Dr. MAHALINGAM
MCET
COLLEGE OF ENGINEERING AND TECHNOLOGY
Enlightening Technical Minds

An Autonomous Institution Since 2011.
Approved by AICTE / Affiliated to Anna University.
Accredited by NAAC with 'A++' Grade.
Tier-1* - Accredited by NBA.
Part of NIA Educational Institution

Curriculum and Syllabi

B.E. Computer Science and Engineering
(Artificial Intelligence and Machine Learning)

Semesters I to VIII

Regulations 2019

(2022 Batch Onwards)

Dr. Mahalingam College of Engineering and Technology

Department of Computer Science and Engineering

(Artificial Intelligence and Machine Learning)

Vision

To develop skilled professionals in the field of AI & ML with global employability, entrepreneurship capability, research focus and social responsibility

Mission

- To develop competent professionals who are skilled in the area of AI and ML by providing state of art academic environment and industry driven curriculum.
- Motivate students to become entrepreneurs and to take higher studies in the field of AI and ML.
- To enrich the department through committed and technically sound faculty team with research focus in thrust areas of AI and ML.
- To provide intelligent solutions for interdisciplinary problems through technical innovations and projects in association with the industry, society and professional bodies.

Programme: B.E. CSE (Artificial Intelligence and Machine Learning)

Programme Educational Objectives (PEOs) - Regulations 2019

B.E. CSE (Artificial Intelligence and Machine Learning) graduates will:

PEO1. Domain Expertise: The graduates will have a strong foundation and knowledge in basics of computer science and advanced AI and ML technologies.

PEO2. Provide Innovative Solutions: The graduates will be able to design and develop novel products and provide innovate solutions to real world problems using principles of AI and ML.

PEO3. Social Awareness and Ethics: The graduates will be ethically socially responsible and have ability to adopt to new technologies with effective communication skills.

Programme Outcomes (POs) - Regulations 2019

On successful completion of B.E. Computer Science and Engineering (Artificial Intelligence and Machine Learning) programme, graduating students/graduates will be able to:

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

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

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

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems.

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

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

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

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

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs) - Regulations 2019

On successful completion of B.E. Computer Science and Engineering (Artificial Intelligence and Machine Learning) programme, graduating students/graduates will be able to:

PSO1. Innovation and development: Ability to design and develop models and solutions using innovative AIML tools and techniques for real world multidisciplinary problems.

PSO2. AIML Tools and Research: Ability to do research innovative new tools and technologies to meet the need of the industry and society.

Programme: B.E Computer Science and Engineering

(Artificial Intelligence and Machine Learning)

2019 Regulations
Curriculum for Semesters I to VIII

Course Code	Course Title	Duration	Credits	Marks
19SHMG6101	Induction Program	3 Weeks	-	100

Semester I

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19MABC1102	Linear Algebra and Infinite Series	3	1	0	4	100	CS,IT,AD, AM & SC
19ENHG2101	Communication Skills – I	2	0	2	3	100	All
19PHBC2002	Physics for Information Sciences	3	0	2	4	100	CS,IT,AD, AM & SC
19EESC2101	Introduction to Electrical and Electronics Engineering	3	0	2	4	100	CS,IT,AD, AM & SC
19CSSN2101	Fundamentals of Programming	3	0	2	4	100	-
19PSHG6001	Wellness for Students	0	0	2	1	100	All
Total		**14**	**1**	**10**	**20**	**600**	

Semester II

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19MABC1202	Calculus and Transforms	3	1	0	4	100	CS,IT,AD, AM & SC
19ENHG2201	Communication Skills – II	2	0	2	3	100	All
19ECSC2201	Digital System Design	2	0	2	3	100	CS,IT,AD, AM & SC
19CSSN2201	Programming with C	3	0	3	4.5	100	-
19MESC4001	Engineering Drawing	1	0	3	2.5	100	AU,CS,EC, EI,IT,ME, AD, AM & SC
19CSSC4001	IT Practices Lab	1	0	4	3	100	CS,IT,AD, AM & SC
19CHMG6201	Environmental Sciences	1	0	0	-	100	All
19PSHG6003	தமிழர்மரபு / Heritage of Tamils**	1	0	0	1	100	All
Total		**14**	**1**	**14**	**21**	**800**	

****** Applicable only for 2022 Batch

Semester III

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19MABC1303	Discrete Mathematics	3	1	0	4	100	CS, IT, AM & SC
19SCCC2301	Data Structures and Algorithm Analysis	3	0	2	4	100	SC & AM
19SCCC1301	Computer Organization and Architecture	3	0	0	3	100	SC & AM
19AMCN1301	Principles of Artificial Intelligence & Neural Networks	3	0	0	3	100	-
19SCCC2302	Database Design	3	0	2	4	100	SC & AM
19SCCC3301	Programming using Java Laboratory	0	0	3	1.5	100	SC & AM
19SCCC3302	Programming using Python Laboratory	0	0	3	1.5	100	SC & AM
19PSHG6002	Universal Human Values 2: Understanding Harmony	2	1	0	3	100	All
XXXXXXXXXX	One Credit Course	0	0	2	1	100	-
19PSHG6004	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology**	1	0	0	1	100	All
Total		**18**	**2**	**12**	**26**	**1000**	

Semester IV

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19MABG1401	Probability and Statistics	3	1	0	4	100	All
19SCCC2401	Basics of Operating Systems	3	0	2	4	100	SC & AM
19AMCN1401	Machine Learning Algorithms and Application	3	0	0	3	100	-
19AMCN1402	Neural Computing in Machine Learning	3	0	0	3	100	-
19AMCN3401	Machine Learning Laboratory	0	0	4	2	100	-
19AMCN3402	Neural Networks and AI Laboratory	0	0	4	2	100	-
19AMPN6401	Mini – Project	0	0	4	2	100	-
XXXXXXXXXX	One Credit Course	0	0	2	1	100	-
Total		**12**	**1**	**16**	**21**	**800**	

Course Code	Course Title	Duration	Credits	Marks
XXXXXXXXXX	Internship or Skill Development*	2 Weeks	1	100

*Refer to clause: 4.8 in UG academic regulations 2019

****** Applicable only for 2022 Batch

Semester V

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19AMCN1501	Deep Learning and Application	3	0	0	3	100	-
19AMCN2501	Predictive Analytics	3	0	2	4	100	-
19AMCN1502	Software Engineering in AI	3	0	0	3	100	-
XXXXXXXXXX	Professional Elective – I	3	0	0	3	100	-
XXXXXXXXXX	Professional Elective – II	3	0	0	3	100	-
XXXXXXXXXX	Open Elective - I	3	0	0	3	100	-
19AMCN3501	Deep Learning and Application Laboratory	0	0	3	1.5	100	-
19AMCN3502	Software Engineering in AI Laboratory	0	0	3	1.5	100	-
19PSHG6501	Employability Skills 1: Teamness and Interpersonal Skills	0	0	2	1	100	All
Total		**18**	**0**	**10**	**23**	**900**	

Semester VI

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19AMCN1601	AI Natural Language Processing	3	0	0	3	100	-
19AMCN1602	Vision and Image Processing	3	0	0	3	100	-
XXXXXXXXXX	Professional Elective – III	3	0	0	3	100	-
XXXXXXXXXX	Professional Elective – IV	3	0	0	3	100	-
XXXXXXXXXX	Open Elective - II	3	0	0	3	100	-
19AMCN3601	AI Natural Language Processing Laboratory	0	0	3	1.5	100	-
19AMCN3602	Vision and Image Processing Laboratory	0	0	3	1.5	100	-
19CSPN6601	Innovative and Creative Project	0	0	4	2	100	-
19PSHG6601	Employability Skills 2: Campus to Corporate	0	0	2	1	100	All
Total		**15**	**0**	**12**	**21**	**900**	

Course Code	Course Title	Duration	Credits	Marks
XXXXXXXXXX	Internship or Skill Development*	2 or 4 Weeks	1	100

*Refer to clause: 4.8 in UG academic regulations 2019

Semester VII

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19AMCN1701	Big data Technology	3	0	0	3	100	-
19AMCN1702	Reinforcement Learning	3	0	0	3	100	-
XXXXXXXXXX	Professional Elective – V	3	0	0	3	100	-
XXXXXXXXXX	Professional Elective – VI	3	0	0	3	100	-
XXXXXXXXXX	Open Elective - III	3	0	0	3	100	-
19AMCN3701	Big data Technology Laboratory	0	0	3	1.5	100	-
19AMCN3702	Reinforcement Learning Laboratory	0	0	3	1.5	100	-
Total		**15**	**0**	**6**	**18**	**700**	

Semester VIII

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19AMPN6801	Project	0	0	16	8	200	-
Total		**0**	**0**	**16**	**8**	**200**	

Course Code	Course Title	Duration	Credits	Marks
XXXXXXXXXX	Internship or Skill Development*	8 or 16 weeks	4	100

*Refer to clause: 4.8 in UG academic regulations 2019

Total Credits (2022 Batch): 165

Vertical wise Electives

Vertical I AI in Robotics							
Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19AMEN1001	Kinematics and Kinetics for Robotics	3	0	0	3	100	-
19AMEN1002	Robotics Vision	3	0	0	3	100	-
19AMEN1003	Dynamics and Control of Robotics	3	0	0	3	100	-
19AMEN1004	Sensors and Actuators for Robotics	3	0	0	3	100	-
19AMEN1005	Application of Robotics	3	0	0	3	100	-
19AMEN1006	Robot Programming	3	0	0	3	100	-
19AMEN1007	Computational Motion Planning	3	0	0	3	100	-
19AMEN1008	NLP for Robotics	3	0	0	3	100	-
19AMEN1009	Robotic Operating Systems and Robot Simulation	3	0	0	3	100	-

Vertical II AI in Cyber Security							
Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
19AMEN1010	Applied Cryptography	3	0	0	3	100	-
19AMEN1011	Network and Wireless Security	3	0	0	3	100	-
19AMEN1012	Intrusion Detection and Prevention Systems	3	0	0	3	100	-
19AMEN1013	Software Vulnerability Analysis	3	0	0	3	100	-
19AMEN1014	Cybercrime Forensics and Digital Forensics	3	0	0	3	100	-
19AMEN1015	Distributed System Security	3	0	0	3	100	
19AMEN1016	Modern Cryptography System	3	0	0	3	100	-
19AMEN1017	Security and Privacy in Cloud	3	0	0	3	100	-

Vertical III AI in IOT							
Course Code	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
		L	**T**	**P**			
19AMEN1018	IOT Architecture and Protocols	3	0	0	3	100	-
19AMEN1019	Network Programming for IOT	3	0	0	3	100	-
19AMEN1020	Data Science for IOT	3	0	0	3	100	-
19AMEN1021	IOT Techniques, Tools and its Applications	3	0	0	3	100	-
19AMEN1022	IOT Forensics	3	0	0	3	100	
19AMEN1023	Machine Learning for IOT	3	0	0	3	100	-
19AMEN1024	IOT Testing	3	0	0	3	100	-
19AMEN1025	IOT Security	3	0	0	3	100	-

Vertical IV Health care and AI							
Course Code	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
		L	**T**	**P**			
19AMEN1026	Genome sequencing	3	0	0	3	100	-
19AMEN1027	Algorithm for DNA sequencing	3	0	0	3	100	-
19AMEN1028	Computational Healthcare	3	0	0	3	100	-
19AMEN1029	Clinical Information Systems	3	0	0	3	100	-
19AMEN1030	Basics of Drug Design	3	0	0	3	100	-
19AMEN1031	CRISPR Technology	3	0	0	3	100	-
19AMEN1032	Artificial Intelligence in genomics and disease prediction	3	0	0	3	100	-
19AMEN1033	Deep Learning in Biomedicine	3	0	0	3	100	-

Vertical V Data Science and AI							
Course Code	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
		L	**T**	**P**			
19AMEN1034	AI and Finance	3	0	0	3	100	-
19AMEN1035	Advanced Social, Text and Media Analytics	3	0	0	3	100	-
19AMEN1036	Intelligent Data Analysis	3	0	0	3	100	-
19AMEN1037	Data Mining for Business Intelligence	3	0	0	3	100	-
19AMEN1038	Accelerated Data Science	3	0	0	3	100	
19AMEN1039	Exploratory Data Analysis Technique	3	0	0	3	100	
19AMEN1040	Recommender Systems	3	0	0	3	100	-
19AMEN1041	Statistical Thinking for Data Science	3	0	0	3	100	-

Open Electives
(Offered to other Programmes)

Course Code	**Course Title**	**Hours/Week**			**Credits**	**Marks**
		L	**T**	**P**		
19AMOC1001	Full Stack Development	3	0	0	3	100
19AMOC1002	Augmented Reality/Virtual Reality	3	0	0	3	100
19AMOC1003	Design thinking	3	0	0	3	100
19AMOC1004	Introduction to Machine Learning	3	0	0	3	100
19AMOC1005	Artificial Intelligence	3	0	0	3	100
19AMOC1006	Theory of computation Ecosystems	3	0	0	3	100
19AMOC1007	Machine Learning with Python	3	0	0	3	100
19AMOC1008	AI for everyone	3	0	0	3	100
19AMOC1009	Solve Business Problems with AI	3	0	0	3	100
19AMOC1010	3D Printing and Design	3	0	0	3	100
19AMOC1011	AI in Data Warehousing	3	0	0	3	100

Regulations 2019
(2022 Batch onwards)

Detailed Syllabi for Semesters I to VIII

Course Code: 19SHMG6101	Course Title: INDUCTION PROGRAM (common to all B.E/B.Tech programmes)
Course Category: Mandatory Non-Credit Course	Course Level : Introductory
Duration: 3 Weeks	Max. Marks:100
Pre-requisites	

- Nil

Course Objectives

The course is intended to:

1. Explain various sources available to meet the needs of self, such as personal items and learning resources.
2. Explain various career opportunities, opportunity for growth of self and avenues available in the campus.
3. Explain the opportunity available for professional development.
4. Build universal human values and bonding amongst all the inmates of the campus and society

Unit I Intellectual Property: An Introduction 9 Hours

Intellectual Property Law: Patent Law-Copyright Law-Trademark Law- Trade secret Law-Right of Publicity-Paralegal tasks in Intellectual Property Law-Ethical obligations of the paralegal in Intellectual Property Law-Trade secrets: Protectible as a trade secret-Maintaining trade secrets-Protecting an Idea

Unit II Patents: Rights and Limitations 9 Hours

Sources of patent law-Subject matter of Patents: Utility Patents-Plant Patents-Design Patents-Design Patents and copyright-Design Patents and trademarks-Computer Software, Business methods and Patent Protection-Rights under Patent Law-Patent Requirements-Limitations on Patent Rights-Patent Ownership

Unit III Patents: Research, Applications, Disputes, and International Considerations 9 Hours

Patent Search Process-Patent Application Process-Patent Infringement-Patent Litigation, International Patent laws

Unit IV Principles of Trademark **9 Hours**

Trademarks and Unfair Competition-Acquiring Trademark Rights-Types of Marks, Strong Marks Versus Weak Marks-Selecting and Evaluating a Trademark-International Trademark Laws

Unit V Principles of Copyrights **9 Hours**

Sources of Copyright Law- The Eight Categories of Works of Authorship-Derivative Works and Compilations- Rights and Limitations :Grant of Exclusive Rights–Copyrights Ownership-International Copyright Laws

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Describe the basics of Intellectual Property Law	Apply
CO2: Identify the Rights and Limitations of various patents	Apply
CO3: Apply the process of patent search and application filling process	Apply
CO4: Explain the concept of trademark and its types	Apply
CO5: Classify the concepts of copyrights and its limitations	Apply

Text Book(s):

T1. Richard Stim, “Intellectual Property: Copyrights, Trademark and Patents”, Cengage learning, 2nd edition 2012.

Reference Book(s):

R1. Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2013.

R2. Prabuddha Ganguli,”Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2017.

Web References:

https://ipindia.gov.in/writereaddata/Portal/ev/sections-index.html

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	-	-	-	-	-	2
CO2	2	-	-	2	-	-	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	2	2	-	-	-
CO5	-	-	-	-	2	-	2	-	-	-	-	2

High-3; Medium-2; Low-1

Semester I

Course Code: 19MABC1102	Course Title: LINEAR ALGEBRA AND INFINITE SERIES (COMMON TO CS, IT, AD, AM & SC)		
Course Category: Basic Science		Course Level : Introductory	
L: T: P(Hours/Week) 3: 1: 0	Credits:4	Total Contact Hours:60	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Determine the solution of system of equations using echelon forms.
2. Apply the properties of vector spaces.
3. Use the Gram-Schmidt process to orthogonalize set of vectors.
4. Determine the canonical form of a quadratic form using orthogonal transformation.
5. Use different testing methods to check the convergence of infinite series.

Unit I Matrices 9+3 Hours

System of linear equations – Homogeneous and Non homogeneous forms – row echelon form– row reduced echelon form – rank of a matrix – Crout"s method – Applications to linear systems.

Unit II Basis and Dimension of Vector Spaces 9+3 Hours

Vector spaces – Linear dependence of vectors – Basis, dimension, row space, column space, null space, rank nullity theorem – Linear transformations – matrix associated with a linear map, range and kernel of linear map – Inverse of linear transformation.

Unit III Orthogonality and Inner Product Space 9+3 Hours

Inner product space of vectors – Inner product spaces – length of a vector, distance between two vectors, orthogonally of vectors – orthogonal projection of a vector – Gram-Schmidt process – orthonormal basis.

Unit IV Eigen Values and Eigen Vectors 9+3 Hours

Eigen values and vectors – symmetric, skew symmetric and orthogonal matrices – Diagonalization of symmetric matrices through orthogonal transformation – reduction of quadratic forms to canonical form-rank, index, and signature nature of quadratic forms – Singular Value decomposition.

Unit V Sequences and Series 9+3 Hours

Sequences – definitions and examples – Series – Tests for convergence – comparison test, integral test, Cauchy"s root test, Alembert"s ratio test – Alternating series – Leibnitz"s test.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Solve system of equations using echelon forms	Apply
CO2: Apply the properties of vector spaces	Apply
CO3: Determine orthogonal set of vectors using Gram Schmidt orthogonalprocess	Apply
CO4: Determine the canonical form of a quadratic form using orthogonaltransformation	Apply
CO5: Use different testing methods to check the convergence of infinite series	Apply

Text Book(s):

T1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & sons, 2010, 10th Edition

T2. David C Lay, "Linear Algebra and its Applications", Pearson India, 2011, 3rd Edition.

T3. Howard Anton, Chris Rorres, "Elementary Linear Algebra Applications version", 9th Edition.

Reference Book(s):

R1. T.Veerarajan, "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi,2008.

R2. V. Krsihnamurthy, V. P. Mainra and J. L. Arora, "An Introduction to Linear Algebra", Affiliated East-West press, Re-print 2005

Web References:

1. https://nptel.ac.in/downloads/111102011/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	-	1	-	1	1	1	1	2
CO2	3	2	1	1	-	1	-	1	1	1	1	2
CO3	3	2	1	1	-	1	-	1	1	1	1	2
CO4	3	2	1	1	-	1	-	1	1	1	1	2
CO5	3	2	1	1	-	1	-	1	1	1	1	2

High-3; Medium-2; Low-1

Course Code: 19ENHG2101	Course Title: COMMUNICATION SKILLS – I (Common to all B.E/B.Tech Programmes)		
Course Category: Humanities		Course Level : Introductory	
L: T: P(Hours/Week) 2: 0: 2	Credits:3	Total Contact Hours:60	Max. Marks:100

Pre-requisites

- The student should have undergone English as his/her first or second language in school.

Course Objectives

The course is intended to:

1. Listen and understand monologues and dialogues of a native speaker on par with B1 of CEFR level.
2. Speak in simple sentences to convey their opinions and ideas on par with B1 of CEFR level
3. Read and infer a given text on par with B1 of CEFR level
4. Draft basic formal written communication on par with B1 of CEFR level

Unit I Listening **15 Hours**

Importance of active listening – Physical condition needed for active listening – Identifying relevant points while taking notes – Framing questions at different linguistic contexts – Listening for specific details of concrete monologues and dialogues – Listening to organize ideas – Developing ideas – Listening to compose paragraphs – Paraphrasing the aural input

Unit II Speaking **15 Hours**

map – Collecting points from various sources – Identifying relevant ideas needed for the speech – Using mind-map to organize thought processing – Prioritizing the ideas – Types of sentences – Frequently used words (Institution, home and leisure) – Mother Tongue Influence

– Expressing the thoughts in simple sentences – Tenses & Voices (Active & Passive) – Postures, gestures and eye contact – Intonation and Sentence stress – Express one's thoughts coherently.

Unit III Reading **15 Hours**

Reading strategies – Skimming -Scanning - Interpretation of visual data – Factual texts on subjects of relevance – Inferring texts – Reading to write a review – Checking the accuracy of reading while presenting the interpreted data – Reading to comprehend.

Unit IV Writing **15 Hours**

WritingSimple and short sentences – Writing E-mail, Memo, Note and Message – Letter Writing – Importance of punctuations – Identifying the main points – Organising the main ideas – Writing a draft.

List of Tasks

1. BEC Preliminary Listening Test – I & Speaking Test – 1
2. BEC Preliminary Listening Test – 2 & Speaking Test – 2
3. BEC Preliminary Listening Test – 3 & Speaking Test – 3
4. BEC Preliminary Listening Test – 4 & Speaking Test – 4
5. BEC Preliminary Listening Test – 5 & Speaking Test – 5
6. BEC Preliminary Listening Test – 6 & Speaking Test – 6

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Listen actively and paraphrase simple messages and specific details of concrete monologues and dialogues.	Apply
CO2: Express one's views coherently in a simple manner.	Apply
CO3: Read and comprehend factual texts on subjects of relevance.	Apply
CO4: Write texts bearing direct meanings for different contexts maintaining an appropriate style.	Apply
	Apply

Text Book(s):

T1. Whitby Norman, “Business Benchmark Pre-intermediate to Intermediate Students" Book”, CUP Publications, 2nd Edition, 2014.

T2. Wood Ian, Williams Anne, Cowper Anna, “Pass Cambridge BEC Preliminary”, 2nd Edition, Cengage Learning, 2015.

T3. Learners Book prepared by the Faculty members of Department of English.

Reference Book(s):

R1. BEC-Preliminary - Cambridge Handbook for Language Teachers, 2nd Edition, CUP 2000.

R2. Hewings Martin - Advanced Grammar in use - Upper-intermediate Proficiency, CUP, 3rd Edition, 2013.

Web References:

http://www.grammarinenglish.com -Jan 23, 2018

https://www.northshore.edu/support_centre /pdf/listen-notes.pdf

http://www.examenglish.com/BEC/BEC_Vantage.html- Jan 23, 2018

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	2	3	3	-	2	-	-
CO2	-	-	-	-	-	-	-	2	3	3	-	2	-	-
CO3	-	-	-	-	-	-	-	1	-	3	-	2	-	-
CO4	-	-	-	-	-	-	-	1	-	3	-	2	-	-

High-3; Medium-2; Low-1

Course Code: 19PHBC2002	Course Title: PHYSICS FOR INFORMATION SCIENCES (common to CS, IT, AD, AM & SC)		
Course Category: Basic Science		Course Level : Introductory	
L: T: P(Hours/Week) 3: 0: 2	Credits:4	Total Contact Hours: 75	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Explain the fundamental concepts of light.

2. Illustrate the characteristics, principles and applications of laser.

3 Explain the mode of propagation and losses in optical fibers.

4. Identify a suitable technique for fabricating integrated circuits.

5. Use the concept of luminescence in various electronic display devices..

Unit I Wave Optics 9 Hours

Nature of Light – Laws of reflection and refraction – Total internal reflection – Reflectivity and Transmissivity – The electromagnetic spectrum – properties of electromagnetic radiation – Interference of light waves- Young's double slit experiment – Newton's rings : determination of radius of bright and dark rings – Diffraction of light waves – Fresnel and Fraunhofer diffraction at single slit and circular aperture – Diffraction grating and resolving power.

Unit II Laser 9 Hours

Characteristics of laser light- Einstein's theory of matter radiation interaction A& B Coefficients– Stimulated and spontaneous emissions of radiations – Population inversion and pumping methods – Types of laser: Neodymium Yttrium Aluminum (Nd: YAG) laser and Carbon di oxide (CO_2) molecular gas laser – Semiconductor laser (Homo junction and hetro junction) – Applications: Holograms and Holographic data storage (record/read).

Unit III Fiber Optics 9 Hours

Optical fibers – Principle of light propagation through optical fibers – Expressions for numerical aperture and acceptance angle – Types of optical fibers based on material, refractive index, and mode of propagation – Fabrication of optical fiber: Double crucible method – Dispersion and

attenuation in optical fiber – Photo detectors: PN, PIN & Avalanche photo diodes – Fiber optic communication system and its advantages

Unit IV Integrated Circuits **9 Hours**

Introduction to semiconductors: Intrinsic and extrinsic semiconductors – Advantages of Integrated circuits (ICs) over discrete components – IC classification – Construction of bipolar transistor – Epitaxial growth & Oxidation – Photolithography- Isolation diffusion – Base diffusion– Emitter diffusion – Contact mask – Aluminium metallization – Passivation – Structures of integrated PNP transistor.

Unit V Display Devices **9 Hours**

Human vision – Red, Blue, and Green (RGB) color scheme – Primary and secondary colors – Color addition and subtraction – Optical Emissions: Luminescence, photoluminescence, cathodoluminescence – electroluminescence – Injection electro Luminescence – Displays (Working principles): Plasma display, LED display, Liquid crystal display (LCD) and Numeric display.

List of Experiments **30 Hours**

1. Determination of Laser parameters – Wave length and particle size.

2. Determination of Acceptance angle and Numerical aperture of an optical fiber.

3. Determination of band gap of semi conducting material – Thermistor.

4. Light Illumination characteristics of Light Dependent Resistor.

5. Thickness of thin material – Air wedge.

6. Determination of wavelength of the given light source using spectrometer.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Explain the fundamentals of light and properties of electromagnetic spectrum	Understand
CO2: Explain the application of Laser through their properties	Understand
CO3: Differentiate various types of optical fiber and its usefulness towards industrial applications	Understand
CO4: Explain the suitable methodology for fabricating integrated circuits	Understand
CO5: Describe the concept of colors and luminescence in various display devices	Understand

Text Book(s):

T1. M. N. Avadhanulu and P. G. Kshirsagar, “Text Book of Engineering Physics”, S. Chand & Company Ltd., New Delhi, 2018.

T2. David Armitage, “Introduction to Micro displays”, John Wiley & Ltd, 2006.

T3. D. Roy Choudhry, Shail Jain, “Linear Integrated Circuits”, 3rd Edition, New Age International Pvt. Ltd, 2010.

Reference Book(s):

R1. D. Halliday., R. Resnick and J. Walker, “Fundamentals of Physics”, Wiley Publications, 10th Edition, 2014

R2. Ajoy Ghatak,“Optics”,Tata McGraw-Hill Education, New Delhi, 5th Edition, 2012.

R3. A. Marikani,“Engineering Physics”, 2nd Edition, PHI Learning, New Delhi, 2014.

R4. Dr. Jayaraman, V.Umadevi, S.Maruthamuthu and B. Saravanakumar, “Engineering Physics Laboratory Manual”, Pearson Publishers, New Delhi, 2014

Web References:

1. https://onlinecourses.nptel.ac.in/noc17_cy07/preview
2. https://onlinecourses.nptel.ac.in/noc17_ph01/preview
3. http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	1	-	-	-	1	2	3	2	-	1	-	-
CO2	2	1	1	-	-	-	1	2	3	2	-	1	-	-
CO3	2	1	1	-	-	-	1	2	3	2	-	1	-	-
CO4	2	1	1	-	-	-	1	2	3	2	-	1	-	-
CO5	2	1	1	-	-	-	1	1	-	1	-	1	-	-

High-3; Medium-2; Low-1

Course Code: 19EESC2101	Course Title: Introduction to Electrical and Electronics Engineering(common to CS, IT, AD, AM & SC)		
Course Category: Engineering Science		Course Level : Introductory	
L: T: P(Hours/Week) 3: 0: 2	Credits:4	Total Contact Hours:75	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1.Explain basics of DC circuits

2. Explain the fundamentals of AC circuits

3. Describe the basic electrical machines

4. Summarize the semiconductor devices

5. Outline the display devices and transducers

6. Utilize carpentry and piping methods

Unit I Fundamentals of DC Circuits 9 Hours

Definition, symbol and unit of quantities – Active and Passive elements – Ohm‟s Law: statement, illustration and limitation – Kirchhoff‟s Laws: statement and illustration – Resistance in series and voltage division rule – Resistance in parallel and current division rule – Method of solving a circuit by Kirchhoff‟s laws – Star to Delta and Delta to Star transformation.

Unit II AC Fundamentals 9 Hours

Magnetic Circuits: Definition of magnetic quantities – Law of electromagnetic induction – Generation of single phase alternating EMF – Terminology – 3 Phase System: 3-Wire and 4 Wire system – Root Mean Square (RMS) – Average value of AC – Phasor representation of alternating quantities – Pure Resistive, Inductive and Capacitive circuits

Unit III Electrical Machines3 9 Hours

DC Generator and DC Motor: Construction, Working Principle, Characteristics of shunt and series motor – Single phase transformer: Construction, working principle - Three phase and Capacitor start and run single phase induction motor: Construction and Working Principle.

Unit IV Semiconductor Devices **9 Hours**

Theory of Semiconductor: PN junction diode, Forward Bias Conduction, Reverse Bias Conduction, V-I Characteristics – Bipolar Junction Transistor: Operation of NPN and PNP Transistor, Common Emitter Configuration – Field Effect Transistor & MOSFET: construction and working principle

Unit V Display Devices and Transducers **9 Hours**

Opto-Electronic Devices: Working principle of Photoconductive Cell, Photovoltaic Cell-solar cell Display Devices: Light Emitting Diode (LED) – Liquid Crystal Display (LCD) – Transducers: Capacitive and Inductive Transducer, Thermistors, Piezoelectric and Photoelectric Transducer.

List of Experiments **30 Hours**

[A]Electrical & Electronics :

1.Identification of resistor and capacitor values

2.Soldering practice of simple circuit and checking the continuity

3.Fluorescent tube, staircase, house wiring and need for earthing

[B]Civil & Mechanical:

1.Make a wooden Tee joint to the required dimension

2.Make a tray in sheet metal to the required dimension

3. Assemble the pipeline connections with different joining components for the given layout.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1:Explain basic laws and simplification techniques in electrical engineering using DC Circuits	Understand
CO2:Explain the fundamentals and basic principles of AC Circuits	Understand
CO3:Describe the principles of basic electrical machines	Understand
CO4:Summarize the working of semiconductor devices	Understand
CO5:Outline the features of display devices and transducers	Understand
CO6: Utilize Carpentry and Piping methods	Apply

Text Book(s):

T1.R.Muthusubramanian and S.Salivahanan, “Basic Electrical and Electronics Engineering”,

McGraw Hill India Limited, New Delhi, 2014.

Reference Book(s):

R1.B.L Theraja, “Fundamental of Electrical Engineering and Electronics”, S.Chand Limited – 2006

R2.J.B.Gupta, “Basic Electrical and Electronics Engineering”, S.K.Kataria & Sons, 2009.

R3. Smarajit Ghosh, “Fundamental of Electrical and Electronics Engineering”, 2nd Edition, PHI Learning Private Limited New Delhi, 2010.

R4. S. K. Sadhev, “Basic Electrical Engineering and Electronics ”, Tata Mcgraw Hill, 2017.

Web References:

1.https://www.nptel.ac.in/courses/108108076/

2.https://www.oreilly.com/library/view/basic-electrical-and/9789332579170/

3.http://www.ait.ac.jp/en/faculty/lab-enginnering/latter/elec-material/

4.http://www.electrical4u.com

5 http://www.allaboutcircuits.com

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2
CO1	2	1	-	-	-	-	-	2	3	2	-	-	-	-
CO2	2	1	-	-	-	-	-	2	3	2	-	-	-	-
CO3	2	1	-	-	-	-	-	2	3	2	-	-	-	-
CO4	2	1	-	-	-	-	-	1	-	1	-	-	-	-
CO5	2	2	-	-	-	-	-	1	-	1	-	-	-	-
CO6	3	2	1	1	-	-	-	2	3	2	-	-	-	-

High-3; Medium-2; Low-1

Course Code: 19CSSN2101	Course Title: Fundamentals of Programming		
Course Category: Engineering Science		Course Level : Introductory	
L: T: P(Hours/Week) 3: 0: 2	Credits:4	Total Contact Hours:75	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Develop solutions using problem solving techniques

2. Design pseudo code using suitable selection and repetition structures

3. Choose appropriate data types, variables and I/O statements

4. Develop programs using selection and iteration statements

5. Construct programs using arrays

Unit I Introduction to Programming 9 Hours

General Problem Solving Strategy – Program Development Cycle – Basic Programming Concepts: A Simple Program, Data Input, Program Variables and Constants – Data Types – Data Processing and Output – Problem solving techniques: Algorithm, flowchart, pseudocode.– Case study: RAPTORS

Unit II Program Development and Control Structures 9 Hours

Program Development: Program Design, Coding, Documenting and Testing a Program – Control Structures: Sequential Structure – Decision structure: single-alternative, dual- alternative, multiple-alternative structure – Loop structure: repeat-until, while, do-while, for.

Unit III Data Types and Operators In C 9 Hours

Overview of C – Structure of C program – Executing a C program – C Character set – keywords- Identifier – Variables and Constants – Data types – Type conversion – Operators and Expressions – Managing formatted and unformatted Input & Output operation.

Unit IV Control Structures **9 Hours**

Statements: Selection statements: if, if-else, nested if-else, if-else-if ladder, switch – Jump statements: break, continue, goto, return – Iteration statements: for, nested for, while, do-while-exit – Storage classes.

Unit V Arrays **9 Hours**

Declaration – Initialization – Characteristics of Array – One-dimensional array – Two- dimensional array – Array Operations – Applications: Linear search, Binary search, Selection sort, Bubble sort, Matrix Operations.

List of Exercises **30 Hours**

1. Solve simple problems using RAPTOR
2. Generate flowchart using control structures using RAPTOR
3. Create C Program to process data types, operators and expression evaluation
4. Develop C Program using formatted and unformatted I/O operations
5. Construct C Program using selection and iteration statements
6. Develop C Program using arrays and array applications such as searching, sorting and matrix operations

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1.Develop solutions using problem solving techniques	Apply
CO2. Write pseudo code using suitable selection and repetition structures for a real time application	Apply
CO3. Choose appropriate data types, variables and I/O statements for solving problems	Apply
CO4: Develop programs using selection and iteration statements for a given scenario	Apply
CO5: Construct programs using arrays for various real time applications	Apply

Text Book(s):

T1. Venit S, and Drake E, “Prelude to Programming Concepts and Design”, 6th Edition, Pearson Education, 2015.

T2. Ajay Mittal, “Programming in C – A Practical Approach”, Pearson Education, 2010

Reference Book(s):

R1.R.G.Dromey, “How to Solve it by Computer”, 2nd Edition, Pearson Education, India, 2008

R2.Yashavant. P. Kanetkar “Let Us C”, 16th Edition, BPB Publications, 2018

R3. PradipDey, ManasGhosh, “Computer Fundamentals and Programming in C”, 2nd Edition, Oxford University Press, 2013

Web References:

http://raptor.martincarlisle.com/

http://www.cprogramming.com/

http://www.c4learn.com/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	2	2	2	1	1	2	3	2	-	2	3	-
CO2	3	2	2	2	2	1	1	2	3	2	-	2	3	-
CO3	3	2	2	2	2	1	1	2	3	2	-	2	3	-
CO4	3	2	2	2	2	1	1	2	3	2	-	2	3	1
CO5	3	2	2	2	2	1	1	2	3	2	-	2	3	1

High-3; Medium-2; Low-1

Course Code: 19PSHG6001	Course Title: Wellness for Students		
Course Category: Humanities		Course Level : Introductory	
L: T: P(Hours/Week) 0: 0: 2	Credits:1	Total Contact Hours:30	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Set SMART goals for academic, career and life

2. Apply time management techniques

3.Articulate the importance of wellness for success in life.

4. Understand the dimensions of wellbeing and relevant practices

Unit I Goal Setting

Understanding Vision and mission statements - Writing personal mission statements –„Focus" as a way of life of most successful people. Clarifying personal values, interests and orientations – Awareness of opportunities ahead – Personal SWOT analysis - Principles driving goal setting: Principle of response and stimuli, Circle of influence and circle of concern, What you see depends on the role you assume. Potential obstacles to setting and reaching your goals - Five steps to goals setting: SMART goals, Inclusive goals, Positive stretch, Pain vs gain, Gun-point commitment.

Unit II Time Management - Tools and Techniques

Importance of planning and working to time. Pareto 80-20 principle of prioritization – Time quadrants as a way to prioritize weekly tasks – The glass jar principle - Handling time wasters – Assertiveness, the art of saying „NO" – Managing procrastination

Unit III Practices for Physical Wellness

Concept of wellness – impact of absence of wellness - Wellness as important component to achieve success. Wellbeing as per WHO - Dimensions of Wellbeing: Physical, Mental, Social, Spiritual – indicators and assessment methods.

Simplified Physical Exercises. Fitness as a subset of Wellness – health related physical fitness - skill related physical fitness. Joint movements, Warm up exercises, simple asanas, WCSC simplified exercises

Unit IV Practices for Mental Wellness

Meditation: Mind and its functions - mind wave frequency – Simple basic meditation – WCSC meditation and introspection tables. Greatness of friendship and social welfare – individual, family and world peace – blessings and benefits.
Food & sleep for wellness: balanced diet - good food habits for better health (anatomic therapy) – hazards of junk food - food and the gunas

Unit V Putting into Practice

Practicals: Using the weekly journal – Executing and achieving short term goals – Periodic reviews.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1.Set well-articulated goals for academics career, and personal aspirations	Apply
CO2:Apply time management techniques to complete planned tasks on time	Apply
CO3: Explain the concept of wellness and its importance to be successful in career and life	Apply
CO4: Explain the dimensions of wellness and practices that can promote wellness	Apply
CO5: Demonstrate the practices that can promote wellness	Valuing

Text Book(s):

T1. Richard Stim, “Intellectual Property: Copyrights, Trademark and Patents”, Cengage learning, 2nd edition 2012.

Reference Book(s):

R1.Stephen R Covey, “First things first”, Simon & Schuster Uk, Aug 1997.

R2.Sean Covey, “Seven habits of highly effective teenagers”, Simon & Schuster Uk, 2004

R3.Vethathiri Maharishi Institute for Spiritual and Intuitional Education, Aliyar, “Valueeducation for harmonious life (Manavalakalai Yoga)”, Vethathiri Publications, Erode, I Ed. (2010).

R4. Dr. R. Nagarathna, Dr.H.R. Nagendra, “Integrated approach of yoga therapy for positive health”, Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.

R5. Tony Buzan, Harper Collins, The Power of Physical Intelligence (English).

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	1	-	1	-	-
CO2	-	-	-	-	-	-	-	-	1	-	1	1	-	-
CO3	-	-	-	-	-	-	-	-	1	-	-	1	-	-
CO4	-	-	-	-	-	-	-	-	1	-	-	1	-	-
CO5	-	-	-	-	-	1	1	-	1	-	-	1	-	-

High-3; Medium-2; Low-1

Semester – II

Course Code: 19MABC1202	Course Title: CALCULUS AND TRANSFORMS (common to CS, IT, AD, AM & SC)		
Course Category: Basic Science		Course Level : Introductory	
L: T: P(Hours/Week) 3: 1: 0	Credits:4	Total Contact Hours:60	Max. Marks:100

Pre-requisites

- NIL

Course Objectives

The course is intended to:

1. Determine the curvature and equation of evolutes of a curve
2. Apply partial derivatives to find extreme values of functions of two variables and to vector fields
3. Determine the solution of first and second order ordinary differential equations
4. Compute the Fourier series expansion for given periodic functions
5. Compute Z transform and inverse transform for discrete time sequences

Unit I Differential Calculus 9+3 Hours

Curvature – Cartesian and Polar coordinates – radius of curvature – center of curvature – circleof curvature – Evolutes and Involutes

Unit II Multivariable Calculus 9+3 Hours

Partial derivatives – total derivatives – Jacobian – maxima and minima and saddle points – method of lagrange multipliers – Gradient – directional derivative – curl and divergence.

Unit III Ordinary Differential Equations of First and Second Order 9+3 Hours

Solution of differential equations of first order and first degree: homogeneous form – linear form and exact differential equations — Second order linear differential equations with constant coefficients – Solution by variation of parameters.

Unit IV Fourier Series 9+3 Hours

Fourier series – Dirichlet's condition – Half range sine and cosine series – Parseval's identity –Harmonic Analysis – Applications.

Unit V Z Transforms **9+3 Hours**

Z transform — region of convergence — properties of z transforms — inverse transform — Solution to homogeneous linear constant difference equations – Interpretation of stability in Zdomain.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Determine the curvature and equation of evolutes of a curve using differentiation techniques	Apply
CO2: Apply partial derivatives to find extreme values of functions and to vector fields	Apply
CO3: Solve the various types of first, second and higher order ordinary differential equations using various techniques	Apply
CO4: Compute the Fourier series expansion for given periodic functions	Apply
CO5: Compute Z transform and inverse transform for discrete time sequences	Apply

Text Book(s):

T1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Edition, John Wiley & sons, 2010.

T2. B.S.Grewal, “Higher Engineering Mathematics”, 43rd Edition, Khanna Publishers, 2014.

Reference Book(s):

R1. Veerarajan, “Engineering Mathematics”, 3rd Edition, Tata McGraw-Hill, New Delhi, 2010.

R2. Srimanta Pal &Subodh C. Bhunia. “Engineering Mathematics”, Oxford University Press, 2015.

Web References:

1. https://nptel.ac.in/courses/117105134/15
2. https://nptel.ac.in/courses/122101003/44

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	1	-	1	1	1	1	2	-	-
CO2	3	2	1	1	-	1	-	1	1	1	1	2	-	-
CO3	3	2	1	1	-	1	-	1	1	1	1	2	-	-
CO4	3	2	1	1	-	1	-	1	1	1	1	2	-	-
CO5	3	2	1	1	-	1	-	1	1	1	1	2	-	-

High-3; Medium-2; Low-1

Course Code: 19ENHG2201	Course Title: COMMUNICATION SKILLS – II (Common to all B.E/B.Tech Programmes)		
Course Category: Humanities		Course Level : Introductory	
L: T: P(Hours/Week) 2: 0: 2	Credits:3	Total Contact Hours:60	Max. Marks:100

Pre-requisites

- Communication Skills – I

Course Objectives

The course is intended to:

1. Listen and understand monologues and dialogues of a native speaker on par with B2 of CEFR level
2. Speak in simple sentences to convey their opinion and ideas on par with B2 of CEFR level
3. Read and infer a given text on par with B2 of CEFR level
4. Draft basic formal written communication on par with B2 of CEFR level

Unit I Listening 15 Hours

Importance and purpose of extensive listening and intensive listening – Body Language – Listening tasks on complex and abstract themes – Correlating Ideas related to listening input –importance of empathetic – listening for main ideas – Paraphrasing – Listening to native speakers English – Compound and Complex sentences – Developing ideas – Listening to compose paragraphs.

Unit II Speaking 15 Hours

Jotting down ideas collected from listening to speak – organising the ideas – Expressing one's view coherently – Understanding grammatical elements (Noun – Pronoun Antecedent) – Expressing ideas assertively – Answering questions during presentations – Understanding the use of discourse markers – word stress and sentence stress – voice modulation and pauses –Highlighting significant points – interpretation of visual data – Using verbal cues – Preparing simple hand — outs.

Unit III Reading **15 Hours**

Reading strategies – Skimming &Scanning – Inferring meaning- Barriers to reading – sub vocalisation, Eye fixation, Regression – Speed Reading Techniques - Reading different types of texts and their contexts with speed – Note making – Reading a review – Paraphrasing –Reading to comprehend.

Unit IV Writing **15 Hours**

Reported speech & Concord (Subject – verb Agreement) – Report writing – Different kinds ofReport – Structure of the report – Writing Proposal – Plagiarism – References – Appendices – Techniques for Report writing – Registers.

List of Tasks

1. BEC Vantage Listening Test – I & Speaking Test – 1
2. BEC Vantage Listening Test – 2 & Speaking Test – 2
3. BEC Vantage Listening Test – 3 & Speaking Test – 3
4. BEC Vantage Listening Test – 4 & Speaking Test – 4
5. BEC Vantage Listening Test – 5 & Speaking Test – 5
6. BEC Vantage Listening Test – 6 & Speaking Test – 6

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO6: Listen actively and empathetically, and paraphrase discussions and presentations on complex and abstract themes and topics	Apply
CO2: Express one's views coherently, fluently and confidently highlighting the significant points with supporting details	Apply
CO3: Read and comprehend different types of texts and their contexts reasonably at moderate speed	Understand
CO4: Write detailed reports on variety of subjects synthesizing information gathered during listening & reading citing appropriate references	Apply

Text Book(s):

T1. Whitby Norman, “Business Benchmark Upper Intermediate Students’ Book”, 2nd Edition, CUP Publications, 2014.

T2. Learners Book prepared by the Faculty members of Department of English.

Reference Book(s):

R1. Cambridge BEC Vantage - Practice Tests, Self-study Edition, Cambridge UniversityPress, 2002.

R2. Hewings Martin, “Advanced Grammar in use - Upper-intermediate Proficiency”, 3rd Edition, CUP, 2013.

Web References:

1. http://www.grammarinenglish.com-Jan 23,2018
2. https://www.northshore.edu/support_centre/pdf/listen-notes.pdf
3. http://www.examenglish.com/BEC/BEC_Vantage.html-Jan 23, 2018

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	2	3	3	-	2	-	-
CO2	-	-	-	-	-	-	-	2	3	3	-	2	-	-
CO3	-	-	-	-	-	-	-	1	-	3	-	2	-	-
CO4	-	-	-	-	-	-	-	1	-	3	-	2	-	-

High-3; Medium-2; Low-1

Course Code: 19ECSC2201	Course Title: DIGITAL SYSTEM DESIGN (common to CS, IT, AD, AM & SC)		
Course Category: Engineering Science		Course Level : Introductory	
L: T: P(Hours/Week) 2: 0: 2	Credits:3	Total Contact Hours:60	Max. Marks:100

Pre-requisites

- Introduction to Electrical and Electronics Engineering

Course Objectives

The course is intended to:

1. Identify and explain fundamental concepts of digital logic design

2. Explain logic processes and implement logical operations using combinational logic circuits

3. Understand concepts of synchronous sequential circuits and to analyze synchronous sequential systems

4. Understand concepts of asynchronous sequential circuits and to analyze asynchronous sequential systems

5. Understand the basic computer system and the peripherals

Unit I Digital Fundamentals 6 Hours

Number System Representation and Conversion - Logic Gates, Universal Gates - Boolean Algebra and Simplification Techniques: SOP – POS and Karnaugh Map Methods for BooleanExpression Simplification.

Unit II Combinational Circuits 6 Hours

Implementing Combinational Logic - Arithmetic Circuits: Full Adder – Full Subtractor - Magnitude Comparator – Multiplexer – Demultiplexer – Encoder and Decoder.

Unit III Synchronous Sequential Circuits 6 Hours

Flip-Flop: RS - JK – T and D – Types of Triggering – Analysis of synchronous sequential circuit- Shift Register.

Unit IV Asynchronous Sequential Circuits **6 Hours**

Analysis of asynchronous sequential circuit – Hazards – Static, Dynamic and Essential Hazards

Unit V Basic Computer System, Memory and I/O Peripherals **6 Hours**

Computer System — Computer Memory - Random Access Memory - Read Only Memory - Expanding Memory Capacity – Input / Output Devices - Secondary Storage.

List of Experiments **30 Hours**

1. Verification of Boolean theorems using digital logic gates
2. Implementation of combinational circuits using basic gates
3. Logic verification of half adder and full adder
4. Logic verification of Multiplexer / Demultiplexer
5. Logic verification of 4 bit shift register
6. Logic verification of 3 bit binary counter

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Explain fundamental concepts in digital logic design	Apply
CO7: Explain the design of combinational logic circuits	Apply
CO8: Elucidate the analysis of synchronous sequential logic circuits	Apply
CO9: Elucidate the analysis of asynchronous sequential logic circuits	Apply
CO5: Categorize a computer system including Input /Output devices and Memory devices	Apply

Text Book(s):

T1. Anil K. Maini, “Digital Electronics Principles, Devices and Applications”, John Wiley & Sons, 2007.

T2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, “Computer Organizationand Embedded Systems”, 6th Edition, McGraw-Hill, 2011

Reference Book(s):

R1. Morris Mano, Michael ciletti, “Digital Degin”, 5th Edition, Pearson Publication, New Delhi, 2014.

R2. Charles H.Roth, Jr. “Fundamentals of Logic Design”, 7th Edition, Jaico publishing House, New Delhi, 2014.

R3. Tokheim, “Digital Electronics Principles and Applications”, Tata McGraw Hill, 6th Edition, 2004.
R4. Leach P Donald, Albert Paul Malvino and Goutam Saha, “Digital Principles and Applications”, 7th Edition, Mcgraw Hill, 2010.

Web References:

1. http://www.nptel.ac.in/courses/ 108105132
2. https://www.surrey.ac.uk/Projects/Labview/boolalegebra/index.html
3. https://scilab.in/textbook_run/2672/42/5

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	2	3	2	-	-	-	-
CO2	2	1	-	-	-	-	-	2	3	2	-	-	-	-
CO3	2	1	-	-	-	-	-	2	3	2	-	-	-	-
CO4	2	1	-	-	-	-	-	2	3	2	-	-	-	-
CO5	2	1	-	-	-	-	-	1	-	1	-	-	-	-

High-3; Medium-2; Low-1

Course Code: 19CSSN2201	Course Title: PROGRAMMING WITH C		
Course Category: Engineering Science		Course Level : Introductory	
L: T: P(Hours/Week) 3: 0: 3	Credits:4.5	Total Contact Hours:90	Max. Marks:100

Pre-requisites

- Fundamentals of Programming

Course Objectives

The course is intended to:

1. Write programs using control structures, arrays and functions
2. Construct programs using pointers
3. Choose appropriate string manipulation and graphics functions
4. Construct appropriate structure and union representations
5. Develop programs using preprocessor directives and files

Unit I C Basics and Functions 10 Hours

Program using Control structures and Arrays – Function Declaration & Definition – Return statement – Classification of functions – Parameter passing methods: call by value – call by reference – Passing Array to a Function– Returning Array from a function– Recursion.

Unit II Pointers 10 Hours

Features of Pointer – Pointer Declaration – void Pointer– Null Pointer – Operations on Pointers– Pointers and Arrays – Array of Pointers – Pointer to a Pointer– Pointer to an Array – Pointerto a function — Dynamic memory allocation.

Unit III Strings and Graphics 7 Hours

Strings: Declaration and Initialization of string – Display of strings with different formats – String standard Functions – String conversion functions – Graphics: Initialization of Graphics – Graphics functions – Programs Using Library Functions.

Unit IV Structures and Union 9 Hours

Declaration & Initialization of Structures – Structure within Structure – Array of Structures –Pointer to Structures – Structure and Functions – type def – Declaration & Initialization of Union – Operations on Union – Enumerated data type – Bit Fields.

Unit V Preprocessor Directives and Files 9 Hours

Preprocessor Directives: Types – Macros – File inclusion – Conditional compilation directivesFiles: Streams – File access: Sequential access, Random access – File type – File operations(open, close, read, write) – Command line arguments.

List of Exercises **45 Hours**

1. Construct programs using control structures and arrays
2. Develop programs using functions and pointers
3. Design programs for string manipulation
4. Construct programs using graphics functions
5. Develop programs using structures and union
6. Create programs using preprocessor directives and files

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Write programs using control structures, arrays and functions for agiven scenario	Apply
CO2: Construct programs using pointers for a given problem	Apply
CO3: Choose appropriate string manipulation and graphics functions for a Given application	Apply
CO4: Construct appropriate structure and union representations for handling compound data	Apply
CO5: Develop programs using preprocessor directives and files for a given scenario	Apply

Text Book(s):

T1. Ashok N. Kamthane, Amit.A. Kamthane, “Programming in C”, 3rd Edition,

PearsonEducation India, 2015.

T2. Ajay Mittal, “Programming in C – A Practical Approach”, Pearson Education, 2010.

Reference Book(s):

R1. Yashavant. P. Kanetkar “Let Us C”,16th edition, BPB Publications, 2018.

R2. PradipDey, ManasGhosh, “Computer Fundamentals and Programming in C”, 2ndEdition, Oxford University Press, 2013.

R3.Byron S Gottfried, “Programming with C”, Schaum’s Outlines, 2nd Edition, TataMcGraw-Hill, 2006.

Web References:

1. https://electronicsforu.com/resources/15-free-c-programming-ebooks
2. https://www.fromdev.com/2013/10/c-programming-tutorials.html
3. https://books.goalkicker.com/CBook/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	1	1	2	3	2	-	2	3	1
CO2	3	2	2	2	2	1	1	2	3	2	-	2	3	1
CO3	3	2	2	2	2	1	1	2	3	2	-	2	3	2
CO4	3	2	2	2	2	1	1	2	3	2	-	2	3	2
CO5	3	2	2	2	2	1	1	2	3	2	-	2	3	1

High-3; Medium-2; Low-1

Course Code: 19MESC4001	Course Title: Engineering Drawing (Common to AU, CS, EC, EI, IT, ME, AD, AM & SC)		
Course Category: Engineering Science		Course Level : Introductory	
L: T: P(Hours/Week) 1: 0: 3	Credits: 2.5	Total Contact Hours:60	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Develop skills for communication of concepts and ideas
2. Expose them to existing national standards related to technical drawings

Unit I Orthographic Projection 12 Hours

Importance of graphics in engineering applications — Use of drafting instruments — BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning. Projection of points, Projection of straight lines located in the first quadrant. Determination of true lengths and true inclinations. Visualization principles — conversion of pictorial into orthographic views.

Unit II Projection of Solids 12 Hours

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

Unit III Projection of Sectioned Solids 12 Hours

Sectioning of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by cutting planes inclined to one reference plane and perpendicular to the other — Orthographic views of sections of simple solids.

Unit IV Development of Surfaces 12 Hours

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones.

Unit V Isometric Projection 12 Hours

Principles of isometric projection – Isometric scale – Isometric projections of simple solids and truncated solids

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Sketch the orthographic projections of the given pictorial view of the object using first angle projection	Apply
CO2: Sketch the projections of simple solids such as prism, pyramid,cylinder and cone using rotating object method	Apply
CO3: Sketch the projections of simple sectioned solids with all necessary dimensions meeting the standards	Apply
CO4: Sketch the lateral surface of simple solids using straight line and radial line development methods	Apply
CO5: Sketch the isometric view of simple solids and truncated solids using principles of isometric projection	Apply

Text Book(s):

T1. Cencil Jensen, Jay D.Helsel and Dennis R. Short, " Engineering Drawing and Design",Tata McGraw Hill India, New Delhi, 7th Edition, 2017.

T2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, Gujarat,53rd Edition, 2015.

T3. K. V. Natrajan, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai,48th Edition, 2018.

Reference Book(s):

R1. BasantAgarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill India, New Delhi, 2nd Edition, 2013.

R2. John K.C., "Engineering Graphics", PHI Learning, Delhi, 2009.

R3. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" TataMcGraw India, New Delhi, 3rd Edition, 2008.

Publications of Bureau of Indian Standards

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawingsheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Web References:

1. Engineering Drawing - http://nptel.ac.in/courses/112103019/
2. https://en.wikipedia.org/wiki/Engineering_drawing

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	-	-	2	3	2	-	1	-	-
CO2	3	2	2	2	-	-	-	2	3	2	-	1	-	-
CO3	3	2	2	2	-	-	-	2	3	2	-	1	-	-
CO4	3	2	2	2	-	-	-	2	3	2	-	1	-	-
CO5	3	2	2	2	-	-	-	2	3	2	-	1	-	-

High-3; Medium-2; Low-1

Course Code: 19CSSC4001	Course Title: IT PRACTICES LAB (common to CS, IT, AD, AM & SC)		
Course Category: Engineering Science		Course Level : Introductory	
L: T: P(Hours/Week) 1: 0: 4	Credits: 3	Total Contact Hours:75	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Build a web page with all web page elements
2. Develop a web design for any real time application
3. Design a Mobile application with GUI components
4. Build a real time mobile application

Unit I Introduction 7 Hours

Internet and World Wide Web – Web Browser – Web Server – Web Page – URIs and URLs –Client Side Scripting – Server Side Scripting

Study of Open Source Tools: Open Element, MIT App Inventor, any other Open source Tool

Unit II HTML 8 Hours

Structure of HTML -Special Characters and Horizontal rules – Headers - Lists – Tables –Forms – Links – Images - Internal Linking – frameset element - meta Elements.

List of Experiments 60 Hours

Web Applications

1. Develop a web page with image, text, links, tables
2. Build a web page with Menus, Image links and Navigations bars
3. Create a web page with containers and Media
4. Construct a web page to display own resume
5. Construct a web page to display the products of a company

Mobile Applications

6. Design an application with GUI widgets
7. Design an application with Layouts and Media
8. Create an application using Event handlers
9. Develop a calculator application to perform all arithmetic operations
10. Construct an application to calculate BMI

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Build a web page with all web page elements	Apply
CO2: Develop a web design for any real time application	Apply
CO3: Design a Mobile application using mobile development framework involving GUI components	Apply
CO4: Build a real time mobile application to handheld devices	Apply

Reference Book(s):

R1. Harvey M. Deitel , Paul J. Deitel,"Internet and World Wide Web – How to Program", 4thEdition ,Pearson Education Asia, 2009.

R2. David Wolber , Hal Abelson , Ellen Spertus, Liz Looney, "App Inventor 2: Create YourOwn Android Apps", 2nd Edition,O'Reilly Media, 2014.

Course Articulation Matrix

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	2	2	1	1	2	3	2	-	2	3	1
CO2	3	2	2	2	2	1	1	2	3	2	-	2	3	1
CO3	3	2	2	2	2	1	1	2	3	2	-	2	3	-
CO4	3	2	2	2	2	1	1	2	3	2	-	2	3	1

High-3; Medium-2; Low-1

Course Code: 19CHMG6201	Course Title: ENVIRONMENTAL SCIENCES (Common to all B.E/B.Tech Programmes)	
Course Category: Mandatory Non-Credit Course	Course Level : Introductory	
L: T: P(Hours/Week) 1: 0: 0	Total Contact Hours:15	Max. Marks:100

Pre-requisites

- NIL

Course Objectives

The course is intended to:

1. Create awareness for conservation and equitable use of natural resources.

2. Explain the measures of prevention of pollution and disaster management.

3. State the importance of environmental legislation in India.

4. Expose the general environmental issues relevant to human health.

5. Explain the innovative measures for day to day environmental issues.

Unit I Natural Resources 2 Hours

Role of individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

Unit II Environmental Pollution and Disaster Management 2 Hours

Role of an individual in prevention of pollution; Disaster management : floods, earthquake, cyclone and landslides.

Unit III Environmental Ethics and Legislations 2 Hours

Environmental ethics : Environment Protection Act; Air Act; Water Act ; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation.

Unit IV Environmental Issues and Public Awarness 2 Hours

Public awareness - Environment and human health

Unit V Environmental Activities **7 Hours**

(a)* Awareness Activities*:

i) Small group meetings about water management, promotion of recycle use,generation of less waste, avoiding electricity waste
ii) Slogan making event
iii) Poster making event

(b) Actual Activities:

i) Plantation
ii) Cleanliness drive
iii) Drive for segregation of waste
iv) To know about the different varieties of plants
v) Shutting down the fans and ACs of the campus for an hour or so

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Describe the measures for conservation and equitable use of natural resources	Understand
CO2: Describe the measures for pollution prevention and disastermanagement	Understand
CO3: Brief the importance of environmental legislation in India	Understand
CO4: Explain the general environmental issues in relevant to human health	Understand
CO5: Demonstrate innovative measures for day to day environmentalissues	Understand

Text Book(s):

T1.Benny Joseph, “Environmental Studies", Tata McGraw Hill, New Delhi, 2006.

T2.Mackenzie Davis and Susan Masten, “Principles of environmental engineering and science”, Mc-Graw Hill, 3rd Edition, 2014.

Reference Book(s):

R1.Trivedi R.K. “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol.I and II, Enviro Media.

R2.Cunningham, W.P.Cooper,T.H. Gorhani, “Environmental Encyclopedia",Jaico Publishing House, Mumbai, 2001.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO2	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO3	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO4	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO5	1	-	-	-	-	-	-	2	1	2	-	-	-	-

High-3; Medium-2; Low-1

Course Code: 23VAT101		Course Title: HERITAGE OF TAMILS (Common to all B.E/B.Tech Programmes) (Regulation 2023)	
Course Category: Humanities		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:50

Pre–requisites

- NIL

Course Objectives

மாணவர்கள் இப்பாடத்தை கற்றலின் மூலம்

CO.1 மொழி மற்றும் இலக்கியம், பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை , நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் , திணைக் கோட்பாடுகள் மூலம் தமிழர் மரபை அறிந்து கொள்ள இயலும்.

CO.2இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பை அறிந்து கொள்ள இயலும்.

தமிழர் மரபு

அலகு 1 – மொழி மற்றும் இலக்கியம் 3

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு 2 – மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு 3 – நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு 4 – தமிழர்களின் திணைக் கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக் கோட்பாடு – சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறைமுகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு 5 – இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறபகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுய மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப் படிகள்– தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

Course Outcomes	**Cognitive Level**
மாணவர்கள் இப்பாடத்தை கற்றபின்	
CO.1 மொழி மற்றும் இலக்கியம், பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை , நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் , திணைக் கோட்பாடுகள் மூலம் தமிழர் மரபை அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
CO.2 இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பை அறிந்து கொள்வார்கள்.	அறிதல் (Understand)

TEXT - CUM REFERENCE BOOKS

1 தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி – வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by:
Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Course Articulation Matrix

CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

Assessment Pattern

	Assessment Component	CO.No.	Marks	Total
End Semester Examination	Part A – (20 Objective type) – All the questions are compulsory – 4 questions from each unit	CO 1 & CO 2	20x1 = 20 marks	50 marks
	Part B – (10 questions) – All the questions are compulsory – 2 questions from each unit		10x2 = 20 marks	
	Part C – (2 questions) – Answer any 2 out of 5 – 1 question from each unit		2x5 = 10 marks	

Course Code: 23VAT101		Course Title: HERITAGE OF TAMILS (Common to all B.E/B.Tech Programmes) (Regulation 2023)	
Course Category: Humanities		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:50

Pre–requisites

- NIL

Course Objectives

The course is intended to:

1. Understand the Heritage of Tamils in terms of Language and Literature, Rock Art Paintings to Modern Art – Sculpture, Folk and Martial Arts, Thinai Concept.
2. Understand the Contribution of Tamils to Indian National Movement and Indian Culture.

HERITAGE OF TAMILS

UNIT I LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS **3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS **3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE **3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO.1 Understand the Heritage of Tamils in terms of Language and Literature, Rock Art Paintings to Modern Art – Sculpture, Folk and Martial Arts, Thinai Concept.	Understand
CO.2 Understand the Contribution of Tamils to Indian National Movement and Indian Culture.	Understand

TEXT - CUM REFERENCE BOOKS

1 தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி – வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by:
Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

Assessment Pattern

	Assessment Component	CO.No.	Marks	Total
End Semester Examination	Part A – (20 Objective type) – All the questions are compulsory – 4 questions from each unit	CO 1 & CO 2	20x1 = 20 marks	50 marks
	Part B – (10 questions) – All the questions are compulsory – 2 questions from each unit		10x2 = 20 marks	
	Part C – (2 questions) – Answer any 2 out of 5 – 1 question from each unit		2x5 = 10 marks	

Semester III

Course Code: 19MABC1303	Course Title: DISCRETE MATHEMATICS (Common to CS, IT, AM & SC)		
Course Category: Basic Science		Course Level : Introductory	
L:T:P (Hours/Week) 3: 1: 0	Credits:4	Total Contact Hours:60	Max. Marks:100

Pre-requisites

- Linear Algebra and Infinite Series

Course Objectives

The course is intended to:

1.Use the concepts of propositional logic to test the validity of arguments

2.Use the concepts of sets, relations and functions in programming

3.Use combinatory in counting problems

4.Use the concepts of groups to study the algebraic structures

5.Use Euclidean algorithm to compute gcd and congruence equations

Unit I Logic 9+3 Hours

Propositions – Logical operators – Logical equivalences and implications – Normal forms – Rules of inference – Consistency and inconsistency – Theory of Inference – Proofs – Predicates-Quantifiers – Universe of discourse – Validity of arguments.

Unit II Relations, Lattices and Functions 9+3 Hours

Relations – Types of relations – Properties of relations – Equivalence relations – Relational matrix – Graph of relations – Partial ordering relation – Poset – Hasse Diagram – Lattices – Properties of Lattices. Functions – Type of functions: Injective, surjective and bijective functions – Composition of functions – Inverse functions.

Unit III Combinatory 9+3 Hours

Mathematical induction – Basics of counting – Pigeon hole principle – Permutations with and without repetition – Circular permutation – Combinations – Recurrence relations – Solution of linear recurrence relations.

Unit IV Algebraic Structures 9+3 Hours

Algebraic Systems – properties – Semi groups and monoids – Homomorphism – Sub semi groups and sub monoids – Groups – Abelian group – Cyclic group – Cosets – Lagrange's theorem – Codes and Group codes.

Unit V Divisibility and Congruence 9+3 Hours

Division Algorithm – Prime and Composite Numbers – Fundamental theorem of Arithmetic – Euclidean algorithm – GCD and LCM – Congruence – Linear congruence – Chinese Remainder Theorem.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Apply logic to test the validity of arguments	Apply
CO2: Apply the concepts of sets, relations and functions in discrete structures	Apply
CO3: Solve the counting problems using combinatorics	Apply
CO4: Apply the concepts of groups and its properties to algebraic structures	Apply
CO5: Compute GCD using Euclidean algorithm and solve system of linear	Apply

Text Book(s):

T1. J.P.Tremblay, R. Manohar, "Discrete Mathematical Structures with applications to Computer Science", TMH International Edition, July 2017.

T2. T.Veerarajan, "Discrete Mathematical Structures with Graph Theory and Combinatorics", Tata McGraw-Hill Education Private Limited, New Delhi, July 2017.

Reference Book(s):

R1. Kennth H. Rosen, "Discrete Mathematics and Its Applications", 7th Edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, July 2017.

R2. Ralph P Grimaldi, Ramana. B. V, " Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education India, 2011.

R3. Tom M.Apostol,"Introduction to Analytic Number Theory", Springer Science + Business Media, Newyork, 1976.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	1	-	1	1	1	1	2	-	-
CO2	3	2	1	1	-	1	-	1	1	1	1	2	-	-
CO3	3	2	1	1	-	1	-	1	1	1	1	2	-	-
CO4	3	2	1	1	-	1	-	1	1	1	1	2	-	-
CO5	3	2	1	1	-	1	-	1	1	1	1	2	-	-

High-3; Medium-2; Low-1

Course Code: 19SCCC2301	Course Title: DATA STRUCTURES AND ALGORITHM ANALYSIS (Common to SC & AM)		
Course Category: Professional Core		Course Level : Introductory	
L:T:P (Hours/Week) 3: 0: 2	Credits:4	Total Contact Hours: 75	Max. Marks:100

Pre-requisites

- NIL

Course Objectives

The course is intended to:

1.Explain the algorithm to solve problems using design strategies and estimate their Complexities.

2. Implement linear data structures.

3. Implement the stack and queue operations.

4. Implement non – linear data structures.

5. Implement solutions using various searching and sorting techniques to solve problems.

Unit I Algorithm Design and Analysis 9 Hours

Introduction – Classification of Data Structures – Abstract data type – Algorithm properties – Fundamentals of Algorithmic Problem Solving –The Analysis framework – Asymptotic notations and Basic Efficiency classes.

Unit II Linked List 9 Hours

Introduction to Abstract Data Type (ADT) – Linked list - Doubly-linked lists – circular linked list – Cursor implementation of linked lists - applications of lists.

Unit III Stack and Queue 9 Hours

Stack – Implementation – Applications: Infix to Postfix conversion, Evaluation of Postfix expression – Queue – Array Implementation of Queues – Circular Queue – Applications.

Unit IV Trees and Graphs **9 Hours**

Trees – Terminologies – Binary Trees – Search Tree ADT – AVL Trees - Tree Traversals - Graph: Definitions - Representation of Graph – Shortest Path Algorithms – Depth First Search – Breadth First Search.

Unit V Searching and Sorting Algorithm **9 Hours**

Searching: Sequential and Binary - Hash Function - Separate Chaining - Open Addressing - Sorting: Bubble Sort – Selection Sort - Merge Sort.

List of Exercises **30 Hours**

1.Implementation of Stack and Queue

2.Implementation of Linked list

3.Applications of Stack

4.Infix to post fix conversion

5.Postfix Evaluation

6.Implementation of Binary Search Trees

7.Implementation of search – Linear, Binary

8.Implementation of sorting technologies – Bubble & Selection.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Explain algorithm to solve problems using design strategies and estimate their complexities.	Apply
CO2: Implement linear data structures.	Apply
CO3: Implement the stack and queue operations.	Apply
CO4: Implement non – linear data structures.	Apply
CO5: Implement solutions using various searching and sorting techniques to solve problems.	Apply

Text Book(s):

T1. Mark A. Weiss., “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson, June 2003

T2. Anany Levitin, “Introduction to the Design & Analysis of Algorithms”, 4th Edition, Pearson Education, February 2017

Reference Book(s):

R1. Robert kruse, C.L, Tondo, and Bruce Leung, “Data Structures & Program Design in C”, Pearson, 2014.
R2. Michael T. Goodrich, Roberto Tamassia, David M. Mount, “Data Structures and Algorithms,2007.
R3. Cormen.T.H.,Leiserson.C.E., Rivest

Web Reference(s):

1. Animation of Various Data Structures URL:http://visualgo.net/

2. NPTEL Course Content URL: http://nptel.ac.in/courses/106102064/ Data Structures and algorithms

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	-	1	1	-	-	2	1	2	-	1	-	-
CO2	2	1	-	2	2	-	-	2	1	2	-	1	-	1
CO3	2	1	-	2	2	-	-	2	1	2	-	1	-	1
CO4	1	1	-	1	1	-	-	2	1	2	-	1	-	-
CO5	2	1	-	2	2	-	-	2	1	2	-	1	-	-

High-3; Medium-2; Low-1

Course Code: 19SCCC1301	Course Title: COMPUTER ORGANIZATION AND ARCHITECTURE (Common to SC & AM)		
Course Category: Professional Core		Course Level : Introductory	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Pre-requisites

- NIL

Course Objectives

The course is intended to:

1. Describe the basic principles of computer architecture
2. Explain the input / output accessing and various processing element architectures
3. Illustrate the concept memory organization
4. Understand various pipeline techniques
5. Discuss the functional blocks of multiprocessors.

Unit I Basic Structure of a Computer System 9 Hours

Functional Units - Basic Operational Concepts - Number Representation and Arithmetic - Operations - Character Representation - Performance - Memory Locations and Addresses- Addressing Modes - Instruction Sets - CISC Vs RISC.

Unit II Input / Output and Processing Unit 9 Hours

Accessing I/O Devices – Interrupts – Bus Structure- Bus Operation - Instruction Execution - Hardware Components - Instruction Fetch and Execution Steps- Control Signals - Hardwired Control- CISC-Style Processors.

Unit III Memory System 9 Hours

Semiconductor RAM Memories - Read-only Memories - Direct Memory Access - Cache Memories – Mapping function - Performance Considerations - Virtual Memory - Memory Management Requirements - Secondary Storage.

Unit IV Pipelining 9 Hours

Pipeline Organization - Pipelining Issues - Data Dependencies - Memory Delays - Branch Delays - Resource Limitations - Performance Evaluation- Superscalar Operation- Pipelining in CISC Processors.

Unit V Multiprocessors 9 Hours

Characteristics of multiprocessors - interconnection structures - inter processor arbitration - inter processor communication and synchronization- cache coherence- shared memory multiprocessors.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Describe the basic principles of computer architecture.	Understand
CO2: Explain the input / output accessing and various processing element.	Understand
CO3: Illustrate the concept memory organization.	Understand
CO4: Understand various pipeline techniques.	Understand
CO5: Discuss the functional blocks of multiprocessors.	Understand

Text Book(s):

T1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, and Naraig Manjikian “Computer Organization and Embedded Systems”, Mcgraw Hill Education, 6th edition, 2011

T2. M.Morris Mano, “Computer System Architecture”, Pearson Publication, 2007

Reference Book(s):

R1. William Stallings, “Computer Organization and Architecture”, 7th Edition PHI ,2010.

R2. Daniel J,”Synthesis Lecture on Fault Tolerant Computer Architecure “, Pearson Education, 2019.

R3. John P.Hayes, “Computer Architecure and Organization”, 3rd Edition, McGraw-Hill.

R4. Jim Ledin, “Modern Computer”, Pearson Education, 2017.

Web Reference(s):

1. http://insy.ewi.tudelft.nl/content/image-and-video-compression-learning-tool-vcdemo
2. https://www.w3.org/standards/agents/authoring

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	-	-	-	-	-	-	-	2	-	1	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	1	-	1
CO3	2	1	1	1	-	-	-	-	-	-	-	1	-	1
CO4	1	1	-	-	-	-	-	-	-	-	-	1	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-	1	-	-

High-3; Medium-2; Low-1

Course Code: 19AMCN1301	Course Title: PRINCIPLES OF ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS		
Course Category: Professional Core		Course Level : Introductory	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Pre-requisites

- NIL

Course Objectives

The Course is intended to:

1. Describe the artificial intelligence principles, techniques and uninformed search strategies.
2. Illustrate the principles of different informed search strategies and Optimization Algorithms.
3. Apply the Knowledge Representation and Reasoning Process for a real application.
4. Elucidate the concept of Neural Networks.
5. Explain the Basics of Fuzzy Logic and Genetic Algorithm.

Unit I Introduction to Artificial Intelligence 9 Hours

Introduction to AI – Types and Applications of AI - Intelligent Agents: Agents and Environments – Nature of Environments – Structure of Agent - Problem solving by searching: Problem-solving agents - Example problems - Search for solutions - Uninformed search strategies - Types.

Unit II Informed Search and Optimization Algorithms 9 Hours

Informed search strategies - Local Search Algorithms and Optimization Problems – Local Search in Continuous Spaces – Searching with Nondeterministic Actions – Online Search Agents and Unknown Environments – Game – Optimal Decisions in Games – Alpha-Beta Pruning – Imperfect Real-time Decisions.

Unit III Knowledge Representation and Reasoning 9 Hours

Knowledge -Based Agents - Propositional Logic – Agent based on propositional logic - First Order Logic: Representation – syntax – knowledge engineering in First Order Logic - Inference in First Order Logic- Forward chaining – Backward Chaining – Resolution and application.

Unit IV Neural Networks 9 Hours

Fundamentals of neural networks - Neural Network Architectures – Characteristics and Learning method - Adaline and Madaline Network – Backpropogation network architecture –

Backpropogation Learning – Applications – Effect of Tuning Parameters – Introduction to Associative memory.

Unit V Fuzzy Logic and Genetic Algorithms 9 Hours

Fuzzy set – Crisp logic – Predicate logic – Fuzzy Logic – Defuzzification – Application - Fundamentals of Genetic Algorithm – Encoding – Crossover - Mutation Operator– Application.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Describe artificial intelligence principles, techniques and uninformed search strategies.	Understand
CO2: Illustrate the principles of informed search and Optimization Algorithms.	Understand
CO3: Apply the Knowledge Representation and Reasoning Process for a real application.	Apply
CO4: Elucidate the concept of Neural Networks.	Understand
CO5: Explain the Basics of Fuzzy Logic and Genetic Algorithm.	Understand

Text Book(s):

T1. Stuart Russell And Peter Norvig,"Artificial Intelligence: A Modern Approach", Fourth Edition,Pearson Paperback publication 2022.

T2. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms – Synthesis and Applications", 2nd Edition, PHI Learning Pvt.Ltd, Newdelhi -2017.

Reference Book(s):

R1. Dr. C.K. Venugopal,"Artificial Intelligence And Machine Learning", Pacific Books International 2019.

R2. Robert J Schalkoff, "Artificial Neural Networks", McGraw-Hill International Edition, 2011.

R3. Ric, E., Knight, K and Shankar, B. 2009. Artificial Intelligence, 3rd edition, Tata McGraw

R4. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

R5. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, 3rd edition, wiley publication, 2009.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	3	-	-	2	-	-	-	-	-	1	1
CO2	2	3	1	3	-	-	2	-	-	-	-	-	1	1
CO3	2	3	2	3	-	-	2	-	-	-	-	2	1	1
CO4	2	2	2	3	-	-	2	-	-	-	-	-	1	1
CO5	2	2	2	3	-	-	2	-	-	-	-	-	1	1

High– 3; Medium– 2; Low– 1

Course Code: 19SCCC2302	Course Title: DATABASE DESIGN (Common to SC & AM)		
Course Category: Professional Core		Course Level : Practice	
L:T:P (Hours/Week) 3: 0: 2	Credits:4	Total Contact Hours:75	Max. Marks:100

Pre-requisites

- NIL

Course Objectives

The course is intended to:

1. Describe the fundamentals of database and data models
2. Draw the ER model and discuss normalization for given database
3. Construct relational tables and formulate SQL queries
4. Explain the concurrency control and recovery mechanisms.
5. Familiarize the various file organization techniques.

Unit I Introduction of DBMS 9 Hours

Introduction – Database System – Terminologies – Need for DBMS – Data Models and its types – Functions of DBMS – Components of DBMS – DBMS Architecture – Key issues and Challenges in Database Systems.

Unit II ER and Relational Models 9 Hours

ER Models – ER to Relational Mapping Object Relational Mapping – Relational Model - Constraints – Keys – Dependencies – Relational Algebra - Normalization: 1NF, 2NF, 3NF, 4NF, BCNF – Join Dependencies.

Unit III Database Design 9 Hours

Basic DDL: Introduction to SQL: Data Definition – Data Manipulation – Set Operations - Aggregate functions – Joins - Nested Queries – triggers – cursors - Database Security, Embedded & Dynamic SQL.

Unit IV Transaction Management **9 Hours**

Transaction Concepts – ACID Properties – Concurrency Control – Need for Concurrency – Lock based Protocols – Two Phase Locking – Deadlock – Transaction Recovery – Save Points – Isolation Levels – SQL Facilities for Concurrency and Recover.

Unit V Implementation techniques **9 Hours**

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 – Query optimization using Heuristics and Cost Estimation Distributed Databases.

List of Exercises **30 Hours**

1.Create database and write SQL queries to retrieve information

2. Design an employee record in an organization and perform the following operations: Insertion, Deletion, Modify, Alter, Update and View.

3. Implement Joins and Nested Queries to an existing Employee database.

a. IN and NOT IN, Exists and NOT EXISTS, UNIQUE, NOT UNIQUE, ALL, DISTINCT

b. Aggregation operators

c. Grouping and Ordering Commands

4. Implement trigger using PL / SQL block.

5. Implement Cursor using PL / SQL block.

6. Implement transaction management- commit, rollback, save point.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Describe the fundamentals of database and data models**.**	Understand
CO2: Draw the ER model and discuss normalization for given database	Apply
CO3: Construct relational tables and formulate SQL queries	Analyze
CO4: Explain the concurrency control and recovery mechanisms	Understand
CO5: Familiarize the various file organization techniques.	Apply

Text Book(s):

T1. Thomas Connolly, Carolyn Begg, “Database Systems: A Practical Approach to Design, Implementation and Management”, 6th Edition, Pearson Education, 2015.

T2. A Silberschatz, H Korth, S Sudarshan, “Database System Concepts”, 7th Edition, McGraw - Hill, 2019.

Reference Book(s):

R1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts , McGraw Hill, 2015

R2. Ramez Elmasri and Shamkant B. Navathe, Fundamental Database Systems,Pearson Education, 2008

R3. Ramez Elmasri and Shamkant B. Navathe, Fundamental Database Systems,Pearson Education, 2008

R4. Peter Rob and Corlos Coronel, Database System, Design, Implementation and Management , Thompson Learning Course Technology, 2003

Web Reference(s):

1. NPTEL lecture videos and notes: https://onlinecourses.nptel.ac.in/noc23_cs41/course
2. SQL practice exercises with solutions: https://www.w3resource.com/sql-exercises/
3. https://www.geeksforgeeks.org/dbms/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	1	1	-	-	-	1	3	-	-	3	2
CO2	2	1	1	2	2	-	1	-	1	3	-	-	3	2
CO3	2	2	1	2	2	-	1	-	1	3	-	-	3	2
CO4	2	2	-	2	2	-	1	-	1	3	-	-	3	2
CO5	2	2	-	2	2	-	-	-	-	3	-	-	3	2

High-3; Medium-2;Low-1

Course Code: 19SCCC3301	Course Title: PROGRAMMING USING JAVA LABORATORY (Common to SC & AM)		
Course Category: Professional Core		Course Level : Practice	
L:T:P (Hours/Week) 0: 0: 3	Credits: 1.5	Total Contact Hours:45	Max. Marks:100

Pre-requisites

- C Programming

Course Objectives

The course is intended to:

1. Implement the object oriented concepts, interfaces and packages.
2. Demonstrate exception handling.
3. Implement Applet programs.
4. Use Event Handlers and Database Connectivity.

List of Exercises **45 Hours**

1. Write a Java program using Classes and objects.
2. Write a Java program using Inheritance.
3. Write a Java program using Polymorphism, overloading, over riding.
4. Write a Java program using Interfaces and Packages.
5. Write a Java program to implement Applets.
6. Write a Java program using Exception handling
7. Write a Java program using Event Handlers
8. Write a Java program for database Connectivity using MYSQL.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1 : Implement the object oriented concepts, interfaces and packages	Apply
CO2 : Demonstrate exception handling.	Apply
CO3 : Implement Applet programs.	Apply
CO4 : Use Event Handlers and Database Connectivity.	Apply

Text Book(s):

T1. Walter Savitch, “An introduction to computer science and programming.” 3rd Edition, O’Reilly, 2004.

T2. Samuel A.Rebelsky, “Experiments in java”, 4thEdition, O’Reilly, 2000

Reference Book(s):

R1. Horstmann, C.S Cornell, “Core java-fundamentals”, 8thEdition, pearson,2013.

R2. Hall, M.Brown, “Core Servlet and Java Server pages”, 2nd Edition, pearson, 2003.

Web References:

1.Official documentation of java 3.10: https://docs.java.org/3/tutorial/

2. Beginner to Advanced java developer guide: https://www.learnjava.org/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	3	3	-	-	-	-	-	1	1	3	-
CO2	2	2	2	3	3	-	-	-	-	2	1	1	3	-
CO3	2	2	2	3	3	-	-	-	-	2	1	1	3	1
CO4	2	2	2	3	3	-	-	-	-	2	1	1	3	-

High-3; Medium-2;Low-1

Course Code: 19SCCN3302	Course Title: PROGRAMMING USING PYTHON LABORATORY (Common to SC & AM)		
Course Category: Professional Core		Course Level : Practice	
L:T:P (Hours/Week) 0: 0: 3	Credits: 1.5	Total Contact Hours:45	Max. Marks:100

Pre-requisites

- C Programming

Course Objectives

The course is intended to:

1. Implement the basic programming structures in python.
2. Demonstrate python data structures – lists, tuples, dictionaries.
3. Implement file management in python.
4. Develop application using various libraries in python.

List of Exercises **45 Hours**

1. Write a Python Program
   a. To exchange the values of two variables.
   b. To implement Fibonacci series up to n using lambda.
   c. To implement array rotation.
2. Write a Python Program
   a. To reverse a string.
   b. To check if a string is palindrome.
   c. To count number of characters in a string.
   d. To replace characters in a string.
3. Write a Python Program
   a. To implement lists.
   b. To implement tuple.
   c. To implement operations in dictionaries.

4. Write a Python Program

   a. To find the factorial of a number using functions.

   b. To find the largest number in a list using functions.

5. Write a Python Program

   a. To copy a text from one file to another file.

   b. To count number of words in a file.

c. To find longest word in a file.

6. Write a Python Program

   a. To compare the elements of the two pandas series using pandas library.

   b. To test whether elements in given array using Numpy library.

   c. To plot a graph using matplot lib library.

   d. To return the specified unit in seconds using scipy library.

7. Write a Python program to simulate bouncing ball using pygame.

8. Write a Python program to simulate elliptical orbits in pygame.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1 : Implement the basic programming structures in python.	Apply
CO2 : Demonstrate python data structures – lists, tuple, dictionaries.	Apply
CO3 : Implement file management in python.	Apply
CO4 : Develop application using various libraries in python.	Apply
CO5: Develop games using pygame.	Apply

Text Book(s):

T1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey, and Chris Meyers, “How to Think Like a Computer Scientist: Learning with Python”,3rd Edition, O’Reilly, 2016.

T2. Mark Lutz, “Powerful Object Oriented Programming Python”, 4th Edition, O’Reilly, 2012.

Reference Book(s):

R1. Mark Lutz, “Learning Python, Powerful OOPs”, 5th Edition, O’Reilly, 2013.

R2. Zelle, John M, “Python Programming: An Introduction to Computer Science”, Franklin Beedle& Associates, 2003.

Web References:

1.Official documentation of python 3.10: https://docs.python.org/3/tutorial/

2.Beginner to Advanced Python developer guide: https://www.learnpython.org/

3.Python quick reference guide: https://www.pyschools.com/

4.https://www.geeksforgeeks.org/python-programming-examples/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	3	3	-	-	-	-	2	-	-	1	-
CO2	1	2	1	3	3	-	-	-	-	2	-	-	1	-
CO3	1	2	1	3	3	-	-	-	-	2	-	-	1	-
CO4	1	2	1	3	3	-	-	-	-	2	-	-	1	-
CO5	1	2	1	3	3	-	-	-	-	2	-	-	1	-

High-3; Medium-2;Low-1

Course Code: 19PSHG6002	Course Title: UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY		
Course Category: Humanities		Course Level : Practice	
L:T:P (Hours/Week) 2: 1: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Pre-requisites

- Induction Program (UHV)

Course Objectives

The course is intended to:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Strengthening of self-reflection
3. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
4. Development of commitment and courage to act.

Unit I Introduction to Value Education 8 Hours

Need for the Value Education Self -exploration as the process for value education ; Continuous Happiness and Prosperity: A look at basic Human Aspirations; Right understanding: Relationship and Physical Facilities ; Happiness and Prosperity: current scenario ; Method to fulfill the Basic human aspirations.

Unit II Harmony in Human Being 10 Hours

Human being as a co-existence of self (‘I’) and the material ‘Body’; needs of Self ('I') and 'Body'; The Body as an instrument of 'I' ; Harmony in the self(‘I’); Harmony of the self(‘I’) with body ;Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya8

Unit III Harmony in the Family and Society 9 Hours

Harmony in the Family the basic unit of human interaction; Values in human to human relationship; Trust as the foundational values of relationship; Respect as the right evaluation; Understanding harmony in the society (society being an extension of family); Vision for the universal human order.

Unit IV Harmony in the Nature 8 Hours

Understanding the harmony in the Nature Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature; Existence as Co-existence at all levels; Holistic perception of harmony in existence.

Unit V Hormony on Professional Ethics 10 Hours

Natural acceptance of human values ;Definitiveness of Ethical Human Conduct; Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics ; Case study: holistic technologies, management models and production systems ; Strategy for transition towards value based life and profession.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Reflect on values, aspiration, relationships and hence identify strengths and weaknesses	Responding
CO2: Appraise physical, mental and social well being of self and practice techniques to promote well being	Responding
CO3: Value human relationships in family and society and maintain harmonious relationships	Valuing
CO4: Respect nature and its existence for survival and sustainable of all life forms and hence practice conservation of nature	Valuing
CO5: Appreciate ethical behaviour as a result of value system in personal and professional situations	Receiving

Text Book(s):

T1. R R Gaur, R Sangal, G P Bagaria, “Human Values and Professional Ethics”, Excel books, newDelhi.

Reference Book(s):

R1. Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, “Jeevan Vidya”, 1999.

R2. A.N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004

R3. Annie Leonard, “The story of stuff”, Free Press, New York, 2010.

Web Reference(s):

1.https://aktu.ac.in/hvpe/ResourceVideo.aspx

2.http://hvpenotes.blogspot.com/

3.https://nptel.ac.in/courses/109/104/109104068/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	1	2	2	-	-	2	-	-
CO2	-	-	-	-	-	1	2	2	2	1	-	2	-	-
CO3	-	-	-	-	-	2	2	2	2	1	-	2	-	-
CO4	-	-	-	-	-	2	2	2	2	-	-	2	-	-
CO5	-	-	-	-	-	1	2	2	2	-	-	2	-	-

High– 3; Medium– 2; Low– 1

Course Code: 23VAT201	Course Title: TAMILS AND TECHNOLOGY (Common to all B.E/B.Tech Programmes) (Regulation 2023)		
Course Category: Humanities		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:50

Pre–requisites

- NIL

Course Objectives

மாணவர்கள் இப்பாடத்தை கற்றலின் மூலம்

CO.1 நெசவு மற்றும் பானைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்ள இயலும்.

CO.2 அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் குறித்து அறிந்து கொள்ள இயலும்.

தமிழரும் தொழில்நுட்பமும்

அலகு 1 – நெசவு மற்றும் பானைத் தொழில்நுட்பம் 3

சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்

அலகு 2 – வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் ஷ சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ – சாரோசெனிக் கட்டிடக் கலை.

அலகு 3 – உற்பத்தித் தொழில்நுட்பம் 3

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத் துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் 3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன் வளம் – முத்து மற்றும் முத்துக் குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு 5 – அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் 3

அறிவியல் தமிழின் வளர்ச்சி – கணினித் தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின் பதிப்பு செய்தல் – தமிழ் மென் பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக் கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

Course Outcomes	**Cognitive Level**
மாணவர்கள் இப்பாடத்தை கற்றபின்	
CO.1 நெசவு மற்றும் பானைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
CO.2 அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

Assessment Pattern

	Assessment Component	CO.No.	Marks	Total
End Semester Examination	Part A – (20 Objective type) – All the questions are compulsory – 4 questions from each unit	CO 1 & CO 2	20x1 = 20 marks	50 marks
	Part B – (10 questions) – All the questions are compulsory – 2 questions from each unit		10x2 = 20 marks	
	Part C – (2 questions) – Answer any 2 out of 5 – 1 question from each unit		2x5 = 10 marks	

TEXT - CUM REFERENCE BOOKS

1 தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி – வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Course Code: 23VAT201		Course Title: TAMILS AND TECHNOLOGY (Common to all B.E/B.Tech Programmes) (Regulation 2023)	
Course Category: Humanities		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:50

Pre–requisites

- NIL

Course Objectives

The course is intended to:

1. Understand Weaving and Ceramic Technology, Design and Construction Technology, Manufacturing Technology, Agriculture and Irrigation Technology.
2. Understand the Scientific Tamil & Tamil Computing.

TAMILS AND TECHNOLOGY

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY **3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING **3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL : 15 PERIODS

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO.1 Understand Weaving and Ceramic Technology, Design and Construction Technology, Manufacturing Technology, Agriculture and Irrigation Technology.	Understand
CO.2 Understand the Scientific Tamil & Tamil Computing.	Understand

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

Assessment Pattern

	Assessment Component	**CO.No.**	**Marks**	**Total**
End Semester Examination	Part A – (20 Objective type) – All the questions are compulsory – 4 questions from each unit	CO 1 & CO 2	20x1 = 20 marks	50 marks
	Part B – (10 questions) – All the questions are compulsory – 2 questions from each unit		10x2 = 20 marks	
	Part C – (2 questions) – Answer any 2 out of 5 – 1 question from each unit		2x5 = 10 marks	

TEXT - CUM REFERENCE BOOKS

1 தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி – வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Semester – IV

Course Code: 19MABG1401	Course Title: PROBABILITY AND STATISTICS (common to all B.E/B.Tech programmes)		
Course Category: Basic Science		Course Level : Introductory	
L: T: P(Hours/Week) 3: 1: 0	Credits:4	Total Contact Hours: 60	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Calculate expectations and variances of random variables
2. Apply the concepts of standard distributions to solve practical problems
3. Calculate the correlation and regression for two variables
4. Test the samples based on hypothesis
5. Apply the samples based on variance

Unit I Probability and Random Variables **9+3 Hours**

Axioms of Probability – Conditional Probability – Total Probability – Baye's Theorem – Random Variables – Probability Mass Function – Probability Density Functions – Properties – Moments – Moment generating functions and their properties.

Unit II Standard Distributions **9+3 Hours**

Binomial – Poisson – Uniform – Exponential – Normal Distributions and their properties – Functions of a random variable.

Unit III Two Dimensional Random Variables **9+3 Hours**

Patent Search Process-Patent Application Process-Patent Infringement-Patent Litigation, International Patent laws

Unit IV Testing of Hypotheses **9+3 Hours**

Sampling Distributions – Testing of hypotheses for mean, variance, proportions and differences using Normal,t, Chi-Square and F distributions – Tests for independence of attributes and Goodness of fit.

Unit V Design of Experiments **9+3 Hours**

Analysis of Variance (ANOVA) – One way Classification – Completely Randomized Design(CRD) – Two way Classification – Randomized Block Design (RBD) – Latin square.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Calculate expectations and variances of random variables	Apply
CO2: Apply the concepts of standard distributions to solve practical problems	Apply
CO3: Calculate the correlation and regression for two variables	Apply
CO4: Test the samples based on hypothesis	Apply
CO5: Apply the samples based on variance	Apply

Text Book(s):

T1. Dr.J.Ravichandran, “Probability and Statistics for Engineers”, Wiley India Pvt.Ltd., 2010.

T2. Douglas C.Montgomery and George C. Runger, “Applied Statistics and Probability for Engineers”, 6th Edition, Wiley India Pvt.Ltd., 2017.

T3. Veerarajan T, “Probability, Statistics and Random process”, 4th Edition, Tata McGraw-Hill, New Delhi, 2013.

Reference Book(s):

R1. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, “Probability and Statistics for Engineers and Scientists”, 9th Edition Pearson Education, Asia, 2016.

R2. M.R. Spiegel,J. Schiller and R.A. Srinivasan, “Schaum's Outlines Probability and Statistics”, 3rd Edition,Tata McGraw Hill edition, 2009.

R3. Morris DeGroot, Mark Schervish, “Probability and Statistics”, Pearson Educational Ltd, 4th Edition, 2014.

Web References:

1. https://onlinecourses.nptel.ac.in/111105041/
2. https://nptel.ac.in/courses/111105090/
3. https://nptel.ac.in/courses/111104075/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	1	-	1	1	1	1	2	-	1
CO2	3	2	1	1	-	1	-	1	1	1	1	2	-	1
CO3	3	2	1	1	-	1	-	1	1	1	1	2	-	1
CO4	3	2	1	1	-	1	-	1	1	1	1	2	-	1
CO5	3	2	1	1	-	1	-	1	1	1	1	2	-	1

High-3; Medium-2; Low-1

Course Code: 19SCCC2401	Course Title: BASICS OF OPERATING SYSTEMS (Common to SC & AM)		
Course Category: Professional Core		Course Level : Practice	
L: T: P(Hours/Week) 3: 0: 2	Credits:4	Total Contact Hours: 75	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Describe the components of operating systems and its services
2. Solve process scheduling and synchronization problems
3. Compare different memory management techniques
4. Develop solutions for free space management
5. Summarize various administrative tasks in Linux environment

Unit I Introduction **9 Hours**

Computer System Organization– Operating System Operations – Kernel Data Structures– Operating Systems Structures: System Components, Operating System Services, System calls, System Programs – Process Concepts: Process Scheduling, Operation on Process, CoOperating process, Inter Process Communication.

Unit II Process Management **10 Hours**

CPU scheduling: Scheduling Algorithms – Process Synchronization: The Critical Section Problem, Peterson's Solution, Hardware Support for Synchronization, Mutex Locks, Semaphores, Monitors – Classical problems of Synchronization – Deadlock: Deadlock Characterization – Methods for handling Deadlocks: Deadlock Prevention, Avoidance, Detection and Recovery from Deadlock.

Unit III Memory Management **9 Hours**

Main Memory: Contiguous Memory Allocation, Paging, Structure of Page Table, Swapping – Virtual Memory: Demand paging, Copy-on-write, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit IV File Systems **9 Hours**

Mass Storage Structure: Hardware Disk Scheduling – RAID Structure – File System Interface: File Concepts, Access methods, Directory Structure, File Protection – File System Implementation: File System Structure and Operations, Directory Implementation, Allocation methods, Free Space Management.

Unit V Case Study-Linux **8 Hours**

History of Unix and Linux, Overview – Processes in Linux – Memory Management in Linux - Linux File System – Security in Linux, Android – History – Architecture – Applications.

List of Exercise **30 Hours**

1. Implementation of Process and I/O System calls
2. Implementation of CPU Scheduling Algorithms
3. Implementation of Classical Synchronization problems using semaphores
4. Implementation of Memory Allocation Strategies
5. Implementation of Page Replacement Algorithms
6. Implementation of Disk Scheduling Algorithms

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Describe the components of operating systems and its services based on system calls	Understand
CO2: Solve process scheduling and synchronization problems using algorithms	Apply
CO3: Compare different memory management techniques using allocation schemes	Apply
CO4: Develop solutions for free space management using file systems and disk scheduling concepts	Apply
CO5: Summarize various administrative tasks in Linux environment using its components and services	Understand

Text Book(s):

T1. AviSilberschatz, Galvin. P.B. and Gagne. G. “Operating System Concepts”, 10thEdition, John Wiley & Sons, 2018.

Reference Book(s):

R1. Andrew S. Tanenbaum, “Modern Operating Systems”, 4th Edition, Pearson Education, 2015.

R2. William Stallings, “Operating Systems Internals and Design Principles”, 9th Edition, Pearson

Web References:

1. MIT open course on operating system engineering: http://ocw.mit.edu/courses/electrical-engineering and-computer-science/6-828-operating-system-engineering-fall-2012/
2. Bell’s Course Notes on Operating Systems Processes: https://www2.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/3_Processes.html
3. NPTEL course on Operating System Fundamentals: https://nptel.ac.in/courses/106/105/106105214/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	1	-	1	-	1	-	-
CO2	3	2	2	2	2	1	1	2	3	2	1	1	3	1
CO3	3	2	2	2	2	1	1	2	3	2	-	1	3	1
CO4	3	2	2	2	2	1	1	2	3	2	1	1	3	1
CO5	2	1	-	-	-	-	-	1	-	1	-	1	-	-

High-3; Medium-2; Low-1

Course Code: 19AMCN1401	Course Title: MACHINE LEARNING ALGORITHMS AND APPLICATION		
Course Category: Professional Core		Course Level : Introductory	
L: T: P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours: 45	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Describe pre-processing techniques to prepare the data for machine learning applications
2. Implement supervised machine learning algorithms for different datasets
3. Illustrate unsupervised machine learning algorithms for different datasets
4. Correlate the Advanced Learning Algorithms
5. Construct the machine learning models for different applications

Unit I Introduction to Machine Learning **9 Hours**

Introduction to Machine Learning – Data and Features – Machine Learning Pipeline - Data Pre-processing: Standardization, Normalization, Missing data problem, Data imbalance problem – Data visualization - Setting up training, development and test sets – Cross validation – Problem of Over fitting, Bias vs. Variance.

Unit II Supervised Learning **9 Hours**

Supervised learning - Regression: Linear regression, logistic regression – Classification: K-Nearest Neighbour, Naïve Bayes, Decision Tree, Support Vector Machine, Perceptron, Error analysis.

Unit III Unsupervised Learning **9 Hours**

Unsupervised learning – Clustering: K-means, Hierarchical, Spectral, subspace clustering, Gaussian Mixture Model, Hidden Markov Model, Parameter Estimation: MLE and Bayesian Estimate, Expectation Maximization, Dimensionality Reduction Techniques, Principal component analysis, Linear Discriminant Analysis.

Unit IV Advanced Learning Algorithms **9 Hours**

Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Types and Task – Q –Learning – Temporal Difference Learning - Ensemble Learning - Random Forest – Bagging - Boosting - Stacking - AdaBoost – Gradian Boosting.

Unit V Machine Learning Applications **9 Hours**

AI applications – Computer Vision – Driverless Cars - Speech Regeneration - Text Mining – Industrial Applications – Health Care Systems.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Describe pre-processing techniques to prepare the data for machine learning applications	Understand
CO2: Implement supervised machine learning algorithms for different datasets	Apply
CO3: Illustrate unsupervised machine learning algorithms for different datasets	Apply
CO4: Correlate the Advanced Learning Algorithms	Analyze
CO5: Construct the machine learning models for different applications	Apply

Text Book(s):

T1. Kevin P. Murphey, “Machine Learning, a probabilistic perspective”, The MIT Press Cambridge, Massachusetts, 2012.

T2. Christopher M Bishop,” Pattern Recognition and Machine Learning”, Springer 2010.

Reference Book(s):

R1. Andrew Ng, Machine learning yearning, URL: http://www. mlyearning.org/(96) 139 (2017).

R2. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Private Limited, 2013.

R3. Richard O. Duda, Peter E. Hart, David G. Stork. Pattern Classification. Wiley, Second Edition;2007

Web References:

https://nptel.ac.in

https://www.cin.ufpe.br/~cavmj/Machine%20-%20Learning%20-20Tom%20Mitchell.pdf

https://ai.stanford.edu/~nilsson/MLBOOK.pdf

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	1	-	-	-	-	-	-	-	1	1	-
CO2	3	3	2	2	-	-	-	-	-	-	-	1	1	1
CO3	3	3	2	2	-	-	-	-	-	-	-	1	1	1
CO4	3	3	2	3	-	-	-	-	-	-	-	1	1	1
CO5	3	3	3	3	2	-	-	-	-	-	2	1	2	1

High-3; Medium-2; Low-1

Course Code: 19AMCN1402	Course Title: NEURAL COMPUTING IN MACHINE LEARNING		
Course Category: Professional Core		Course Level : Introductory	
L: T: P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours: 45	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Describe the concept of single layer perceptron model
2. Implement various multilayer feed forward network terminologies
3. Demonstrate the latest trends in single layer feedback networks.
4. Illustrate the various memory techniques in neural network
5. Articulate the concepts of Self organized network

Unit I Single Layer Perceptron Model **9 Hours**

Single-layer perceptron classifiers: Classification model - Features and decision regions, Discriminant functions - Linear machine and Minimum distance classification - Non-parametric training concept - Training and Classification using the Discrete perceptron: algorithm and example - Single layer continuous Perceptron networks for linearly separable classifications.

Unit II Multi-Layer Feed Forward Networks **9 Hours**

Multilayer feed forward Networks: Linearly separable Pattern classification - Delta learning rule for Multi perceptron model - Generalized Delta learning rule - Feed forward recall and error back propagation training.

Unit III Single Layer Feedback Networks **9 Hours**

Single-layer Feedback Networks: Basic concepts of dynamic systems - Mathematical foundations of Discretetime Hopfield Networks - Mathematical foundations of Gradient type Hopfield networks - Associative memories: Basic concepts - Linear Associator.

Unit IV Associative Memory **9 Hours**

Bidirectional associative memory - associative memory for spatio-temporal patterns - Case study: Implementation of NN in anysimulator. Self-Learning: Bidirectional Associative memory.

Unit V Self Organized Network **9 Hours**

UN supervised learning of clusters - winner-take-all learning recall mode - Initialization of weights, seperability limitations.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1:Describe the concept of single layer perceptron model	Understand
CO2: Implement various multilayer feed forward network terminologies	Apply
CO3: Demonstrate the latest trends in single layer feedback networks	Apply
CO4: Illustrate the various memory techniques in neural network	Apply
CO5: Articulate the concepts of Self organized network	Understand

Text Book(s):

T1. Jacek M.Zurada, “Introduction to Artificial Neural Systems”, Jaico Publ.House, 1994.

T2. Robert J. Schalkoff, “Artificial Neural”, McGraw-Hill, 1997.

Reference Book(s):

R1. Simon Haykin, “Neural Networks – A Comprehensive formulation”, AW, 1998.

R2. Koko, “Neural Networks”, PHI, 1992.

R3. N.K. Bose, P.Liang, “Neural Network Fundamentals”, M.H, 2002.

Web References:

1. https://page.mi.fu-berlin.de/rojas/neural/neuron.pdf

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	2	-	-	-	2	-	-	2	1
CO2	2	1	1	1	-	2	-	-	-	2	-	-	2	1
CO3	2	2	1	-	-	2	-	1	-	2	-	-	2	1
CO4	1	1	-	-	-	2	1	1	-	2	-	1	2	1
CO5	2	1	-	1	-	2	1	-	-	2	-	-	2	1

High-3; Medium-2; Low-1

Course Code: 19AMCN3401	Course Title: MACHINE LEARNING LABORATORY		
Course Category: Professional Core		Course Level : Practice	
L: T: P(Hours/Week) 0: 0: 4	Credits:2	Total Contact Hours: 60	Max. Marks:100

Pre-requisites

- C / Python Programming

Course Objectives

The course is intended to:

1. Design a program using Data set libraries in python
2. Design a program using Data sets
3. Implementation of different algorithm techniques
4. Implementation of Logistic Regression and SVM classification

List of Exercises **60 Hours**

1. Implementation of Python Basic Libraries such as Math, Numpy and Scipy.
2. Implementation of Python Libraries for Ml application such as Pandas and Matplotlib.
3. Write a python program to create and load different datasets.
4. Write a python program to compute Mean, Median, Mode, Variance and Standard Deviation using Datasets.
5. Write a Python program to Reshape, Filter, Merge the data, and handle missing values in datasets.
6. Write a Python program to implement Find-S Algorithm
7. Write a Python program to implement Candidate elimination Algorithm.
8. Write a Python program to implement Simple Linear Regression and plot the graph.
9. Write a Python program to implement Logistic Regression using sklearn.
10. Write a Python program to implement navie bayes classifier algorithm.
11. Write a Python program to implement SVM classification.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Design a program using Data set libraries in python	Apply
CO2: Design a program using Data sets	Apply
CO3: Implementation of different algorithm techniques	Apply
CO4: Implementation of Logistic Regression and SVM classification	Apply

Text Book(s):

T1. Giuseppe BOnaccorso, “Machine Learning Algorithms”, Packet Publishing, 2017.

T2. Yuxi (Hayden) Liu, “Python Machine Learning By Example”, Packet Publishing,2017

Reference Book(s):

R1. Simon Haykin, “Neural Networks and Learning Machines”, 3rd Edition,Pearson India Education ServicesPvt.Ltd,, 2018.

R2. Scikit-learn, and Tensor Flow “Machine Learning and Deep Learning with Python”, 2nd illustrated reprint edition, Packt Publishing, 2017.

Web References:

1. https:Python_Machine_Learning/GOVOCwAAQBAJ?kptab=editions&sa=X&ved=2ahUKEwjNs5ny-YD-AhUFTmwGHZ9MCUMQmBZ6BAgIEAg

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	2	2	2	1	1	-	1	-	1	2	1
CO2	2	3	2	2	2	2	1	1	-	1	-	1	2	1
CO3	2	3	2	2	2	2	1	1	-	1	-	1	2	1
CO4	2	3	2	2	2	2	1	1	-	1	-	1	2	1

High-3; Medium-2; Low-1

Course Code: 19AMCN3402	Course Title: NEURAL NETWORKS AND AI LABORATORY		
Course Category: Professional Core		Course Level : Practice	
L: T: P(Hours/Week) 0: 0: 4	Credits:2	Total Contact Hours: 60	Max. Marks:100

Pre-requisites

- C / Python Programming

Course Objectives

The course is intended to:

1. Create and train PROLOG programming language
2. Implementation of various search algorithms to solve problem
3. Develop a simple AI application
4. Implementation of perceptron class in sklearn

List of Exercises **60 Hours**

1. Study of PROLOG Programming language and its functions
2. Implementation of Depth First Search for Water jug problem
3. Implementation of Breath First Search for Tic-Tac-Toe Problem
4. Implementation of backtracking technique or N-Queen Problem
5. Implementation of Traveling salesman Problem
6. Develop a simple AI application (Build a chatbot, spam filtering in email, speech recognition)
7. Develop a snake game
8. Implementation of Perceptron class in sklearn

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Describe PROLOG programming language	Apply
CO2: Implementation of various search algorithms to solve problem	Apply
CO3: Develop a simple AI application	Apply
CO4: Implementation of perceptron class in sklearn	Apply

Text Book(s):

T1. Hoon Heng Teh “Neural Logic Networks: A New Class Of Neural Networks”, World Scientific Publishing Company, 1995.

T2. Yuxi (Hayden) Liu, “Python Machine Learning By Example”, Packet Publishing, 2017.

Reference Book(s):

R1. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, “Foundations of Machine Learning”, 1st Edition, MIT Press, 2018.

R2. Sebastian Raschka, Vahid Mirjalili “Machine Learning and Deep Learning with Python, Scikit-learn, and TensorFlow”, 2nd illustrated reprint edition, Packt Publishing, 2017.

Web References:

1.https:Python_Machine_Learning/GOVOCwAAQBAJ?kptab=editions&sa=X&ved=2ahUKEwjNs5ny-YD-AhUFTmwGHZ9MCUMQmBZ6BAgIEAg

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	2	2	2	1	1	-	1	-	1	1	1
CO2	2	3	1	2	2	2	1	1	-	1	-	1	1	1
CO3	2	3	1	2	2	2	1	1	-	1	-	1	1	1
CO4	2	3	1	2	2	2	1	1	-	1	-	1	1	1

High-3; Medium-2; Low-1

Course Code: 19AMPN6401	Course Title: MINI – PROJECT		
Course Category: Project		Course Level : Practice	
L: T: P(Hours/Week) 0: 0: 4	Credits:2	Total Contact Hours: 60	Max. Marks:100

Pre-requisites

- Nil

Course Objectives

The course is intended to:

1. Identify solutions to simple engineering problems.

2. Use the knowledge of Science, engineering & engineering tools to solve simple problems relevant to the discipline.

The objective of Project is to enable the student to take up investigative study in the broad field of Computer Science and Engineering, to solve relevant social/environmental/ethical issues on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work. The assignment will normally include:

1. Survey and study of published literature on the assigned topic.
2. Working out a preliminary Approach to the Problem relating to the assigned topic
3. Conducting Analysis, Design, Implementation/Modeling /Simulation
4. Preparing a Written Report of the Study/Work
5. Final Presentation before a departmental committee.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Design, develop and implement solutions using relevant modern tools to simple engineering problems that are relevant to the discipline.	Apply
CO2: Work in teams performing different roles for effective accomplishment of project goals following ethical practices.	Apply
CO3: Demonstrate the use of prior knowledge of science and engineering and engineering tools to formulate, analyze and investigate problems systematically	Apply
CO4: Communicate the process, methods and materials, findings, results and solutions through reports and presentations in appropriate forums.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	3	3	3	-	-	-	-	3	3	3
CO2	-	-	-	-	-	-	-	3	3	-	3	-	-	-
CO3	3	3	-	3	-	3	3	-	-	-	-	3	3	3
CO4	-	-	-	-	-	-	3	-	-	3	-	-	-	-

High-3; Medium-2; Low-1