Course Outcomes

Please Refer This link ()

BE Computer

SecondYearofComputerEngineering		
SemesterIII		
Course Code	Course Name	*CourseOutcomes*
21 02 41	**Discrete Mathematics**	**CO1:Formulate** problems precisely,solve the problems,apply formal proof techniques,and explain reasoning clearly. **CO2:Apply**appropriatemathematicalconceptsandskillstosolveproblemsinbothfamiliarandunfamiliar situations includingthoseinreal-life contexts. **CO3:Designandanalyze**realworldengineeringproblemsbyapplyingsettheory,propositionallogicandtoconstruct proofsusingmathematicalinduction. **CO4:Specify,manipulateandapply**equivalencerelations;constructandusefunctionsandapplytheseconceptstosolvenew problems. **CO5:Calculate**numbersofpossibleoutcomesusingpermutationsandcombinations;tomodelandanalyzecomputationalprocessesusing combinatorics. **CO6:Modelandsolve**computingproblemusingtreeandgraphandsolveproblemsusingappropriate algorithms. **CO7:Analyze** The properties of binary operations,apply abstract algebra in coding theory and evaluate the algebraic structures**.**

21 02 42	Fundamentals of Data Structures	CO1: **Design** the algorithms to solve the programming problems, **identify** appropriate algorithmic strategies for specific applications,and analyze the time and space complexity.
		CO2: **Discriminate** the usage of various structures, **Design/Program/Implement** the appropriatedatastructures;usetheminimplementationsofabstractdatatypesandIdentitytheappropriatedatastructureinapproachingtheproblemsolution.
		CO3: **Demonstrate** use of sequential data structures- Array and Linked lists to store and processdata.
		CO4: **Understand**thecomputationalefficiencyoftheprincipalalgorithmsforsearchingandsortingandchoosethemostefficientonefortheapplication.
		CO5:**Compare**and**contrast**differentimplementationsofdatastructures(dynamic and static).
		CO6: **Understand, Implement and apply** principles of data structures-stack and queue to solve computational problems.
21 02 43	Object Oriented Programming(OOP)	CO1:**Apply Constructs-sequence**,selection and iteration;classes objects,inheritance,use predefined classes for libraries while developing software.
		CO2:**Design**object-orientedsolutionsforsmallsystemsinvolvingmultipleobjects.
		CO3: **Use** virtual and complex programming situations.
		CO4: **Apply Object-oriented software principles in problem** solving.
		CO5:**Analyze** the strengths of object-oriented programming.
		CO6:**Develop**theapplicationusingobjectorientedprogramminglanguage(C++).

21 02 44	Computer Graphics	**CO1:Identify**thebasicterminologiesofComputerGraphicsandinterpretthe mathematicalfoundationoftheconceptsofcomputergraphics.
		CO2:ApplymathematicstodevelopComputerprogramsforelementarygraphicoperations.
		CO3:Illustratetheconceptsof windowingandclippingand**apply**variousalgorithmstofillandclippolygons.
		CO4:Understandand**apply**thecoreconceptsofcomputergraphics,includingtransformationintwo and three dimensions,viewing andprojection.
		CO5:Understand the concepts of color models,lighting,shading model and hidden surface elimination.
		CO6:Create Effective Programs Using Concepts Of curves,fractals,animation gaming.
21 02 45	**Digital Electronics and Logic Design**	**CO1:Simplify** Boolean Expressions using K Map.
		CO2:Design And Implement combinational circuits.
		CO3:Design And Implement Sequential Circuits.
		CO4:Develop simplereal-worldapplicationusingASMandPLD.
		CO5: **DifferentiateandChoose**appropriatelogicfamiliesICpackagesasperthegivendesignspecifications.
		CO6:Explain Organization And Architecture Of Computer System
21 02 46	**Data Structures Laboratory**	**CO1: Use** algorithms on various linear data structure using sequential organization to solve real life problems.
		CO2:Analyzeproblemsto**apply**suitablesearchingandsortingalgorithmtovariousapplications.
		CO3:Analyzeproblemsto**usevariantsof**linkedlistandsolvevariousreallifeproblems.
		CO4: Designingandimplementdatastructuresandalgorithmsforsolvingdiffe

		rentkindsofproblems.
21 02 47	**OOP and Computer Graphics Laboratory**	**CO1:U**nderstandand**apply**theconceptslikeinheritance,polymorphism,exceptionhandlingandgenericstructuresforimplementing reusableprogrammingcodes. **CO2:Analyze**theconceptoffileand**apply**itwhilestoringandretrievingthedata fromsecondarystorages. **CO3:** **Analyze**and**apply**computergraphicsalgorithmsforline-circledrawing,scanconversionandfilling withthehelpofobjectoriented programmingconcepts. **CO4: Understand** the concept of windowing and clipping and apply various algorithms to fill andclip polygons. **CO5:Apply**logictoimplement,curves,fractals,animation gaming programs.
21 02 48	**DigitalElectronicsLaboratory**	CO1:**Understand**theworkingofdigitalelectroniccircuits. CO2:**Apply**theknowledgetoappropriateICasperthedesignspecifications. CO3:**Design** and **implement** Sequential and Combinational digital circuits as per the specifications.
21 02 49	**Business Communication Skills**	**CO1:Express** effectively through verbal/oral communication and improve listening skills **CO2:Write** precise briefs or reports and technical documents. **CO3:Prepare** for group discussion /meetings/interviews and presentations. **CO4:Explore** goal/target setting,self-motivation and practicing creative thinking. **CO5:** **Operate**effectivelyinmulti-disciplinaryandheterogeneousteamsthroughtheknowledgeofteamwork,Inter-personalrelationships,conflictmanagementandleadershipqualities.

21 02 50	**Humanity and Social Science**	**CO1:** Aware Of The Various Issues Concerning Humans And Society. **CO2:** Aware About Their Responsibilities Towards Society. **CO3:** Sensitized about broader issues regarding the social,cultural,economic and human aspects,involved in social changes. **CO4:** Able to understand the nature of the individual and the relationship between self and the community. **CO5:** Able tounderstandmajorideas,values,beliefs,andexperiencesthatha veshapedhumanhistoryandcultures.

<h1 style="text-align:center; color:blue">SemesterIV</h1>

20 70 03	**Engineerin g Mathemati cs III**	CO1:SolveLineardifferentialequations,essential in modellingand design computer-based systems. CO2:ApplyconceptofFouriertransformandZ-transformanditsapplicationstocontinuousanddiscretesystemsandim ageprocessing. CO3:ApplyStatisticalmethodslikecorrelationandregressionanalysisandprob abilitytheoryfordataanalysis andpredictions in machinelearning. CO4:SolveAlgebraicandTranscendentalequationsandSystemoflinearequati onsusingnumericaltechniques. CO5:ObtainInterpolatingpolynomials,numericaldifferentiationandintegrat ion,numericalsolutionsofordinarydifferential equationsusedin modern scientificcomputing.
21 02 52	**Data Structures and Algorithms**	CO1:**Identifyandarticulate**thecomplexitygoalsandbenefitsofagoodhashin gschemeforreal-world applications. CO2:**Apply**non-lineardatastructuresforsolvingproblemsofvariousdomain. CO3:**Designandspecify**theoperationsofanonlinear-basedabstractdatatypeandimplementthemin a high-level

			programming language.
			CO4:**Analyze**thealgorithmicsolutionsforresourcerequirementsandoptimization
			CO5:**Use**efficientindexingmethodsandmultiwaysearchtechniquestostorea nd maintaindata.
			CO6:U**se**appropriatemoderntoolstounderstandandanalyzethefunctionaliti esconfinedtothesecondarystorage.
21 02 53	**Software Engineerin g**		**CO1:Analyze**softwarerequirementsandformulatedesignsolutionforasoftwa re.
			CO2: Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical,social,legal and economic concerns.
			CO3:Applynewsoftwaremodels,techniquesandtechnologiestobringoutinno vativeandnovelisticsolutionsforthegrowthofthesocietyinallaspectsand evolvingintotheircontinuousprofessionaldevelopment.
			CO4:Model anddesignUserinterfaceandcomponent-level.
			CO5:Identifyandhandleriskmanagementandsoftwareconfigurationmanage ment.
			CO6:Utilize Knowledge Software Testing Approaches,approaches verification and validation.
			CO7: Construct software of high quality – software that is reliable, and that is reasonably easy to understand,modify and maintain efficient,reliable,robust and cost-effective software solutions.
21 02 54	**Microproc essor**		**CO1:E**xhibit skill of assembly language programming for the application.
			CO2:Classify Processorarchitectures.
			CO3:Illustrate advanced features of 80386 Microprocessor.
			CO4:Compare And Contrast Different Processor Modes.
			CO5:Use Interrupt Mechanism In Applications

		CO6:DifferentiatebetweenMicroprocessorsandMicrocontrollers. **CO7:Identify**and**analyze**thetoolsandtechniquesusedtodesign,implement,a nddebugmicroprocessor-based systems.
21 02 55	**Principles of Programming Languages**	CO1:**Makeuseof Basic Principles Of Programming Languages**. CO2:**Develop**aprogramwithDatarepresentationandComputations. CO3:**Develop** programs using Object Oriented Programming language : Java. CO4:**Develop Application Using Inheritance**,encapsulation,and polymorphism. CO5:**Demonstrate** Multithreading For Robust Application Development. CO6:**Develop**asimpleprogramusingbasicconceptsofFunctionalandLogicalp rogrammingparadigm.
21 02 56	**Data Structures and Algorithms Laboratory**	**CO1:Understand**theADT/libraries,hashtablesanddictionarytodesignalgorith msforaspecificproblem. **CO2:**Choosemostappropriatedatastructuresand**apply**algorithmsforgraphica lsolutionsoftheproblems. **CO3:Apply And Analyze** nonlinear datastructurestosolverealworld complex problems. **CO4:Apply** and **analyze** algorithm design techniques for indexing, sorting, multi-way searching,file organization and compression. **CO5:Analyze** the The efficiency most appropriate data structure for creating efficient solutions for engineering design situations.
21 02 57	**Microproc essor Laboratory**	CO1.**Understand**and**apply**variousaddressingmodesandinstructionsettoimp lementassemblylanguageprograms CO2.Apply Logic To Implement code conversion CO3.**Analyze** and **apply** logic to **demonstrate processor mode of operation**

21 02 58	Project Based Learning II	CO1:Identify The Real Life problem from societal need point of view
		CO2:Chooseandcomparealternativeapproachestoselectmostfeasibleone
		CO3:Analyzeandsynthesizetheidentifiedproblemfromtechnologicalperspective
		CO4:Designthereliableandscalablesolutiontomeetchallenges
		CO5:Evaluate The Solution Based On The Criteria Specified
		CO6:Inculcatelonglifelearningattitudetowardsthesocietalproblems
21 02 59	Code of Conduct	CO1: **Understand** the basic perception of profession, professional ethics, various moral and social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
		CO2: **Aware**ofprofessionalrightsandresponsibilitiesofanengineer,responsibilitiesofanengineerforsafety andriskbenefitanalysis.
		CO3: **Understand**theimpactoftheprofessionalEngineeringsolutionsinsocietalandEnvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment.
		CO4:**Acquire** knowledge about various roles of engineers in a variety of global issues and able to apply ethical principlesto resolvesituationsthatarise intheirprofessionallives.

Third Year of Computer Engineering

SemesterV

Course Code	Course Name	*CourseOutcomes*

310241	Database Management Systems	CO1:Analyze and design Database Management System using ER model
		CO2: Implement database queries using database languages
		CO3: Normalize the database design using normal forms
		CO4:Apply Transaction Management concepts in real-time situations
		CO5: Use NoSQL databases for processing unstructured data
		CO6: Differentiate between Complex Data Types and analyze the use of appropriate data types
310242	Theory of Computation	CO1: Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants
		CO2: Construct regular expression to present regular language and understand pumping lemma for RE
		CO3: Design Context Free Grammars and learn to simplify the grammar
		CO4: Construct Pushdown Automaton model for the Context Free Language
		CO5: Design Turing Machine for the different requirements outlined by theoretical computer science
		CO6: Understand different classes of problems, classify and analyze them and study concepts of NP completeness
310243	Systems Programming and Operating System	CO1: Analyze and synthesize basic System Software and its functionality.
		CO2: Identify suitable data structures and

		Design & Implement various System Software
		CO3: Compare different loading schemes and analyze the performance of linker and loader
		CO4: Implement and Analyze the performance of process scheduling algorithms
		CO5: Identify the mechanism to deal with deadlock and concurrency issues
		CO6: Demonstrate memory organization and memory management policies
310244	**Computer Networks and Security**	CO1: Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies
		CO2: Illustrate the working and functions of data link layer
		CO3: Analyze the working of different routing protocols and mechanisms
		CO4: Implement client-server applications using sockets
		CO5: Illustrate role of application layer with its protocols, client-server architectures
		CO6: Comprehend the basics of Network Security
310246	**Database Management Systems Laboratory**	CO1: Design E-R Model for given requirements and convert the same into database tables
		CO2: Design schema in appropriate normal form considering actual requirements
		CO3: Implement SQL queries for given requirements , using different SQL concepts
		CO4: Implement PL/SQL Code block for given

		requirements CO5: Implement NoSQL queries using MongoDB CO6: Design and develop application considering actual requirements and using database concepts
310247	**Computer Networks and Security Laboratory**	CO1: Analyze the requirements of network types, topology and transmission media CO2: Demonstrate error control, flow control techniques and protocols and analyze them CO3: Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms CO4: Develop Client-Server architectures and prototypes CO5: Implement web applications and services using application layer protocols CO6: Use network security services and mechanisms
310248	**Laboratory Practice I**	**Systems Programming and Operating System** CO1: Implement language translators CO2: Use tools like LEX and YACC CO3: Implement internals and functionalities of Operating System **Internet of Things and Embedded Systems** CO4: Design IoT and Embedded Systems based application CO5: Develop smart applications using IoT CO6:Develop IoT applications based on cloud environment OR

		Human Computer Interface
		CO4: Implement the interactive designs for feasible data search and retrieval
		CO5: Analyze the scope of HCI in various paradigms like ubiquitous computing, virtual reality, multi-media, World wide web related environments
		CO6: Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems OR
		Distributed Systems
		CO4: Demonstrate knowledge of the core concepts and techniques in Distributed Systems
		CO5: Apply the principles of state-of-the-Art Distributed Systems in real time applications
		CO6: Design, build and test application programs on Distributed Systems OR
		Software Project Management
		CO4: Apply Software Project Management tools
		CO5: Implement software project planning and scheduling
		CO6: Analyze staffing in software project
310249	**Seminar and Technical Communication**	CO1: Analyze a latest topic of professional interest
		CO2: Enhance technical writing skills
		CO3: Identify an engineering problem, analyze it and propose a work plan to solve it
		CO4: Communicate with professional technical

		presentation skills

SemesterVI

310251	**Data Science and Big Data Analytics**	CO1: Analyze needs and challenges for Data Science Big Data Analytics CO2: Apply statistics for Big Data Analytics CO3: Apply the lifecycle of Big Data analytics to real world problems CO4: Implement Big Data Analytics using Python programming CO5: Implement data visualization using visualization tools in Python programming CO6: Design and implement Big Databases using the Hadoop ecosystem
310252	**Web Technology**	CO1: Implement and analyze behavior of web pages using HTML and CSS CO2: Apply the client side technologies for web development CO3: Analyze the concepts of Servlet and JSP CO4: Analyze the Web services and frameworks CO5: Apply the server side technologies for web development CO6: Create the effective web applications for business functionalities using latest web development platforms
310253	**Artificial Intelligence**	CO1: Identify and apply suitable Intelligent agents for various AI applications

		CO2: Build smart system using different informed search / uninformed search or heuristic approaches
		CO3: Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem
		CO4: Apply the suitable algorithms to solve AI problems
		CO5: Implement ideas underlying modern logical inference systems
		CO6: Represent complex problems with expressive yet carefully constrained language of representation
310255	**Internship**	CO1:To demonstrate professional competence through industry internship.
		CO2:To apply knowledge gained through internships to complete academic activities in a professional manner.
		CO3: To choose appropriate technology and tools to solve given problem.
		CO4: To demonstrate abilities of a responsible professional and use ethical practices in day to day life.
		CO5: Creating network and social circle, and developing relationships with industry people.
		CO6: To analyze various career opportunities and decide carrier goals
310256	**Data Science and Big Data Analytics Laboratory**	CO1: Apply principles of Data Science for the analysis of real time problems
		CO2: Implement data representation using statistical methods
		CO3: Implement and evaluate data analytics algorithms
		CO4: Perform text preprocessing

		CO5: Implement data visualization techniques
		CO6: Use cutting edge tools and technologies to analyze Big Data
310257	**Web Technology Laboratory**	CO1: Understand the importance of website planning and website design issues
		CO2: Apply the client side and server side technologies for web application development
		CO3: Analyze the web technology languages, frameworks and services
		CO4: Create three tier web based applications
310258	**Laboratory Practice II**	**Artificial Intelligence**
		CO1: Design system using different informed search / uninformed search or heuristic approaches
		CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
		CO3: Design and develop an expert system
		Information Security
		CO4: Use tools and techniques in the area of Information Security
		CO5: Use the knowledge of security for problem solving
		CO6: Apply the concepts of Information Security to design and develop applications OR
		Augmented and Virtual Reality
		CO4: Use tools and techniques in the area of Augmented and Virtual Reality
		CO5: Use the knowledge of Augmented and Virtual Reality for problem solving

		CO6: Apply the concepts of Augmented and Virtual Reality to design and develop applications OR

Cloud Computing

CO4: Use tools and techniques in the area of Cloud Computing

CO5: Use the knowledge of Cloud Computing for problem solving

CO6: Apply the concepts Cloud Computing to design and develop applications OR

Software Modelling and Architectures

CO4: Use tools and techniques in the area Software Modelling and Architectures

CO5: Use the knowledge of Software Modelling and Architectures for problem solving

CO6: Apply the concepts Software Modelling and Architectures to design and develop applications |

Fourth Year of Computer Engineering

SemesterVII

Course Code	Course Name	*CourseOutcomes*
410241	**Design and Analysis of Algorithms**	CO1: Formulate the problem CO2: Analyze the asymptotic performance of algorithms CO3: Decide and apply algorithmic strategies to solve given problem CO4: Find optimal solution by applying various methods CO5: Analyze and Apply Scheduling and Sorting Algorithms. CO6: Solve problems for multi-core or distributed or concurrent environments
410242	**Machine Learning**	CO1: Identify the needs and challenges of machine learning for real time applications. CO2: Apply various data pre-processing techniques to simplify and speed up machine learning algorithms. CO3: Select and apply appropriately supervised machine learning algorithms for real time applications. CO4: Implement variants of multi-class classifier and measure its performance. CO5 :Compare and contrast different clustering algorithms. CO6: Design a neural network for solving engineering problems

410243	Blockchain Technology	CO1: Interpret the fundamentals and basic concepts in Blockchain
		CO2: Compare the working of different blockchain platforms
		CO3: Use Crypto wallet for cryptocurrency based transactions
		CO4: Analyze the importance of blockchain in finding the solution to the real-world problems.
		CO5: Illustrate the Ethereum public block chain platform
		CO6: Identify relative application where block chain technology can be effectively used and implemented.
410246	Laboratory Practice III	CO1: Apply preprocessing techniques on datasets.
		CO2: Implement and evaluate linear regression and random forest regression models.
		CO3: Apply and evaluate classification and clustering techniques.
		CO4: Analyze performance of an algorithm.
		CO5: Implement an algorithm that follows one of the following algorithm design strategies: divide and conquer, greedy, dynamic programming, backtracking, branch and bound.
		CO6: Interpret the basic concepts in Blockchain technology and its applications
410247	Laboratory Practice IV	CO1: Apply android application development for solving real life problems
		CO2: Design and develop system using various multimedia components.
		CO3: Identify various vulnerabilities and demonstrate using various tools.
		CO4: Apply information retrieval tools for natural language processing

		CO5: Develop an application using open source GPU programming languages
		CO6: Apply software testing tools to perform automated testing
410248	**Project Stage I**	CO1:Solve real life problems by applying knowledge.
		CO2: Analyze alternative approaches, apply and use the most appropriate one for a feasible solution.
		CO3: Write precise reports and technical documents in a nutshell.
		CO4: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting teamwork
		CO5:Interpersonal relationships, conflict management and leadership quality.

SemesterVIII

410250	**High Performance Computing**	CO1: Understand various Parallel Paradigm
		CO2: Design and Develop an efficient parallel algorithm to solve given problem
		CO3: Illustrate data communication operations on various parallel architecture
		CO4: Analyze and measure performance of modern parallel computing systems
		CO5: Apply CUDA architecture for parallel programming
		CO6: Analyze the performance of HPC applications
410251	**Deep Learning**	CO1: Understand the basics of Deep Learning and apply the tools to implement deep learning applications
		CO2: Evaluate the performance of deep learning models (e.g., with respect to the bias-variance tradeoff, overfitting and underfitting, estimation of test error).

		CO3: To apply the technique of Convolution (CNN) and Recurrent Neural Network (RNN) for implementing Deep Learning models
		CO4: To implement and apply deep generative models.
		CO5: Construct and apply on-policy reinforcement learning algorithms
		CO6:To Understand Reinforcement Learning Process
410254	**Laboratory Practice V**	CO1: Analyze and measure performance of sequential and parallel algorithms.
		CO2: Design and Implement solutions for multicore/Distributed/parallel environment.
		CO3: Identify and apply the suitable algorithms to solve AI/ML problems.
		CO4: Apply the technique of Deep Neural network for implementing Linear regression and classification. CO5: Apply the technique of Convolution (CNN) for implementing Deep Learning models.
		CO6: Design and develop Recurrent Neural Network (RNN) for prediction
410255	**Laboratory Practice VI**	CO1: Apply basic principles of elective subjects to problem solving and modeling.
		CO2: Use tools and techniques in the area of software development to build mini projects
		CO3: Design and develop applications on subjects of their choice.
		CO4: Generate and manage deployment, administration & security.
410256	**Project Stage I**	CO1: Show evidence of independent investigation
		CO2: Critically analyze the results and their interpretation.

		CO3: Report and present the original results in an orderly way and placing the open questions in the right perspective.
		CO4: Link techniques and results from literature as well as actual research and future research lines with the research.
		CO5: Appreciate practical implications and constraints of the specialist subject