Dr. MAHALINGAM
MCET
COLLEGE OF ENGINEERING AND TECHNOLOGY
Enlightening Technical Minds Estd. 1998
An Autonomous Institution (Since 2011)

Dr. MAHALINGAM
COLLEGE OF ENGINEERING AND TECHNOLOGY
Affiliated to Anna University, Chennai; Approved by AICTE ; Accredited by NAAC with Grade 'A++'
Accredited by NBA - Tier1 (Mech, Auto, Civil, EEE, ECE, E&I and CSE)
Udumalai Road, Pollachi - 642 003 Tel: 04259-236030/40/50 Fax: 04259-236070 www.mcet.in

Curriculum and Syllabi
B.E. Computer Science and Engineering

Semesters I to IV

Regulations 2019

Dr. Mahalingam College of Engineering and Technology, Pollachi – 642003.
(An autonomous institution approved by AICTE and affiliated to Anna University)

Department of Computer Science and Engineering

Vision

To develop engineers with global employability, entrepreneurship capability, research focus and social responsibility

Mission

- To develop internationally competent engineers in dynamic IT field by providing state-of-art academic environment and industry driven curriculum
- To motivate and guide students to take up higher studies and establish entrepreneurial ventures
- To enrich the department through committed and technically sound faculty team with research focus in thrust areas
- To undertake societal problems and provide solutions through technical innovations and projects in association with the industry, society and professional bodies

OBE Coordinator | Programme Coordinator | Head of the Department

Head - OBE

Dr. Mahalingam College of Engineering and Technology, Pollachi – 642003.
(An autonomous institution approved by AICTE and affiliated to Anna University)

Programme: B.E. Computer Science and Engineering

Programme Educational Objectives (PEOs) - Regulations 2019

B.E. Computer Science and Engineering graduates will:

PEO1. Domain expertise: Possess expertise and emerge as key players in IT integrated domains.

PEO2. Computing skills and ethics: Employ computing skills to solve societal and environmental issues in an ethical manner.

PEO3. Lifelong learning and research: Involve in lifelong learning and research to meet the demands of global technology.

Programme Outcomes (POs) - Regulations 2019

On successful completion of B.E. Computer Science and Engineering programme, graduating students/graduates will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and concepts of Computer Science to solve complex engineering problems.

PO2. Problem analysis: Identify, review literature, formulate and analyse complex engineering problems using first principles of mathematics and engineering sciences.

PO3. Design and development of solutions: Design and develop computing solutions for complex engineering problems with societal and environmental awareness.

PO4. Complex problem investigation: Investigate complex problems by employing research methods to arrive at valid conclusions.

PO5. Modern tool usage: Evaluate and use appropriate tools and techniques in engineering activities.

PO6. Societal contribution: Follow professional engineering practice by applying contextual knowledge to assess societal and legal issues.

OBE Coordinator | Programme Coordinator | Head of the Department

Head - OBE

PO7. Environment and Sustainability: Understand and provide professional engineering solutions taking into consideration environmental and economic sustainability.

PO8. Ethics: Follow ethical principles and norms in engineering practice.

PO9. Individual and team work: Function effectively as an individual, team member or leader in diversified environments.

PO10. Communication: Communicate effectively through various modes for all engineering activities.

PO11. Project management and finance: Apply Engineering knowledge and management principles for effective project management in multi-disciplinary environments.

PO12. Life-long learning: Engage in independent life-long learning and skill development for professional and social well being.

Programme Specific Outcomes (PSOs) - Regulations 2019

On successful completion of B.E. Computer Science and Engineering programme, graduating students/graduates will be able to:

PSO1. Systems engineering: Employ software engineering principles in the design and development of efficient systems

PSO2. Knowledge engineering: Apply data analytics techniques for solving real world problems

OBE Coordinator | Programme Coordinator | Head of the Department

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Programme: B.E Computer Science and Engineering
2019 Regulations
Curriculum for Semesters I to II

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

Semester I (2019 Batch)

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
19ENHG2101	Communication Skills – I	2	0	2	3	100	All
19CHBC2101	Chemistry for Information Sciences	3	0	2	4	100	CS & IT
19EESC2101	Introduction to Electrical and Electronics Engineering	3	0	2	4	100	CS & IT
19CSSN2101	Fundamentals of Programming	3	0	2	4	100	-
19PSHG3002	Personal Effectiveness	0	0	2	1	100	All
Total		**14**	**1**	**10**	**20**	**600**	

Semester II (2019 Batch)

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
19ENHG2201	Communication Skills – II	2	0	2	3	100	All
19PHBC2201	Physics for Information Sciences	3	0	2	4	100	CS & IT
19ECSC2201	Digital System Design	2	0	2	3	100	CS & IT
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, MC & PR
19PSHG3001	Wellness for Students	0	0	2	1	100	All
19CHMG6201	Environmental Sciences	1	0	0	-	100	All
Total		**15**	**1**	**14**	**22**	**800**	

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

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Programme: B.E Computer Science and Engineering
2019 Regulations
Curriculum for Semesters I to IV

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

Semester I (2020 Batch)

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
19ENHG2101	Communication Skills – I	2	0	2	3	100	All
19EESC2101	Introduction to Electrical and Electronics Engineering	3	0	2	4	100	CS & IT
19CSSN2101	Fundamentals of Programming	3	0	2	4	100	-
19CSSC4001	IT Practices Lab	1	0	4	3	100	CS & IT
19PSHG6001	Wellness for Students*	0	0	2	-	-	All
Total		**12**	**1**	**12**	**18**	**500**	

Semester II (2020 Batch)

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
19ENHG2201	Communication Skills – II	2	0	2	3	100	All
19PHBC2002	Physics for Information Sciences	3	0	2	4	100	CS & IT
19ECSC2201	Digital System Design	2	0	2	3	100	CS & IT
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, MC & PR
19PSHG6001	Wellness for Students*	0	0	2	1	100	All
19CHMG6201	Environmental Sciences	1	0	0	-	100	All
Total		**15**	**1**	**14**	**22**	**800**	

* Annual Pattern

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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
19CSCN1301	Data Structures and Algorithm Analysis – I	3	0	0	3	100	-
19CSCN1302	Computer Architecture	3	0	0	3	100	-
19ECSN1301	Principles of Communication Engineering	3	0	0	3	100	-
19CSCN2301	Database Systems	3	0	2	4	100	-
19CSCN3301	Data Structures and Algorithm Analysis Laboratory	0	0	3	1.5	100	-
19CSCN4301	Java Programming Laboratory	1	0	3	2.5	100	-
19PSHG6002	Universal Human Values 2: Understanding Harmony	2	1	0	3	100	All
XXXXXXXXXX	One Credit Course	0	0	2	1	100	-
Total		**18**	**2**	**10**	**25**	**900**	

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
19CSCN1401	Data Structures and Algorithm Analysis – II	3	1	0	4	100	-
19CSCN2401	Operating Systems	3	0	2	4	100	-
19EESN2401	Microcontrollers and IoT	3	0	2	4	100	-
19CSCN3401	Python Programming Laboratory	0	0	4	2	100	-
19CSPN6401	Mini – Project	0	0	4	2	100	-
XXXXXXXXXX	One Credit Course	0	0	2	1	100	-
Total		**12**	**2**	**14**	**21**	**700**	

Course Code	Course Title	Duration	Credits	Marks
19CSPN6001	Internship or Skill Development*	2 Weeks	1	100

*Refer to clause:4.8 in UG academic regulations 2019

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Tentative Curriculum for Semesters V to VIII

Semester V

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
	Formal Languages and Automata Theory	3	1	0	4	100	-
	Data Communication and Computer Networks	3	0	2	4	100	-
	Professional Elective –I	3	0	0	3	100	-
	Professional Elective –II (Online)	3	0	0	3	100	-
	Open Elective –I	3	0	0	3	100	-
	Object Oriented Software Engineering	3	0	0	3	100	-
	Internet Programming Laboratory	1	0	3	2.5	100	-
	Object Oriented Software Engineering Laboratory	0	0	3	1.5	100	-
	Employability Skills	0	0	2	1	100	All
Total		**19**	**1**	**10**	**25**	**900**	

Semester VI

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
	Compiler Design	3	1	0	4	100	-
	Machine Learning	3	0	0	3	100	-
	Professional Elective –II	3	0	0	3	100	-
	Professional Elective –IV (Online)	3	0	0	3	100	-
	Open Elective –II	3	0	0	3	100	-
	Machine Intelligence Laboratory	0	0	4	2	100	-
	Innovative and Creative Project	0	0	4	2	100	-
	Campus to Corporate	0	0	2	1	100	All
Total		**15**	**1**	**10**	**21**	**800**	

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

*Refer to clause: 4.8 in UG academic regulations 2019

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Semester VII

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
	Cyber Security	3	0	0	3	100	-
	Software Project Management	3	0	0	3	100	-
	Cloud Computing laboratory	1	0	3	2.5	100	-
	Open Source Software Development Laboratory	1	0	3	2.5	100	-
	Professional Elective –V	3	0	0	3	100	
	Professional Elective –VI	3	0	0	3	100	-
	Open Elective - III	3	0	0	3	100	
Total		**17**	**0**	**6**	**20**	**700**	

Semester VIII

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

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

*Refer to clause: 4.8 in UG academic regulations 2019

Total Credits (2019 Batch only): 168

Total Credits (2020 Batch onwards): 166

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Professional Electives

Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
		L	T	P			
Human Computer Interaction							
	User Interface Design	3	0	0	3	100	-
	Usability Engineering	3	0	0	3	100	-
	Graphics and Visualization	3	0	0	3	100	-
	Visualization Techniques	3	0	0	3	100	-
	Multimedia Systems and Applications	3	0	0	3	100	-
	Game Theory	3	0	0	3	100	-
	Business Intelligence	3	0	0	3	100	-
Intelligent Systems							
	Information Retrieval Techniques	3	0	0	3	100	-
	Soft Computing	3	0	0	3	100	-
	Deep Learning	3	0	0	3	100	-
	Robotic Process Automation	3	0	0	3	100	-
	Big Data Analytics	3	0	0	3	100	-
	Social Network Analytics	3	0	0	3	100	-
	Optimization Techniques	3	0	0	3	100	-
Secure Computing and Communication							
	Multicore Architecture	3	0	0	3	100	-
	Distributed Computing	3	0	0	3	100	-
	Software Defined Networks	3	0	0	3	100	-
	High Speed Networks	3	0	0	3	100	-
	Cryptographic Techniques	3	0	0	3	100	-
	Network and Internet Security	3	0	0	3	100	-
	Internet of Things	3	0	0	3	100	-

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Software Engineering							
	Agile Software Development	3	0	0	3	100	-
	Software Testing Methodologies	3	0	0	3	100	-
	Software Quality Management	3	0	0	3	100	-
	Web Technologies	3	0	0	3	100	-
	Software Design Patterns	3	0	0	3	100	-
	Reliability Engineering	3	0	0	3	100	-
	Product Design	3	0	0	3	100	-

Open Electives

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
	Human Computer Interface Design	3	0	0	3	100
	Computer Forensics	3	0	0	3	100
	Augmented Reality and Virtual Reality	3	0	0	3	100

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Dr. MAHALINGAM COLLEGE OF TECHNOLOGY, POLLACHI

2019 REGULATION -COURSE CODE GENERATION PROCEDURE FOR UG COURSES

1	2	3	4	5	6	7	8	9	10
1	9	A	U						

REGULATION

BOARD /DEPARTMENTS	
CHARACTER TYPE-ALPHABET	
AU	AUTO
CE	CIVIL
CS	CSE
EC	ECE
EE	EEE
EI	EIE
IT	IT
ME	MECH
MC	MECHATRONICS
PR	PRODUCTION
CH	CHEMISTRY
EN	ENGLISH
MA	MATHS
PH	PHYSICS
PS	PROFESSIONALSKILLS

SEMESTER NUMBER	
CHARACTER TYPE-NUMBER	
1to8	SEMESTER
0	FLOATINGSEMESTER

COURSE TYPE	
CHARACTER TYPE – ALPHABET	
B	BASIC SCIENCE
S	ENGINEERING SCIENCE
H	HUMANITIES
C	PROFESSIONAL CORE
E	PROFESSIONAL ELECTIVE
O	OPENELECTIVE
I	INDUSTRY OFFERED COURSE
R	MINOR REVISION IN SYLLABUS
V	OCC
P	PROJECT/ SKILLDEVELOPMENT/INTERNSHIP
M	MANDATORY NON – CREDIT COURSE

MODE OF ASSESSMENT	
CHARACTER TYPE-NUMBER	
1	THEORY
2	THEORYWITH PRACTICALCOMPONENT
3	PRACTICAL
4	PRACTICALWITHTHEORY COMPONENT
5	THEORY WITH SELFSTUDY COMPONENT
6	CUSTOMIZED

SEQUENCE NUMBER
CHARACTERTYPE-NUMBER
01,02,03….99

COMMON TOANY BOARD/DEPARTMENTS	
CHARACTERTYPE-ALPHABET	
G	GENERIC (COMMON TOALL BRANCHES–ex. COMMUNICATION SKILLS)
N	NON COMMON COURSE(INDIVIDUAL)
C	COMMON COURSE(ex COMMON TO EC, EE, EI)

Regulations 2019

Detailed Syllabi for Semesters I to IV

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

List of Activities:

1. History of Institution and Management: Overview on NIA Education Institutions-Growth of MCET – Examination Process-OBE Practices – Code of Conduct – Centre of Excellence
2. Lectures by Eminent People, Motivational Talk – Alumni, Employer
3. Familiarization to Dept./Branch: HoD Interaction – Senior Interaction – Department Association
4. Universal Human Value Modules: Module 1, Module 2,Module 3 and Module 4
5. Orientation on Professional Skill Courses
6. Proficiency Modules – Mathematics, English, Physics and Chemistry
7. Introduction to various Chapters, Cell, Clubs and its events
8. Creative Arts: Painting, Music and Dance
9. Physical Activity: Games and Sports, Yoga and Gardening
10. Group Visits: Visit to Local areas and Campus Tour

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Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Explain various sources available to meet the needs of self, such as personal items and learning resources through visit to local areas and campus	Understand
CO2: Explain various career opportunities and avenues available in the campus through orientation sessions	Understand
CO3: Explain the opportunity available for professional development through professional skills, curricular, co-curricular and extracurricular activities	Understand
CO4: Build universal human values and bonding amongst all the inmates of the campus and society for having a better life	Apply

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	2	-	-	-	-	-	-	2	1	2	-	-	-	-

High-3; Medium-2;Low-1

Assessment Pattern

Component	Marks	Details
Attendance	10	Minimum 80% and 1 mark for every 2% observed
Knowledge Test	40	Objective type questions
Work plan for future	50	Career plan developed consulting mentor
Total	**100**	

Non-letter Grades

Marks Scored	Performance Level
70 & above	Good
30 – 69	Average
< 30	Fair

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Semester - I

Course Code:19MABC1102	Course Title: Linear Algebra and Infinite Series (common to CS & IT)		
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, signature nature of quadratic forms – Singular Value decomposition.

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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 orthogonal process	Apply
CO4: Determine the canonical form of a quadratic form using orthogonal transformation	Apply
CO5: Use different testing methods to check the convergence of infinite series	Apply

Text Book(s):

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

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

T3.Howard Anton, Chris Rorres, Elementary Linear Algebra Applications version,9th Edition, Wiley India edition,2011.

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	PSO1	PSO2
CO1	2	-	-	-	-	-	-	2	2	3	-	2	-	-
CO2	2	-	-	-	-	-	-	2	2	3	-	2	-	-
CO3	2	-	-	-	-	-	-	2	2	3	-	2	-	-
CO4	2	-	-	-	-	-	-	2	2	3	-	2	-	-
CO5	2	-	-	-	-	-	-	2	2	3	-	2	-	-

High-3; Medium-2;Low-1

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Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	30
	CCET II	3,4	50	
	CCET III	5	50	
	Tutorials / Quiz / Assignments	1,2,3,4,5	30	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

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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**

Importance of note making to practice speaking – Traditional note making, developing Mind 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.

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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	Understand
CO4: Write texts bearing direct meanings for different contexts maintaining an appropriate style	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, Cengage Learning, 2nd Edition, 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.

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BOS Convener

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BOS Chairman

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	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	2	-	-	-	-	-	-	1	2	3	-	-	-	-
CO3	1	-	-	-	-	-	-	1	-	3	-	-	-	-
CO4	2	-	-	-	-	-	-	1	-	3	-	-	-	-

High-3; Medium-2; Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	2,3,4	50	20
	CCET II	2,3,4	50	
	CCET III	2,3,4	50	
	Continuous Assessment – Practical	1,2	75	10
	Final Assessment – Practical	1,2	50	10
End Semester Examination	ESE	2,3,4	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CHBC2101		Course Title: Chemistry for Information Sciences (common to CS & IT) (2019 Batch Only)	
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

- Higher Secondary Chemistry I and II

Course Objectives

The course is intended to:

1. Explain the principles of electrochemistry, batteries and fuel cells.
2. Explain the mechanism of corrosion and corrosion control.
3. Describe the preparation, properties and applications of engineering plastics.
4. Explain the chemistry of water and water conditioning methods.
5. Describe synthesis, properties and applications of nanomaterials.

Unit I Electrochemistry and Batteries **9 Hours**

Cells – Types of cells – galvanic and electrolytic cells – emf and its measurement – Nernst equation – Batteries – types and Characteristics, Construction, working and applications – Alkaline battery, Lead – Acid battery, Nickel – Cadmium battery, Lithium ion battery, Hydrogen Oxygen fuel cells.

Unit II Corrosion and its Control **9 Hours**

Corrosion – dry and wet corrosion – mechanism of electrochemical corrosion – galvanic corrosion and concentration cell corrosion, Factors influencing corrosion. Corrosion Control methods – Cathodic protection methods, Metallic coating – Galvanizing, Tinning – Chrome plating and Electroless plating of Nickel.

Unit III Polymers, Plastics and Composites **9 Hours**

Polymers – definition – polymerization – types – addition and condensation polymerization-classification – Terminologies – Plastics – Classification, Engineering plastics (PVC, Teflon, Polycarbonates, Polyurethanes, PET) – preparation, properties and uses, Compounding of plastics – Moulding technique – blow and extrusion. Polymer composites – FRP and ceramic matrix composites.

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BOS Chairman

Unit IV Water Technology **9 Hours**

Water quality parameters – Types of water- Hardness of water – Types, expression, units, problems – determination of hardness by EDTA method – Boiler feed water – boiler troubles(scale, sludge, priming, foaming, caustic embrittlement, Boiler corrosion) – Water conditioning methods – Internal conditioning – phosphate , calgon and sodium aluminate conditioning, External conditioning – demineralization, Desalination of brackish water – reverse osmosis process.

Unit V Synthesis and Applications of Nano Materials **9 Hours**

Introduction – Difference between bulk and Nano materials – size dependent properties. Nano scale materials – particles, clusters, rods and tubes. Synthesis of Nanomaterials: Sol-gel process, Electro deposition, Hydrothermal methods. Applications of Nano materials in Electronics , Energy science and medicines. Risk and future perspectives of nano materials

List of experiments **30 Hours**

1. Determination of Dissolved Oxygen in water by Winkler's method
2. Determination of strength of strong acid by conductance measurement
3. Estimation of Fe^{2+} by potentiometric titration
4. Determination of corrosion rate by weight loss method
5. Estimation of hardness of water by EDTA method
6. Determination of molecular weight of polymer by viscometric method

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1:Explain batteries based on their characteristics, construction, working principle and applications	Understand
CO2:Explain the mechanism of corrosion and its control techniques	Understand
CO3: Identify a suitable plastic for a specific engineering application.	Understand
CO4: Calculate hardness of water based on water quality parameters associated with water conditioning methods	Apply
CO5: Describe synthesis, properties and applications of nanomaterials	Understand

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Text Book(s):

T1.Jain & Jain, Engineering Chemistry(All India),17th edition, DhanpatRai Publishing Company(P) Ltd, New Delhi, 2018.

T2.Wiley Engineering Chemistry, 2nd Edition, Wiley India Pvt. Ltd. New Delhi,2011.

Reference Book(s):

R1.Larry Brown and Tom Holme, "Chemistry for Engineering Students", 3rd Edition, Cengage Leg,2010.

R2.S. S. Dara "A text book of Engineering Chemistry" S. Chand & Co. Ltd., New Delhi,2006.

R3.Charles P. Poole, Jr., Frank J. Owens "Introduction to Nanotechnology" Wiley India Pvt. Ltd. New Delhi, 2003.

R4.V.R.Gowariker, N.V.Viswanathan and Jayadev Sreedhar, "Polymer Science", New Age International (P) Ltd, Chennai, 2006.

Web References:

1. http://nptel.ac.in/courses/122101001/downloads/lec.23.pdf
2. http://nptel.ac.in/courses/118104004/
3. http://nptel.ac.in/courses/104105039/

Course Articulation Matrix

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

High-3; Medium-2;Low-1

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Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	20
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2,3,4,5	75	10
	Final Assessment – Practical	1,2,3,4,5	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code:19EESC2101		Course Title: Introduction to Electrical and Electronics Engineering (common to CS & IT)	
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 Machines **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.

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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

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BOS Convener

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BOS Chairman

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	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO2	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO3	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO4	1	-	-	-	-	-	-	1	-	1	-	-	-	-
CO5	1	-	-	-	-	-	-	1	-	1	-	-	-	-
CO6	2	-	-	-	-	-	-	-	2	2	-	-	-	-

High-3; Medium-2; Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	20
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2,3,6	75	10
	Final Assessment – Practical	1,2,3,6	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

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: RAPTOR

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.

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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:	
CO 1: Develop solutions using problem solving techniques	Apply
CO 2: Write pseudo code using suitable selection and repetition structures for a real time application	Apply
CO 3: Choose appropriate data types, variables and I/O statements for solving problems	Apply
CO 4: Develop programs using selection and iteration statements for a given scenario	Apply
CO 5: 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.

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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:

1. http://raptor.martincarlisle.com/
2. http://www.cprogramming.com/
3. http://www.c4learn.com/

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	2	3	-	-	2	-

High-3; Medium-2;Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	20
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2,3,4,5	75	10
	Final Assessment – Practical	1,2,3,4,5	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code:19CSSC4001	Course Title: IT Practices Lab (2020 Batch onwards)		
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

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BOS Convener

Approved in Academic Council meeting

BOS Chairman

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(s):

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

R2. David Wolber , Hal Abelson , Ellen Spertus, Liz Looney, "App Inventor 2: Create Your Own 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	2	-	-	-	1	-	-	1	2	3	-	-	2	-
CO2	2	-	-	-	1	-	-	1	2	3	-	-	2	-
CO3	2	-	-	-	1	-	-	1	2	3	-	-	2	-
CO4	2	-	-	-	1	-	-	1	2	3	-	-	2	-

High-3; Medium-2;Low-1

Assessment Pattern

	Assessment Component	CO.No.	Marks	Total
Continuous Assessment	Each Lab Experiment	1,2,3,4	75	75
	Cycle Test 1	1,2	50	25
	Cycle Test 2	3,4	50	
			Total	100

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BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code:19PSHG3002		Course Title: Personal Effectiveness (Common to all B.E/B.Tech Programmes) (2019 Batch only)	
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. Identify strength, weaknesses and opportunities
3. Plan for achieving the goals
4. Apply time management techniques
5. Create time and pursue activities of self interest

Unit I The Importance of Envisioning

Importance of positive self – perception – Principle of dual creation (Everything gets created twice – Envisioning) – Understanding Vision and mission statements – Writing personal mission statements – 'Focus' as a way of life of most successful people – Importance of goal setting – Importance of planning and working to time.

Unit II Fundamental Principles of Goal Setting and Working to Time

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.

Unit III Goal Setting and Action Orientation

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 – Importance of action orientation – Converting goals to actionable tasks – Establishing road map – Using Gantt chart for planning and progress.

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BOS Chairman

Unit IV Time management - Tools and Techniques

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 V Putting into Practice

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

Course Outcomes	**Cognitive/ Affective**
At the end of this course, students will be able to:	
CO1:Identify the strengths, weaknesses and opportunities	Apply
CO2:Set well-articulated goals for academics, career, and personal aspirations	Apply
CO3:Establish the road map to realize the goals	Apply
CO4:Apply time management techniques to complete planned tasks on time	Apply
CO5:Create time and pursue activities of self-interest that add value	Value

Text book(s):

T1. Reading material, workbook and journal prepared by PS team of the college.

Reference Book(s):

R1. Stephen R Covey, "First things first", Simon & Schuster U.K, Aug 1997.
R2. Sean Covey, "Seven habits of highly effective teenagers", Simon & Schuster U.K, 2004.

Course offering:

Orientation programme (2 days)	CO1 and CO2
Student practice (weekly review classes)	CO3
Student journal writing (interim reviews)	CO4 and CO5

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Course Articulation Matrix

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

High-3; Medium-2;Low-1

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Semester - II

Course Code:19MABC1202	Course Title: Calculus and Transforms (common to CS & IT)		
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 – circle of 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.

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BOS Convener

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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 Z domain.

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 (for semester III), 3rd Edition, Tata McGraw-Hill, New Delhi, 2010.

R2. Srimanta Pal &Subodh C. Bhunia. "Engineering Mathematics",1st Edition, Oxford University Press, 2015.

Web References:

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

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	30
	CCET II	3,4	50	
	CCET III	5	50	
	Tutorials / Quiz / Assignments	1,2,3,4,5	30	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

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.

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Unit IV Writing **15 Hours**

Reported speech & Concord (Subject – verb Agreement) – Report writing – Different kinds of Report – 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:	
CO1: 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 CUP Publications, 2nd Edition, 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 University Press, 2002.

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

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	2,3,4	50	20
	CCET II	2,3,4	50	
	CCET III	2,3,4	50	
	Continuous Assessment – Practical	1,2	75	10
	Final Assessment – Practical	1,2	50	10
End Semester Examination	ESE	2,3,4	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code:19PHBC2201 / 19PHBC2002		Course Title: Physics for Information Sciences (common to CS & IT)	
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).

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

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

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO2	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO3	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO4	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO5	1	-	-	-	-	-	-	1	2	3	-	-	-	-

High-3; Medium-2; Low-1

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	20
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2,3,4,5	75	10
	Final Assessment – Practical	1,2,3,4,5	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19ECSC2201	Course Title: Digital System Design (common to CS & IT)		
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 Boolean Expression 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

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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	Understand
CO2: Explain the design of combinational logic circuits	Understand
CO3: Elucidate the analysis of synchronous sequential logic circuits	Understand
CO4: Elucidate the analysis of asynchronous sequential logic circuits	Understand
CO5: Categorize a computer system including Input /Output devices and Memory devices	Understand

Text Book(s):

T1. Anil K. Maini, "Digital Electronics Principles, Devices and Applications", John Wiley & Sons, 1st Edition, 2007.

T2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", 6th Edition, McGraw-Hill, 2011

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BOS Chairman

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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO2	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO3	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO4	1	-	-	-	-	-	-	1	2	3	-	-	-	-
CO5	1	-	-	-	-	-	-	1	-	2	-	-	-	-

High-3; Medium-2; Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	20
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2,3,4	75	10
	Final Assessment – Practical	1,2,3,4	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

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.

10 Hours

Unit II Pointers

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 – Pointer to a function – Dynamic memory allocation.

7 Hours

Unit III Strings and Graphics

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.

9 Hours

Unit IV Structures and Union

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.

9 Hours

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BOS Chairman

Unit V **Preprocessor Directives and Files**

Preprocessor Directives: Types – Macros – File inclusion – Conditional compilation directives Files: 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 a given 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, Pearson Education India, 2015.

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

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BOS Convener

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BOS Chairman

Reference Book(s):

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

R2.PradipDey, ManasGhosh, "Computer Fundamentals and Programming in C", 2nd Edition, Oxford University Press, 2013.

R3.Byron S Gottfried, "Programming with C", Schaum's Outlines, 2nd Edition, Tata McGraw-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	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	2	3	-	-	2	-

High-3; Medium-2;Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	20
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2,3,4,5	75	10
	Final Assessment – Practical	1,2,3,4,5	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19MESC4001	Course Title: Engineering Drawing (Common to AU, CS, EC, EI, IT, ME, MC & PR)		
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.

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BOS Convener

Approved in Academic Council meeting

BOS Chairman

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, 1st Edition, 2009.

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

Publications of Bureau of Indian Standards

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
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.

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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	2	-	-	-	-	-	-	-	2	2	-	-	-	-
CO2	2	-	-	-	-	-	-	-	2	2	-	-	-	-
CO3	2	-	-	-	-	-	-	-	2	2	-	-	-	-
CO4	2	-	-	-	-	-	-	-	2	2	-	-	-	-
CO5	2	-	-	-	-	-	-	-	2	2	-	-	-	-

High-3; Medium-2; Low-1

Assessment pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	Each Lab Experiment	1,2,3,4,5	75	75
	Cycle Test 1	1,2,3	50	25
	Cycle Test 2	4,5	50	
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code:19PSHG3001		Course Title: Wellness for Students (Common to all B.E/B.Tech Programmes) (2019 Batch only)	
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. Articulate the importance of wellness for success in life.
2. Understand the dimensions of wellbeing and relevant practices
3. Guide in adopting such practices to improve wellness
4. Reflect the impact of changes sensed on personal and social effectiveness

Unit I Wellness - Importance and dimensions

Values and aspirations – goals – SMART Goals – means for achieving goals – job Vs career – success in life – attributes of successful persons. Maslow's Hierarchy of needs motivation – 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 – Guna – causes and impact – multiple dimensions of human structure (physical, astral, causal bodies) – human-panchabootha relationship.

Unit II Practices for physical wellness through Yoga

Simplified Physical Exercises: Hand, Leg, Neuromuscular breathing, eye exercises, kapalabathy, makarasanam 1 & 2, body massage, 14-points acupressure – Suryanamaskar - relaxation. Simple asanas.

Unit III Practices for physical wellness through exercises

Fitness as a subset of Wellness – health related physical fitness – skill related physical fitness. Exercises related ailment and injuries – safety and precautions – first aid.

Fitness development: Muscular strength – exercises (calisthenics): pull-up, sit-up, push-up and weight training; Explosive power – exercises: vertical jump, long jump; Cardio respiratory

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endurance – exercises: walking, jogging, treadmill, stair climbing, bicycling, skipping; Flexibility – exercises: stretching.
Speed, agility, balance and coordination – exercises: sprint, cone drill, ladder drill, hurdle drill, ball throw – mental agility exercises.

Unit IV Practices for mental wellness

Meditation: Mind and its functions – mind wave frequency – Agna, Thuriyam and Shanthi meditation – introspection: analysis of thoughts, moralization of desire, neutralization of anger and eradication of worries – simple mindfulness exercises.

Unit V Practices for social and spiritual wellness

Kayakalpa yoga – youthfulness and life force - cultural education – greatness of guru – universal compassion – fivefold culture.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.

Course Outcomes	**Cognitive/ Affective**
At the end of this course, students will be able to:	
CO1: Explain the concept of wellness and its importance to be successful in career and Life	Understand
CO2: Explain the dimensions of wellness and practices that can promote wellness	Understand
CO3: Demonstrate the practices that can promote wellness	Respond
CO4: Sense and improve the wellness periodically and its impact on personal Effectiveness	Value
CO5: Maintain harmony with self, family, peers, society and nature	Internalize

Text Book(s):

T1.Reading material and workbook prepared by PS team of the college

Reference Book(s):

R1.Vethathiri Maharishi Institute for Spiritual and Intuitional Education, Aliyar ,"Value education for harmonious life (Manavalakalai Yoga)", Vethathiri Publications, Erode,I Ed. (2010).

R2. Dr.R.Nagarathna, Dr.H.R.Nagendra, "Integrated approach of yoga therapy for positive health", Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.

R3. Tony Buzan, Harper Collins, The Power of Physical Intelligence (English).

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course offering:

Orientation programme (3 days)	CO1 and CO2
Student practice (weekly review classes)	CO3
Student journal writing (interim reviews)	CO4 and CO5

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	**Yoga:**	1,2,3,4,5		75
	Physical Exercises, KayaKalpa		15	
	Meditation		15	
	Assessment of student's workbook		10	
	Sports:			
	Physical Exercises, KayaKalpa		20	
	Assessment of student's workbook		15	
End Semester Examination (combined for yoga and sports)	Written test (MCQ and short answers)	1,2,3,4,5	30	Marks out of 100 is reduced to 25
	Physical exercises		50	
	Viva-voce		20	
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19PSHG6001		Course Title: Wellness for Students (Common to all B.E/B.Tech Programmes) (2020 Batch onwards)	
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

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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/ Affective**
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. Reading material, workbook and journal prepared by PS team of the college.

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, "Value education 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).

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BOS Chairman

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

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	Personal Effectiveness	1,2,5	35	75
	Yoga and physical Exercise: Physical Exercises Meditation Assessment of student's workbook	3,4,5	 20 10 10	
End Semester Examination	Written test (MCQ and short answers) Physical exercises Viva-voce	1,2,3,4,5	30 50 20	Marks out of 100 is reduced to 25
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

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

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(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 disaster management	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 environmental issues	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

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BOS Chairman

Assessment Pattern

Component	Marks	Details
Attendance	10	Minimum 80% and 1 mark for every 2% observed
Knowledge Test	40	Objective type questions
Activity(ies)	50	Report on the activity performed
Total	**100**	

Non-letter Grades

Marks Scored	Performance Level
70 & above	Good
30 – 69	Average
< 30	Fair

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BOS Convener

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BOS Chairman

Semester III

Course Code: 19MABC1303	Course Title:Discrete Mathematics (common to CS & IT)		
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 combinatorics 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 Combinatorics **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.

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BOS Chairman

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 congruence equations	Apply

Text Book(s):

T1. J.P.Tremblay, R. Manohar, Discrete Mathematical Structures with applications to Computer Science, 1st Edition, TMH International Edition,July 2017.

T2. T.Veerarajan, "Discrete Mathematical Structures with Graph Theory and Combinatorics", 1st Edition, 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.

Web References:

1. Logic, Relations: http://nptel.ac.in/courses/106106094
2. Combinatorics: https://nptel.ac.in/courses/111/104/111104026/
3. Algebraic Structures: https://nptel.ac.in/courses/106/103/106103205/

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Assessment pattern

	Assessment Component	CO .No.	Marks	Total
Continuous Assessment	CCET 1	1,2	50	30
	CCET 2	3,4	50	
	CCET 3	5	50	
	Tutorial	1,2,3,4,5	30	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CSCN1301	Course Title: Data Structures and Algorithm Analysis – I		
Course Category: Professional Core		Course Level: Practice	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Pre-requisites

- Programming with C

Course Objectives

The course is intended to:

1. Describe the importance of data structures and asymptotic notations
2. Perform various operations on List data structure
3. Perform various operations on Stack and Queue data structures
4. Apply suitable methods for efficient data access through hashing and determine the complexity of algorithms
5. Compare the efficiency of brute force & divide and conquer techniques

Unit I Basic Concepts of Algorithms **8 Hours**

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

Unit II List **9 Hours**

List – Array implementation – Linked List implementation:Singly, Doubly, Circular Linked list – Operations: Insert, Delete and Search- Applications of List.

Unit III Stack and Queue **9 Hours**

Stack – Implementation – Applications: Balancing Symbols, Infix to Postfix conversion, Evaluation of Postfix expression and function calls – Queue – Implementation –Circular Queue-Deque – Applications.

Unit IV Hashing and Mathematical Analysis of Algorithms **10 Hours**

Hashing – Separate chaining – Open addressing – Double hashing – Rehashing.
Mathematical analysis of non-recursive algorithms: Matrix Multiplication – Mathematical analysis of recursive algorithms: Factorial problem, Towers of Hanoi – Empirical analysis of algorithms.

Unit V Simple Algorithmic Design Techniques **9 Hours**

Brute force approach: Exhaustive Search – String matching:Naive approach, Linear search Bubble sort – Divide and Conquer technique: Binary search, Merge sort, Quick sort.

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BOS Chairman

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1:Describe the importance of data structures and the notations used in algorithm analysis	Understand
CO2:Perform operations on List data structures for various applications	Apply
CO3:Perform operations on Stack and Queue data structures for various applications	Apply
CO4:Apply suitable methods for efficient data access through hashing and determine the complexity of algorithms using mathematical analysis	Apply
CO5:Compare the efficiency of brute force & divide and conquer techniques for problem solving	Apply

Text Book(s):

T1. Mark A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2011.

T2.AnanyLevitin, "Introduction to the Design & Analysis of Algorithms", 3rd Edition, Pearson Education, 2011.

Reference Book(s):

R1.SartajSahni, "Data Structures, Algorithms and Applications in C++", 2ndEdition, Universities Press, 2005.

R2.Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in C++", 2nd Edition, John Wiley & Sons, 2010.

R3.Cormen.T.H.,Leiserson.C.E., Rivest. R.L. and Stein.C., "Introduction to Algorithms", PHI Pvt. Ltd., 2001.

Web Reference(s):

1. Animation of Various Data Structures URL:http://visualgo.net/
2. NPTEL Course Content URL: http://nptel.ac.in/courses/106102064/ DataStructures and Algorithms
3. The Animation of Recursion URL: http://www.animatedrecursion.com/

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	2	-
CO2	2	1	-	2	2			2	1	2	-	1	2	-
CO3	2	1	-	2	2			2	1	2	-	1	2	-
CO4	2	1	-	2	2			2	1	2	-	1	2	-
CO5	2	1	-	2	2			2	1	2	-	1	2	-

High-3; Medium-2;Low-1

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	30
	CCET II	3,4	50	
	CCET III	5	50	
	Tutorials / Quiz / Assignments	1,2,3,4,5	30	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CSCN1302		Course Title: Computer Architecture	
Course Category: Professional Core		Course Level: Practice	
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 memory organization and various addressing modes
2. Explain the various components of the processing unit and bus organization
3. Design cache memory organization
4. Use various pipeline techniques
5. Describe the various Parallel Processing architectures

Unit I **Memory Organization and Addressing** **9 Hours**

Evolution of Microprocessor – Basic Processor Architecture – Operational concepts – Performance – Memory location – Memory Operations – Instructions and sequencing – Addressing modes – CISC Vs RISC – DMA.

Unit II **Input / Output and Basic Processing Unit** **9 Hours**

Accessing I/O devices – Interrupts – Buses – Instruction Execution – Hardware Components – Instruction Fetch and Execution Steps – Control Signals – Hardwired Control, CISC Style Processors: Micro programmed Control.

Unit III **Cache Memory Design** **9 Hours**

Characteristics of Memory Systems – Cache Memory Principles – Elements of Cache Design – Mapping Function – Example of Mapping Techniques – Replacement Algorithms – Performance Consideration.

Unit IV **Pipelining** **9 Hours**

Pipelining Concept – Pipeline Organization and issues- Data Dependencies – Memory Delays – Branch Delays – Resource Limitations – Performance Evaluation – Superscalar operation– Pipelining in CISC Processors

Unit V **Parallelism** **9 Hours**

Instruction Level Parallelism – Parallel Processing Challenges – Flynn's Classification – Hardware multithreading – Multicore Processors: GPU, Multiprocessor Network Topologies – Case Study: ARM, Intel 32/64.

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BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Describe the memory organization and various addressing modes with example	Understand
CO2: Explain the various components of the processing unit and bus organization for instruction execution	Understand
CO3: Design cache memory organization using various mapping techniques	Apply
CO4: Use various pipeline techniques to improve the performance of processors	Apply
CO5: Describe the various Parallel Processing architectures to implement parallelism	Understand

Text Book(s):

T1.Carl Hamacher, Zvonok Vranesic, Safwat Zaky, NaraigManjikian "Computer Organization and Embedded Systems", 6th Edition, McGraw Hill, 2012. (Unit 1,2,3,4)

T2.David A. Patterson and John L. Hennessey, "Computer Organization and Design: The Hardware/Software Interface", 5th Edition, Morgan Kauffman / Elsevier, 2014.(Unit 5)

Reference Book(s):

R1.William Stallings, "Computer Organization and Architecture: Designing for Performance", 10th Edition, Pearson Education, 2016.

R2. S.S.S.P.Rao, "Basics of Computer Organisation and Architecture: Problems and Solutions", Alpha Science International Ltd, 2014.

R3. John L. Hennessey and David A. Patterson, "Computer Architecture: A Quantitative Approach", Morgan Kauffman / Elsevier, 5th Edition, 2012

Web Reference(s):

1. Computer Architecture – Coursera URL: https://www.coursera.org/lecture/comparch/course-introduction-Ouq7L
2. Computer System Architecture-MIT Open Courseware Notes URL: https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-823-computer-system-architecture-fall-2005/index.htm
3. Computer Architecture: NPTEL Course URL: http://www.nptel.ac.in/courses/106102062/

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	30
	CCET II	3,4	50	
	CCET III	5	50	
	Tutorials / Quiz / Assignments	1,2,3,4,5	30	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19ECSN1301	Course Title: Principles of Communication Engineering		
Course Category: Engineering Science		Course Level: Introductory	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Pre-requisites

- Introduction to Electrical and Electronics Engineering

Course Objectives

The course is intended to:

1. Determine the performance of various modulation and demodulation techniques of analog communication
2. Identify the digital modulation schemes for transmission and reception
3. Describe the characteristics of pulse modulation
4. Explain the basic principle of satellite and optical communication
5. Explain basic concepts of cellular communication

Unit I Analog Communication 9

Basic schemes of modern communication system – Need for modulation – Types: Amplitude modulation and Frequency Modulation, Phase Modulation in time and frequency domain, Comparison of AM and FM, PM signals.

Unit II Digital Communication 9

Introduction, Shannon limit for information capacity, bits, bit rate, baud – ASK and FSK Transmitter and Receiver, phase shift keying – binary phase shift keying – QPSK– Quadrature Amplitude modulation: Principle, transmitter and Receiver.

Unit III Digital Transmission 9

Introduction– Pulse modulation – Pulse Code Modulation:. PCM sampling, Quantization, Sampling rate, signal to quantization noise ratio – delta modulation – adaptive delta modulation – differential pulse code modulation – ISI – Eye pattern.

Unit IV Satellite and Optical Communication 9

Satellite communication systems: Kepler's law, LEO, MEO and GEO orbits, Footprint, Link model – GPS System – Optical communication systems: Elements of optical fiber transmission link, Types of Losses.

Unit V Mobile Communication 9

Multiple access techniques: TDMA, FDMA, CDMA – Cellular Concept and Frequency Reuse: Channel Assignment and Hand off, call processing in cellular phone – GPRS –Global System for Mobile Communications (GSM): 2G, 3G, 4G, 5G systems.

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BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1:Determine the performance in time and frequency domain of different modulation and demodulation techniques used in analog communication	Apply
CO2:Identify the digital modulation schemes used for transmission and reception of digital communication systems	Apply
CO3:Describe the characteristics of pulse modulation techniques used for reliable data transmission	Understand
CO4:Explain the basic principle of operation used in satellite and optical communication for data transmission	Understand
CO5:Explain the basic concepts used in cellular communication for multiuser systems	Understand

Text Book(s):

T1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6th Edition, Pearson Education, 2014.

T2. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2014.

Reference Book(s):

R1. Simon Haykin, "Communication Systems", 5th Edition, John Wiley & Sons. 2017.

R2.Lathi. B.P., "Modern Analog and Digital Communication systems", 4th Edition, Oxford University Press, 2017.

R3.Jochen Schiller,"Mobile Communications" 2nd Edition, Pearson Education, 2014.

R4.B.Sklar, "Digital Communication Fundamentals and Applications", 2nd Edition, Pearson Education, 2009.

Web References:

1. Basic schemes of modern communication URL: http://www.nptel.ac.in /course.php? disciplined =106
2. Multiple Access URL: http://ocw.mit.edu/courses/electrical-engineering-and-computerscience/6-450-principles-of-digital-communications-i-fall-2006

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	2	3	-	2	-	-

High-3; Medium-2;Low-1

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	30
	CCET II	3,4	50	
	CCET III	5	50	
	Tutorials / Quiz / Assignments	1,2,3,4,5	30	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CSCN2301	Course Title:Database Systems		
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 functions and architecture of database management system
2. Design relational databases using ER model and normalization concepts
3. Construct SQL queries using DDL, DML and DCL commands
4. Develop applications using database connectivitythrough advanced SQL concepts
5. Explain the concurrency control and recovery mechanisms

Unit I Foundations of DBMS **7 Hours**

File System – Database System – File System Vs. DBMS – Roles in DBMS Environment – Data Models and Conceptual Modeling – Functions of DBMS – Components of DBMS – Multi user DBMS Architecture.

Unit II Relational Model, ER Model and Normalization **10 Hours**

Relational Model: Terminology, Integrity Constraints – Relational Algebra – ER Modeling: Concepts, Relationship Types, Attributes, Structural Constraints – Normalization: Data Redundancy and Update Anomalies, Functional Dependencies,1NF, 2NF, 3NF, BCNF.

Unit III SQL Fundamentals **10 Hours**

SQL: Overview of Query Language, Data Types, Data Definition, Views, Access Control – Data Manipulation – Joins – Nested Queries.

Unit IV Advanced SQL and Query Processing **9 Hours**

Advanced SQL: Functions and procedures, Cursors, Triggers – Accessing SQL from a Programming Language – Query Processing: Decomposition, Heuristical Approach to Query Optimization, Cost Estimation for Relational Algebra Operations.

Unit V Transaction and Concurrency Control **9 Hours**

Transaction: Properties – Concurrency Control: Locking methods, Deadlock, Timestamp Ordering, Multi-version Timestamp Ordering, Optimistic Techniques – Database Recovery: Transaction and Recovery, Recovery facilities, Recovery Techniques.

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BOS Chairman

List of Exercises **30 Hours**

1. Design a database using ER diagrams
2. Create and modify the tables using DDL commands and manipulate the data using DML commands
3. Implement Joins and nested queries
4. Implement Functions and procedures
5. Create Cursors and Triggers
6. Access database through programming language

The suggested applications are (not limited to)

1. Library management system
2. Hotel Management system
3. Student management system
4. Ticket reservation system
5. Hospital management system
6. Employee management system

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO 1: Describe the functions and architecture of database management system using its components	Understand
CO 2: Design relational databases using ER model and normalization concepts for real world scenarios	Apply
CO 3: Construct SQL queries using DDL, DML and DCL commands for effective retrieval of data from database	Apply
CO 4: Develop applications using database connectivity through advanced SQL Concepts for solving real world problems	Apply
CO 5: Explain the concurrency control and recovery mechanisms to manage multiple transactions in real time application	Understand

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BOS Convener

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BOS Chairman

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", 7thEdition, McGraw- Hill,2019.

Reference Book(s):

R1. RamezElmasri,Shamkant B. Navathe, "Fundamentals of Database Systems", 7thEdition, Pearson Education,2017.

R2. C.J. Date, A. Kannan and S. Swamynathan– "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

Web References:

1. Text book handouts: http://www.inf.unibz.it/~nutt/IDBs1011/idbs-slides.html
2. NPTEL lecture videos and notes: https://nptel.ac.in/courses/106106093/
3. SQL practice exercises with solutions: https://www.w3resource.com/sql-exercises/

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Assessment Pattern

	Assessment Component	CO.No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	20
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2,3,4,5	75	10
	Final Assessment – Practical	1,2,3,4,5	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CSCN3301	Course Title:Data Structures and Algorithm Analysis Laboratory		
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

- Programming with C

Course Objectives

The course is intended to:

1. Implement list data structures using array and linked list
2. Implement stack data structure for various applications
3. Implement queue data structure and hashing techniques
4. Compare the efficiency of Brute-Force and Divide & Conquer approaches

List of Exercises

1. Implementation of List using array representation
2. Implementation of List using linked list representation
3. Implementation of Doubly linked list
4. Implementation of Stack application: Balancing parenthesis
5. Implementation of Stack application: Evaluation of postfix expression
6. Implementation of Circular Queue using array representation
7. Implementation of Hashing
8. Implementation of String Matching algorithm
9. Implementation of Searching techniques
10. Implementation of Sorting techniques: Bubble and Merge sort

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BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Implement list data structures and perform various operations using array and linked list representation.	Apply
CO 2: Implement stack data structure for various applications using array representation	Apply
CO 3: Implement circular queue using array and hashing techniques for efficient data handling in various scenarios	Apply
CO 4: Compare the efficiency of Brute-Force and Divide & Conquer approaches for solving problems.	Apply

Text Book(s):

T1.Mark A. Weiss., "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2011.

T2.Anany Levitin, "Introduction to the Design & Analysis of Algorithms", Pearson Education, 3rdEdition, 2011.

Reference Book(s):

R1.SartajSahni, "Data Structures, Algorithms and Applications in C++", 2nd Edition, Universities Press, 2005.

R2.Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in C++", 2nd Edition, John Wiley & Sons, 2010.

R3.Cormen.T.H.,Leiserson.C.E., Rivest. R.L. and Stein.C., "Introduction to Algorithms", PHI Pvt. Ltd., 2001.

Web References:

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
3. The Animation of Recursion URL: http://www.animatedrecursion.com/

Course Articulation Matrix

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

High-3; Medium-2;Low-1

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BOS Chairman

Assessment pattern

	Assessment Component	CO.No.	Marks	Total
Continuous Assessment	Each Lab Experiment	1,2,3,4	75	75
	Cycle Test 1	1,2	50	25
	Cycle Test 2	3,4	50	
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CSCN4301		Course Title: Java Programming Laboratory	
Course Category: Professional Core		Course Level: Practice	
L:T:P (Hours/Week) 1: 0: 3	Credits:2.5	Total Contact Hours:60	Max Marks:100

Pre-requisites

- Programming with C

Course Objectives

The course is intended to:

1. Implement simple Java programs using control structures and arrays
2. Implement java programs using classes, objects and suitable modifiers
3. Develop code using java utilities, Inheritance and Polymorphism
4. Design an application using Swing that handles run-time exceptions

Unit I **Java Introduction** **4 Hours**

Overview of Java – Data types – Operators – Control flows – Arrays & Iterators – Classes & Objects – Modifiers: Access, Non- Access Modifiers.

Unit II **Object orientation in Java** **4 Hours**

Constructors & Destructors – Inheritance & types – Polymorphism: Method overloading, Method overriding.

Unit III **Interfaces and Java Utilities** **4 Hours**

Abstract classes and Abstract Methods – Interfaces – String handling functions – String tokenizer – Regex – Date – Array List – Linked List – Stack .

Unit IV **Exceptions & Java Swing** **3 Hours**

Exceptions: Built-in & User defined Exceptions – Introduction to Java Swing – Swing API – Introduction to IO Streams.

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List of Exercises **45 Hours**

1. Implement Java programs using user Inputs and control structures
2. Implement Java programs using Arrays and Iterators
3. Implement programs using Classes, Objects with suitable Modifiers
4. Implement programs using Constructors, Destructors & Inheritance
5. Implement programs using Method Overloading & Overriding
6. Implement programs using Abstract class and Interfaces
7. Implement programs using Java Utilities (String, Regex, Date)
8. Implement programs using Collections in Java
9. Implement program to handle run-time Exceptions & files
10. Develop a simple application using Java Swing

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Implement simple java programs using control structures and Arrays	Apply
CO2: Implement java programs using classes, objects and suitable modifiers	Apply
CO3: Develop code for real world problems using java Utilities, Inheritance and Polymorphism.	Apply
CO4: Design an application using Swing that handles run-time exceptions for a given scenario	Apply

Text Book(s):

T1. Herbert Schildt, "Java the Complete Reference", McGraw-Hill Education, 10th Edition, October 2017.

Reference Book(s):

R1. Bart Baesens, Aimee Backiel, Seppe Vanden Brocke, "Beginning Java Programming: The Object Oriented Approach" , John Wiley & Sons, 2015.

R2. Daniel Liang, "Introduction to Java Programming, Comprehensive Version", Pearson Education, 9th Edition, 2014.

Web References:

1. Oracle, Java tutorials, URL: https://docs.oracle.com/javase/tutorial/java/
2. NPTEL, Course on Programming in Java, URL: https://nptel.ac.in/courses/106105191/
3. Java tutorials, URL: https://www.geeksforgeeks.org/java-tutorials/

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BOS Convener

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BOS Chairman

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	Each Lab Experiment	1,2,3,4	75	75
	Cycle Test 1	1,2	50	25
	Cycle Test 2	3,4	50	
			Total	100

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BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19PSHG6002		Course Title: Universal Human Values 2 :Understanding Harmony (common to all B.E/B.Tech programmes)	
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 1)

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 **6+3 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 **6+3 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 Swasthya.

Unit III Harmony in the Family and Society **6+3 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 **6+3 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 Harmony on Professional Ethics **6+3 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

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BOS Chairman

Course Outcomes	Affective 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. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

Reference Book(s):

R1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
R2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
R3. The story of stuff, Annie Leonard, Free Press, New York 2010.

Web References:

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

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BOS Convener

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BOS Chairman

Assessment Pattern

	Assessment Component	CO No.	Marks	Total Marks Weightage
Continuous Assessment	Socially relevant project/Group Activities/ Assignments	1,2,3,4,5	20	75%
	Assessment by faculty mentor		10	
	Self-assessment		10	
	Assessment by peers		10	
End Semester Examination	Part A – Objective type – 20x1=20 marks Part B – Short answer questions – 15x 2 = 30 marks Part C – Descriptive Type Questions (Either or Pattern) – 5 x 10 = 50 marks	1,2,3,4,5	100	25%
			Total	100%

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Semester IV

Course Code: 19MABG1401		Course Title:Probability and Statistics (common to all B.E/B.Tech programmes)	
CourseCategory: Basic Science		CourseLevel: 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+3Hours**

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

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

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and regression – Transformation of random variables.

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.

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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 At the end of this course, students will be able to:	Cognitive Level
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", 1st Edition, 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.

R4. Johnson and C.B. Gupta,"Probability and Statistics for Engineers", 9th Edition,Pearson Education, Asia, 2016.

Web References:

1.Probability,Random Variables,Standard Distributions,Two dimentional random variables,Testing of Hypotheses: https://onlinecourses.nptel.ac.in/111105041/

2.Probability,Random Variables,Standard Distributions,Two dimentional random variables,Testing of Hypotheseshttps://nptel.ac.in/courses/111105090/

3.Design of Experiments : https://nptel.ac.in/courses/111104075/

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BOS Convener

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BOS Chairman

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Assessment Pattern

	Assessment Component	CO .No.	Marks	Total
Continuous Assessment	CCET 1	1,2	50	30
	CCET 2	3,4	50	
	CCET 3	5	50	
	Tutorials / Quiz / Assignments	1,2,3,4,5	30	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CSCN1401	Course Title: Data Structures and Algorithm Analysis – II		
Course Category: Professional Core		Course Level: Practice	
L:T:P (Hours/Week) 3: 1: 0	Credits:4	Total Contact Hours:60	Max. Marks:100

Pre-requisites

- Data Structures and Algorithm Analysis – I

Course Objectives

The course is intended to:

1. Perform various operations on Binary trees and Heaps
2. Implement operations on Search tree structures
3. Perform various operations on Graphs and Sets
4. Apply Greedy strategy & Dynamic Programming techniques
5. Compare the working of Backtracking & Branch and Bound techniques

Unit I Trees Structures **9+3 Hours**

Tree – Preliminaries – Binary trees – Tree traversal – Applications: Expression tree, Decision tree, Game tree – Binary Heap – Heap sort.

Unit II Search Tree Structures **9+3 Hours**

Binary search tree – B-Trees – k-d tree – Tries.

Unit III Graph **9+3 Hours**

Graph – Definitions – Representations – Topological sort – Breadth first traversal – Depth first traversal – Biconnectivity – Euler circuits – Sets – Representation – Operations.

Unit IV Greedy Method and Dynamic Programming **9+3 Hours**

Greedy technique: Dijikstra's algorithm, Prim's and Kruskal's algorithm, Huffman Tree – Dynamic Programming: Binomial Coefficient, Floyd's and Warshall's algorithm, Multistage Graph.

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BOS Chairman

Unit V **Backtracking & Branch and Bound** **9+3 Hours**

Limitations of Algorithm Power: P,NP and NP Complete problems - Backtracking: n-Queens problem, Hamiltonian Circuit, Subset-sum problem - Branch and Bound: Assignment problem, Knapsack problem, Travelling salesman problem.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Perform various operations on Binary trees and Heaps for real world applications	Apply
CO2: Implement operations on Search tree structures for efficient storage and retrieval of data	Apply
CO3: Perform various operations on Graphs and Sets by using suitable storage organizations	Apply
CO4: Apply Greedy strategy & Dynamic Programming techniques for solving optimization problems	Apply
CO5: Compare the working of Backtracking & Branch and Bound techniques and choose the suitable technique for problem solving	Apply

Text Book(s):

T1. Mark A. Weiss., "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2011.

T2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 3rd Edition, Pearson Education, 2011.

Reference Book(s):

R1. Ellis Horowitz, Sartaj Sahni, Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publications, 2010.

R2. Adam Drozdek, "Data Structures and Algorithms in C++", 4th Edition, Cengage Learning, 2013.

R3.Cormen.T.H.,Leiserson.C.E., Rivest R.L and Stein C, "Introduction to Algorithms", PHIPvt Ltd, 2001.

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Web Reference(s):

1. SWAYAM Course Design and Analysis of Algorithms: https://swayam.gov.in/nd1_noc19_cs47/preview
2. Animation Videos: http://www.animatedrecursion.com/
3. Course Material: THE P VERSUS NP PROBLEM https://www.claymath.org/sites/default/files/pvsnp.pdf

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Assessment Pattern:

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	30
	CCET II	3,4	50	
	CCET III	5	50	
	Tutorials / Quiz / Assignments	1,2,3,4,5	30	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CSCN2401		Course Title:Operating Systems	
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 System: Disk Structure, Disk Attachment, Disk Scheduling – 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.

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BOS Chairman

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

Design Principles – Kernel Modules – Process Management – Scheduling – Memory Management – File Systems – Input and Output – Inter-process Communication – Network Structure – Security.

30 Hours

List of Exercises

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:	
CO 1: Describe the components of operating systems and its services based on system calls	Understand
CO 2: Solve process scheduling and synchronization problems using algorithms	Apply
CO 3: Compare different memory management techniques using allocation schemes	Apply
CO 4: Develop solutions for free space management using file systems and disk scheduling concepts.	Apply
CO 5: 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", 10th Edition, 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 Education, 2018.

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BOS Chairman

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	1	1	-	1	1	-	-	1	2	3	-	-	-	-
CO2	2	1	-	2	2	-	-	1	2	3	-	-	1	1
CO3	2	1	-	2	2	-	-	1	2	3	-	-	1	1
CO4	2	1	-	2	2	-	-	1	2	3	-	-	1	1
CO5	1	1	-	1	1	-	-	1	-	1	-	-	-	-

High-3; Medium-2; Low-1

Assessment Pattern

	Assessment Component	CO.No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	20
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2,3,4	75	10
	Final Assessment – Practical	1,2,3,4	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19EESN2401		Course Title: Microcontrollers and IoT	
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

- Programming with C
- Digital System Design

Course Objectives

The course is intended to:

1. Write PIC18/PIC16 microcontroller basedI/O programs using EmbeddedC
2. Write programs for interfacing peripheral devices and sensors
3. Use IoT Connectivity technologies
4. Implement IoT protocols and architecture
5. Implement simple IoT applications in various domains

Unit I **PIC Microcontroller** **9 Hours**

PIC18FX Pin connection – File register – I/O programming: Data type and Time delay, Logical operations, Timer and Counter: Timer0 – Serial port– Analog to digital converter.

Unit II **IoT Sensors and Peripheral interfacing** **9 Hours**

IoT – Major Components – Challenges, Advantages and Disadvantages – LED interfacing - LCD interfacing – Keyboard interfacing – Relay and Opto-isolator – Sensor interfacing- Temperature sensor, IR sensor, Ultrasonic Sensor

Unit III **IoT Connectivity Technologies and Board Interfacing** **9 Hours**

IoT networking - local network- Bluetooth, LPWAN, XBEE- IOT gateway - Raspberry pi board and Arduino Board details- Python programming- GPIO, UART – Interfacing multiple nodes with gateway.

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Unit IV **IoT Architecture and Implementation of IoT** **9 Hours**

IOT Architecture – Networking Protocols:MQTT -CoAP – Implementation of IoT- Collect data from the devices in the local network, Send the data to a server, control the device from the server- Applications: remote data logging system – remote Lamp control.

Unit V **Applications** **9 Hours**

Patient Monitoring in Health Care– Home Automation– Smart Irrigation in Agriculture Monitoring – Smart parking – Factory Automation

List of Exercises **30 Hours**

1. Control the LED using switch(PIC microcontroller)
2. Control the lamp using Relay interfacing (PIC microcontroller)
3. Interface IR sensor and control the FAN(ARDUINO)
4. Interfacing temperature sensor and ultrasonic sensor.(ARDUINO)
5. Multi node connection to GATEWAY using local network. (Sensors, Arduino and Raspberry pi)
6. Send the data to the server from GATEWAY. (Sensors ,ARDUINO, Raspberry pi and web server)
7. Control the home appliances(lamp, fan) from server. (Lamp,fan,arduino, Raspberry pi and web server)

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Write PIC18/PIC16 microcontroller based I/O programs using Embedded C for control applications	Apply
CO2: Write programs for interfacing peripheral devices and sensors with PIC Microcontroller	Apply
CO3: Use Connectivity technologies for data transfer in IoT	Apply
CO4: Implement protocols and architecture for data processing in IoT	Apply
CO5: Implement simple applications in Agriculture, Health Care & Automation using IoT	Apply

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Text Book(s):

T1.Muhammad Ali Mazidi, RolinD.Mckinlay, Danny Causery,"PIC Microcontroller and Embedded systems using assembly and C PIC18", 2nd edition, Micro Digital Ed, 2016.

T2. CharalamposDoukas , "Building Internet of Things with the Arduino", 1st edition, volume 1,Create space publishers , April 2012.

Reference Book(s):

R1. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A hands-on approach",1st edition, Universities Press, 2015.

R2. Marco Schwartz, "Internet of Things with the Arduino Yun", 1st Edition, Packt Publishing, 2014.

R3.Pedro Larrañaga, David Atienza, Javier Diaz-Rozo, Alberto Ogbechie, Carlos Esteban Puerto-Santana, Concha Bielza"Industrial Applications of Machine Learning", CRC Press, 2018.

Web Reference(s):

1. Introduction to IoT NPTEL Video: https://www.youtube.com/watch?v=WUYAjxnwjU4
2. Sensing NPTEL Video : https://www.youtube.com/watch?v=z3VEZPwl5gA&list=PLE7VH8RC_N3bpVn-e8QzOAHziEgmjQ2qE&index=3
3. Connectivity Technologies NPTEL Video: https://www.youtube.com/watch?v=GHUR_GfQQsQ&list=PLE7VH8RC_N3bpVn-e8QzOAHziEgmjQ2qE&index=9

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
Continuous Assessment	CCET I	1,2	50	30
	CCET II	3,4	50	
	CCET III	5	50	
	Continuous Assessment – Practical	1,2 ,3,4,5	75	10
	Final Assessment – Practical	1,2 ,3,4,5	50	10
End Semester Examination	ESE	1,2,3,4,5	100	60
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman

Course Code: 19CSCN3401	Course Title:Python Programming 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

- Nil

Course Objectives

The course is intended to:

1. Implement basic programming constructs and functions in python
2. Implement file and object oriented concepts in python
3. Implement collection objects and file handling in python
4. Develop Python program with Database Connectivity

List of Exercises **60 Hours**

1. Implement data types, operators and expressions
2. Implementation of branching statements and looping constructs
3. Implementation of Recursive and Non Recursive functions
4. Implementation of class and objects
5. Implementation of Inheritance and polymorphism
6. Implementation of Exception handling
7. Implementation of list, tuple and dictionary
8. Implementation of file handling techniques
9. Implementation of pickle and shelve objects
10. Implement Database Connectivity with SQL Server

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BOS Chairman

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Implement basic programming constructs and functions in python for simple problems	Apply
CO 2: Implement Object oriented concepts python for solving real world problems	Apply
CO 3: Implement python program with collection objects and file for simple problems	Apply
CO 4: Develop python program with Database Connectivity for real world problems	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", 4thEdition, O'Reilly, 2012.

Reference Book(s):

R1.Mark Lutz, "Learning Python, Powerful OOPs", 5thEdition, O'Reilly, 2013.

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

Web References:

1. https://docs.python.org/3/tutorial/
2. https://www.learnpython.org/
3. https://www.pyschools.com/

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Passed in Board of Studies meeting

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Approved in Academic Council meeting

BOS Chairman

Assessment Pattern

	Assessment Component	CO.No.	Marks	Total
Continuous Assessment	Each Lab Experiment	1,2,3,4	75	75
	Cycle Test 1	1,2	50	25
	Cycle Test 2	3,4	50	
			Total	100

Passed in Board of Studies meeting

BOS Convener

Approved in Academic Council meeting

BOS Chairman