E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai
Accredited by NAAC with 'A' Grade | Accredited by NBA

NAGAPATTINAM – 611002

B.TECH. INFORMATION TECHNOLOGY

R-2019

SEMESTER III										
Course Code	**Course Name**	**L**	**T**	**P**	**C**	**Maximum Marks**			**Category**
						CA	**ES**	**Total**	
Theory Course									
1901MA302	Engineering Mathematics III (Queuing Model and Network Model)	3	2	0	4	40	60	100	BS
1902IT301	Data Structures and Algorithms	3	0	0	3	40	60	100	PC
1902IT302	Computer Organization and Architecture	3	0	0	3	40	60	100	PC
1902IT303	Digital Principles and Design	3	0	0	3	40	60	100	PC
1902IT304	Problem solving using Python	3	0	0	3	40	60	100	PC
1901GEX04	Biology for Engineers	3	0	0	3	40	60	100	BS
Laboratory Course									
1902IT351	Data Structures and Algorithms Lab	0	0	2	1	50	50	100	PC
1902IT352	Digital Principles and Design Lab	0	0	2	1	50	50	100	PC
1902IT353	Python Programming Lab	0	0	2	1	50	50	100	PC
1904GE351	Life Skills: Verbal Ability	0	0	2	1	100	-	100	EEC
Audit Course									
1902MCX02	Constitution of India	2	0	0	0	100	-	100	-
Total		**20**	**2**	**8**	**23**	**590**	**510**	**1100**	**-**

1901MA302		**ENGINEERING MATHEMATICS III**	**L**	**T**	**P**	**C**
		(Queuing Model and Network Model)	**3**	**2**	**0**	**4**

PREREQUISITE :

1. Engineering Mathematics I
2. Engineering Mathematics II

COURSE OBJECTIVES:

1. To introduce Fourier series analysis and applications in Engineering, apart from its use in solving boundary value problems.
2. To acquaint the student with Fourier transform techniques used in wide variety of situations
3. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I	**FOURIER SERIES**	**12 Hours**
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis – Simple Applications		
UNIT II	**FOURIER TRANSFORMS**	**12 Hours**
Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity		
UNIT III	**QUEUEING MODELS**	**12 Hours**
Characteristics of Queuing Models – Markovian Queues – (M / M / 1): (FIFO / /),(M / M / 1): (FIFO / N /),(M / M / C): (FIFO / /),(M / M / C): (FIFO / N /)models – Little‟s formulae.		
UNIT IV	**NETWORK MODEL**	**12 Hours**
Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource analysis in Network Scheduling.		
UNIT V	**TRANSPORTATION AND ASSIGNMENT MODELS**	**12 Hours**
Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem		
	TOTAL:	**60 HOURS**

FURTHER READING / SEMINAR :

1. Linear partial differential equations of higher order
2. Solution of non-homogeneous partial differential equations

COURSE OUTCOMES:

	After completion of the course, Student will be able to
CO1	Compute the solution of partial differential equations
CO2	Use Fourier series analysis which is central to many applications in engineering
CO3	Solve various Queueing model problems
CO4	Apply Network model used in wide variety of situations
CO5	Apply Transportation and Assignment techniques for discrete time systems.

REFERENCES:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012
2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd , 2007
4. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company Limited, New Delhi, 2008.
5. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.
6. www.nptelvideos.in/2012/11/mathematics-iii.html

1902IT301		DATA STRUCTURES AND ALGORITHMS	L	T	P	C
			3	0	0	3

Aim: This course is used to study and understand the concepts of Data Structures and Algorithms

PREREQUISITE :	Programming in C and C++

COURSE OBJECTIVES:

1. Learn the fundamental concepts of Data Structures
2. Study the various algorithms and analysis methods
3. Use various data structures and algorithms techniques for real time examples

UNIT I	**INTRODUCTION**	**9 Hours**
Data Structures – Programming Strategies – ADT – Algorithms – Problem Solving – Complexity – Asymptotic Notations – Recurrence Relations		
UNIT II	**DATA STRUCTURES**	**9 Hours**
Array – List: Types, Applications, Linked List – Stack: Operations, Applications, Implementations – Queue: Operations, Applications, Implementations – Tree: Types, Implementation, Applications		
UNIT III	**DIVIDE AND CONQUER & DYNAMIC PROGRAMMING**	**9 Hours**
Divide and Conquer techniques with Algorithm Analysis – Merge Sort – Optimal Binary Search Tree, Huffman Tree – Strassen's Matrix Multiplications. Dynamic Programming with Algorithm Analysis – Graph – Warshall's, Floyd' Algorithms – Binomial Coefficient		
UNIT IV	**GREEDY AND ITERATIVE METHODS**	**9 Hours**
Prim's Algorithm – Kruskal's Algorithms – Dijikstra's Algorithms – The stable Marriage Problem – Algorithm Analysis		
UNIT V	**ALGORITHM ANALYSIS AND APPLICATIONS**	**9 Hours**
Algorithm Analysis and power – P,NP,NP-Complete Problems – Backtracking – N-Queen Problem, Graph Coloring – Branch and Bound –Decision Tree - Travelling Salesman Problem – Knapsack Problem		
	TOTAL:	**45 HOURS**

FURTHER READING / SEMINAR :

1. Decision Tree Approach,
2. Networking problems

COURSE OUTCOMES:

	After completion of the course, Student will be able to
CO1	Understand the concepts of Data structures and Algorithms
CO2	Explain various data structures
CO3	Apply Divide and Conquer & Dynamic programming method to solve different problems
CO4	Apply Greedy and Iterative method to solve different problems
CO5	Analysis various algorithms using various types and methods

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2014
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction toAlgorithms", Second Edition, Mcgraw Hill, 2012.
3. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011
4. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,2012
5. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 8th Edition, Wiley Publishers, 2014.
6. nptel.ac.in/

1902IT351		**DATA STRUCTURES AND ALGORITHMS LAB**	**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**
PREREQUISITE :		Programming using C				

LIST OF EXPERIMENTS:

MODULE 1:

1. Implement Array ADT
2. Write the program to perform Linked List, Stack and Queue Operations
3. Write the program to implement Tree Traversal operations
4. Write the program to implement sorting operations
5. Write the program to implement searching operations

MODULE 2:

1. Implement Tower of Honoi Problem using recursion
2. Implement Fibonacci number generation using recursion
3. Implement minimum spanning tree using Prim’s, Kruskal’s Algorithms
4. Write program to implement all the functions of a dictionary (ADT) using hashing.
5. Given the sequence of integers 5 9 1 7 4 3 2 0 manually arrange this sequence in ascending order using the three "‘elementary"’ sorting methods: insertion sort, bubblesort and selection sort, showing at each step the new configuration of the sequence. How many comparisons and how many element moves were used by each method? Which is the best performing method for sorting this array of integers? Which would be the worst arrangement of this sequence?

Hardware: Standalone desktops 30 Nos
Software: Turbo C++ compiler or equivalent

	TOTAL:	**30 HOURS**

1902IT302	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

Course Objectives:

1. To make students understand the basic structure and operation of digital computer.
2. To study the concepts of pipelining.
3. To expose the students to the concept of parallelism
4. To familiarize the students with hierarchical memory system including cache memories and virtual memory.

Unit I	STRUCTURE OF COMPUTERS & MACHINE INSTRUCTION	9 Hours

Introduction, Technologies for building Processors and Memory, Performance, The Power Wall,Operations of the Computer Hardware, Operands of the Computer Hardware, Signed and Unsignednumbers, Representing Instructions in the Computer, Logical Operations, Instructions for MakingDecisions, Supporting Procedures in Computer Hardware, Communicating with People.

Unit II	PROCESSING UNIT	9 Hours

MIPS Addressing for 32-Bit Immediate and Addresses, Parallelism and Instructions: Synchronization, Translating and Starting a Program, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Sub word Parallelism, Real Stuff: Streaming SIMD Extensions and Advanced Vector Extensions in x86.

Unit III	PIPELINING	9 Hours

Logic Design Conventions, Building a Datapath, A Simple Implementation Scheme, An overview of Pipelining, Pipelined Datapath and Control, Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, Real Stuff: The ARM Cortex – A8 and Intel Core i7 Pipelines, Going Faster: Instruction –Level Parallelism and Matrix Multiply. An Introduction to Digital Design Using a Hardware Design Language to Describe and Model a Pipeline.

Unit IV	MEMORY	9 Hours

Memory Technologies, the Basics of Caches, Measuring and Improving Cache Performance, dependable memory hierarchy, Virtual Machines, Virtual Memory, A Common Framework for Memory Hierarchy, Using a Finite- State Machine to Control a Simple Cache, Parallelism and Memory Hierarchy: Redundant Arrays of Inexpensive Disks, Advanced Material: Implementing Cache Controllers, Real Stuff: The ARM Cortex-A8 and Intel Core i7 Memory Hierarchies, Going Faster: Cache Blocking and Matrix Multiply.

Unit V	DISK STORAGE	9 Hours

Disk Storage and Dependability-RAID levels-hardware multi threading-clusters- message passingmultiprocessors-Multiprocessors network topologies.

TOTAL: 45 Hours

Further Reading:
1. Introduction to Multi Core Programming
2. Working principles of Intel and AMD Processor

Course Outcomes: After completion of the course, Student will be able to

- CO1: Understand the concepts of structure of computers and machine instructions
- CO2: Explain the concepts of processing units
- CO3: Design and analyze pipelined control units
- CO4: Evaluate performance of memory systems
- CO5: Understand disk storage and apply RAID concepts in real time problems

References:

1. David A. Patterson and John L. Hennessey, “Computer organization and design, The Hardware/Software interface”, Morgan Kauffman / Elsevier, Fifth edition, 2014.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, 5th Edition, Tata McGraw Hill, 2013.
3. William Stallings, ―Computer Organization and Architecture – Designing for Performance‖, Sixth Edition, Pearson Education, 2013.
4. V.P. Heuring, H.F. Jordan, ―Computer Systems Design and Architecture‖, Second Edition, Pearson Education, 2015.
5. Behrooz Parhami, ―Computer Architecture‖, Oxford University Press, 2012.
6. http://nptel.ac.in

1902IT303		**DIGITAL PRINCIPLES AND DESIGN**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

AIM: This is to provide the concepts of Digital principles, logic, conversion and design procedures

COURSE OBJECTIVES:

Learn how to design digital circuits, by simplifying the Boolean functions. Also, gives an ideaabout designs using PLDs, and writing codes for designing larger digital systems.

UNIT I	**BOOLEAN ALGEBRA AND LOGIC GATES**	**9 Hours**

Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra and Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map and Tabulation Methods – Logic Gates – NAND and NOR Implementations.

UNIT II	**COMBINATIONAL LOGIC**	**9 Hours**

Combinational Circuits – Analysis and Design Procedures – Circuits for Arithmetic Operations, Code Conversion – Decoders and Encoders – Multiplexers and Demultiplexers – Introduction to HDL – HDL Models of Combinational circuits.

UNIT III	**SYNCHRONOUS SEQUENTIAL LOGIC**	**9 Hours**

Sequential Circuits – Latches and Flip Flops – Analysis and Design Procedures – State Reduction and State Assignment – Shift Registers – Counters – HDL for Sequential Logic Circuits.

UNIT IV	**ASYNCHRONOUS SEQUENTIAL LOGIC**	**9 Hours**

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards

UNIT V	**MEMORY AND PROGRAMMABLE LOGIC**	**9 Hours**

RAM and ROM – Memory Decoding – Error Detection and Correction – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices – Application Specific Integrated Circuits.

	TOTAL:	**45 HOURS**

FURTHER READING / SEMINAR :

1. Decision Tree Approach
2. Networking problems

COURSE OUTCOMES:

	After completion of the course, Student will be able to
CO1	Understand different methods used for the simplification of Boolean functions
CO2	Explain the fundamentals of VHDL / Verilog HDL
CO3	Design and implement combinational circuits
CO4	Design and implement synchronous sequential circuits
CO5	Design and implement asynchronous sequential circuits

REFERENCES:

1. Morris Mano M. and Michael D. Ciletti, “Digital Design”, Pearson Education, 2015.
2. John F. Wakerly, “Digital Design Principles and Practices”, Seventh Edition, Pearson Education, 2015
3. Charles H. Roth Jr, “Fundamentals of Logic Design”, Fifth Edition – Jaico Publishing House, Mumbai, 2013.
4. Donald D. Givone, “Digital Principles and Design”, Tata Mcgraw Hill, 2013.
6. Kharate G. K., “Digital Electronics”, Oxford University Press, 2010.
7. http://nptel.ac.in

1902IT352		**DIGITAL PRINCIPLES AND DESIGN LAB**	**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**

LIST OF EXPERIMENTS:

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.
3. Design and implementation of combinational circuits using MSI devices: 4 – bit binary adder / subtractor Parity generator / checker Magnitude Comparator Application using multiplexers
4. Design and implementation of sequential circuits: Shift –registers - Synchronous and asynchronous counters
5. Coding combinational / sequential circuits using HDL.
6. Design and implementation of a simple digital system

Hardware: 1. Digital trainer kits 302. Digital ICs required for the experiments in sufficient numbers
Software: 1. HDL simulator

	TOTAL:	**30 HOURS**

1902IT304	**PROBLEM SOLVING USING PYTHON**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PREREQUISITE:

Programming Languages

COURSE OBJECTIVES:

1. To know the basics of problem solving
2. To read and write simple Python programs.
3. To develop Python programs with conditions, loops and data structures.
4. To define Python functions and call them.
5. To do input/output with files in Python.

UNIT I	**PROBLEM SOLVING AND PYTHON INTRODUCTION**	**9 Hours**

Problem solving techniques: Program development life-cycle – Algorithms – building blocks of algorithms -Flowchart– Pseudo Code-Illustrative problems. Introduction to Python, Python Interpreter and its working, Syntax and Semantics

UNIT II	**PYTHON BASICS**	**9 Hours**

Data Types, operators, loops, Assignments and Expressions, Control Flow Statements.

UNIT III	**DATA STRUCTURES AND FUNCTIONS**	**9 Hours**

Lists-Tuples-Dictionaries-Functions and lambda expressions-Iterations and Comprehensions.

UNIT IV	**FILES,MODULES AND Packages**	**9 Hours**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages

UNIT V	**CLASSES OBJECTS And REGULAR EXPRESSIONS**	**9 Hours**

Overview of OOPs terminology-class-inheritance-overloading-Regular Expressions

TOTAL: 45 HOURS

Course Outcomes:
At the end of this course, students will be able to,
CO1 : Execute Python code in variety of environments
CO2 :Use the correct Python control flow construct
CO3 : Design Data structures and functions using python
CO4 : Implement File, Modules and Packages concepts using Python
CO5 : Create their own classes and use existing python classes

FURTHER READING: Python for Data Science

REFERENCES:

1. Martin. C. Brown, "PYTHON: The Complete Reference", McGraw Hill,2001.
2. Naomi R. Ceder , The Quick Python Book, Second Edition,2010
3. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for
4. Python 3.2, Network Theory Ltd., 2011.
5. John V Guttag, ―Introduction to Computation and Programming Using Python'', Revised and
6. expanded Edition, MIT Press , 2013
7. Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python: An
8. Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
9. Allen B. Downey ,"Think Python: How to Think Like a Computer Scientist'', 2nd edition,
10. Updatedfor Python 3,Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)
11. http://nptel.ac.in/

1902IT353	**PYTHON PROGRAMMING LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments:

1. Study of key features of the Python language, intro to the Python IDE's
2. Play with Data types, keywords, conditional and control statements, looping, branching
3. Implement Python program concepts using List, Tuple and Dictionaries
4. Implement Functions using Python
5. Perform the following file operations using Python
   a) Traverse a path and display all the files and subdirectories in each level till the Deepest level for a given path. Also, display the total number of files and subdirectories.
   b) Read a file content and copy only the contents at odd lines into a new file.
6. Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
7. Perform Sorting and Searching using Python
8. Perform the following file operations using Python
   a) Traverse a path and display all the files and subdirectories in each level till the deepest level for a given path. Also, display the total number of files and subdirectories.
   b) Read a file content and copy only the contents at odd lines into a new file
9. Perform exception handling using Python
10. Implement Python programming concepts using classes and objects
11. Using Regular Expressions, develop a Python program to
    a) Identify a word with a sequence of one upper case letter followed by lower case letters.
    b) Find all the patterns of "1(0+)1" in a given string.
    c) Match a word containing 'z' followed by one or more o's.Prompt the user for input.
12. Devise a Python program to implement the Hangman Game.
13. Simulate bouncing ball using Pygame

Requirements:
Software:
Operating System: Windows /Linux operating system
Tool: Python 3.6 (or above)
IDE: Pycharm, Spyder

TOTAL: 30 HOURS

Online Resource:
https://www.learnpython.org/
https://wiki.python.org/moin/BeginnersGuide/Programmers
https://www.python.org/about/gettingstarted/
https://www.javatpoint.com/python-tutorial
https://www.geeksforgeeks.org/python-programming-language/

1901GEX04		BIOLOGY FOR ENGINEERS	L	T	P	C
			3	0	0	3

COURSE OBJECTIVES: The objective of this course is to enable learners to understand the basic concepts of biology and its applications in engineering.

COURSE OUTCOMES: Upon completion of this course, students will be able to

1. Describe how biological observations of 18th Century that lead to major discoveries.
2. Classify biology based on morphological, biochemical and ecological matters
3. Describe the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
4. Analyze biological processes at the reductionistic level
5. Describe about all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
6. Classify enzymes and distinguish between different mechanisms of enzyme action.
7. Describe DNA as a genetic material in the molecular basis of information transfer.
8. Apply thermodynamic principles to biological systems.
9. Classify microorganisms.
10. Describe about bio-inspired engineering.

Module I	Biology Introduction and its Classification	**7 Hours**

Introduction to Biology, fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Exciting aspect of biology - need to study biology- Discussion about biological observations of 18th Century - major discoveries. Examples from Brownian motion and the origin of thermodynamics - original observation of Robert Brown and Julius Mayor.

Classification - morphological, biochemical or ecological. Hierarchy of life forms at phenomenological level. classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms for the study of biology- E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus

Module II	Genetics and Macromolecular analysis	**10 Hours**

Genetics - Newton’s laws to Physical Sciences”- Mendel’s laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis - part of genetics. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Single gene disorders in humans. Complementation using human genetics.

Macromolecular analysis: analyses of biological processes at the reductionistic level Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

Module III	Biomolecules and Enzymes	**10 Hours**

Biomolecules - Molecules of life. monomeric units and polymeric structures. Sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.

Enzymes - monitor enzyme catalyzed reactions. Enzyme catalyzereactions. Enzyme classification. Mechanism of enzyme action -two examples. Enzyme kinetics and kinetic parameters. RNA catalysis.

Information Transfer - The molecular basis of coding and decoding genetic information - universal Molecular basis of information transfer. DNA - genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Gene in terms of complementation and recombination.

Module IV	Metabolism and Microbiology	**8 Hours**

Metabolism: principles of energy transactions. Thermodynamics to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP - energy currency. Breakdown of glucose to CO2 + H2O (Glycolysis and Krebs cycle) - synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge

Microbiology Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.			
Module V	Bio-inspired Engineering		**10 Hours**
Introduction to biologically-inspired designs (BID for Biomedical and Non-biomedical applications): Human-organs-on-chips; Muscular Biopolymers; Bio-optics; Nanostructures for Drug Delivery; Genetic Algorithms; Artificial neural networks; Swarm intelligence algorithms; Biosensors: role in medical diagnostics (Sensium digital plaster); environmental monitoring; Bio-filters; Bio-robotics; 3D Bio-printing; Self healing concrete.			
		Total:	**45 Hours**
REFERENCES:			

1. Biology for Engineers, Rajiv Singal , CBS Publishers and Distributors Pvt Ltd; First Edition edition (4 June 2019).
2. Biology for Engineers, Wiley Editorial, Wiley (2018).
3. Principles of Soft Computing, S. N. Sivanandam, S. N. Deepa, Wiley; Third edition (2018).
4. Computational Medicine: Tools and Challenges, Zlatko Trajanoski, Springer; 2012 edition (19 September 2012).
5. Health Informatics - E-Book: An Interprofessional Approach, Ramona Nelson, Nancy Staggers, Elsevier; 2 edition (December 8, 2016).
6. Biology for Engineers, G.K..Suraishkumar, Oxford University Press
7. Biology for Engineers, Arthur T. Johnson, CRC Press

1902MCX02		**CONSTITUTION OF INDIA**	**L**	**T**	**P**	**C**
			2	**0**	**0**	**0**

Course Content

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries.

The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America. The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our ownancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

	TOTAL:	**30 HOURS**

1904GE351	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	1

Course Objectives:
The students should be made to:

1. To help students comprehend and use vocabulary words in their day to day communication.
2. To apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.
3. To ensure students will be able to use targeted grammatical structures meaningfully and appropriately in oral and written production.
4. To enable the students to arrange the sentences in meaningful unit and to determine whether constructions rely on active or passive voice
5. To Apply the principles of effective business writing to hone communication skills

Unit I	VOCABULARY USAGE	6 Hours

Introduction - Synonyms and Antonyms based on Technical terms – Single word Substitution – Newspaper, Audio and video listening activity.

Unit II	COMPREHENSION ABILITY	6 Hours

Skimming and Scanning – Social Science passages – Business and Economics passages – latest political and current event based passages – Theme detection – Deriving conclusion from passages

Unit III	BASIC GRAMMAR AND ERROR DETECTION	6 Hours

Parallelism – Redundancy – Ambiguity – Concord - Common Errors – Spotting Errors – Sentence improvement – Error Detection FAQ in Competitive exams.

Unit IV	REARRANGEMENT AND GENERAL USAGE	6 Hours

Jumble Sentences – Cloze Test - Idioms and Phrases – Active and passive voice – Spelling test.

Unit V	APPLICATION OF VERBAL ABILITY	6 Hours

Business Writing - Business Vocabulary - Delivering Good / Bad News - Media Communication - Email Etiquette – Report Writing - Proposal writing – Essay writing– Indexing –Market surveying.

	TOTAL	**30 Hours**

COURSE OUTCOMES:
On Completion of the course, the students should be able to

CO1: Use new words in their day to day communication.
CO2: Gather information swiftly while reading passages.
CO3: Students are proficient during their oral and written communication.
CO4: Rearrange the sentences and able to identify the voice of the sentence.
CO5: Students use their knowledge of the best practices to craft effective business documents

REFERENCES:

1. Arun Sharma and Meenakshi Upadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017
2. R S Aggarwal and Vikas Aggarwal , Quick Learning Objective General English ,S.Chand Publishing House, 2017
3. Dr.K.Alex , Soft Skills, S.Chand Publishing House, Third Revise Edition, 2014
4. Raymond Murphy, Essential English Grammar in Use, Cambridge University press, New Delhi, Third Edition , 2007

ASSESSMENT PATTERN :

1. Two tests will be conducted (25 * 2) - 50 marks
2. Five assignments will be conducted (5*10) - 50 Marks