

# **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](http://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



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**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.

  
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**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.

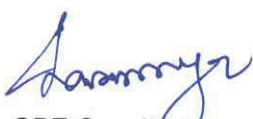
**PO12. Life-long learning:** Engage in independent life-long learning and skill development for professional and social well being.

#### **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



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Programme Coordinator



Head of the Department



Head - OBE





**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
<b>Total</b>		<b>14</b>	<b>1</b>	<b>10</b>	<b>20</b>	<b>600</b>	

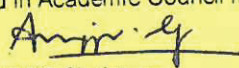
**Semester II (2019 Batch)**

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
<b>Total</b>		<b>15</b>	<b>1</b>	<b>14</b>	<b>22</b>	<b>800</b>	

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 BOS Chairman



**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
<b>Total</b>		<b>12</b>	<b>1</b>	<b>12</b>	<b>18</b>	<b>500</b>	

**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
<b>Total</b>		<b>15</b>	<b>1</b>	<b>14</b>	<b>22</b>	<b>800</b>	

\* 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	-
<b>Total</b>		<b>18</b>	<b>2</b>	<b>10</b>	<b>25</b>	<b>900</b>	

### 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	-
<b>Total</b>		<b>12</b>	<b>2</b>	<b>14</b>	<b>21</b>	<b>700</b>	

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
<b>Total</b>		<b>19</b>	<b>1</b>	<b>10</b>	<b>25</b>	<b>900</b>	

**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
<b>Total</b>		<b>15</b>	<b>1</b>	<b>10</b>	<b>21</b>	<b>800</b>	

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	
<b>Total</b>		<b>17</b>	<b>0</b>	<b>6</b>	<b>20</b>	<b>700</b>	

### Semester VIII

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

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			
<b>Human Computer Interaction</b>							
	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	-
<b>Intelligent Systems</b>							
	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	-
<b>Secure Computing and Communication</b>							
	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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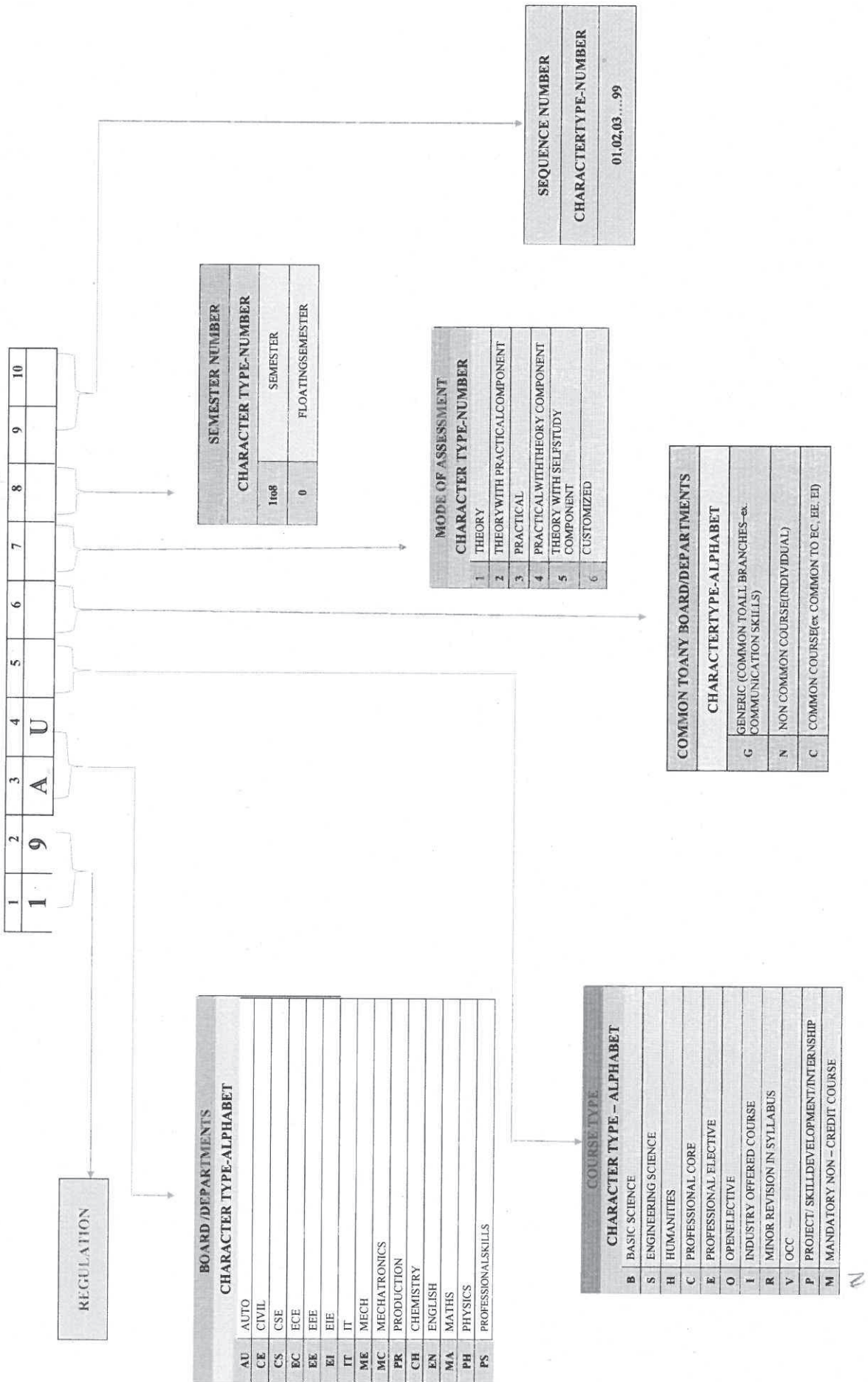
  
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**Dr. MAHALINGAM COLLEGE OF TECHNOLOGY, POLLACHI**  
**2019 REGULATION - COURSE CODE GENERATION PROCEDURE FOR UG COURSES**





**Regulations 2019**

**Detailed Syllabi for  
Semesters I to IV**



<b>Course Code: 19SHMG6101</b>	<b>Course Title: Induction Program (common to all B.E/B.Tech programmes)</b>
<b>Course Category: Mandatory Non-Credit Course</b>	<b>Course Level: Introductory</b>
<b>Duration: 3 Weeks</b>	<b>Max. Marks:100</b>

### 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
<b>Total</b>	<b>100</b>	

### Non-letter Grades

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

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### Semester - I

<b>Course Code:19MABC1102</b>	<b>Course Title: Linear Algebra and Infinite Series (common to CS &amp; IT)</b>		
<b>Course Category: Basic Science</b>	<b>Course Level: Introductory</b>		
<b>L:T:P (Hours/Week) 3: 1: 0</b>	<b>Credits:4</b>	<b>Total Contact Hours:60</b>	<b>Max. Marks:100</b>

#### **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, 10<sup>th</sup> Edition, John Wiley & sons, 2010.T2. David C Lay, Linear Algebra and its Applications, 3<sup>rd</sup> Edition, Pearson India, 2011.T3. Howard Anton, Chris Rorres, Elementary Linear Algebra Applications version, 9<sup>th</sup> 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
			<b>Total</b>	<b>100</b>

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

### 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

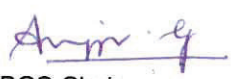
**15 Hours**

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**

Writing Simple 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 – 1 & 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

<b>Course Outcomes</b>	<b>Cognitive Level</b>
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, 2<sup>nd</sup> Edition, 2014.
- T2. Wood Ian, Williams Anne, Cowper Anna, Pass Cambridge BEC Preliminary, Cengage Learning, 2<sup>nd</sup> Edition, 2015.
- T3. Learners Book prepared by the Faculty members of Department of English.

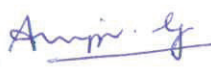
**Reference Book(s):**

- R1. BEC-Preliminary - Cambridge Handbook for Language Teachers, 2<sup>nd</sup> Edition, CUP 2000.
- R2. Hewings Martin - Advanced Grammar in use - Upper-intermediate Proficiency, CUP, 3<sup>rd</sup> Edition, 2013.

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**Web References:**

1. <http://www.grammarinenglish.com> -Jan 23, 2018
2. [https://www.northshore.edu/support\\_centre/pdf/listen-notes.pdf](https://www.northshore.edu/support_centre/pdf/listen-notes.pdf)
3. [http://www.examenlsh.com/BEC/BEC\\_Vantage.html](http://www.examenlsh.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
<b>Continuous Assessment</b>	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
<b>End Semester Examination</b>	ESE	2,3,4	100	60
			<b>Total</b>	100

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**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**

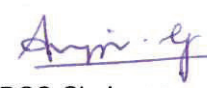
1. Determination of Dissolved Oxygen in water by Winkler's method
2. Determination of strength of strong acid by conductance measurement
3. Estimation of  $Fe^{2+}$  by potentiometric titration
4. Determination of corrosion rate by weight loss method
5. Estimation of hardness of water by EDTA method
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),17<sup>th</sup> edition, DhanpatRai Publishing Company(P) Ltd, New Delhi, 2018.

T2.Wiley Engineering Chemistry, 2<sup>nd</sup> Edition, Wiley India Pvt. Ltd. New Delhi,2011.

**Reference Book(s):**

R1.Larry Brown and Tom Holme, "Chemistry for Engineering Students", 3<sup>rd</sup> 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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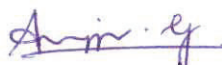
### Assessment Pattern

	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
			<b>Total</b>	<b>100</b>

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

### 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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**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", 2<sup>nd</sup> 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-engineering/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
<b>Continuous Assessment</b>	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
<b>End Semester Examination</b>	ESE	1,2,3,4,5	100	60
			<b>Total</b>	100

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

### 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

**9 Hours**

### Unit II Program Development and Control Structures

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.

**9 Hours**

### Unit III Data Types and Operators In C

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.

**9 Hours**

### Unit IV Control Structures

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

<b>Course Outcomes</b>	<b>Cognitive Level</b>
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", 6<sup>th</sup> 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", 2<sup>nd</sup> Edition, Pearson Education, India, 2008.

R2.Yashavant. P. Kanetkar "Let Us C", 16<sup>th</sup> Edition, BPB Publications, 2018.

R3.PradipDey, ManasGhosh, "Computer Fundamentals and Programming in C", 2<sup>nd</sup> 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
<b>Continuous Assessment</b>	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
<b>End Semester Examination</b>	ESE	1,2,3,4,5	100	60
			<b>Total</b>	<b>100</b>

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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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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	
<b>Total</b>				<b>100</b>

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<b>Course Code:19PSHG3002</b>		<b>Course Title: Personal Effectiveness (Common to all B.E/B.Tech Programmes) (2019 Batch only)</b>	
<b>Course Category: Humanities</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week)</b> <b>0: 0: 2</b>	<b>Credits:1</b>	<b>Total Contact Hours:30</b>	<b>Max. Marks:100</b>

**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.

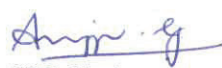
**Unit III Goal Setting and Action Orientation**

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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#### 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.

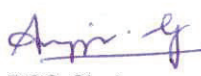
#### Course offering:

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

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## 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 Involutives.

#### 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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**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.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
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, 10<sup>th</sup> Edition, John Wiley & sons, 2010.  
T2. B.S. Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers, 2014.

**Reference Book(s):**

- R1. Veerarajan Engineering Mathematics (for semester III), 3<sup>rd</sup> Edition, Tata McGraw-Hill, New Delhi, 2010.  
R2. Srimanta Pal & Subodh C. Bhunia. "Engineering Mathematics", 1<sup>st</sup> Edition, Oxford University Press, 2015.

**Web References:**

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

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### 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
			<b>Total</b>	100

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**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 – 1 & 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, 2<sup>nd</sup> 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, 3<sup>rd</sup> Edition, 2013.

**Web References:**

1. <http://www.grammarinenglish.com>-Jan 23,2018
2. [https://www.northshore.edu/support\\_centre/pdf/listen-notes.pdf](https://www.northshore.edu/support_centre/pdf/listen-notes.pdf)
3. [http://www.examenglish.com/BEC/BEC\\_Vantage.html](http://www.examenglish.com/BEC/BEC_Vantage.html)-Jan 23, 2018

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### 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

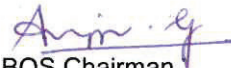
### Assessment Pattern

	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
			<b>Total</b>	<b>100</b>

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<b>Course Code:19PHBC2201 / 19PHBC2002</b>		<b>Course Title: Physics for Information Sciences (common to CS &amp; IT)</b>	
<b>Course Category: Basic Science</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week)</b> <b>3: 0: 2</b>	<b>Credits:4</b>	<b>Total Contact Hours:75</b>	<b>Max. Marks:100</b>

### 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<sub>2</sub>) molecular gas laser – Semiconductor laser (Homo junction and hetro junction) – Applications: Holograms and Holographic data storage (record/read).

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**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

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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", 3<sup>rd</sup> Edition, New Age International Pvt. Ltd, 2010

#### Reference Book(s):

- R1. D. Halliday., R. Resnick and J. Walker, "Fundamentals of Physics", Wiley Publications, 10<sup>th</sup> Edition, 2014
- R2. Ajoy Ghatak, "Optics", Tata McGraw-Hill Education, New Delhi, 5<sup>th</sup> Edition, 2012.
- R3. A. Marikani, "Engineering Physics", 2<sup>nd</sup> 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](https://onlinecourses.nptel.ac.in/noc17_cy07/preview)
2. [https://onlinecourses.nptel.ac.in/noc17\\_ph01/preview](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

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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
			<b>Total</b>	100

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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

<b>Course Outcomes</b>	<b>Cognitive Level</b>
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, 1<sup>st</sup> Edition, 2007.
- T2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", 6<sup>th</sup> Edition, McGraw-Hill, 2011

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### Reference Book(s):

- R1. Morris Mano, Michael ciletti, "Digital Degin", 5<sup>th</sup> Edition, Pearson Publication, New Delhi, 2014.
- R2. Charles H.Roth, Jr. "Fundamentals of Logic Design", 7<sup>th</sup> Edition, Jaico publishing House, New Delhi, 2014.
- R3. Tokheim, "Digital Electronics Principles and Applications", Tata McGraw Hill, 6<sup>th</sup> Edition, 2004.
- R4. Leach P Donald, Albert Paul Malvino and Goutam Saha, "Digital Principles and Applications", 7<sup>th</sup> 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](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
			<b>Total</b>	100

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## 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", 3<sup>rd</sup> Edition, Pearson Education India, 2015.
- T2. Ajay Mittal, "Programming in C – A Practical Approach", Pearson Education, 2010.

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**Reference Book(s):**

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

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

R3.Byron S Gottfried, "Programming with C", Schaum's Outlines, 2<sup>nd</sup> 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
<b>Continuous Assessment</b>	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
<b>End Semester Examination</b>	ESE	1,2,3,4,5	100	60
<b>Total</b>				100

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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, 7<sup>th</sup> Edition, 2017.  
T2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, Gujarat, 53<sup>rd</sup> Edition, 2015.  
T3. K. V. Natrajan, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 48<sup>th</sup> Edition, 2018.

**Reference Book(s):**

- R1. BasantAgarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill India, New Delhi, 2<sup>nd</sup> Edition, 2013.  
R2. John K.C., "Engineering Graphics", PHI Learning, Delhi, 1<sup>st</sup> Edition, 2009.  
R3. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw India, New Delhi, 3<sup>rd</sup> Edition, 2008.

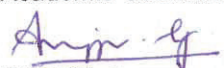
**Publications of Bureau of Indian Standards**

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](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

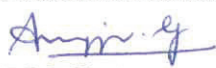
**Assessment pattern**

	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	
<b>Total</b>				<b>100</b>

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<b>Course Code:19PSHG3001</b>		<b>Course Title: Wellness for Students (Common to all B.E/B.Tech Programmes) (2019 Batch only)</b>	
<b>Course Category: Humanities</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week)</b> <b>0: 0 :2</b>	<b>Credits:1</b>	<b>Total Contact Hours:30</b>	<b>Max. Marks:100</b>

### 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

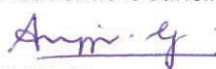
Fitness as a subset of Wellness – health related physical fitness – skill related physical fitness. Exercises related ailment and injuries – safety and precautions – first aid.

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 Intuition 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).

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**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
<b>Continuous Assessment</b>	<b>Yoga:</b> Physical Exercises, KayaKalpa	1,2,3,4,5	15	75
	Meditation		15	
	Assessment of student's workbook		10	
	<b>Sports:</b> Physical Exercises, KayaKalpa		20	
<b>End Semester Examination</b> (combined for yoga and sports)	Assessment of student's workbook	1,2,3,4,5	15	Marks out of 100 is reduced to 25
	Written test (MCQ and short answers)		30	
	Physical exercises		50	
	Viva-voce		20	
<b>Total</b>				100

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<b>Course Code: 19PSHG6001</b>		<b>Course Title: Wellness for Students (Common to all B.E/B.Tech Programmes) (2020 Batch onwards)</b>	
<b>Course Category: Humanities</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week)</b> <b>0: 0: 2</b>	<b>Credits:1</b>	<b>Total Contact Hours:30</b>	<b>Max. Marks:100</b>

**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 Intuition 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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### 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

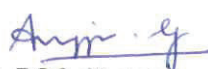
### Assessment Pattern

	Assessment Component	CO. No.	Marks	Total
<b>Continuous Assessment</b>	Personal Effectiveness	1,2,5	35	75
	Yoga and physical Exercise:	3,4,5	20	
	Physical Exercises			
	Meditation			
	Assessment of student's workbook		10	
<b>End Semester Examination</b>	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	
			<b>Total</b>	100

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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, 3<sup>rd</sup> 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	-	-	-	-

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### 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
<b>Total</b>	<b>100</b>	

### Non-letter Grades

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

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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, 1<sup>st</sup> Edition, TMH International Edition, July 2017.
- T2. T.Veerarajan, "Discrete Mathematical Structures with Graph Theory and Combinatorics", 1<sup>st</sup> Edition, Tata McGraw-Hill Education Private Limited, New Delhi, July 2017.

**Reference Book(s):**

- R1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", 7<sup>th</sup> Edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, July 2017.
- R2. Ralph P Grimaldi, Ramana. B. V, " Discrete and Combinatorial Mathematics", 5<sup>th</sup> 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	-	-

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## 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
			<b>Total</b>	<b>100</b>

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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", 2<sup>nd</sup> Edition, Pearson Education, 2011.  
T2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 3<sup>rd</sup> Edition, Pearson Education, 2011.

**Reference Book(s):**

- R1. Sartaj Sahni, "Data Structures, Algorithms and Applications in C++", 2<sup>nd</sup> Edition, Universities Press, 2005.  
R2. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in C++", 2<sup>nd</sup> 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/> 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	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

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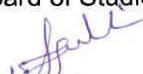
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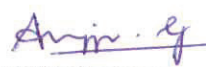
## Assessment Pattern

	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
			<b>Total</b>	100

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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, Naraig Manjikian "Computer Organization and Embedded Systems", 6<sup>th</sup> 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", 5<sup>th</sup> Edition, Morgan Kaufman / Elsevier, 2014. (Unit 5)

**Reference Book(s):**

- R1. William Stallings, "Computer Organization and Architecture: Designing for Performance", 10<sup>th</sup> 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 Kaufman / Elsevier, 5<sup>th</sup> Edition, 2012

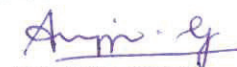
**Web Reference(s):**

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/>

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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	-	-	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
			<b>Total</b>	<b>100</b>

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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", 6<sup>th</sup> Edition, Pearson Education, 2014.  
T2. Rappaport T.S, "Wireless Communications: Principles and Practice", 2<sup>nd</sup> Edition, Pearson Education, 2014.

**Reference Book(s):**

- R1. Simon Haykin, "Communication Systems", 5<sup>th</sup> Edition, John Wiley & Sons. 2017.  
R2. Lathi. B.P., "Modern Analog and Digital Communication systems", 4<sup>th</sup> Edition, Oxford University Press, 2017.  
R3. Jochen Schiller, "Mobile Communications" 2<sup>nd</sup> Edition, Pearson Education, 2014.  
R4. B. Sklar, "Digital Communication Fundamentals and Applications", 2<sup>nd</sup> 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

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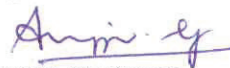
## Assessment Pattern

	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
			<b>Total</b>	<b>100</b>

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<b>Course Code: 19CSCN2301</b>		<b>Course Title: Database Systems</b>	
<b>Course Category: Professional Core</b>		<b>Course Level: Practice</b>	
<b>L:T:P (Hours/Week)</b> <b>3: 0: 2</b>	<b>Credits:4</b>	<b>Total Contact Hours:75</b>	<b>Max Marks:100</b>

### 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 connectivity through 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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## 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)

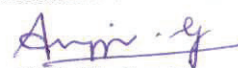
1. Library management system
2. Hotel Management system
3. Student management system
4. Ticket reservation system
5. Hospital management system
6. Employee management system

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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**Text Book(s):**

- T1. Thomas Connolly, Carolyn Begg, "Database Systems: A Practical Approach to Design, Implementation and Management", 6<sup>th</sup> Edition, Pearson Education, 2015.  
 T2. A Silberschatz, H Korth, S Sudarshan, "Database System Concepts", 7<sup>th</sup> Edition, McGraw- Hill, 2019.

**Reference Book(s):**

- R1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 7<sup>th</sup> Edition, Pearson Education, 2017.  
 R2. C.J. Date, A. Kannan and S. Swamynathan- "An Introduction to Database Systems", 8<sup>th</sup> 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
<b>Continuous Assessment</b>	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
<b>End Semester Examination</b>	ESE	1,2,3,4,5	100	60
<b>Total</b>				100

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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

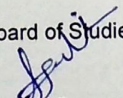
The course is intended to:

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

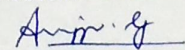
#### List of Exercises

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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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", 2<sup>nd</sup> Edition, Pearson Education, 2011.  
T2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", Pearson Education, 3<sup>rd</sup> Edition, 2011.

**Reference Book(s):**

- R1. Sartaj Sahni, "Data Structures, Algorithms and Applications in C++", 2<sup>nd</sup> Edition, Universities Press, 2005.  
R2. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in C++", 2<sup>nd</sup> 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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## 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	
<b>Total</b>				100

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

**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**

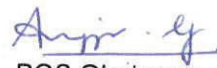
**3 Hours**

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

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**List of Exercises**

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, 10<sup>th</sup> Edition, October 2017.

**Reference Book(s):**

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

R2. Daniel Liang, "Introduction to Java Programming, Comprehensive Version", Pearson Education, 9<sup>th</sup> 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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## 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	
				<b>Total</b>

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<b>Course Code: 19PSHG6002</b>	<b>Course Title: Universal Human Values 2 :Understanding Harmony (common to all B.E/B.Tech programmes)</b>		
<b>Course Category: Humanities</b>		<b>Course Level: Practice</b>	
<b>L:T:P (Hours/Week)</b> 2:1: 0	<b>Credits:3</b>	<b>Total Contact Hours:45</b>	<b>Max Marks:100</b>

**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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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**

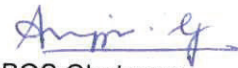
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	1	2	2	-	-	2	-	-
CO2	-	-	-	-	-	1	2	2	2	1	-	2	-	-
CO3	-	-	-	-	-	2	2	2	2	1	-	2	-	-
CO4	-	-	-	-	-	2	2	2	2	-	-	2	-	-
CO5	-	-	-	-	-	1	2	2	2	-	-	2	-	-

High-3; Medium-2; Low-1

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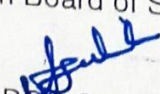
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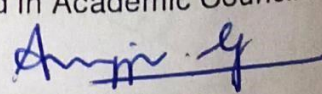
## Assessment Pattern

	Assessment Component	CO No.	Marks	Total Marks Weightage
<b>Continuous Assessment</b>	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	
<b>End Semester Examination</b>	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%
			<b>Total</b>	100%

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## Semester IV

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

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

**Text Book(s):**

- T1. Dr.J.Ravichandran, "Probability and Statistics for Engineers", 1<sup>st</sup> Edition, Wiley India Pvt.Ltd.,2010.  
T2. Douglas C.Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", 6<sup>th</sup> Edition, Wiley India Pvt.Ltd.,2017.  
T3. Veerarajan T, "Probability, Statistics and Random process", 4<sup>th</sup> Edition, Tata McGraw-Hill, New Delhi, 2013.

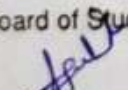
**Reference Book(s):**

- R1. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", 9<sup>th</sup> Edition Pearson Education, Asia, 2016.  
R2. M.R. Spiegel, J. Schiller and R.A. Srinivasan, "Schaum's Outlines Probability and Statistics", 3<sup>rd</sup> Edition, Tata McGraw Hill edition, 2009.  
R3. Morris DeGroot, Mark Schervish, "Probability and Statistics", Pearson Educational Ltd, 4<sup>th</sup> Edition, 2014.  
R4. Johnson and C.B. Gupta, "Probability and Statistics for Engineers", 9<sup>th</sup> Edition, Pearson Education, Asia, 2016.

**Web References:**

1. Probability, Random Variables, Standard Distributions, Two dimensional random variables, Testing of Hypotheses: <https://onlinecourses.nptel.ac.in/111105041/>  
2. Probability, Random Variables, Standard Distributions, Two dimensional random variables, Testing of Hypotheses <https://nptel.ac.in/courses/111105090/>  
3. Design of Experiments : <https://nptel.ac.in/courses/111104075/>

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### 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

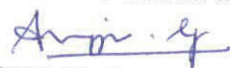
### Assessment Pattern

	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
			<b>Total</b>	<b>100</b>

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

### 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**

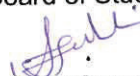
Graph – Definitions – Representations – Topological sort – Breadth first traversal – Depth first traversal – Biconnectivity – Euler circuits – Sets – Representation – Operations.

#### Unit IV      **Greedy Method and Dynamic Programming**

**9+3 Hours**

Greedy technique: Dijkstra'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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**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.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
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", 2<sup>nd</sup> Edition, Pearson Education, 2011.  
T2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 3<sup>rd</sup> Edition, Pearson Education, 2011.

**Reference Book(s):**

- R1. Ellis Horowitz, Sartaj Sahni, Rajasekaran, "Fundamentals of Computer Algorithms", 2<sup>nd</sup> Edition, Galgotia Publications, 2010.  
R2. Adam Drozdek, "Data Structures and Algorithms in C++", 4<sup>th</sup> Edition, Cengage Learning, 2013.  
R3. Cormen.T.H., Leiserson.C.E., Rivest R.L and Stein C, "Introduction to Algorithms", PHIPvt Ltd, 2001.

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BOS Chairman

### Web Reference(s):

1. SWAYAM Course Design and Analysis of Algorithms:  
[https://swayam.gov.in/nd1\\_noc19\\_cs47/preview](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

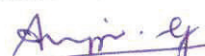
### Assessment Pattern:

	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
			<b>Total</b>	<b>100</b>

Passed in Board of Studies meeting

  
BOS Convener

Approved in Academic Council meeting

  
BOS Chairman

<b>Course Code: 19CSCN2401</b>		<b>Course Title: Operating Systems</b>	
<b>Course Category: Professional Core</b>		<b>Course Level: Practice</b>	
<b>L:T:P (Hours/Week)</b> <b>3: 0: 2</b>	<b>Credits:4</b>	<b>Total Contact Hours:75</b>	<b>Max Marks:100</b>

**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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**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.

**List of Exercises****30 Hours**

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

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
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. Avi Silberschatz, Galvin. P.B. and Gagne. G. "Operating System Concepts", 10<sup>th</sup> Edition, John Wiley & Sons, 2018.

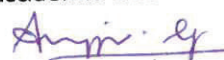
**Reference Book(s):**

- R1. Andrew S. Tanenbaum, "Modern Operating Systems", 4<sup>th</sup> Edition, Pearson Education, 2015.
- R2. William Stallings, "Operating Systems Internals and Design Principles", 9<sup>th</sup> Edition, Pearson Education, 2018.

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### 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](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

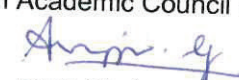
### Assessment Pattern

	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
			<b>Total</b>	100

Passed in Board of Studies meeting

  
BOS Convener

Approved in Academic Council meeting

  
BOS Chairman

<b>Course Code: 19EESN2401</b>		<b>Course Title: Microcontrollers and IoT</b>	
<b>Course Category: Engineering Science</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week)</b> 3: 0: 2	<b>Credits:4</b>	<b>Total Contact Hours:75</b>	<b>Max Marks:100</b>

### Pre-requisites

- Programming with C
- Digital System Design

### Course Objectives

The course is intended to:

1. Write PIC18/PIC16 microcontroller based I/O programs using Embedded C
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**

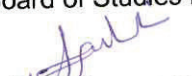
IoT – Major Components – Challenges, Advantages and Disadvantages – LED interfacing - LCD interfacing – Keyboard interfacing – Relay and Opto-isolator – Sensor interfacing- Temperature sensor, IR sensor, Ultrasonic Sensor

#### Unit III IoT Connectivity Technologies and Board Interfacing

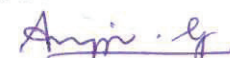
**9 Hours**

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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BOS Chairman

**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)

<b>Course Outcomes</b>	<b>Cognitive Level</b>
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, Rolin D. McKinlay, Danny Causey, "PIC Microcontroller and Embedded systems using assembly and C PIC18", 2nd edition, Micro Digital Ed, 2016.
- T2. Charalampos Doukas, "Building Internet of Things with the Arduino", 1st edition, volume 1, Create space publishers, April 2012.

### Reference Book(s):

- R1. Arshdeep Bahga, Vijay Madiseti, "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=z3VEZPwI5gA&list=PLE7VH8RC\\_N3bpVn-e8QzOAHziEgmjQ2qE&index=3](https://www.youtube.com/watch?v=z3VEZPwI5gA&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](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

  
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BOS Chairman

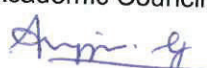
## Assessment Pattern

	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
<b>Total</b>				<b>100</b>

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

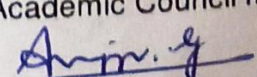
**60 Hours**

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", 3<sup>rd</sup> Edition, O'Reilly, 2016.  
T2. Mark Lutz, "Powerful Object Oriented Programming Python", 4<sup>th</sup> Edition, O'Reilly, 2012.

**Reference Book(s):**

- R1. Mark Lutz, "Learning Python, Powerful OOPs", 5<sup>th</sup> Edition, O'Reilly, 2013.  
R2. Zelle, John M, "Python Programming: An Introduction to Computer Science", Franklin Beedle & Associates, 2003.

**Web References:**

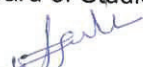
1. <https://docs.python.org/3/tutorial/>
2. <https://www.learnpython.org/>
3. <https://www.pyschools.com/>

**Course Articulation Matrix**

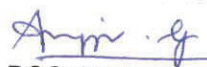
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	2	2	-	-	1	3	3	1	1	2	-
CO2	2	1	-	2	2	-	-	1	3	3	1	1	2	-
CO3	2	1	-	2	2	-	-	1	3	3	1	1	2	-
CO4	2	1	-	2	2	-	-	1	3	3	1	1	2	-
CO5	2	1	-	2	2	-	-	1	3	3	1	1	2	2

High-3; Medium-2; Low-1

Passed in Board of Studies meeting

  
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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	
				<b>Total</b>

Passed in Board of Studies meeting

  
BOS Convener

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BOS Chairman