CO1:	Understand mathematical description and representation of continuous and discrete

	time signals and systems.
CO2:	Understand and resolve the signals in frequency domain using Fourier series and Fourier transform.
CO3:	Understand the limitations of Fourier transform and need for Laplace transform.
CO4:	To develop the ability to analyze the system in s-domain.
CO5:	To understand the basic concept of probability.
ANALOG COMMUNICATION (EC 403)	
CO1:	Understand different blocks in communication system and how noise affects communication using different parameters
CO2:	Distinguish between different amplitude modulation schemes with their advantages, disadvantages and applications
CO3:	Analyze generation and detection of FM signal and comparison between amplitude and angle modulation schemes
CO4:	Identify different radio receiver circuits and role of AGC
CO5:	Sample analog signal and recover original
Control System EC 404	
CO1:	Student is able to do the mathematical modeling of control system.
CO2:	Student is able to analyse the performance of control system.
CO3:	Student is able to improve the performance of control system.
CO4:	Students will able to understand stability and make them change as per their requirement.
CO5:	Students will able to understand the various parameters used in various automatic control system
Analog Circuits (EC 405)	
CO1:	Understand the fundamentals and areas of applications for the integrated circuits.
CO2:	Analyze important types of integrated circuits.
CO3:	Demonstrate the ability to design practical circuits that perform the desired operations.
CO4:	Understand the differences between theoretical, practical & simulated results in integrated circuits.
CO5:	Select the appropriate integrated circuit modules to build a given application.
MICROPROCESSOR AND ITS APPLICATIONS (EC 501)	
CO1:	To differentiate between RISC and CISC architectures
CO2:	To draw the timing diagram of read and write cycle under both minimum mode of operation and maximum mode of operation
CO3:	To write assembly language programs for 8086 microprocessor and 8051 microcontroller
CO4:	To design interface between 8086 microprocessor and peripheral devices such as 8255 programmable input output port, 8257 DMA controller, 8254 programmable interval timer and USART
CO5:	To design interface between 8051 microprocessor and input output devices such as LED, Switches , sensors, LCD, 7 Segment etc
Digital Communication (EC 502)	
CO1:	To understand digital modulation and to explain the block diagram of the Digital modulation methods like PCM.
CO2:	Perform the time and frequency domain analysis of the signals in a digital communication system.
CO3:	Able to calculate the error probabilities in the digital communication system and to evaluate the performance measures
CO4:	To detect and correct the errors in the digital communication systems using coding techniques
CO5:	Able to solve numerical design problems of digital communication
Communication Network & Transmission Lines (EC-503(A))	
CO1:	Students will be aware of the propagation characteristics in transmission linesUnderstand various functions of network and also the stability of networkUnderstand various functions of network and also the stability of network
CO2:	Applications and approximations of various Filters

CO3:	Synthesize the network using passive elements.
CO4:	students will be able to understand the concept of infinite line,open circuit,short circuit line and various losses occur due to any termination of line.
CO5:	Students will be aware of Transmission lines at higher frequencies. Use the smith chart as a graphical tool to solve impedance matching issues.
Electromagnetic Theory (EC504)	
CO1:	Students will be able to learn and apply concepts of orthogonal co-ordinate system and vector calculus to solve electric and magnetic field problems.
CO2:	Know concepts about electric and magnetic fields; electromagnetic wave existence and its propagation in different medium.
CO3:	Gain knowledge about signal transmission, parameters associated with transmission line; measure of various losses and techniques to reduce those losses.
CO4:	To study uniform plane wave propagation in different media and wave polarization
CO5:	To study guided wave propagation in metallic wave guides
Matlab Programming (EC 506)	
CO1:	To understand Matlab working environment and graph Plotting
CO2:	To understand the basic terminologies of the machine learning operations.
CO3:	To code for the Image Pre processing operations.
CO4:	To implement the image object segmentation.
CO5:	To understand the concept of Classification and Image retrieval.
Cellular Mobile communication (EC 6001)	
CO1:	Discuss cellular radio concepts.
CO2:	Identify various propagation effects.
CO3:	To have knowledge of the mobile system specifications.
CO4:	Classify multiple access techniques in mobile communication.
CO5:	Analyze various methodologies to improve the cellular capacity
Digital Signal Processing Subject (EC-6002)	
CO1:	The students will be able to understand the concepts of digital signals more clearly.
CO2:	They will get sufficient exposure to matrix laboratory(MATLAB)
CO3:	They will be able to understand different types of signals and their utility which is very important in industrial applications
Antenna and Wave Propagation (EC 6003)	
CO1:	Capable to write parametric integral expressions for a given current source. And calculation in the far field region
CO2:	Determine directions of maximum signal radiations and the nulls in the radiation patterns.
CO3:	Calculate electromagnetic fields for a given vector magnetic potential
CO4:	Discover pattern multiplication principle for array antennas. To draw Radiation patters
CO5:	To solve the problems of radio wave propagation, and to design array antenna systems from specifications.
VLSI CIRCUITS & SYSTEM (EC-605)	
CO1:	Perform the time and frequency domain analysis of the signals in a communication system
CO2:	Use of different modulation and demodulation techniques used in analog communication
CO3:	Identify and solve basic communicationproblems
CO4:	Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
CO5:	Differentiate between different pulse modulation and demodulation techniques andsignal multiplexing for various applications
Microwave Engineering (EC 7001)	
CO1:	Understood the propagation characteristics of EM waves in various wave guide structures.

CO2:	Use S-parameter terminology to describe circuits and Design microwave transmission lines.
CO3:	Describe and analyze different impedance matching techniques and Design impedance matching networks for specific application.
CO4:	Use microwave components such as isolators, couplers, circulators and Know principles of Microwave devices.
CO5:	Know principles of Microwave tubes and microwave devices and about different Microwave Measurement techniques.
Satellite Communication (EC-7002)	
CO1:	Explain the basics of satellite communication
CO2:	Describe the basic parameters of satellite systems
CO3:	Define orbital mechanics and launch methodologies
CO4:	Explain and analyzes link budget of satellite signal for proper communication
CO5:	Explain satellite access techniques
OPTICAL COMMUNICATION (EC 7003)	
CO1:	Demonstrate an understanding of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.
CO2:	Estimate the losses and analyze the propagation characteristics of an optical signal in different types of fibers
CO3:	Describe the principles of optical sources and power launching-coupling methods
CO4:	Compare the characteristics of fiber optic receivers
CO5:	Design a fiber optic link based on budgets
Data communication (EC 7004)	
CO1:	Describe the components of a data communications system.
CO2:	Able to describe the various error detection and correction schemes.
CO3:	Familiarity with the topologies basic protocols of computer networks, and how they can be used to assist in network design and implementation.
CO4:	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
CO5:	Identify the different types of network devices and their functions within a network
Wireless communication (EC-7005)	
CO1:	Students will have idea about the growth in wireless communications that gives rise to technological improvements.
CO2:	Students will be able to understand the technological aspects of wireless communication
CO3:	Students will get an idea about propagation channels
CO4:	Students will be able to understand the various models associated with wireless communication and designing of wireless network
CO5:	Students will have idea about diversity techniques and use of equalizers
VLSI Design (EC 8001)	
CO1:	Student will be able to simulate digital circuit on xilinx tool using verilog coding
CO2:	Student will be able to design layout of different circuits
CO3:	Apply the lamda basedcdesign rule for design
CO4:	Identify the various IC fabrication methods
CO5:	Concepts of modeling a digital system using Hardware Description Language
ADVANCED COMMUNICATION SYSTEM (EC-8002)	
CO1:	The students will be able to know elements of communication system.
CO2:	The students will know the correlative coding.
CO3:	The students will know multi carrier modulation.
CO4:	The students will know about the MIMO system.
CO5:	The students will be able to know the spread spectrum communication.
Principal Management and Economics (EC8003)	
CO1:	Describe the primary functions of management and the roles of managers.
CO2:	Describe the work of major contributors to the field of management.
CO3:	Distinguish between mission, vision, and values. Explain the pros and cons of planning. Explain the stages of the planning cycle. List and describe the types of plans and common planning tools.
CO4:	Explain the components and considerations of strategic management.

CO5:	Explain the process and techniques of individual and group decision-making.
Radar Engineering (EC 8004)	
CO1:	Demonstrate the basic principle of RADAR System.
CO2:	Solve the RADAR Equation and to calculate Transmitter power
CO3:	Analyze the working principle of CW and Frequency Modulated Radar
CO4:	Analyze the principle of each and every block of MTI and Pulse Doppler Radar.
CO5:	Calculate Noise Figure and Noise Temperature in Radar Receivers and can describe antennas used for Radars

Programme specific outcomes (PSOs) relevant to the Course:

- **PSO1:** An ability to design and analyze the concepts and applications in the field of communication/ networking, signal processing, embedded systems and semiconductor technology.
- **PSO2:** An ability to comprehend the technological advancements in the usage of modern design tools to analyze and design subsystems/processes for a variety of applications.
- **PSO3:** An ability to learn the courses related to Microelectronics; Signal processing, Microcomputers, Embedded and Communication Systems to develop solutions to real world problems.
- **PSO4:** An ability to communicate in both oral and written forms, the work already done and the future plans with necessary road maps, demonstrating the practice of professional ethics and the concerns for social and environmental impact.