ACADEMIC CURRICULUM AND SYLLABUS

(REGULATIONS 2019)

FOR

UNDER GRADUATE PROGRAMMES

CHOICE BASED CREDIT SYSTEM

(Applicable to the students admitted from the Academic Year 2020-21 onwards)

B.TECH – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

EASWARI ENGINEERING COLLEGE

(AUTONOMOUS INSTITUTION)

Bharathi Salai, Ramapuram, Chennai – 600 089

CONTENTS

I-SEMESTER - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SEMESTER I								
S.No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**R**	**C**
THEORY								
1.	191LEH101T	Technical English	HS	3	-	-	-	3
2.	191MAB101T	Engineering Mathematics - I	BS	3	2	-	-	4
3.	191PYB101T	Engineering Physics	BS	3	-	-	-	3
4.	191CYB101T	Engineering Chemistry	BS	3	-	-	-	3
5.	191GES101T	Engineering Graphics	ES	2	-	4	-	4
6.	191GES102T	Problem Solving through Python Programming	ES	3	-	-	-	3
LABORATORY								
7.	191GEB111L	Physics and Chemistry Laboratory	BS	-	-	4	-	2
8.	191GES111L	Python Programming Laboratory	ES	-	-	3	1	2
TOTAL CREDITS								**24**
MANDATORY COURSE								
9.	191GEM101L	Induction Training [&]	MC	-	-	2	-	1[&]

[&] Mandatory to attend Induction training and earn one credit.

II-SEMESTER - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SEMESTER II								
S.No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**R**	**C**
THEORY								
1.	191LEH201T	Professional Communication/ BEC Certification	HS	3	-	-	-	3
2.	191MAB201T	Engineering Mathematics - II	BS	3	2	-	-	4
3.	191GES201T	Basic Electrical and Electronics Engineering	ES	3	-	-	-	3
4.	191GES205T	Programming and Data Structures using C	ES	3	-	-	-	3
5.	191GES206T	Data Essentials	ES	3	-	-	-	3
LABORATORY								
6.	191GES211L	Engineering Practices Laboratory	ES	-	-	4	-	2
7.	191GES214L	Programming and Data Structures using C Laboratory	ES	-	-	3	1	2
8.	191GES215L	Data Essentials Laboratory	ES	-	-	2	-	1
TOTAL CREDITS								21
MANDATORY COURSE								
9.	191CYM201T	Environmental Science[&&]	MC	3	-	-	-	3[&&]
10.	191GEM211L	NSS / NCC / YRC -Phase - I*	MC	-	-	2	-	1*

[&&] Mandatory to register for the course and earn three credits

* The student may opt for any one. They have to complete the respective Phase II and Phase III. Those who are not opting NSS/NCC/YRC have to opt for Foreign language / Indian constitution in the sixth semester.

III-SEMESTER - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SEMESTER III								
S.No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**R**	**C**
THEORY								
1.	191MAB302T	Discrete Mathematics	BS	3	2	-	-	4
2.	191AIC301T	Database Management Systems	PC	3	-	-	-	3
3.	191AIC302T	Object Oriented Programming with SCALA	PC	3	-	-	-	3
4.	191AIC303T	Operating Systems	PC	3	-	-	-	3
5.	191AIC304T	Digital Principles and Computer Organization	PC	3	-	-	-	3
LABORATORY								
6.	191AIC311L	Database Management Systems Laboratory	PC	-	-	4	-	2
7.	191AIC312L	OOPS Laboratory	PC	-	-	3	1	2
8.	191AIC313L	Digital Systems & COA Laboratory	PC	-	-	4	-	2
HUMAN EXCELLENCE COURSE								
9.	191GEM311L	Yoga / Social Service - Phase - I**	HS	-	-	2	-	1
TOTAL CREDITS								**23**
EMPLOYABILITY ENHANCEMENT COURSE								
10.	191AIA311I	Inplant Training / Internship[#]	EEC	-	-	-	-	1[#]
11.	191AIA301I	Industry Supported Course (Optional) [##]	EEC	1	-	-	-	1[##]
ONLINE COURSE								
12.	191AIA303I	Online Course (Optional) [$]	PE	-	-	-	-	3[$]

** Student may opt for any one. They have to complete the respective Phase II in semester V.

[#] Mandatory to do Internship and earn minimum one credit between 3rd and 6th semester.

[##] Students may earn credits in lieu of Professional elective - V in 8th semester. Please refer Clause 26.1.1 of B.E. Regulations 2019.

[$] Online courses of three credits each can be considered in lieu of Professional Elective – IV and Professional Elective – VI. A student earned only three credits can drop only Professional Elective – VI. Please refer Clause 14.9 of B.E. Regulations 2019.

SYLLABUS OF
Ist to IIIrd SEMESTER SUBJECTS

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191LEH101T	TECHNICAL ENGLISH	3	3	0	0	3

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	To develop the basic writing skills of the First year Engineering students.
2.	To help learners develop their listening skills, which will, enable them to listen to lectures and enhance their ability to comprehend by asking questions and seeking clarification.
3.	To help learners develop their speaking skills and help them to speak fluently.
4.	To inculcate reading habit and to develop effective reading skills.
5.	To help students improve their active and passive vocabulary.
6.	To develop the basic writing skills of the First year Engineering students.

UNIT	TITLE	PERIODS
1	UNIT I	9
Short comprehension passages – skimming, scanning, predicting and inference of the passage – Tips for effective writing –Hints development – Purpose of a good conversation – Tips for improving Conversation – Active and Passive listening – Types of listening – Barriers to listening – listening for specific purposes – Listening to lectures and note taking - Parts of Speech - Tenses – WH Questions – Yes/No questions – Prefixes and Suffixes – Word formation		
UNIT	TITLE	PERIODS
2	UNIT II	9
Longer Comprehension passages - Questions – multiple choice –short questions – open-ended questions – Sentence structure - Types of paragraph – Short narrative paragraphs– Comparison and contrast – argumentative paragraph – analytical paragraph – Techniques for writing precisely - Introducing your friend – Exchange information – Expressing opinion/ agreeing /disagreeing - Telephonic conversation - If Clause – Subject verb agreement – degrees of comparison – Pronouns - adverbs.		
UNIT	TITLE	PERIODS
3	UNIT III	9
Short texts – Cloze passage guessing from context – Note making – Use of reference words – Discourse markers – Connectives – Jumbled sentences –Product description–Process description - Prepositions - Direct/Indirect speech – Connotations – One word substitution – Idiomatic expressions.		
UNIT	TITLE	PERIODS
4	UNIT IV	9
Different types of texts – Newspapers/ magazines/short stories - Inference – Tips for effective writing – Letter writing –– Letter to the Editor - Speaking about oneself/ hometown – Review of books – listening to native speakers – American accent and neutral accent - Countable/Uncountable nouns – Articles – Synonyms and Antonyms – Phrasal verbs		
UNIT	TITLE	PERIODS
5	UNIT V	9
Reading for specific purpose – Short essays – developing an outline –Group discussion – Giving advice – Modal verbs – Instructions and Recommendations - Collocations.		

TOTAL PERIODS:	45

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Listen, Understand and Respond to others in different situations.
CO2:	Speak correctly and fluently in different situations using appropriate communication strategies.
CO3:	Read and Comprehend a range of texts adopting different reading skills.
CO4:	Write with clarity in simple, apt and flawless language with coherence and cohesion.
CO5:	Use their communicative competency with purpose and clarity in the context of Science and Technology.

TEXT BOOKS:	
1.	Sanjay Kumar, Pushp Lata. English Language and Communication Skills for Engineers, Oxford University Press 2018

REFERENCE BOOKS:	
1.	Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.
2.	Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books: 2013
3.	Means,L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning USA: 2007

E-BOOKS / WEB REFERENCES:	
1.	https://www.usingenglish.com http://grammarbook.com
2.	https://www.usingenglish.com http://grammarbook.com

JOURNALS::	
1.	National Council for Teachers of English
2.	https://www2.ncte.org/resources/journals/college-english/

EXTENSIVE READER:	
1.	Spencer Johnson, Who Moved My Cheese, Putnam Adult, 1998

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191MAB101T	**ENGINEERING MATHEMATICS - I**	**3**	**2**	**0**	**0**	**4**

PREREQUISITES:
NIL

UNIT	**TITLE**	**PERIODS**
1	**Matrices**	**12**
Overview of system of Linear Equations - Eigen values and Eigen vectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigen vectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.		
UNIT	**TITLE**	**PERIODS**
2	**Differential Calculus**	**12**
Limit of a function - Continuity - Derivatives – Differentiation Rules – Mean Value Theorem – Interval of increasing and decreasing functions – Maxima and Minima - Interval of concavity and convexity – Taylor's Series for one variable.		
UNIT	**TITLE**	**PERIODS**
3	**Multivariable Calculus**	**12**
Limits and Continuity – Partial derivatives – Total derivative – Differentiation of implicit functions – Jacobian and properties Taylor's series for functions of two variables – Maxima, minima and saddle points - Method of Lagrange multipliers.		
UNIT	**TITLE**	**PERIODS**
4	**Integral Calculus**	**12**
Definite Integrals and its properties –Fundamental theorem of Calculus - Techniques of integration for Indefinite Integrals using basic integration formulas – Integration by parts – Trigonometric Substitutions – Integration of Rational functions by Partial Fractions.		
UNIT	**TITLE**	**PERIODS**
5	**Multiple Integration**	**12**
Double integrals – Change the order of integration in double integrals - Change of variables (Cartesian to polar) - Applications: areas and volumes - Triple integrals (Cartesian, Cylindrical and Spherical coordinates).		

TOTAL PERIODS:	**60**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	To express large amounts of data and functions in an organized and concise form apart from diagonalizing matrices.
CO2:	To solve maxima and minima problems using differentiation.
CO3:	Apply functions of several variables to solve problems in engineering and technology.
CO4:	To evaluate integrals by using Fundamental Theorem of Calculus.
CO5:	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change the order and change of variables.

TEXT BOOKS:	
1.	Grewal B.S., - Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed., 2014.
2.	Joel Hass, Christopher Heil and Maurice D.Weir “Thomas’ Calculus”, 14th Edition, Pearson.

REFERENCE BOOKS:	
1.	Bali N.P.and Manish Goyal “ Engineering Mathematics” (For Semester I) Third Edition, University Science Press.
2.	Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons.
3.	Fritz John and Richard Courant, “Introduction to Calculus and Analysis” Springer.
4.	James Stewart, “Calculus: Early Transcendental”, Cengage Learning, 7th Edition, New Delhi, 2015.
5.	Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191PYB101T	**ENGINEERING PHYSICS**	**3**	**0**	**0**	**0**	**3**

PREREQUISITES:
NIL

COURSE OBJECTIVE:	
1.	To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT	**TITLE**	**PERIODS**
1	**Properties Of Matter**	**9**
Stress - Strain relationship, Hooke's law, Elastic moduli, Stress - Strain diagram for various engineering materials, Ductile and Brittle materials - Torsional pendulum – Beam, Expression for bending moment - Cantilever, Uniform and Non- uniform bending, Theory and Experimental determination of Young's modulus.		
UNIT	**TITLE**	**PERIODS**
2	**Sound Waves And Vibrations**	**9**
Propagation, Intensity, Loudness of sound waves – Determination of absorption coefficient, Reverberation, Sabine's formula for reverberation time - Factors affecting acoustics of buildings and their remedies - Acoustic Quieting: Aspects, Methods, Quieting for Specific observers, Mufflers, Soundproofing - Ultrasonic waves and properties, Methods of Ultrasonic production, Applications of Ultrasonic in engineering and medicine.		
UNIT	**TITLE**	**PERIODS**
3	**Thermal Physics**	**9**
Fundamentals of thermal energy – Expansion joints - Bimetallic strips - Thermal conductivity, conductions in solids, Differential equation of one dimensional heat flow- Forbe's and Lee's disc method - Conduction through compound media Thermal insulation – thermal shock resistance - Applications: Solar water heater- tempered glass- cryogenic materials		
UNIT	**TITLE**	**PERIODS**
4	**Quantum Mechanics**	**9**
Inadequacies of Classical Mechanics – Black body radiation- Planck's theory of radiation - Dual nature of electromagnetic radiation – De Broglie hypothesis for matter waves – Heisenberg's uncertainty principle – Schrodinger's time dependent and independent wave equation, significance of wave function - Born interpretation - Particle confinement in 1D box.		
UNIT	**TITLE**	**PERIODS**
5	**Applied Optics**	**9**
Spontaneous and Stimulated emission - Einstein co-efficients (derivation) – Spatial and Temporal coherence – Schawlow- Townes condition for population inversion (Qualitative study) - Types of lasers – Nd:YAG, Semiconductor - Applications of Laser in science, engineering and medicine. Principle and propagation of light in optical fibre, Derivation for Numerical aperture and Acceptance angle - Types and losses of optical fibre - Fibre Optical Communication (Block diagram) - Active and Passive sensors - Medical endoscope		
TOTAL PERIODS:		**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	The students will gain knowledge on the basics of properties of matter and its applications,
CO2:	The students will acquire knowledge on the concepts of sound waves and vibrations.
CO3:	The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and solar water heaters,
CO4:	The students will get knowledge on advanced physics concepts of quantum theory,
CO5:	The students will acquire knowledge on the concepts of optical devices and their applications in fibre optics.

TEXT BOOKS:	
1.	Bhattacharya D.K & T.Poonam, Engineering Physics , Oxford University Press, 2015.
2.	Pandey B.K.& S.Chaturvedi, Engineering Physics, Cengage Learning India, 2012.
3.	Senthilkumar, G.Engineering Physics I, VRB Publishers, 2011.

REFERENCE BOOKS:	
1.	Aruldhas G, Quantum Mechanics, PHI Learning Pvt. Ltd.,New Delhi, 2011.
2.	Arthur Beiser,Concepts of Modern Physics, 6th edn.,McGraw Hill 2003.
3.	Gaur R.K & S.L.Gupta, Engineering Physics, Dhanpat Rai Publishers, 2012.
4.	Halliday D, R.Resnick & J.Walker, Principles of Physics, Wiley, 2015.
5.	Serway R.A & J.W.Jewett, Physics for Scientists and Engineers, Cengage Learning, 2010.
6.	Tipler P.A & G.Mosca, Physics for Scientists and Engineers with Modern Physics, W.H.Freeman, 2007.
7.	Zeemansky M.W and R.H.Dittman, Heat and Thermodynamics, 8th edn., Mc.Graw Hill, NewYork, 2017.

E-BOOKS / WEB REFERENCES:	
1.	NIL

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191CYB101T	**ENGINEERING CHEMISTRY**	**3**	**3**	**0**	**0**	**3**

PREREQUISITES:
NIL

COURSE OBJECTIVE:	
1.	To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
2.	To get the basic idea about the polymers and applications of polymers and polymer reinforced composites.
3.	It deals with the information about the types of fuels, calorific value calculations and manufacture of solid, liquid and gaseous fuels.
4.	It enable the students to gain information about Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells
5.	To impart knowledge about the nano materials synthesis, properties and applications

UNIT	**TITLE**	**PERIODS**
1	**Water Treatment And Technology**	**9**
Introduction – characteristics - alkalinity - types and determination – hardness – types only -boiler feed water- requirements-boiler troubles – scale & sludge -disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) - softening of hard water - external treatment process - demineralization and zeolite, internal treatment - boiler compounds (phosphate, calgon, carbonate and colloidal conditioning methods) – desalination of brackish water –reverse osmosis.		
UNIT	**TITLE**	**PERIODS**
2	**Polymers And Reinforced Plastics**	**9**
Introduction- classification of polymers - Natural and synthetic - Thermoplastic and Thermosetting, Functionality–Degree of polymerization,types - addition and condensation polymerization – free radical polymerization mechanism - Preparation, properties and uses of PVC, Nylon 6,6, Teflon and Epoxy resin. Plastics - Compounding of plastics – moulding methods –injection, extrusion and compression – FRP – carbon and glass – applications.		
UNIT	**TITLE**	**PERIODS**
3	**Fuels And Combustion**	**9**
Classification - Coal – proximate and ultimate analysis, - carbonization -metallurgical coke – manufacture by Otto Hoffmann method – petroleum – refining - cracking –synthetic petrol by Bergius process - knocking in petrol and diesel engines- octane and cetanerating of fuels-synthesis – advantages and commercial application of power alcohol and biodiesel- Gaseous fuels- liquefied petroleum gases (LPG)- compressed natural gas (CNG)- Combustion of fuels:Introduction - calorific value–higher & Lower– theoretical calculation - Flue gas analysis by Orsat method.		
UNIT	**TITLE**	**PERIODS**
4	**Energy Sources And Storage Devices**	**9**
Energy – Types – Non-renewable energy - Nuclear energy –fission and fusion reactions - differences between nuclear fissionand fusion - nuclear chain reactions - light water nuclear reactor for power generation – breeder reactor – renewable energy - solar energy conversion - solar cells - wind energy.Electrochemical cells – reversible and irreversible cells –Cell construction and representation -Batteries -types of batteries – characteristics – construction and working of primary battery (dry cell) - secondary battery (lead acid battery and lithium-ion-battery) - fuel cells (H_2-O_2).		

UNIT	TITLE	PERIODS
5	**Concepts Of Nano Chemistry And Green Chemistry**	9
Nano chemistry introduction – basics –general properties - distinction between nanoparticles, molecules and bulk materials–size-dependent properties. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electro deposition, chemical vapour deposition, laser ablation - properties of nanoparticles – Types of Nanoparticles:nano cluster, nano rod, nanowire and nano tube – Carbon Nano Tube (Synthesis, properties and applications) – applications of nano particles..Green chemistry introduction - Principles - Applications		

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	The knowledge gained on water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.
CO2:	The knowledge gained on water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.
CO3:	Students can get knowledge about various fuels and its applications based on its calorific value.
CO4:	It provides the students to understand about conventional and non-conventional energy sources and its applications
CO5:	It provides the students to gain knowledge about the recent trentds in nano materials.

TEXT BOOKS:	
1.	Kannan P and Ravikrishnan A, “Engineering Chemistry”, Sri Krishna, Hitech publishing Company Pvt. Ltd, 2014
2.	Jain P.C. and Monika Jain, “Engineering Chemistry” Dhanpat Rai, Publishing Company (P) Ltd.,New Delhi, 2015.

REFERENCE BOOKS:	
1.	Dara S.S &S.S Umare, “A Text book of Engineering Chemistry”, S.Chand & Company Ltd., New Delhi, 2015.
2.	Palanna O.G, “Engineering Chemistry”, McGraw Hill Education (India)Pvt. Ltd, Chennai,2017
3.	Vairam S ,P. Kalyani and Suba Ramesh., “Engineering Chemistry”,Wiley India PVT, Ltd, New Delhi, 2013.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES101T	**ENGINEERING GRAPHICS**	**2**	**0**	**4**	**0**	**4**

PREREQUISITES:
NIL

COURSE OBJECTIVE:	
1.	To develop students, graphic skills for communication of concepts, ideas and design of engineering products.
2.	To expose them to existing National standards related to technical drawings.
3.	To Familiarize with basic geometrical constructions and orthographic projections.
4.	To make the students to draw the different projections of the solids.
5.	To view the true shape and apparent shape of the sectioned solids and their developments.
6.	To get an idea about 3D views through isometric projections.

UNIT	**TITLE**	**PERIODS**
0	**Concepts And Conventions Used**	**2**
Principles of Engineering graphics and their significance - Use Of drawing Instruments-BIS conventions and specifications-Size, Layout and folding of drawing sheets-Lettering and Dimensioning.		
UNIT	**TITLE**	**PERIODS**
1	**Plane Curves, Projection Of Points**	**17**
Conic Sections - Construction of Ellipse, Parabola & hyperbola by eccentricity method – Construction of cycloid – Introduction to Scales. Introduction of Orthographic projection - Principal planes - First angle projection - projection of points.		
UNIT	**TITLE**	**PERIODS**
2	**Projection Of Lines And Planes**	**17**
Projection of straight lines inclined to both the principal planes by rotating line method. Projection of simple planes inclined to both the principal planes by rotating object method.		
UNIT	**TITLE**	**PERIODS**
3	**Projection Of Solids**	**17**
Projection of simple solids like Prism, Pyramid, Cylinder & Cone when the axis is inclined to one of the principal planes by rotating object method.		
UNIT	**TITLE**	**PERIODS**
4	**Section Of Solids And Development Of Surfaces**	**17**
Sectioning of simple solids (Prism, Pyramid, Cylinder & Cone) in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of surfaces of right regular and sectioned solids.		
UNIT	**TITLE**	**PERIODS**
5	**Isometric And Orthographic Projections**	**17**
Principles of Isometric projections-Isometric scale- Isometric Views of simple and truncated solids – combination of two solid objects in simple vertical positions. Conversion of Isometric views to Orthographic views of the objects.		

UNIT	TITLE	PERIODS
6	**Computer Aided Drafting :(Demonstration Only, Not for Exam)**	3
The Concepts of Computer Aided Drafting for Engineering drawing, Computer graphics & Geometrical modeling (2D Orthographic Views) and 3D drafting (Isometric Views) using AutoCAD.		

TOTAL PERIODS:	**90**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Familiarize with the fundamentals and standards of Engineering graphics
CO2:	Perform basic geometrical constructions and principles of orthographic projections.
CO3:	Project orthographic projections of lines and plane surfaces.
CO4:	Draw projections of solids and development of surfaces.
CO5:	Visualize and to project isometric views and conversion of Isometric views to Orthographic views.
CO6:	Understand the basics of AUTO CAD and fundamentals of perspective projections.

TEXT BOOKS:	
1.	Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.
2.	Jayapoovan T, “Engineering Graphics using AUTOCAD”, Vikas Publishing ,7 th Edition.
3.	Venugopal K. and Prabhu Raja V., “Engineering Drawingwith AUTOCAD and building drawing”, New Age International (P) Limited, 2018, 5TH edition.

REFERENCE BOOKS:	
1.	Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
2.	Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.
3.	Dinesh Kumar S, K.Sivakumar and R.Ramadoss, “ Engineering Graphics”, Maruthi Publishers, Chennai,2019.
4.	Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
5.	Parthasarathy N S and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
6.	Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES102T	**PROBLEM SOLVING THROUGH PYTHON PROGRAMMING**	**3**	**0**	**0**	**0**	**3**

PREREQUISITES:
NIL

COURSE OBJECTIVE:	
1.	The course on Python Programming is intended to enhance the computational and logical thinking of students. Upon completion of the course, the students would be able to master the principles of Python programming and demonstrate significant experience in problem solving.

UNIT	**TITLE**	**PERIODS**
1	**Algorithmic Problem Solving**	**9**
Algorithms, building blocks of algorithms (statements, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Case study: Towers of Hanoi, Insertion sort, Guess an integer number in a range.		
UNIT	**TITLE**	**PERIODS**
2	**Control Flow Statements**	**9**
Python interpreter, Interactive mode and script mode; variables, expressions, statements; values and data types; Operators and Precedence of operators, comments; Conditionals: conditional, alternative, chained conditional, nested conditional; Iterations: while, for, break, continue.		
UNIT	**TITLE**	**PERIODS**
3	**Functions And Strings**	**9**
Modules and functions: Function definition and use, flow of execution, Parameters and Arguments; Fruitful functions: return values, composition, recursion; Strings: string slices, immutability, Looping and counting, String methods.		
UNIT	**TITLE**	**PERIODS**
4	**List, Tuple And Dictionaries**	**9**
Lists: list operations, list slices, list methods, traversing, mutability, aliasing, list arguments, list comprehension; Tuples: tuple assignment, tuple as return value; Dictionaries: Operations and Functions, Looping and Dictionaries, Histogram		
UNIT	**TITLE**	**PERIODS**
5	**Files, Exceptions**	**9**
Files: text files, reading and writing files, Format operator, Filenames and paths; Exceptions: handling exceptions, multiple exception blocks, finally block; Case study: tkinter.		

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Design solutions to simple computational problems.
CO2:	Read, write and execute Python Programs
CO3:	Decompose a Python program into functions.
CO4:	Implement compound data using Python lists, tuples, and dictionaries.
CO5:	Read and write data from/to files in Python Programs.

CO6:	Understand the GUI concepts and implement in Python.

TEXT BOOKS:	
1.	Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‘‘, Version 2.0.17 edition, Updated for Python 3, Shroff/O‘Reilly Publishers, (http://greenteapress.com/wp/thinkpython/)
2.	Reema Thareja “Python Programming using Problem solving Approach”, Oxford University Press.

REFERENCE BOOKS:	
1.	Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC, 2013.
2.	Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3.	Timothy A. Budd, —Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd. 2015.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GEB111L	**PHYSICS AND CHEMISTRY LABORATORY**	**0**	**0**	**4**	**0**	**2**

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GEB111L	**(A) PHYSICS LABORATORY**	**0**	**0**	**4**	**0**	**2**

COURSE OBJECTIVES:	
1.	To gain knowledge in the scientific methods and learn the process of measuring different Physical variables.
2.	Develop the skills in arranging and handling different measuring instruments.
3.	Get familiar on experimental errors in various physical measurements and to plan/ suggest on how the contributions could be made of the same order, so as to minimize the errors.

LIST OF EXPERIMENTS (**Any Five Experiments)**	
1.	Torsion Pendulum – Rigidity modulus of wire and moment of inertia of disc.
2.	Non Uniform Bending – Young's modulus determination.
3.	Spectrometer – Wave length of spectral lines using grating.
4.	Lee's Disc – Thermal Conductivity of bad conductor.
5.	Semiconductor Laser –Wavelength of laser light, Size of particle and Numerical aperture of optical fiber.
6.	Air Wedge – Measurement of thickness of thin wire.
7.	Determination of the Band gap of a semiconductor.
8.	Ultrasonic Interferometer - Velocity of sound and Compressibility of liquid.

TOTAL PERIODS:	**30**

TEXT BOOKS:	
1.	G.Rajkumar, Physics laboratory Practical, McGraw Hill publication, 2019.
2.	R.K.Shukla and Anchal Srivastava, Practical Physics, 1st Edition, New Age International (P) Ltd, New Delhi, 2006.
3.	Physics Laboratory Manual, Faculty Members, Department of Physics, Easwari Engineering College, Chennai.
REFERENCES: (OPTIONAL)	
1.	Chattopadhyay D, P.C.Rakshit and B.Saha, An Advanced Course in Practical Physics, 2nd ed., Books & Allied Ltd., Calcutta, 1990.
2.	Souires G L , Practical Physics, 4th Edition, Cambridge University, UK, 2001.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GEB111L	**(B) CHEMISTRY LABORATORY**	**0**	**0**	**4**	**0**	**2**

COURSE OBJECTIVES:	
1.	To make the student to acquire practical skills in the determination of water quality parameters.
2.	To acquaint the students with the determination of molecular weight of polymer by using viscometer.

LIST OF EXPERIMENTS (**Any Five Experiments**)	
1.	Determination of chloride content of water sample by Argentometric method
2.	Determination of strength of given HCl using pH meter
3.	Determination of strength of acid in a mixture using conductivity meter.
4.	Determination of permanent, total and temporary hardness of water sample.
5.	Estimation of Fe2+ by Potentiometric titration
6.	Determination of molecular weight of PVA using Ostwald viscometer
7.	Determination of alkalinity in water sample
8.	Estimation of Iron content in water sample using spectrophotometer (1,10 – Phenanthroline / thiocyanate method)
9.	Conductometric titrations of strong acid Vs strong base
10.	Determination of DO Content of water sample by Wrinkles method
11.	Determination of BOD and COD in water sample

TOTAL PERIODS:	**30**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

REFERENCES: (OPTIONAL)	
1.	Dr. C. Ravichandran, “Engineering Chemistry Laboratory-I” Global publications, 2019.
2.	Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., “Vogel’s Textbook of practical organic chemistry, LBS Singapore (1994).
3.	Jeffery G.H, Bassett J., Mendham J. and Denny R.C., “Vogel’s Text book of quantitative analysis chemical analysis”, ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
4.	Daniel R. Palleros, “Experimental organic chemistry” John Wiley & Sons, Inc.,New York (2001).

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES111L	**PYTHON PROGRAMMING LABORATORY**	**0**	**0**	**3**	**1**	**2**

COURSE OBJECTIVES:	
1.	The course on Python programming laboratory is used to write, test and debug simple Python programs. Upon completion of the course, the students would be able to master the concepts of data types, loops, functions, list, tuples, dictionary , files and GUI.

LIST OF EXPERIMENTS	
1.	LCM of two numbers.
2.	Sum of squares of first n natural numbers
3.	Fibonacci series.
4.	Armstrong number
5.	Sum of Digits in a Number.
6.	First n prime number.
7.	Factorial of a number using recursion
8.	Count the number of vowels in a string
9.	Matrix multiplication.
10.	Simple calculator
11.	Linear search
12.	Selection sort
13.	Insertion sort
14.	Word count.
15.	Mini Project (any ONE): Design GUI for ▪ Airline reservation system ▪ Feedback system ▪ Employee management system ▪ Student management system ▪ Banking system

TOTAL PERIODS:	**60**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Write, test and debug simple Python Programs
CO2:	Implement python programs with conditional and loops.
CO3:	Use functions for structuring Python programs.
CO4:	Represent compound data using Python lists, tuples, and dictionaries.
CO5:	Read and write data from the files in Python.
CO6:	Design GUI applications..

Syllabus for

Second Semester Subjects

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191LEH201T	**PROFESSIONAL COMMUNICATION**	**3**	**0**	**0**	**0**	**3**

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	To strengthen their listening skills which help them comprehend lectures and talks in their areas of specialization.
2.	To develop their speaking skills to make technical presentations, participate in Group Discussions.
3.	To develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
4.	To foster their ability to write convincing job applications.
5.	To equip with appropriate skills for writing effective reports.

UNIT	**TITLE**	**PERIODS**
1		**9**
Communication – Process of Communication – Different forms of communication – Communication flow- Barriers of communication - Purpose and Function expressions – Extended definitions – Cause and Effect expressions - Compound nouns- Homonyms/homophones		
UNIT	**TITLE**	**PERIODS**
2		**9**
Communication – Process of Communication – Different forms of communication – Communication flow- Barriers of communication - Purpose and Function expressions – Extended definitions – Cause and Effect expressions - Compound nouns- Homonyms/homophones		
UNIT	**TITLE**	**PERIODS**
3		**9**
Etiquette of Group discussion – discussing GD topics - reading journals and paraphrasing – Report Writing – Accident report/– Industrial visit report – Words often Misspelt – Describing a process using sequence words – Words used as different parts of speech		
UNIT	**TITLE**	**PERIODS**
4		**9**
Small talk – review on films and books – email etiquette - Cover letter & Resume – Calling for quotations – Placing order – Letter of complaint - escalation letter - Feasibility report - Project report – - Abbreviations and Acronyms pertaining to Science and Technology – Types of Essays - Argumentative, Analytical, Descriptive & Expository.		
UNIT	**TITLE**	**PERIODS**
5		**9**
Writing Statements of Purpose-format, Sample – Modifiers, Redundancies-Direct indirect speech-Project Proposal – Minutes of Meeting - Verbal Analogies – Case studies relating to Goal Setting-Writing articles		

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Draft effective formal letters and emails
CO2:	Listen and comprehend different technical/non-technical excerpts critically and infer the implied meaning.
CO3:	Write ungrammatically and help in organizing ideas logically on a topic using a wide range of vocabulary.
CO4:	Read different genres of texts and evaluate them for content and structure.
CO5:	Be proactive in using the language confidently and effectively for personal and professional growth.

TEXT BOOKS:	
1.	Raymond Murphy, English Grammar in Use: Reference and Practice for Intermediate Students, Cambridge : CUP, 2004

REFERENCE BOOKS:	
1.	Ashraf Rizvi M 'Effective Technical Communication', Tata McGraw-Hill, New Delhi, 2005
2.	Golding S.R. 'Common Errors in English Language', Macmillan, 1978
3.	Richard Johnson - Sheehan, Technical Communication Today, Longman Publishing Group, 2011
4.	Stephen R. Covey, The Seven Habits of Highly Effective People, Free Press, 1989

E-BOOKS / WEB REFERENCES:	
1.	**https://owl.purdue.edu**
2.	**https:www.hellolingo.com**
3.	**https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=47**

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191MAB201T	**ENGINEERING MATHEMATICS - II**	**3**	**2**	**0**	**0**	**4**

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	The objective of this course is to familiarize the prospective engineers with techniques in ordinary differential equations, complex variables and complex integration.
2.	The Study of Laplace transform help to solve the differential equations that occur in various branches of engineering disciplines.
3.	Vector calculus can be widely used for modelling the various laws of physics.
4.	The various methods of complex analysis can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT	**TITLE**	**PERIODS**
1	**Ordinary Differential Equations**	**12**

Basic concepts - Separable differential equations - Exact differential equations - Integrating factors - Linear differential equations – Second order linear differential equations with constant coefficients – Particular Integral using operator method and Method of variation of parameters – Homogenous equation of Euler‘s and Legendre‘s type.

UNIT	**TITLE**	**PERIODS**
2	**Laplace Transforms**	**12**

Existence conditions – Transforms of elementary functions –Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Transform of periodic functions - Inverse transforms: Convolution theorem (Statement only) and Partial Fractions - Application to solution of linear second order ordinary differential equations with constant coefficients.

UNIT	**TITLE**	**PERIODS**
3	**Vector Calculus**	**12**

Gradient and directional derivative – Divergence and curl – Irrotational and Solenoidal vector fields – Line integral – Surface integral - Area of a curved surface - Green’s, Gauss divergence and Stokes’ theorems in evaluating line, surface and volume integrals (Planar, Cylindrical and Spherical Surfaces).

UNIT	**TITLE**	**PERIODS**
4	**Complex Variables**	**12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian form - Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by function

$$w = z + c,\ cz,\ \frac{1}{z},\ z^2$$ - Bilinear transformation.

UNIT	**TITLE**	**PERIODS**
5	**Complex Integration**	**12**

Complex integral - Cauchy’s integral theorem – Cauchy’s integral formula – Taylor’s and Laurent’s series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour (No poles on the real axis).

TOTAL PERIODS:	**60**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	The effective mathematical tools to obtain the solutions of first and second order differential equations that model physical processes
CO2:	Gradient, divergence and curl of a vector point function and related identities. Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
CO3:	The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems
CO4:	Analytic functions, conformal mapping and complex integration.
CO5:	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to solve the differential equations with constant coefficients.

TEXT BOOKS:	
1.	Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2.	Joel Hass, Christopher Heil and Maurice D.Weir Thomas' Calculus , 14th Edition, Pearson.

REFERENCE BOOKS:	
1.	Bali and Manish Goyal N.P. "Engineering Mathematics"(For Semester II) Third Edition, University Science Press .
2.	Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
3.	James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015.
4.	O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.
5.	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES201T	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	**3**	**0**	**0**	**0**	**3**

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	To understand the Basic Fundamentals in Electrical Circuits.
2.	To study the construction, Principle of operation and performance of DC and AC Machines
3.	To understand the principles of PN Junction diode and BJT
4.	To Study the protection and safety measures in Electricity

UNIT	**TITLE**	**PERIODS**
1	**Fundamentals Of Electricity And Circuits**	**9**
Evolution of Electricity and Inventions- Electrical Quantities—Charge- Electric Potential, Voltage, Current, Power Energy, DC, AC, time period, Frequency, Phase, Flux density, RMS, Average, Peak, Phasor and Vector diagram. Electric circuit elements – Sources - Ohm's Law - Kirchhoff's Laws, Faradays Law, Lenz's Law- Wiring- House wiring and Industrial Wiring systems.		
UNIT	**TITLE**	**PERIODS**
2	**Measuring Instruments**	**9**
Principle of Operation Moving Coil and Moving Iron Types of Voltmeters and Ammeters - Multimeters –Measurements of resistance, inductance & capacitance-Power and Energy Measurements- Energy Efficient Equipment's and sample load (Domestic load) calculations.		
UNIT	**TITLE**	**PERIODS**
3	**Electrical Machines**	**9**
Construction - Principle of Operation - EMF Equation –Application of DC Generator, DC Motor – types and Characteristics – Applications – Transformer-AC Machines – Construction, Operation and types of Single phase and three Phase Induction Motors.		
UNIT	**TITLE**	**PERIODS**
4	**Basic Electronics And Communication**	**9**
PN Junction Diode, Zener Diode – V-I Characteristics – Applications – Rectifier – Half Wave – Full Wave and Rectifiers – Transistors types – Transistor as an Amplifier —- Junction Field Effect Transistor (JFET) operation and characteristics, SCR - characteristics and its applications- CRO- Principle of Cathode Ray Tube-regulated power Supply- Function Generators. Communication systems- types- Analog, Digital and Wireless.		
UNIT	**TITLE**	**PERIODS**
5	**Protection, Safety And Indian Electricity Scenario**	**9**
Hazards of Electricity-Shock, Burns, arc- blast, Thermal Radiation, Explosives, fires, effect of electricity on the human Body. Electrical safety practices, Protection devices. Electrical power- Generation resources- transmission and Distribution. Regulatory authorities- role of MNRE, MNRE, NTPC, TEDA, TANGEDCO.		

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Demonstrate knowledge on basics of electrical circuits, Construction and working principle of various electrical machines.
CO2:	Analyze the behaviour and performance of electrical circuits and machines.
CO3:	Apply knowledge on CRO and function generator.
CO4:	Describe electrical hazards and safety equipment
CO5:	Analyze and apply various grounding and bonding techniques.
CO6:	Select appropriate safety method for low, medium and high voltage equipment.
CO7:	Participate in a safety team.
CO8:	Carry out proper maintenance of electrical equipment by understanding various standards.

TEXT BOOKS:	
1.	Hasan Saeed S, D.K.Sharma, Non-Conventional Energy Resources, Katson Books, 3rd Edition, 2013
2.	John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel, Al Winfield,'Electrical Safety Handbook', McGraw-Hill Education, 4thEdition, 2012.
3.	Kothari D.P and I.J. Nagarath –"Basic Electrical & Electronics Engineering", Mc.Grawhill publications, 1st Edition, 2014.
4.	Leonard S Bobrow, "Foundations of Electrical Engineering", Oxford University Press, 2013
5.	Vincent Del Toro, Electrical Engineering Fundamentals, Prentice Hall, 2006.

REFERENCE BOOKS:	
1.	Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007 2. John Bird, "Electrical Circuit Theory and Technology", Elsevier, First Indian Edition, 2006.
2.	Lawmans, Electricity act 2003, Act No. 36 of 2003, Kamal Publishers, New Delhi.
3.	Maxwell Adams.J, 'Electrical Safety- a guide to the causes and prevention of electric hazards', The Institution of Electric Engineers, IET 1994. 2. Ray A. Jones, Jane G. Jones, 'Electrical Safety in the Workplace', Jones & Bartlett Learning, 2000.
4.	Mehta V.K & Rohit Mehta, Principles of Electrical Engineering, S.Chand publications, 2nd Edition, 2003.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES205T	**PROGRAMMING AND DATA STRUCTURES USING C**	**3**	**0**	**0**	**0**	**3**

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	Be familiar with the basics of C programming language.
2.	To understand the concepts of ADTs
3.	To Learn linear data structures – lists, stacks, and queues
4.	To apply Tree and Graph structures
5.	To understand sorting, searching and hashing algorithms

UNIT	**TITLE**	**PERIODS**
1	**C Programming Basics And Advanced Features**	**9**
Conditional statements – Control statements – Arrays - Pointers - Variation in pointer declarations – Functions - Function Pointers –-Structures - File handling concepts – File read – write – binary and Stdio - File Manipulations		
UNIT	**TITLE**	**PERIODS**
2	**Linear Data Structures – LIST**	**9**
Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation —singly linked lists- circularly linked lists- doubly-linked lists – Stack ADT- Queue ADT- applications of queues.		
UNIT	**TITLE**	**PERIODS**
3	**Non Linear Data Structures – TREES**	**9**
Tree ADT –Unbalanced tree –Balanced tree- tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree **-** Heap –Binary Heap- Applications of heap.		
UNIT	**TITLE**	**PERIODS**
4	**Non Linear Data Structures – GRAPHS**	**9**
Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs-minimum spanning tree-dijkstra's algorithm-kruskal's algorithm		
UNIT	**TITLE**	**PERIODS**
5	**Searching, Sorting And Hashing Techniques**	**9**
Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.		

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Outline the basic concepts of C programming
CO2:	Apply the concept of abstract data types for linear data structures
CO3:	Develop solutions using linear and non-linear data structures

CO4:	evaluate algorithms and data structures in terms of time complexity of basic operations.
CO5:	Apply searching and sorting techniques to solve the complex problem
CO6:	Describe the hash function and concepts of collision and its resolution methods

TEXT BOOKS:	
1.	Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2.	Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education,1997.

REFERENCE BOOKS:	
1.	Byron S Gottfried, “Programming with C”, Schaum"s Outlines, Second Edition, Tata McGraw-Hill, 2006.
2.	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
3.	Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education,1983.
4.	Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.
5.	Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES206T	**DATA ESSENTIALS**	**3**	**0**	**0**	**0**	**3**

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	To understand the use of various tools used in excel.
2.	To design the databases with MySQL.
3.	To demonstrate the basic concepts of Data Warehousing and Data Mining.
4.	To understand the basic data mining Techniques in Weka.
5.	To explain the essential components of Big Data and data science essentials with python programming.

UNIT	**TITLE**	**PERIODS**
1	**Introduction**	**9**
Introduction to Microsoft Excel - Excel Basics - Create and Save workbooks - Enter and edit data - Modify a worksheet and workbook- Work with Cells ,Worksheets and cell references- functions and formulas- Create and edit charts and graphics- Filter and sort table data- Work with pivot tables and charts- Import and export data- Work with Macros and the Web.		
UNIT	**TITLE**	**PERIODS**
2	**Database Essentials**	**9**
Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model - Entity-Relationship model – E-R Diagrams – Enhanced - ER Model – ER-to-Relational Mapping- MySQL Basics.		
UNIT	**TITLE**	**PERIODS**
3	**Data Warehousing & Data Mining Essentials**	**9**
Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Data Warehouse Schemas for Decision Support - Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Preprocessing – Cleaning, Integration, Reduction - Data mining with weka.		
UNIT	**TITLE**	**PERIODS**
4	**Big Data Essentials**	**9**
Evolution of Big data – Best Practices for Big data Analytics – Big data characteristics – Validating – The Promotion of the Value of Big Data – Big Data Use Cases - Characteristics of Big Data - Applications – Understanding Big Data Storage – A General Overview of High-Performance Architecture – HDFS – MapReduce and YARN.		
UNIT	**TITLE**	**PERIODS**
5	**Data Science Essentials**	**9**
Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – Statistics with python.		

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Familiarize with various tools used in excel.

CO2:	Construct databases with MySQL.
CO3:	Outline the basic concepts of Data Warehousing and Data Mining.
CO4:	Apply data mining Techniques in Weka.
CO5:	Describe the essential components of Big Data.
CO6:	Analyze statistical data using python.

TEXT BOOKS:	
1.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, — Database System Conceptsǁ, Sixth Edition, Tata McGraw Hill, 2011.
2.	Jiawei Han and Micheline Kamber, —Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.
3.	Anand Rajaraman and Jeff Ullman “Mining of Massive Datasets”, Cambridge University Press, 2012.
4.	Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.

REFERENCE BOOKS:	
1.	NIL

E-BOOKS / WEB REFERENCES:	
1.	https://www.excelbee.com
2.	https://online.rice.edu/courses/excel-data-analysis/
3.	http://web.utk.edu/~dhouston/excel/exercise.html

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES211L	**ENGINEERING PRACTICES LABORATORY**	**0**	**0**	**4**	**0**	**2**

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	To provide exposure to the students with the concepts involved in product realization by carrying out manufacturing shop exercises. Hands-on practice with manufacturing shop exercises and assembly leading to realization of a new product in a group.

LIST OF EXPERIMENTS
GROUP A (CIVIL & MECHANICAL)
I CIVIL ENGINEERING PRACTICE
A. Plumbing Works:
1. Pipeline joints, its location and functions: Valves, Taps, Couplings, Unions, Reducers, Elbows in household fittings.
2. Connection of two Galvanized Iron pipes
3. Connection of PVC pipes
B. Carpentry works:
1. Joints in Roofs, Doors, Windows and Furniture.
2. Cross Lap joint
3. Mortise and Tenant joint
II MECHANICAL ENGINEERING PRACTICE
A. Welding:
1. Arc welding of Butt joints, Tap joints and Tee joints.
2. Gas welding practice
B. Basic machining:
1. Simple Turning and Taper turning
2. Drilling practice
C. Sheet metal work:
1. Rectangular tray making
2. Funnel making

TOTAL PERIODS:	**30**

LIST OF EXPERIMENTS
GROUP B (ELECTRICAL & ELECTRONICS)
III ELECTRICAL ENGINEERING PRACTICE
A. Plumbing Works:
1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.
IV ELECTRONICS ENGINEERING PRACTICE
1. Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, RMS period, frequency) using CR.
2. Logic gates AND, OR, EX-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL PERIODS:	**30**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Fabricate carpentry components and pipe connections including plumbing works.
CO2:	Use welding equipments to join the structures.
CO3:	Carry out the basic machining operations
CO4:	Make the models using sheet metal works
CO5:	Carry out basic home electrical works and Understand works of Home Appliances
CO6:	Measure the electrical quantities
CO7:	Elaborate on the Electronic components, Logic gates and soldering practice.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES214L	**PROGRAMMING AND DATA STRUCTURES USING C LABORATORY**	**0**	**0**	**3**	**1**	**2**

COURSE OBJECTIVES:	
1.	Be familiar with c programming
2.	To implement linear and non-linear data structures
3.	To understand the different operations of search trees
4.	To implement graph traversal algorithms
5.	To get familiarized to sorting and searching algorithms

LIST OF EXPERIMENTS	
1.	C Programs using Conditional and Control Statements
2.	C Programs using Functions and Structure.
3.	Array implementation of List ADT
4.	Array implementation of Stack and Queue ADTs
5.	Linked list implementation of List, Stack and Queue ADTs
6.	Applications of List, Stack and Queue ADTs
7.	Implementation of Binary Trees and its operations
8.	Implementation of Binary Search Trees
9.	Implementation of AVL Trees
10.	Implementation of Breadth first Search and Depth first Search
11.	Implementation of searching and sorting algorithms
12.	Mini project Hashing – any two collision techniques

TOTAL PERIODS:	**60**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Apply the concept of linear data structures for problem solving
CO2:	Develop solutions for complex problems using non-linear data structures
CO3:	Implement various searching and sorting algorithms
CO4:	Implement simple data structures
CO5:	Design hashing algorithms for efficient data storage and retrieval
CO6:	Develop real-time applications using the linear and non-linear data structures

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191GES215L	**DATA ESSENTIALS LABORATORY**	**0**	**0**	**2**	**0**	**1**

COURSE OBJECTIVES:	
1.	To Create and access data using Microsoft Excel
2.	To form Graph for visualizing real time data
3.	To propose database using MySQL
4.	To Preprocess the data using Weka
5.	To execute statistical analysis for given data using python

LIST OF EXPERIMENTS	
1.	Grade Sheet Exercise: Illustrates how to create a basic spreadsheet by entering text, numbers, and formulas.
2.	Mortgage Exercise: How functions can be used to create a spreadsheet to perform calculations.
3.	Sorting and ChartWizard: Learn how to sort data and Demonstrates the ease of creating charts.
4.	Linking Exercise: Learn how to consolidate several worksheets into one and to link several worksheets to a master worksheet.
5.	Statistical Analysis Exercise: Use a worksheet to calculate descriptive statistics (e.g., mean, standard deviation, distribution, correlation).
6.	Create database and perform manipulations on database using MySQL.
7.	Using Weka Tool Perform 1. Data preprocessing by selecting or filtering attributes 2. Data preprocessing for handling missing values
8.	Perform data virtualization using Weka.
9.	Write a python code to count the number of occurrences of each value in an array of non negative numbers.
10.	Develop a application for accessing database using python

TOTAL PERIODS:	**30**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1	Create and access data using Microsoft Excel
CO2	Construct Graph for visualizing real time data
CO3	Design database using MySQL
CO4	Preprocess the data using Weka
CO5	Perform statistical analysis for given data using python
CO6	Develop applications for accessing database using python.

Syllabus for

Third Semester Subjects

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191MAB302T	**DISCRETE MATHEMATICS**	**3**	**2**	**0**	**0**	**4**

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	To extend student‘s logical and mathematical maturity and ability to deal with abstraction.
2.	To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
3.	To understand the basic concepts of Combinatorics and graph theory.
4.	To familiarize the applications of algebraic structures.
5.	To understand the concepts and significance of lattices and Boolean algebra which are widely used in computer science and engineering

UNIT	**TITLE**	**PERIODS**
1	**Mathematical Logic**	**9+3**
Statements and Notations – Connectives – Normal forms – Theory of inference for the statement calculus – Predicate calculus – Inference theory of the predicate calculus		
UNIT	**TITLE**	**PERIODS**
2	**Combinatorics**	**9+3**
Mathematical induction – Strong induction – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.		
UNIT	**TITLE**	**PERIODS**
3	**Graphs**	**9+3**
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths and circuits (Definition and examples only)		
UNIT	**TITLE**	**PERIODS**
4	**Algebraic Structures**	**9+3**
Algebraic systems – Semi groups and Monoids (Definitions and examples) - Groups – Subgroups – Homomorphism‘s – Normal subgroup and cosets – Lagrange‘s theorem – Definitions and examples of Rings, Integral domains and Fields.		
UNIT	**TITLE**	**PERIODS**
5	**Lattices And Boolean Algebra**	**9+3**
Partial ordering – Posets – Lattices as posets – Properties of lattices - Some special lattices – Boolean algebra.		
	TOTAL PERIODS:	**60**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Have knowledge of the concepts needed to test the logic of a program.
CO2:	Be aware of the counting principles.

CO3:	Have an understanding in identifying structures on many levels.
CO4:	Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.
CO5:	Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.

TEXT BOOKS:	
1.	Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2.	Tremblay, J.P. and Manohar.R, “Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCE BOOKS:	
1.	Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007.
2.	Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum‘s Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
3.	Koshy, T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191AIC301T	**DATABASE MANAGEMENT SYSTEMS**	3	0	0	0	3

PREREQUISITES:
Data Essentials

COURSE OBJECTIVES:	
1.	To learn the fundamentals of data models and to represent a database system using ER diagrams.
2.	To study SQL and relational database design.
3.	To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
4.	To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
5.	To have an introductory knowledge about the Storage and Query processing Techniques.
6.	To gain knowledge about Advanced database concepts.

UNIT	**TITLE**	**PERIODS**
1	**Relational Databases**	**9**
Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL.		
UNIT	**TITLE**	**PERIODS**
2	**Database Design**	**9**
Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form		
UNIT	**TITLE**	**PERIODS**
3	**Transactions and Concurrency**	**9**
Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery – Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.		
UNIT	**TITLE**	**PERIODS**
4	**Data Storage and Querying**	**9**
RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.		
UNIT	**TITLE**	**PERIODS**
5	**Advanced Topics**	**9**
Distributed Databases: Architecture, Data Storage, Transaction Processing- Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL – XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery.		
	TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Select the suitable database model based on size and complexity.
CO2:	Create the schema and appropriate mapping constraints for various database applications
CO3:	Apply various normal forms for database design.
CO4:	Use ACID properties to ensure data integrity and accuracy.
CO5:	Analyze various indexing strategies for efficient storage and retrieval.
CO6:	Evaluate how advanced databases differ from traditional databases.

TEXT BOOKS:	
1.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Conceptsǁ, Sixth Edition, Tata McGraw Hill, 2011.
2.	RamezElmasri, Shamkant B. Navathe, —Fundamentals of Database Systemsǁ, Sixth Edition, Pearson Education, 2011.

REFERENCE BOOKS:	
1.	Date C.J, Kannan. A, Swamynathan.S, —An Introduction to Database Systemsǁ, Eighth Edition, Pearson Education, 2006.
2.	Raghu Ramakrishnan, —Database Management Systemsǁ, Fourth Edition, McGraw-Hill College Publications, 2015.
3.	G.K.Gupta,"Database Management Systemsǁ, Tata McGraw Hill, 2011.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191AIC302T	**OBJECT ORIENTED PROGRAMMING WITH SCALA**	**3**	**0**	**0**	**0**	**3**

PREREQUISITES:
Python, Data Structures

COURSE OBJECTIVES:	
1.	To understand the basics of Scala Programming
2.	To understand Object Oriented Programming concepts and principles
3.	To know the principles of inheritance and interfaces
4.	To Analyze the concepts of Exception and Abstraction in scala.
5.	To learn scala's exception handling mechanism, multithreading and packages.

UNIT	**TITLE**	**PERIODS**
1	**Basics of Scala**	**9**

Introduction - The Scala Environment – Data types – Variables – Operators - Expressions, Values, and Types – Names – Classes and objects - Control statements and Looping Statements – Strings – Arrays – Functions - Higher-Order Functions - Curried Functions - Higher-Order Functions on Lists – Closures.

UNIT	**TITLE**	**PERIODS**
2	**Scala OOPS Concepts - Objects and Class**	**9**

Object and Class - Singleton object - Companion Objects - Case classes and objects – Constructors – Method overloading and overriding – Field overriding - Extending a class – implicit classes – inner classes – Traits - Pattern Matching – Extractors -Collection Classes

UNIT	**TITLE**	**PERIODS**
3	**Inheritance and Polymorphism**	**9**

Inheritance: Defining derived classes & Visibility modes – Types of Inheritance : Single-level Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance – Inheritance vs Composition – Polymorphism : Types of Polymorphism - Parametric Polymorphism - Subtype Polymorphism - Ad-Hoc Polymorphism - Function Overloading - Operator Overloading.

UNIT	**TITLE**	**PERIODS**
4	**Abstraction and Encapsulation**	**9**

Abstraction: Abstract Methods - Abstract Class and its importance – implementation of abstraction – Encapsulation: Packages - Access Modifiers – application of encapsulation - Type Class and Conversions.

UNIT	**TITLE**	**PERIODS**
5	**Exception handling and Multithreading**	**9**

Exception handling: Try-Catch Blocks - Finally Block - Throw Keyword - Throws Keyword - Custom Exception – Multithreading: Thread - Thread Life Cycle – Thread Methods – Collections - File Handling

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Understand the fundamentals of Scala Programming..
CO2:	Implement basic concepts of OOP principles in Scala programming..
CO3:	Demonstrate the concepts of polymorphism and inheritance
CO4:	Develop interactive Scala programs with packages and generics classes.
CO5:	Implement error handling techniques using exception handling.
CO6:	Implement a real time applications in the Scala programming language

TEXT BOOKS:	
1.	Introduction to the Art of Programming Using Scala by Mark Lewis
2.	Programming Scala, 2nd Edition by Dean Wampler, Alex Payne

REFERENCE BOOKS:	
1.	Programming in Scala: A comprehensive Step-by-Step Scala Programming Guide by Martin Odersky, Lex Spoon, Bill Venners
2.	Scala for the Impatient by Cay Hortsmann

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191AIC303T	**OPERATING SYSTEMS**	**3**	**0**	**0**	**0**	**3**

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	To Understand the basic concepts and functions of operating systems.
2.	To Learn about Processes, Threads and Scheduling algorithms
3.	To Understand the principles of concurrency and Deadlocks.
4.	To Learn various memory management schemes.
5.	To Learn Virtualization and Software Installation.

UNIT	**TITLE**	**PERIODS**
1	**Operating System Overview**	**6**
Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System - Computer System Organization - Operating System Structure and Operations - System Calls, System Programs, OS Generation and System Boot.		
UNIT	**TITLE**	**PERIODS**
2	**Process Management**	**11**
Processes – Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling – Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization – The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.		
UNIT	**TITLE**	**PERIODS**
3	**Storage Management and File System**	**10**
Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32 and 64 bit architecture Examples; Virtual Memory - Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.		
UNIT	**TITLE**	**PERIODS**
4	**I/O Systems**	**9**
Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation- File System Structure, Directory Structure, Allocation Methods, Free Space Management, I/O Systems.		
UNIT	**TITLE**	**PERIODS**
5	**Case Study**	**9**

Virtualization - Basic Concepts,VMware ,System Administration, Setting up a Multifunction Server, Domain Name System, Setting Up Local Network Services; on Windows OS, Mobile OS - iOS and Android – Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Design various Scheduling algorithms.
CO2:	Apply the principles of concurrency.
CO3:	Design deadlock, prevention and avoidance algorithms.
CO4:	Compare and contrast various memory management schemes.
CO5:	Design and Implement a prototype file system.
CO6:	Perform administrative tasks with Virtualization..

TEXT BOOKS:	
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, ―Operating System Conceptsǁ, 10th Edition, John Wiley and Sons Inc., 2018

REFERENCE BOOKS:	
1.	William Stallings, “Operating Systems – Internals and Design Principles”, 8th Edition, Prentice Hall, 2013.
2.	Andrew S. Tanenbaum, “Modern Operating Systems”, 4th Edition, Addison Wesley, 2015.
3.	Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw HillEducation”, 2012.
4.	D M Dhamdhere, “Operating Systems: A Concept-Based Approach”, Second Edition, Tata McGraw-Hill Education, 2007.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191AIC304T	**DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION**	**3**	**0**	**0**	**0**	3

PREREQUISITES:
NIL

COURSE OBJECTIVES:	
1.	To design digital circuits using simplified Boolean functions
2.	To analyze and design combinational and sequential circuits
3.	To make students understand the basic structure and operation of digital computer
4.	To study the design of data path unit and control unit for processor
5.	To understand the concept of various memories and interfacing

UNIT	**TITLE**	**PERIODS**
1	**Digital Fundamentals**	**9**
Introduction to Digital Systems - Signed Binary Numbers – Complements – Logic Gates – Boolean Algebra – 4-Variable K-Maps – Standard & Canonical Forms – NAND – NOR Implementation.		
UNIT	**TITLE**	**PERIODS**
2	**Combinational And Sequential Circuits**	**9**
Combinational circuits – Binary Adder & Subtractor – Decoder – Encoder – Multiplexers – Introduction to Synchronous Sequential Circuits – Flip-Flops – Registers – Synchronous Counters.		
UNIT	**TITLE**	**PERIODS**
3	**Basic Computer Organization And Design**	**9**
Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language (C language).		
UNIT	**TITLE**	**PERIODS**
4	**Central Processing Unit**	**9**
Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Micro programmed Control – Pipelining – Data Hazard – Control Hazards.		
UNIT	**TITLE**	**PERIODS**
5	**Memory and I/O**	**9**
Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel And Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA.		

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Design digital circuits using simplified Boolean functions
CO2:	Analyze and design combinational and sequential circuits

CO3:	Describe data representation, and classify the types of instruction formats and the operation of a digital computer
CO4:	Illustrate the fixed point and floating-point arithmetic for ALU operation
CO5:	Discuss about control implementation scheme and analyze pipeline performance
CO6:	Explain the concept of various memory organization and its interfacing

TEXT BOOKS:	
1.	M. Morris Mano, Michael D. Ciletti, “Digital Design”, Fifth Edition, Pearson Education, 2013.
2.	David A. Patterson, John L. Hennessy, “Computer Organization and Design, The Hardware/Software Interface”, Fifth Edition, Morgan Kaufmann/Elsevier, 2013.

REFERENCE BOOKS:	
1.	Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013
2.	John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017
3.	Carl Hamacher, ZvonkoVranesic, SafwatZaky, NaraigManjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw-Hill, 2012.
4.	William Stallings, “Computer Organization and Architecture – Designing for Performance”, Tenth Edition, Pearson Education, 2016.
5.	Govindarajalu, —Computer Architecture and Organization, Design Principles and Applications", Second edition, McGraw-Hill Education India Pvt Ltd, 2014.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191AIC311L	**DATABASE MANAGEMENT SYSTEMS LABORATORY**	**0**	**0**	**4**	**0**	**2**

COURSE OBJECTIVES:	
1.	To understand data definitions and data manipulation commands
2.	To learn the use of nested and join queries
3.	To understand functions, procedures and procedural extensions of data bases
4.	To be familiar with the use of a front end tool
5.	To understand design and implementation of typical database applications

LIST OF EXPERIMENTS	
1.	Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
2.	Database Querying – Simple queries, Nested queries and Sub queries.
3.	Views, Sequences, Synonyms
4.	Database Programming: Implicit and Explicit Cursors
5.	Procedures and Functions
6.	Triggers
7	Exception Handling
8.	Design and Implementation of GUI Using Front End Tools
9.	Database Connectivity using ODBC
10.	Implementation of real time database applications (Mini Project)

TOTAL PERIODS:	**45**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Populate and query a database using SQL DDL/DML/TCL commands
CO2:	Analyze the use of Tables, Views, Functions and Procedures
CO3:	Handle exception in triggers and procedures.
CO4:	Create database considering constraints and normal forms
CO5:	Design and implement a database schema for a given problem-domain
C06:	Design and Develop applications with GUI and database connectivity

SYSTEM REQUIREMENTS	
1.	**HARDWARE:**
	Standalone desktops 30 Nos. (or) Server supporting 30 terminals or more.
2.	**SOFTWARE:**
	Front end: PHP/VB/VC ++/JAVA or Equivalent

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191AIC312L	**OBJECT ORIENTED PROGRAMMING LABORATORY**	**0**	**0**	**3**	**1**	**2**

COURSE OBJECTIVES:	
1.	To build software development skills using SCALA programming for real-world applications.
2.	To understand and apply the concepts of classes, packages, interfaces, array and, exception handling.
3.	To develop applications using traits.
4.	To understand the concept of multithreading.
5.	To develop an application using Scala programming.

LIST OF EXPERIMENTS	
1.	Develop a Scala application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e. domestic or commercial). Compute the bill amount using the following tariff. If the type of the EB connection is domestic, calculate the amount to be paid as follows: ● First100units - Rs. 1 per unit ● 101-200units - Rs. 2.50 per unit ● 201 -500 units - Rs. 4 per unit ● > 501units - Rs. 6 per unit If the type of the EB connection is commercial, calculate the amount to be paid as follows: ● First 100 units - Rs. 2 per unit ● 101-200 units - Rs. 4.50 per unit ● 201 -500 units - Rs. 6 per unit ● > 501 units - Rs. 7 per unit
2.	Write a Scala program to implement the concept of packages
3.	Develop a Scala application with Employee class with Emp_name, Emp_id, Address, Mail_id, and Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
4.	Design a Scala for ADT Stack. Implement this concept using array. Provide necessary exception handling in both the implementations
5.	Write a scala program to perform string operations using Array. Write functions for the following ● Append - add at end ● Insert – add at particular index ● Search ● List all string starts with given letter ● Remove elements from the list.
6.	Write a scala program to create an abstract class named Shape that contains two integers and an empty method named printArea (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method print Area( ) that prints the area of the given shape
7.	Write a program scala program to throws the following exceptions ● NumberFormatException ● ArrayIndexOutofBound ● StringIndexOutofBound ● Arithmetic Exception
8.	Write Scala program to implement user defined exception.
9.	Write a Scala program to separate even and odd numbers of a given array of integers. Put all even numbers first, and then odd numbers.
10.	Write a Scala program to triplicate each element immediately next to the given list of integers.
11.	Write a scala program that handles the exception handling concepts

12.	Write a scala program that implements string handling operation.

TOTAL PERIODS:	**60**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1	Develop solutions for complex problems by making use of the OOPS Concepts
CO2	Design and develop scala applications using inheritance.
CO3	Build an array and perform various string operations
CO4	Apply the concept of traits to develop scala applications
CO5	Develop a real time application using Scala programming.
CO6	Implement the concept of abstract class for problem solving.

Course Code	Course Title	Periods per week				Credits
		L	T	P	R	
191AIC313L	**DIGITAL SYSTEMS & COA LABORATORY**	**0**	**0**	**4**	**0**	**2**

COURSE OBJECTIVES:	
1.	To understand the various basic logic gates.
2.	To design and implement the various combinational circuits.
3.	To design and implement sequential circuits.
4.	To Implement ALU operations.
5.	To design and Implement division algorithms.

LIST OF EXPERIMENTS	
1.	Verification of Boolean Theorems using basic gates.
2.	Design and implement Half/Full Adder and Subtractor.
3.	Design and implementation of Magnitude Comparator.
4.	Study of flip-flops.
5.	Design and implement shift-registers.
6.	Write the program to find 1's and 2's complement of a given number.
7.	Write a program for addition and subtraction of 2 unsigned binary numbers.
8.	Write a program to Multiply 2 unsigned binary numbers.
9.	Write the program to implement the restoring division Algorithm.
10.	Write the program to implement the non-restoring division Algorithm.

TOTAL PERIODS:	**60**

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Understand the theorems using basic gates.
CO2:	Implement simplified combinational circuits using basic logic gates.
CO3:	Design and Implement sequential circuits like registers.
CO4:	Describe and implement Arithmetic and logical operations.
CO5:	Analyze the results of Restoring and non Restoring Division Algorithms.
CO6:	Implement digital applications using digital logics.

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS

HARDWARE:

1. Digital trainer kits - 30

2. Digital ICs required for the experiments in sufficient numbers

SOFTWARE:

1. HDL simulator.
2. MATLAB.