AURORA'S TECHNOLOGICAL AND RESEARCH INSTITUTE

(Approved by AICTE and Affiliated to JNTUH) (Accredited by NAAC with 'A' Grade)

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DEPARTMENT OF INFORMATION TECHNOLOGYCOURSE OUTCOMES (COs)

B.Tech. 1st Year I Sem Syllabus (w.e.f AY 2018-19) Common for EEE, CSE & IT

Course Code	Course Title / Name	Course Outcomes
MA101BS	Mathematics - I	**At the end of this course, each student should beable to:** **CO1:** Write the matrix representation of a set of linear equations and to analyse the solutionof the system of equations. **CO2:** Find the Eigen values and Eigen vectors. **CO3:** Reduce the quadratic form to canonical formusing orthogonal transformations. **CO4:** Analyse the nature of sequence and series. **CO5:** Solve the applications on the mean valuetheorems. **CO6:** Evaluate the improper integrals using Betaand Gamma functions. **CO7:** Find the extreme values of functions of two variables with/ without constraints.
CH102BS	Chemistry	**At the end of this course, each student should beable to:** **CO1:** The knowledge of atomic, molecular and electronic changes, band theory related toconductivity. **CO2:** The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its

		treatments.
		CO3: The required skills to get clear concepts on basic spectroscopy and application to medicaland other fields.
		CO4: The knowledge of configurationally and conformational analysis of molecules and reaction mechanisms.
EE103ES	Basic Electrical Engineering	**At the end of this course, each student should beable to:**
		CO1: To analyze and solve electrical circuits using network laws and theorems.
		CO2: To understand and analyze basic Electric and Magnetic circuits.
		CO3: To study the working principles of Electrical Machines.
		CO4: To introduce components of Low Voltage Electrical Installations .
ME105ES	Engineering Workshop	**At the end of this course, each student should beable to:**
		CO1: Study and practice on machine tools and their operations .
		CO2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
		CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
		CO4: Apply basic electrical engineering knowledge for house wiring practice.
EN105HS	English	**At the end of this course, each student should beable to:**
		CO1: Use English Language effectively in spokenand written forms.
		CO2: Comprehend the given texts and respond appropriately.
		CO3: Communicate confidently in various contexts and different cultures.

		CO4: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
CH106BS	Engineering Chemistry Lab	At the end of this course, each student should beable to: CO1: Determination of parameters like hardnessand chloride content in water. CO2: Estimation of rate constant of a reaction from concentration – time relationships. CO3: Determination of physical properties like adsorption and viscosity. CO4: Calculation of Rf values of some organic molecules by TLC technique.
EN107HS	English Language and Communication Skills Lab	At the end of this course, each student should beable to: CO1: Better understanding of nuances of English language through audio- visual experience and group activities . CO2: Neutralization of accent for intelligibility. CO3: Speaking skills with clarity and confidence which in turn enhances their employability skills.
EE108ES	Basic Electrical Engineering Lab	At the end of this course, each student should beable to: CO1: Get an exposure to basic electrical laws. CO2: Understand the response of different types of electrical circuits to different excitations. CO3: Understand the measurement, calculation and relation between the basic electrical parameters. CO4: Understand the basic characteristics of transformers and electrical machines.

B.Tech. 1st Year II Sem Syllabus (w.e.f AY 2018-19) Common for EEE, CSE & IT

Course Code	Course Title / Name	Course Outcomes
MA201BS	Mathematics - II	**At the end of this course, each student should beable to:** **CO1:** Identify whether the given differential equation of first order is exact or not. **CO2:** Solve higher differential equation and apply the concept of differential equation to real world problems . **CO3:** Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped. **CO4:** Evaluate the line, surface and volume integrals and converting them from one to another.
AP202BS	Applied Physics	**At the end of this course, each student should beable to:** **CO1:** The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state. **CO2:** The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fibre optics enable the students to apply to various systems like communications ,solar cell, photo cells and so on. **CO3:** Design, characterization and study of properties of material help the students toprepare new materials for various engineering applications. **CO4:** The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
CS203ES	Programming For Problem Solving	**At the end of this course, each student should beable to:** **CO1:** To write algorithms and to draw flowcharts

		for solving problems.
		CO2: To convert the algorithms/flowcharts to C programs.
		CO3: To code and test a given logic in C programming language.
		CO4: To decompose a problem into functions andto develop modular reusable code.
		CO5: To use arrays, pointers, strings and structuresto write C programs.
		CO6: Searching and sorting problems.
ME204ES	Engineering Graphics	**At the end of this course, each student should beable to:** **CO1:** Preparing working drawings to communicatethe ideas and information. **CO2:** Read, understand and interpret engineering drawings.
AP205BS	Applied Physics Lab	**At the end of this course, each student should beable to:** **CO1 :** Apply the various procedures and techniquesfor the experiments. **CO2 :** Use the different measuring devices and meters to record the data with precision. **CO3 :** Apply the mathematical concepts/equationsto obtain quantitative results. **CO4 :** Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.
CS206ES	Programming For Problem Solving Lab	**At the end of this course, each student should beable to:** **CO1:** Formulate the algorithms for simple Problems. **CO2:** Translate given algorithms to a working andcorrect program. **CO3:** Correct syntax errors as reported by the compilers . **CO4:** Identify and correct logical errors encountered during execution. **CO5:** Represent and manipulate data with arrays, strings and structures.

		CO6: Use pointers of different types .
		CO7: Create, read and write to and from simple textand binary files.
		CO8: Modularize the code with functions so that they can be reused.
*MC209ES	Environmental Science	**At the end of this course, each student should beable to:** Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

B.Tech. II Year I Sem R18 Syllabus Information Technology

Course Code	Course Title / Name	Course Outcomes
CS301ES	Analog and Digital Electronics	**At the end of this course, each student should beable to:** **CO1:** Know the characteristics of various components. **CO2:** Understand the utilization of components. **CO3:** Design and analyze small signal amplifier circuits. **CO4:** Learn Postulates of Boolean algebra and to minimize combinational functions **CO5:** Design and analyze combinational and sequential circuits **CO6:** Know about the logic families and realization of logic gates.
CS302PC	Data Structures	**At the end of this course, each student should beable to:** **CO1:** Ability to select the data structures that efficiently model the information in a problem. **CO2:** Ability to assess efficiency trade-offs among different data structure implementations or combinations. **CO3:** Implement and know the application of algorithms for sorting and pattern matching. **CO4:** Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries,

		heaps, graphs, and AVL-trees.
MA303BS	Computer Oriented Statistical Methods	**At the end of this course, each student should beable to:** **CO1:** Apply the concepts of probability anddistributions to some case studies. **CO2:** Correlate the material of one unit to the material in other units. **CO3:** Resolve the potential misconceptions and hazards in each topic of study.
IT304PC	Computer Organization And Microprocessor	**At the end of this course, each student should beable to:** **CO1:** Understand the basics of instructions sets andtheir impact on processor design. **CO2:** Demonstrate an understanding of the designof the functional units of a digital computer system. **CO3:** Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory. **CO4:** Design a pipeline for consistent execution of instructions with minimum hazards. **CO5:** Recognize and manipulate representations of numbers stored in digital computers.
CS305PC	Object Oriented Programming using C++	**At the end of this course, each student should beable to:** **CO1:** Able to develop programs with reusability. **CO2:** Develop programs for file handling. **CO3:** Handle exceptions in programming. **CO4:** Develop applications for a range of problems using object-oriented programming techniques.
CS306ES	Analog and Digital Electronics Lab	**At the end of this course, each student should beable to:** **CO1:** Know the characteristics of various components. **CO2:** Understand the utilization of components. **CO3:** Design and analyze small signal amplifier circuits. **CO4:** Postulates of Boolean algebra and to minimize combinational functions.

		CO5: Design and analyze combinational and sequential circuits.
		CO6: Known about the logic families and realization of logic gates.
CS307PC	Data Structures Lab	**At the end of this course, each student should beable to:** **CO1:** Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions,pointers and strings, and data structures like stacks, queues and linked lists. **CO2:** Ability to Implement searching and sorting Algorithms.
CS309PC	C++ Programming Lab	**At the end of this course, each student should beable to:** Ability to develop applications for a range of problems using object-oriented programming techniques
*MC309	Gender Sensitization Lab	**At the end of this course, each student should beable to:** **CO1:** Students will have developed a better understanding of important issues related to gender in contemporary India. **CO2:** Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. **CO3:** Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. **CO4:** Students will acquire insight into the gendered division of labour and its relation topolitics and economics. **CO5:** Men and women students and professionals will be better equipped to work and live together as equals. **CO6:** Students will develop a sense of appreciation

| | | of women in all walks of life. **CO7:** Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence. |

B.Tech. II Year II Sem R18 Syllabus Information Technology

Course Code	Course Title / Name	Course Outcomes
CS401PC	Discrete Mathematics	**At the end of this course, each student should beable to:** **CO1:** Ability to understand and construct precise mathematical proofs. **CO2:** Ability to use logic and set theory to formulate precise statements. **CO3:** Ability to analyze and solve counting problems on finite and discrete structures. **CO4:** Ability to describe and manipulate sequences. **CO5:** Ability to apply graph theory in solving computing problems.
SM402MS	Business Economics & Financial Analysis	**At the end of this course, each student should beable to:** The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.
CS403PC	Operating Systems	**At the end of this course, each student should beable to:** **CO1:** Will be able to control access to a computerand the files that may be shared **CO2:** Demonstrate the knowledge of the components of computer and their respectiveroles in computing. **CO3:** Ability to recognize and resolve user problems with standard operating environments. **CO4:** Gain practical knowledge of how programming languages, operating systems,and architectures interact and how to use each effectively.

CS404PC	Database Management Systems	**At the end of this course, each student should beable to:** **CO1:** Gain knowledge of fundamentals of DBMS, database design and normal forms **CO2:** Master the basics of SQL for retrieval and management of data. **CO3:** Be acquainted with the basics of transaction processing and concurrency control. **CO4:** Familiarity with database storage structures and access techniques
CS405PC	Java Programming	**At the end of this course, each student should beable to:** **CO1:** Able to solve real world problems using OOP techniques. **CO2:** Able to understand the use of abstract classes. **CO3:** Able to solve problems using java collection framework and I/o classes. **CO4:** Able to develop multithreaded applicationswith synchronization. **CO5:** Able to develop applets for web applications. **CO6:** Able to design GUI based applications.
CS406PC	Operating Systems Lab	**At the end of this course, each student should beable to:** **CO1:** Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management. **CO2:** Able to implement C programs using Unix system calls.
CS407PC	Database Management Systems Lab	**At the end of this course, each student should beable to:** **CO1:** Design database schema for a given application and apply normalization **CO2:** Acquire skills in using SQL commands for data definition and data manipulation. **CO3:** Develop solutions for database applications using procedures, cursors and triggers

CS408PC	Java Programming Lab	**At the end of this course, each student should beable to:** **CO1:** Able to write programs for solving real world problems using java collection frame work. **CO2:** Able to write programs using abstract classes. **CO3:** Able to write multithreaded programs. **CO4:** Able to write GUI programs using swing controls in Java.
*MC409	Constitution of India	**At the end of this course, each student should beable to:** **CO1 :** Able to understand historical background of the constitutional making and its importance for building a democratic India, the structureof Indian government, the structure of state government, the local Administration. **CO2:** Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commissionand UPSC for sustaining democracy. **CO3:** Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government. **CO4:** Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.

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Course Code	Course Title / Name	Course Outcomes
CS501PC	Formal Languages & Automata Theory	**At the end of this course, each student should beable to:** **CO1:** Able to understand the concept of abstract machines and their power to recognize the languages. **CO2:** Able to employ finite state machines for modeling and solving computing problems. **CO3:** Able to design context free grammars for formal languages. **CO4:** Able to distinguish between decidability and undecidability. **CO5:** Able to gain proficiency with mathematical tools and formal methods.
CS502PC	Software Engineering	**At the end of this course, each student should beable to:** **CO1:** Ability to translate end-user requirements into system and software requirements, using e.g.UML, and structure the requirements in a Software Requirements Document (SRD). **CO2:** Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices. **CO3:** Will have experience and/or awareness of testing problems and will be able to develop a simple testing report
IT503PC	Data Communication And Computer Networks	**At the end of this course, each student should beable to:** **CO1:** Students should be understand and explore the basics of Computer Networks and Various Protocols. He/She will be in a position to understand the World Wide Web concepts. **CO2:** Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and ad hoc networks.

Code	Course	Course Outcomes
IT504PC	Web Programming	**At the end of this course, each student should beable to:** **CO1:** Design web pages. **CO2:** Use technologies of Web Programming. **CO3:** Apply object-oriented aspects to Scripting. **CO4:** Create databases with connectivity using JDBC. **CO5:** Build web-based application using sockets.
IT511PE	Professional Elective-I : BIOMETRICS	**At the end of this course, each student should beable to:** **CO1:** Identify the various Biometric technologies. **CO2:** Design of biometric recognition for the organization. **CO3:** Develop simple applications for privacy. **CO4:** Understand the watermarking techniques of biometrics. **CO5:** Understand the research on biometric techniques. **CO6:** Understand the need of biometric in the society.
CS512PE	Professional Elective-I : Advanced Computer Architecture	**At the end of this course, each student should beable to:** **CO1:** Computational models and Computer Architectures. **CO2:** Concepts of parallel computer models. **CO3:** Scalable Architectures, Pipelining, Superscalar processors, multiprocessors
CS513PE	Professional Elective-I : Data Analytics	**At the end of this course, each student should beable to:** **CO1:** Understand the impact of data analytics for business decisions and strategy **CO2:** Carry out data analysis/statistical analysis **CO3:** To carry out standard data visualization andformal inference procedures **CO4:** Design Data Architecture **CO5:** Understand various Data Sources
CS514PE	Professional Elective-I : Image Processing	**At the end of this course, each student should beable to:** **CO1:** Demonstrate the knowledge of the basic

		concepts of two-dimensional signal acquisition, sampling, and quantization.
		CO2: Demonstrate the knowledge of filtering techniques.
		CO3: Demonstrate the knowledge of 2D transformation techniques.
		CO4: Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.
CS515PE	Professional Elective-I : Principles of Programming Languages	**At the end of this course, each student should beable to:** **CO1:** Acquire the skills for expressing syntax and semantics in formal notation **CO2:** Identify and apply a suitable programming paradigm for a given computing application **CO3:** Gain knowledge of and able to compare the features of various programming languages
CS521PE	Professional Elective –II: Computer Graphics	**At the end of this course, each student should beable to:** **CO1:** Acquire familiarity with the relevant mathematics of computer graphics. **CO2:** Be able to design basic graphics application programs, including animation **CO3:** Be able to design applications that display graphic images to given specifications
IT521PE	Professional Elective –II: Database Security	**At the end of this course, each student should beable to:** **CO1:** Ability to carry out a risk analysis for largedatabase. **CO2:** Ability to set up, and maintain the accounts with privileges and roles.
CS522PE	Professional Elective –II: Advanced Operating Systems	**At the end of this course, each student should beable to:** **CO1:** Understand the design approaches of advanced operating systems **CO2:** Analyze the design issues of distributedoperating systems. **CO3:** Evaluate design issues of multi processor operating systems.

		CO4: Identify the requirements Distributed File System and Distributed Shared Memory. **CO5:** Formulate the solutions to schedule the real time applications.
IT523PE	Professional Elective –II: Machine Learning	**At the end of this course, each student should beable to:** **CO1:** Understand the concepts of computational intelligence like machine learning **CO2:** Ability to get the skill to apply machine learning techniques to address the real time problems in different areas **CO3:** Understand the Neural Networks and its usage in machine learning application.
IT524PE	Professional Elective –II: Pattern Recognition	**At the end of this course, each student should beable to:** **CO1:** Understand the theory, benefits, inadequaciesand possible applications of various machine learning and pattern recognition algorithms **CO2:** Identify and employ suitable machine learning techniques in classification, pattern recognition, clustering and decision problems.
CS505PC	Software Engineering Lab	**At the end of this course, each student should beable to:** **CO1:** Ability to translate end-user requirements into system and software requirements **CO2:** Ability to generate a high-level design of the system from the software requirements **CO3:** Will have experience and/or awareness of testing problems and will be able to develop a simple testing report
IT506PC	Computer Networks & Web Programming Lab	**At the end of this course, each student should beable to:** **CO1:** Implement data link layer farming methods **CO2:** Analyze error detection and error correction codes. **CO3:** Implement and analyze routing and congestion issues in network design. **CO4:** Implement Encoding and Decoding

		techniques used in presentation layer **CO5:** To be able to work with different network tools
EN508HS	Advanced Communication Skills Lab	**At the end of this course, each student should beable to:** **CO1:** To improve fluency in English through a well developed vocabulary and enable them to listen at normal conservational speed by educated English speakers and respond appropriately in different socio cultural and professional context. **CO2:** Further, they would be required to communicate their ideas relevantly and coherently in writing **CO3:** To prepare all the students for their placements **CO4:** Learn to overcome stage fear and make presentations with ease **CO5:** Learn how to pronounce words using the rules they have been taught
*MC510	Intellectual Property Rights	**At the end of this course, each student should beable to:** **CO1:** Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP. **CO2:** Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development. **CO3:** Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautious steps to be taken to prevent infringement of proprietary rights in products and technologydevelopment. **CO4:** Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and

		IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.
		CO5: Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.
		CO6: Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;

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Course Code	Course Title / Name	Course Outcomes
IT601PC	Introduction To Embedded Systems	**At the end of this course, each student should beable to:** **CO1:** Expected to understand the selection procedure of processors in the embedded domain. **CO2:** Design procedure of embedded firm ware. **CO3:** Expected to visualize the role of realtime operating systems in embedded systems. **CO4:** Expected to evaluate the correlation between task synchronization and latency issues
IT602PC	Principles Of Compiler Construction	**At the end of this course, each student should beable to:** **CO1:** Ability to design, develop, and implement a compiler for any language. **CO2:** Able to use lex and yacc tools for developing a scanner and a parser. **CO3:** Able to design and implement LL and LR parsers. **CO4:** Able to design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity. **CO5:** Ability to design algorithms to generate machine code
IT603PC	Algorithm Design And Analysis	**At the end of this course, each student should be able to:** **CO1:** Ability to analyze the performance of algorithms **CO2:** Ability to choose appropriate data structures and algorithm design methods for a specified application **CO3:** Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs
IT604PC	Internet Of Things	**At the end of this course, each student should beable to:** **CO1:** Interpret the impact and challenges posed by

		IoT networks leading to new architectural models.
		CO2: Compare and contrast the deployment of smart objects and the technologies to connectthem to network.
		CO3: Appraise the role of IoT protocols for efficient network communication.
		CO4: Elaborate the need for Data Analytics andSecurity in IoT.
		CO5: Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
IT611PE	Professional Elective-III : Ethical Hacking	**At the end of this course, each student should beable to:** **CO1:** Gain the knowledge of the use and availabilityof tools to support an ethical hack . **CO2:** Gain the knowledge of interpreting the resultsof a controlled attack . **CO3:** Understand the role of politics, inherent and imposed limitations and metrics for planningof a test . **CO4:** Comprehend the dangers associated with penetration testing.
CS612PE	Professional Elective-III : Network Programming	**At the end of this course, each student should beable to:** **CO1:** To write socket API based programs . **CO2:** To design and implement client-server applications using TCP and UDP sockets. **CO3:** To analyze network programs.
CS613PE	Professional Elective-III : Scripting Languages	**At the end of this course, each student should beable to:** **CO1:** Comprehend the differences between typical scripting languages and typical system and application programming languages. **CO2:** Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given

| | | problem. |
		CO3: Acquire programming skills in scripting language
CS614PE	Professional Elective-III : Mobile Application Development	At the end of this course, each student should beable to: CO1: Student understands the working of AndroidOS Practically. CO2: Student will be able to develop Android user interfaces CO3: Student will be able to develop, deploy and maintain the Android Applications.
CS615PE	Professional Elective-III : Software Testing Methodologies	At the end of this course, each student should beable to: Design and develop the best test strategies in accordance to the development model.
IT605PC	Embedded Systems & Internet Of Things Lab	At the end of this course, each student should beable to: CO1: Implement an architectural design for IoT for specified requirement CO2: Solve the given societal challenge using IoT CO3: Choose between available technologies anddevices for stated IoT challenge
IT606PC	Compiler Construction Lab	At the end of this course, each student should beable to: CO1: Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML CO2: Apply client-server principles to develop scalable and enterprise web applications. CO3: Ability to design, develop, and implement a compiler for any language. CO4: Able to use lex and yacc tools for developing a scanner and a parser. CO5: Able to design and implement LL and LR parsers.
IT621PE	**Professional Elective-III** Ethical Hacking	At the end of this course, each student should beable to: CO1: Gain the knowledge of the use and availability of tools to support an ethical hack

		CO2: Gain the knowledge of interpreting the results of a controlled attack
IT622PE	**Professional Elective-III** Network Programming	At the end of this course, each student should beable to: **CO1:** To write socket API based programs **CO2:** To design and implement client-server applications using TCP and UDP sockets **CO3:** To analyze network programs
CS623PE	**Professional Elective-III** Scripting Languages	At the end of this course, each student should beable to: **CO1:** Ability to understand the differences between Scripting languages and programming languages **CO2:** Able to gain some fluency programming in Ruby, Perl, TCL
CS624PE	**Professional Elective-III** Mobile Application Development	At the end of this course, each student should beable to: **CO1:** Student understands the working of AndroidOS Practically. **CO2:** Student will be able to develop user interfaces. **CO3:** Student will be able to develop, deploy and maintain the Android Applications.
CS625PE	**Professional Elective-III** Software Testing Methodologies	At the end of this course, each student should beable to: Design and develop the best test strategies in accordance to the development model.
*MC609	Environmental Science	At the end of this course, each student should beable to: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

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Course Code	Course Title / Name	Course Outcomes
IT701PC	Information Security	At the end of this course, each student should beable to: **CO1:** Demonstrate the knowledge of cryptography, network security concepts and applications. **CO2:** Ability to apply security principles in system design.
CS702PC	Data Mining	At the end of this course, each student should beable to: **CO1:** Ability to understand the types of the data to be mined and present a general classification oftasks and primitives to integrate a data mining system. **CO2:** Apply preprocessing methods for any given raw data. **CO3:** Extract interesting patterns from large amounts of data. **CO4 :** Discover the role played by data mining in various fields. **CO5:** Choose and employ suitable data mining algorithms to build analytical applications **CO6:** Evaluate the accuracy of supervised and unsupervised models and algorithms.
IT711PE	**Professional Elective– IV** Web Security	At the end of this course, each student should beable to: **CO1:** Understand the Web architecture and applications **CO2:** Understand client side and service side programming **CO3:** Understand how common mistakes can be bypassed and exploit the application **CO4:** Identify common application vulnerabilities.
CS713PE	**Professional Elective–IV** Artificial Intelligence	At the end of this course, each student should beable to: **CO1:** Ability to formulate an efficient problem space for a problem expressed in natural language. **CO2:** Select a search algorithm for a problem and estimate its time and space complexities. **CO3:** Possess the skill for representing knowledge using the appropriate technique for a givenproblem. **CO4:** Possess the ability to apply AI techniques to solve problems of game playing, and machinelearning.

		At the end of this course, each student should beable to:
CS714PE	**Professional Elective–IV** Cloud Computing	**CO1:** Ability to understand various service delivery models of a cloud computing architecture. **CO2:** Ability to understand the ways in which the cloud can be programmed and deployed. **CO3:** Understanding cloud service providers.
CS715PE	**Professional Elective-IV** Ad-hoc & Sensor Networks	At the end of this course, each student should beable to: **CO1:** Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks **CO2:** Ability to solve the issues in real-time application development based on ASN. **CO3:** Ability to conduct further research in the domain of ASN
IT721PE	**Professional Elective V** Intrusion Detection Systems	At the end of this course, each student should beable to: **CO1:** Possess a fundamental knowledge of Cyber Security. **CO2:** Understand what vulnerability is and how to address most common vulnerabilities. **CO3:** Know basic and fundamental risk management principles as it relates to Cyber Security andMobile Computing. **CO4:** Have the knowledge needed to practice safer computing and safeguard your information usingDigital Forensics. **CO5:** Understand basic technical controls in use today, such as firewalls and Intrusion Detection systems. **CO6:** Understand legal perspectives of Cyber Crimes and Cyber Security.
CS722PE	**Professional Elective V** Real Time Systems	At the end of this course, each student should beable to: **CO1:** Be able to explain real-time concepts such as preemptive multitasking, task priorities, priority inversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores. **CO2:** Able describe how a real-time operating system kernel is implemented. **CO3:** Able explain how tasks are managed. **CO4:** Explain how the real-time operating system implements time management.

		CO5: Discuss how tasks can communicate using semaphores, mailboxes, and queues. **CO6:** Be able to implement a real-time system on an embedded processor. **CO7:** Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OSII, TinyOs.
CS723PE	**Professional Elective V** Soft Computing	**At the end of this course, each student should beable to:** **CO1:** Identify the difference between onventional Artificial Intelligence to ComputationalIntelligence. **CO2:** Understand fuzzy logic and reasoning to handle and solve engineering problems Apply the Classification and clustering techniques on various applications. **CO3:** Understand the advanced neural networks and its applications **CO4:** Perform various operations of genetic algorithms, Rough Sets. **CO5:** Comprehend various techniques to build model for various applications
IT724PE	**Professional Elective-V** Distributed Databases	**At the end of this course, each student should beable to:** **CO1:** Understand theoretical and practical aspects of distributed database systems. **CO2:** Study and identify various issues related to the development of distributed database system. **CO3:** Understand the design aspects of object-oriented database system and related development.
CS725PE	**Professional Elective V** Software Process & Project Management	**At the end of this course, each student should beable to:** **CO1:** Gain knowledge of software economics, phases in the life cycle of software development,project organization, project control and process instrumentation **CO2:** Analyze the major and minor milestones, artifacts and metrics from management and technical

		perspective **CO3:** Design and develop software product using conventional and modern principles of software project management.
OPEN ELECTIVE-II		Please Refer to Annexure -I
IT703PC	Information Security Lab	**At the end of this course, each student should beable to:** **CO1:** Implement various encryption and decryption algorithms to provide security to the data placed on network.
IT704PC	Industrial Oriented Mini Project/ Summer Internship	**At the end of this course, each student should beable to:** **CO1:** Formulate a real world problem and develop its requirements **CO2:** Student will be exposed to industrial awareness **CO3:** Self learning technologies, methods and/or techniques that contribute to the software solution of the project.
IT705PC	Seminar	**At the end of this course, each student should beable to:** **CO1:** Ability to work in actual working environment. **CO2:** Ability to utilize technical resources **CO3:** Ability to write technical documents and giveoral presentations related to the work completed.
IT706PC	Project Stage - I	**At the end of this course, each student should beable to:** **CO1:** Formulate a real world problem and develop its requirements. **CO2:** Self learning technologies, methods and/or techniques that contribute to the software solution of the project.

B.Tech. IV Year II Sem R18 Syllabus Information Technology

Course Code	Course Title / Name	Course Outcomes
SM801MS	Organizational Behaviour	**At the end of this course, each student should beable to:** CO1: The outcome of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

IT811PE	**Professional Elective–VI** Natural Language Processing	**At the end of this course, each student should beable to:** **CO1:** Show sensitivity to linguistic phenomena and an ability to model them with formal grammars. **CO2:** Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems **CO3:** Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods. **CO4:** Able to design, implement, and analyze NLP algorithms **CO5:** Able to design different language modeling Techniques.
CS812PE	**Professional Elective–VI** Distributed Systems	**At the end of this course, each student should beable to:** **CO1:** Ability to understand Transactions and Concurrency control. **CO2:** Ability to understand Security issues. Understanding Distributed shared memory. **CO3:** Ability to design distributed systems for basic level applications.

CS813PE	**Professional Elective–VI** Neural Networks & Deep Learning	**At the end of this course, each student should beable to:** **CO1:** Ability to understand the concepts of Neural Networks **CO2:** Ability to select the Learning Networks in modeling real world systems **CO3:** Ability to use an efficient algorithm for Deep Models **CO4:** Ability to apply optimization strategies for large scale applications
CS814PE	**Professional Elective–VI** Human Computer Interaction.	**At the end of this course, each student should beable to:** **CO1:** Ability to apply HCI and principles to interaction design. **CO2:** Ability to design certain tools for blind or PH people
CS815PE	**Professional Elective–VI** Cyber Forensics	**At the end of this course, each student should beable to:** **CO1:** Students will understand the usage of computers in forensic, and how to use various forensictools for a wide variety of investigations. **CO2:** It gives an opportunity to students to continue their zeal in research in computer forensics.

Open Elective – III-		Please Refer to ANNEXURE-I
IT802PC	Project Stage - II	**At the end of this course, each student should be able to:** **CO1:** Ability to implement and execute well definedobjective **CO2:** Ability to work in team at component level and system level **CO3:** Ability to troubleshoot.

Course Code	Course Title / Name	Course Outcomes
CE600OE	**Open Elective –I** Disaster Preparedness &Planning Management	At the end of this course, each student should beable to: **CO1:**The application of Disaster Concepts to Management **CO2:**Analyzing Relationship between Development and Disasters. **CO3:**Ability to understand Categories of Disasters **CO4:**Realization of the responsibilities to society
CS600OE	**Open Elective –I** Entrepreneurship	At the end of this course, each student should beable to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.
CS601OE	**Open Elective –I** Fundamentals of Management for Engineers	At the end of this course, each student should beable to: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.
CS602OE	**Open Elective –I** Cyber Law & Ethics	At the end of this course, each student should beable to: **CO1:**The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. **CO2:**The students will learn the rights and responsibilities as an employee, team member and a global citizen
EC600OE	**Open Elective –I** Fundamentals of Internet of Things	At the end of this course, each student should beable to: **CO1:** Known basic protocols in sensor networks. **CO2:**Program and configure Arduino boards for various designs.

		CO3: Python programming and interfacing for Raspberry Pi.
		CO4: Design IoT applications in different domains
EE600OE	**Open Elective –I** Reliability Engineering	**At the end of this course, each student should beable to:** **CO1:** Model various systems applying reliability networks **CO2:** Evaluate the reliability of simple and complex systems **CO3:** Estimate the limiting state probabilities of repairable systems **CO4:** Apply various mathematical models for evaluating reliability of irreparable systems
EE601OE	**Open Elective –I** Renewable Energy Sources	**At the end of this course, each student should beable to:** **CO1:** Understand the principles of wind power and solar photovoltaic power generation, fuel cells. **CO2:** Assess the cost of generation for conventional and renewable energy plants **CO3:** Design suitable power controller for wind and solar applications **CO4:** Analyze the issues involved in the integration of renewable energy sources to the grid
ME600OE	**Open Elective –I** Quantitative Analysis for Business Decisions	**At the end of this course, each student should beable to:** **CO1:** Familiar with issues that would crop up in business **CO2:** Able to formulate Mathematical Model to resolve the issue **CO3:** Able to select technique for solving the formulated Mathematical Model **CO4:** Able to analyze the results obtained through the selected technique for implementation.

Open Elective –II

(Common for EEE, ECE, CSE, IT, ME)

Course Code	Course Title / Name	Course Outcomes
CS700OE	**Open Elective –II** Data Structures	**At the end of this course, each student should beable to:** **CO1:**Ability to select the data structures that efficiently model the information in a problem. **CO2:**Ability to assess efficiency trade-offs among different data structure implementations or combinations. **CO3:**Implement and know the application of algorithms for sorting and pattern matching. **CO4:**Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.
CS701OE	**Open Elective –II** Artificial Intelligence	**At the end of this course, each student should beable to:** **CO1:**Ability to formulate an efficient problem space for a problem expressed in natural language. **CO2:**Select a search algorithm for a problem and estimate its time and space complexities. **CO3:**Possess the skill for representing knowledge using the appropriate technique for a given problem. **CO4:**Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.
CS702OE	**Open Elective –II** Python Programming	**At the end of this course, each student should beable to:** **CO1:**Examine Python syntax and semantics and be fluent in the use of Python flow control and functions. **CO2:**Demonstrate proficiency in handling Strings and File Systems. **CO3:**Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions. **CO4:**Interpret the concepts of Object-Oriented

		Programming as used in Python. **CO5:**Implement exemplary applications related to Network Programming, Web Services and Databases in Python.
CS703OE	**Open Elective –II** Java Programming	**At the end of this course, each student should beable to:** **CO1:**Develop Programs with reusability Develop programs to handle multitasking **CO2:**Develop programs to handle exceptions **CO3:**Develop applications for a range of problems using object-oriented programming techniques **CO4:**Design simple Graphical User Interface Applications
EC700OE	**Open Elective –II** Electronic Sensors	**At the end of this course, each student should beable to:** **CO1:**Learn about sensor Principle, Classification and Characterization. **CO2:**Explore the working of Electromechanical, Thermal, Magnetic, radiation and Electro analytic sensors Understand the basic concepts of Smart Sensors **CO3:**Design a system with sensors **CO4:**UNIT - I Sensors / Transducers: Principles, Classification, Parameters, Characteristics, Environ
EE700OE	**Open Elective –II** Utilization Of Electrical Energy	**At the end of this course, each student should beable to:** **CO1:**Understand basic principles of electric heating and welding. **CO2:**Determine the lighting requirements for flood lighting, household and industrial needs. **CO3:**Calculate heat developed in induction furnace. **CO4:**Evaluate speed time curves for traction
EE701OE	**Open Elective –II** Electric Drives And Control	**At the end of this course, each student should beable to:** **CO1:**Understand the various drive mechanisms and methods for energy conservation. **CO2:**Apply power electronic converters to control the speed of DC motors and induction motors. **CO3:**Evaluate the motor and power converter for a specific application.

		CO4: Develop closed loop control strategies of drives
ME700OE	**Open Elective –II** Basic Mechanical Engineering	**At the end of this course, each student should beable to:** **CO1:** To understand the mechanical equipment for usage at engineering systems. **CO2:**To familiarize with the general principles and requirements for refrigeration, manufacturing, **C03:** To realize the techniques employed to engineering systems.

Open Elective –III

(Common for EEE, ECE, CSE, IT, ME)

Course Code	Course Title / Name	Course Outcomes
CE800OE	**Open Elective – III** Environmental Impact Assessment	**At the end of this course, each student should beable to:** **CO1:**Identify the environmental attributes to be considered for the EIA study **CO2:**Formulate objectives of the EIA studies **CO3:**Identify the methodology to prepare rapid EIA **CO4:**Prepare EIA reports and environmental management plans
CS800OE	**Open Elective – III** Machine Learning	**At the end of this course, each student should beable to:** **CO1:**Understand the concepts of computational intelligence like machine learning **CO2:**Ability to get the skill to apply machine learning techniques to address the real time problems in different areas **CO3:**Understand the Neural Networks and its usage in machine learning application.
CS801OE	**Open Elective – III** Mobile Application Development	**At the end of this course, each student should beable to:** **CO1:**Student understands the working of Android OS Practically. **CO2:**Student will be able to develop Android user interfaces **CO3:**Student will be able to develop, deploy and maintain the Android Applications.

CS802OE	**Open Elective – III** Scripting Languages	**At the end of this course, each student should beable to:** **CO1:**Comprehend the differences between typical scripting languages and typical system and application programming languages. **CO2:**Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem. **CO3:**Acquire programming skills in scripting language
CS803OE	**Open Elective – III** Database Management Systems	**At the end of this course, each student should beable to:** **CO1:**Gain knowledge of fundamentals of DBMS, database design and normal forms **CO2:**Master the basics of SQL for retrieval and management of data. **CO3:**Be acquainted with the basics of transaction processing and concurrency control. **CO4:**Familiarity with database storage structures and access technique
EC800OE	**Open Elective – III** Measuring Instruments	**At the end of this course, each student should beable to:** **CO1:**Able to identify suitable sensors and transducers for real time applications. **CO2:**Able to translate theoretical concepts into working models. Able to understand the basic of measuring device and use them in relevant situation.
EE800OE	**Open Elective – III** Basics Of Power Plant Engineering	Upon completion of the course, the students can understand the principles of operation for different power plants and their economics

EE801OE	**Open Elective – III** Energy Sources And Applications	**At the end of this course, each student should beable to:** **CO1:**List and generally explain the main sources of energy and their primary applications nationally and internationally Understand the energy sources and scientific concepts/principles behind them **CO2:**Understand effect of using these sources on the environment and climate **CO3:**Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment. **CO4:**List and describe the primary renewable energy resources and technologies. **CO5:**To quantify energy demands and make comparisons among energy uses, resources, and technologies. **CO6:**Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation. **CO7:**Understand the Engineering involved in projects utilizing these sources
ME800OE	**Open Elective – III** Non-Conventional Sources Of Energy	**At the end of this course, each student should beable to:** **CO1:**Identify renewable energy sources and their utilization. Understand the basic concepts of solar radiation and analyze the working of solar and thermal systems. Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas and hydrogen. **CO2:**Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator. **CO3:**Identify methods of energy storage for specific Applications