

**SONA COLLEGE OF TECHNOLOGY, SALEM-5**

**(An Autonomous Institution)**

**B.Tech-Information Technology**

**CURRICULUM and SYLLABI**

**[For students admitted in 2020-2021]**

**B.E / B.Tech Regulation 2019**

**Approved by BOS and Academic Council meetings**

**Sona College of Technology, Salem**  
(An Autonomous Institution)

**Courses of Study for B.E/B.Tech. Semester I under Regulations 2019 (CBCS)**

**Branch: Information Technology**

S.No	Course Code	Course Title	L	T	P	C	Category
<b>Theory</b>							
1	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS
2	U19ENG101C	Communication skills in English- I	2	0	0	2	HS
3	U19PHY103C	Engineering Physics	3	0	0	3	BS
4	U19BEE106A	Basic Electrical and Electronics Engineering	3	0	0	3	ES
5	U19PPR105	Problem Solving using Python Programming	3	0	0	3	ES
<b>Practical</b>							
6	U19PHL110	Engineering Physics Laboratory	0	0	3	1.5	BS
7	U19BEEL113A	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	ES
8	U19PPL111	Python Programming Laboratory	0	0	2	1	ES
9	U19GE101	Basic Aptitude – I	0	0	2	0	EEC
<b>Total Credits</b>						<b>18.5</b>	
<b>Optional Language Elective*</b>							
10	U19OLE1101	French	0	0	2	1	HS
11	U19OLE1102	German					
12	U19OLE1103	Japanese					

\*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (Not accounted for CGPA calculation)

## **Approved By**

Chairperson,  
Science and  
Humanities BoS  
**Dr.M.Renuga**

Chairperson,  
Information  
Technology BoS  
**Dr.J.Akilandeswari**

Member Secretary,  
Academic Council  
**Dr.R.Shivakumar**

Chairperson,  
Academic Council  
& Principal  
**Dr.S.R.R.Senthil  
Kumar**

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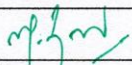
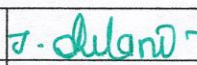
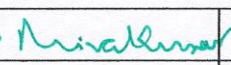
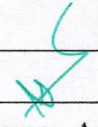
HOD/ Information Technology, First Semester BE IT Students and Staff, COE

**Sona College of Technology, Salem – 636 005**  
**(An Autonomous Institution)**  
**Courses of Study for BE / B Tech Semester II under Regulations 2019 (CBCS)**  
**Branch: Information Technology**

S.No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
<b>Theory</b>								
1	U19MAT202D	Applied Probability and Statistics	3	1	0	4	BSC	60
2	U19ENG201C	Communication Skills in English - II	2	0	2	3	HSMC	60 (30L+30P)
3	U19CHE204B	Applied Chemistry	3	0	0	3	BSC	45
4	U19EGR206A	Engineering Graphics	2	0	2	3	ESC	60 (30L+30P)
5	U19IT201	Programming in C	3	0	0	3	PCC	45
6	U19IT202	Information Technology Essentials	2	0	0	2	ESC	30
<b>Practical</b>								
7	U19IT203	Programming in C Laboratory	0	0	3	1.5	PCC	45
8	U19CHL209	Engineering Chemistry Laboratory	0	0	3	1.5	BSC	45
9	U19GE201	Basic Aptitude – II	0	0	2	0	EEC	30
<b>Total Credits</b>						<b>21</b>		
<b>Optional Language Elective*</b>								
10	U19OLE1201	French	0	0	2	1	HSMC	30
11	U19OLE1202	German						
12	U19OLE1203	Japanese						

\*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (Not accounted for CGPA calculation)

Approved by

			
<b>Chairperson, Science and Humanities BoS</b>	<b>Chairperson, Information Technology BoS</b>	<b>Member Secretary, Academic Council</b>	<b>Chairperson, Academic Council &amp; Principal</b>
<b>Dr. M. Renuga</b>	<b>Dr. J. Akilandeswari</b>	<b>Dr. R. Shivakumar</b>	<b>Dr. S. R. R. Senthil Kumar</b>

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**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester III Regulations 2019**  
**Branch: Information Technology**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19MAT301D	Discrete and Combinatorial Mathematics	3	1	0	4	60
2	U19IT301	Data Structures	3	0	0	3	45
3	U19IT302	Digital Logic Design	3	0	0	3	45
4	U19IT303	Computer Architecture	3	0	0	3	45
5	U19IT304	Object Oriented Programming in C++	3	0	0	3	45
6	U19GE303	<b>Mandatory Course-</b> Essence of Indian Traditional Knowledge	2	0	0	0	30
<b>Practical</b>							
7	U19IT305	Data Structures using C++ Laboratory	0	0	4	2	60
8	U19IT306	Digital Logic Design Laboratory	0	0	2	1	30
9	U19ENG301	Communications Skill Laboratory	0	0	2	1	30
10	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
<b>Total Credits</b>						<b>21</b>	

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**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester IV Regulations 2019**  
**Branch: Information Technology**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19MAT401C	Operations Research	3	1	0	4	60
2	U19IT401	Operating Systems	3	0	2	4	75
3	U19IT402	Principles of Communication	3	0	0	3	45
4	U19IT403	Design and Analysis of Algorithms	3	0	2	4	75
5	U19IT404	Java Programming	3	0	0	3	45
6	U19GE402	<b>Mandatory Course:</b> Environment and Climate Science	2	0	0	0	30
<b>Practical</b>							
7	U19IT405	Java Programming Laboratory	0	0	2	1	30
8	U19IT406	Microprocessors Laboratory	1	0	2	2	45
9	U19GE401	Soft Skills and Aptitude - II	0	0	2	1	30
<b>Total Credits</b>						<b>22</b>	

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**Member Secretary, Academic Council**  
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**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester V under Regulations 2019**  
**Branch: Information Technology**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19IT501	Computer Networks	3	0	0	3	45
2	U19IT502	Database Management Systems	3	0	0	3	45
3	U19IT503	Theory of Computation	3	1	0	4	60
4	U19IT504	Software Engineering	3	0	0	3	45
5	noc22_cs96	NPTEL- Introduction to Internet of Things	3	0	0	3	45
	noc22_cs87	NPTEL- Cloud computing					
	noc22_cs125	NPTEL- Design and Implementation of Human-Computer Interfaces					
<b>Practical</b>							
6	U19IT505	Database Management Laboratory	0	0	4	2	60
7	U19IT506	Mobile Application Development Laboratory	0	0	4	2	60
8	U19IT507	Internet of Things Laboratory	0	0	2	1	30
9	U19GE501	Soft Skills and Aptitude – III	0	0	2	1	30
<b>Total Credits</b>						<b>22</b>	

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**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester VI Regulations 2019**  
**Branch: Information Technology**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19IT601	Full Stack Development	3	0	0	3	45
2	U19IT602	Machine Learning	3	0	0	3	45
3	U19IT905	<b>Professional Elective</b> – Information Security	3	0	0	3	45
	U19IT912	<b>Professional Elective</b> – Total Quality Management					
4	U19IT913	<b>Professional Elective</b> – Software Quality Assurance	3	0	0	3	45
	U19IT918	<b>Professional Elective</b> – Intellectual Property Rights					
	U19IT926	<b>Professional Elective</b> – Robotic Process Automation					
5	<b>Open Elective</b>		3	0	0	3	45
	U19BM1001	Hospital Management					
	U19BM1002	Basic Life Support					
	U19CE1002	Municipal Solid Waste Management					
	U19CE1003	Energy Efficiency and Green Building					
	U19EE1002	Energy Conservation and Management					
	U19EE1004	Renewable Energy Systems					
	U19FT1001	Fundamentals of Fashion Design					
	U19MC1004	Fundamentals of Robotics					
U19ME1004	Renewable Energy Sources						
<b>Practical</b>							
6	U19IT603	Full stack Development Laboratory	0	0	4	2	60
7	U19IT604	Software Design and Testing Laboratory	0	0	4	2	60
8	U19IT605	Machine Learning Laboratory	0	0	2	1	30
9	U19GE601	Soft Skills and Aptitude - IV	0	0	2	1	30
<b>Total Credits</b>						<b>21</b>	

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Sona College of Technology, Salem  
(An Autonomous Institution)  
Courses of Study for B.E/B.Tech Semester VII under 2019 (CBCS)  
Branch: Information Technology

IT  
VII

S.No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19GE701 /	Professional Ethics and Human Values /	3 /	0	0	3 /	45 /
2	U19IT701 /	Cryptography and Network Security /	3 /	0	0	3 /	45 /
3	U19IT907 /	<b>Professional Elective</b> – Wireless Technologies /	3 /	0	0	3 /	45 /
	U19IT918 /	<b>Professional Elective</b> – Intellectual Property Rights /					
4	U19IT905 /	<b>Professional Elective</b> – Information Security /	3 /	0	0	3 /	45 /
	U19IT912 /	<b>Professional Elective</b> – Total Quality Management /					
5	U19IT929 /	<b>Professional Elective</b> – Human Computer Interaction /	3 /	0	0	3 /	45 /
6	U19BM1001 /	<b>Open Elective</b> – Hospital Management /	3 /	0	0	3 /	45 /
	U19BM1002 /	Basic Life Support /					
	U19CE1001 /	Building Services and Safety Regulations /					
	U19EC1003 /	Sensors and Smart Structures Technologies /					
	U19EC1006 /	Mobile Technology and its Applications /					
	U19EC1007 /	CMOS VLSI Design /					
	U19EE1002 /	Energy Conservation and Management /					
	U19EE1003 /	Innovation, IPR and Entrepreneurship Development /					
	U19EE1004 /	Renewable Energy Systems /					
	U19FT1001 /	Fundamentals of Fashion Design /					
	U19ME1002 /	Industrial Safety /					
U19ME1004 /	Renewable Energy Sources /						
<b>Practical</b>							
7	U19IT702 /	Cloud computing Laboratory /	0	0	4 /	2 /	60
8	U19IT703 /	Mini Project /	0	0	4 /	2 /	60
<b>Total</b>						<b>22 /</b>	

Approved By

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05-07-2023

Regulations-2019

IT  
VIII


**Sona College of Technology, Salem  
(An Autonomous Institution)**


**Courses of Study for B.E/B.Tech. Semester VIII under Regulations 2019 (CBCS)**


**Branch: Information Technology**

S.No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Practical</b>							
1	U19IT801 ✓	Project Work ✓	0	0	24	12	360 ✓
<b>Total</b>						<b>12</b> ✓	

**Approved By**


  
**Chairperson, Information Technology BoS  
Dr.J.Akilandeswari**

  
**Member Secretary, Academic Council  
Dr.R.Shivakumar 26/12/23**

  
**Chairperson, Academic Council & Principal  
Dr.S.R.R.Senthil Kumar**

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HOD/Information Technology, Eighth Semester BE IT Students and Staff, COE

  
22-12-2023

Regulations-2019

**Sona College of Technology, Salem**  
(An Autonomous Institution)

**Courses of Study for B.E./B.Tech. Semester I under Regulations 2019 (CBCS)**

**Branch: Information Technology**

S.No	Course Code	Course Title	L	T	P	C	Category
<b>Theory</b>							
1	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS
2	U19ENG101C	Communication skills in English- I	2	0	0	2	HS
3	U19PHY103C	Engineering Physics	3	0	0	3	BS
4	U19BEE106A	Basic Electrical and Electronics Engineering	3	0	0	3	ES
5	U19PPR105	Problem Solving using Python Programming	3	0	0	3	ES
<b>Practical</b>							
6	U19PHL110	Engineering Physics Laboratory	0	0	3	1.5	BS
7	U19BEEL113A	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	ES
8	U19PPL111	Python Programming Laboratory	0	0	2	1	ES
9	U19GE101	Basic Aptitude – I	0	0	2	0	EEC
<b>Total Credits</b>						<b>18.5</b>	
<b>Optional Language Elective*</b>							
10	U19OLE1101	French	0	0	2	1	HS
11	U19OLE1102	German					
12	U19OLE1103	Japanese					

\*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (Not accounted for CGPA calculation)

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& Principal  
**Dr.S.R.R.Senthil  
Kumar**

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## U19ENG101C - COMMUNICATION SKILLS IN ENGLISH – I COMMON TO IT

L	T	P	C
2	0	0	2

### Course Outcome: At the end of course, the students will be able to

1. Use grammatical components effectively in both written and spoken communication
2. Develop speaking skills for self-introduction, delivering speeches and technical presentation.
3. Speak effectively in real time and business situations
4. Write email, formal letters and descriptions of graphics
5. Develop skills for writing reports and proposals, and for general purpose and technical writing.

### UNIT I

- Parts of speech
- Self-introduction – personal information, name, home background, study details, area of interest, hobbies, strengths and weaknesses, projects and paper presentations, likes and dislikes in food, travel, clothes, special features of home town.
- Instructions, Email – fixing an appointment, cancelling appointments, conference details, hotel accommodation, order for equipment, training programme details, paper submission for seminars and conferences
- Paragraph writing – Describing – defining – providing examples or evidences

### UNIT II

- Tenses, active and passive voice
- Welcome address, Vote of Thanks, Special Address on specific topic.
- Letter Writing – Business communication, quotations, placing orders, complaints, replies to queries from business customers, inviting dignitaries, accepting and declining invitations

### UNIT III

- Prefixes and Suffixes
- Mini presentation in small groups of two or three on Office Arrangements, Facilities, Office Functions, Sales, Purchases, Training Recruitment, Advertising, Applying for financial assistance, applying for a job, team work, discussion, presentation.
- Cover letter and resume writing

## **UNIT IV**

- Modal verbs and probability, concord
- Situational Role Play - between examiner and candidate, teacher and student, customer and sales manager, hotel manager and organiser, team leader and team member, bank manager and candidate, interviewer and applicant, car driver and client, industrialist and candidate, receptionist and appointment seeker, new employee and manager, employee and employee, p.a. and manager, schedule for training
- Proposal: establishing a lab, introducing a subject in the curriculum, training programme for students

## **UNIT V**

- If conditionals
- Situational Role Play - Asking for directions, seeking help with office equipment, clarifying an error in the bill, job details, buying a product, selling a product, designing a website, cancelling and fixing appointments, hotel accommodation, training facilities, dress code, conference facilities.
- Technical report writing - feasibility report, accident report, survey report

**TOTAL: 40 Hours**

**Speaking test will be conducted for 20 marks externally and evaluated along with Communication Skills in English – I in the End Semester Valuation.**

## **TEXT BOOK**

- Technical English I & II, Dr. M. Renuga et al. Sonaversity, 2016

## **EXTENSIVE READING**

- The Story of Amazon.com- Sara Gilbert, published by Jaico
- The Story of Google – Sara Gilbert, published by Jaico

## **REFERENCE**

1. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
2. A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by Cambridge University Press India Pvt. Ltd.

**U19MAT102A - LINEAR ALGEBRA AND CALCULUS**  
**Common to CIVIL, MECH, EEE, CSE, IT and MCT**

**L T P C**  
**3 1 0 4**

**Course Outcomes: At the end of the course, the students will be able to**

- find the rank of the matrix and solve linear system of equations by direct and indirect methods
- apply the concepts of vector spaces and linear transformations in real world applications
- apply the concepts of eigen values and eigen vectors of a real matrix and their properties in diagonalization and the reduction of a real symmetric matrix from quadratic form to canonical form
- find the Taylor's series expansion, Jacobians and the maxima and minima of functions of two variables
- apply appropriate techniques of multiple integrals to find the area and volume.

**UNIT I - LINEAR SYSTEM OF EQUATIONS**

**12**

Rank of a matrix – Solution of linear system of equations by matrix method, Gauss elimination, Gauss-Jordan, Gauss-Jacobi and Gauss-Seidel methods.

**UNIT II - VECTOR SPACES**

**12**

Vector Space – Linear independence and dependence of vectors – Basis – Dimension – Linear transformations (maps) – Matrix associated with a linear map – Range and kernel of a linear map – Rank-nullity theorem (without proof).

**UNIT III - EIGEN VALUES AND EIGEN VECTORS**

**12**

Eigen values and eigen vectors of real matrices – Properties of eigen values and eigen vectors – Cayley-Hamilton theorem – Diagonalization of real symmetric matrices – Reduction of quadratic form to canonical form.

**UNIT IV - MULTIVARIABLE CALCULUS**

**12**

Functions of several variables – Partial differentiation – Total derivative – Jacobians – Taylor's theorem for function of two variables – Maxima and minima of function of two variables without constraints – Constrained maxima and minima by Lagrange's method of undetermined multipliers.

## **UNIT V - MULTIPLE INTEGRALS**

**12**

Double integrals – Change of order of integration – Change of variables from Cartesian to polar coordinates – Area as double integrals in Cartesian coordinates – Triple integrals – Volume as triple integrals in Cartesian coordinates.

**Theory: 45 hours; Tutorial: 15 hours**

**TOTAL: 60 Hours**

### **TEXT BOOKS**

1. T. Veerarajan, “Linear Algebra and Partial Differential Equations”, McGraw Hill Publishers, 1<sup>st</sup> Edition, 2018.
2. T. Veerarajan, “Engineering Mathematics for Semesters I & II”, McGraw Hill Publishers, 1<sup>st</sup> Edition, 2019.

### **REFERENCE BOOKS**

1. S. Lipschutz and M. L. Lipson, “Linear Algebra”, McGraw Hill Publishers, 6<sup>th</sup> Edition, 2018.
2. E. Kreyszig, “Advanced Engineering Mathematics”, Wiley Publishers, 10<sup>th</sup> Edition, Reprint, 2017.
3. C. Prasad and R. Garg, “Advanced Engineering Mathematics”, Khanna Publishers, 1<sup>st</sup> Edition, 2018.
4. B. V. Ramana, “Higher Engineering Mathematics”, McGraw Hill Publishers, 29<sup>th</sup> Reprint, 2017.
5. B. S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 44<sup>th</sup> Edition, 2018.



**U19PHY103C - ENGINEERING PHYSICS**  
**(For B.Tech Information Technology)**

**L T P C**  
**3 0 0 3**

**Course Outcomes: At the end of the course, the students will be able to,**

1. Discuss the dual nature of matter and radiation and the application of wave nature of particles.
2. Describe the basic components of lasers.
3. Analyse the relation between arrangement of atoms and material properties.
4. Differentiate the electrical and thermal conductivity of metals.
5. Elucidate the classification and theory of semiconducting materials.

**UNIT I - QUANTUM PHYSICS**

**9**

Origin of quantum mechanics – Limitations of classical theory - Dual nature of matter and radiation.

**Particle nature of radiation** - Compton effect - Explanation based on quantum theory - Expression for Compton shift (no derivation).

**Wave nature of matter** - de Broglie waves - Schrödinger's time independent and time dependent wave equations - Physical significance of wave function - Energy and wave function of an electron trapped in one dimensional box.

**Application of wave nature of particles** - Electron microscope - Comparison of optical and electron microscope - Scanning electron microscope - Limitations of electron microscope.

**UNIT II - LASERS**

**9**

**Basic terms** - Energy level - normal population - induced absorption (pumping) - population inversion - meta stable state - spontaneous emission - stimulated emission.

**Basic components of a laser** - Active medium - pumping technique - optical resonator  
**Einstein's theory** - stimulated absorption - spontaneous emission and stimulated emission.

**Types of lasers** - Solid lasers ( Nd:YAG) - Gas lasers (CO<sub>2</sub> laser) - semiconductor laser (homojunction and hetero junction laser).

**Holography** - Construction and reconstruction of hologram.

### UNIT III - CRYSTAL PHYSICS

9

Importance of crystals - Types of crystals - Basic definitions in crystallography (Lattice –space lattice - unit cell - lattice parameters – basis - crystallographic formula) - Seven crystal systems and fourteen Bravais lattices – Lattice planes and Miller indices – Interplanar distance - d spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number and Atomic Packing factor for SC, BCC, FCC and HCP Structures - Polymorphism and allotropy.

**Crystal imperfections** - Point, line and surface defects – burger vector.

### UNIT IV - CONDUCTING MATERIALS

9

Usage of conducting materials - basic definitions (electrical resistance - conductance - resistivity - conductivity).

**Classical free electron theory of metals** - Postulates of classical free electron theory - microscopic form of Ohm's law - Electrical conductivity - definition and expression for electrical conductivity - Thermal conductivity - definition and expression for thermal conductivity - Wiedemann - Franz law and Lorentz number - Success and failure of classical free electron theory.

**Quantum free electron theory** - Drawbacks of quantum free electron theory - origin of energy bands - band theory of solids ( qualitative treatment only) - Fermi energy and Fermi distribution function - Effect of temperature on Fermi function - Density of energy states - carrier concentration in metals.

### UNIT V - SEMICONDUCTING MATERIALS

9

Properties of semiconductors - Classification of semiconductors - Intrinsic and extrinsic semiconductors - Elemental and compound semiconductors.

**Intrinsic semiconductor** - Two types of charge carriers - Energy band diagram of intrinsic semiconductors (at  $T = 0\text{ K}$  and  $T > 0\text{ K}$ ) - Expression for number of electrons in conduction band - Expression for number of holes in valence band - Law of mass action and intrinsic carrier concentration - Fermi level - Variation of Fermi level with temperature - electrical conductivity - band gap determination.

**Extrinsic semiconductors** - Draw backs of intrinsic semiconductors – Types of extrinsic semiconductors – ‘n’-type and ‘p’-type semiconductors – Energy band diagram of ‘n’ type and ‘p’ type semiconductors (at  $T = 0\text{ K}$  and  $T > 0\text{ K}$ ) – Carrier concentration of extrinsic semiconductors (Qualitative Treatment only) – Hall effect – Determination of Hall coefficient – Applications.

**TOTAL: 45 Hours**

## **TEXT BOOKS**

- M.N.Avadhanulu, 'Engineering Physics' S.Chand & Company Ltd, New Delhi (2015)
- B. K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning India Pvt. Ltd., Delhi, 2019

## **REFERENCES**

- Engineering Physics, Sonaversity, Sona College of Technology, Salem (Revised Edition 2018 ).
- Rajendran, V, and Marikani A, 'Materials science' TMH Publications, (2004) New Delhi.
- Palanisamy P.K, 'Materials science', SciTech Publications (India) Pvt. Ltd., Chennai, Second Edition (2007)
- K. Bhattacharya, Poonam Tandon "Engineering Physics" Oxford University Press 2017.

**Course Outcomes: At the end of the course, the student will be able to,**

- Analyse the various DC circuits and find the circuit parameters.
- Describe the principles of AC fundamentals.
- Discuss the construction and working principle of DC machines and Transformer.
- Explain the basics of semiconductor devices and its applications.
- Discuss the various applications of operational amplifier and working principle of UPS.

### UNIT I - DC FUNDAMENTALS

9

Electrical components and parameters – Resistance, Conductance – Ohm’s law, limitations of Ohm’s law – Kirchhoff’s law – Power – Energy – resistors in series and parallel – comparison of series and parallel circuits – Star-Delta transformation – simple problems.

### UNIT II - AC FUNDAMENTALS

9

AC waveforms – standard terminologies – RMS and average value of Sinusoidal, Triangular and Square waveforms – form factor, peak factor – Resistance, Inductance, Capacitance in AC circuits – Impedance – RL, RC, RLC series circuits – series resonance – simple problems.

### UNIT III - ELECTRICAL MACHINES

9

**DC Generator:** construction of DC Machine – working principle of DC Generator – EMF equation – Types of DC Generator.

**DC Motor:** Working principle of DC Motor – Types of DC Motor.

**Transformer:** Working principle of Transformer – EMF equation – Transformation ratio.

### UNIT IV - SEMICONDUCTOR DEVICES

9

**BJT:** Operations of NPN and PNP Transistors – Characteristics of Transistors in CE, CB and CC configuration.

*Introduction to power semiconductors - SCR, MOSFET – V-I characteristics and applications.*

## UNIT V - OPERATIONAL AMPLIFIERS AND POWER SUPPLY

9

**Operational Amplifier:** Ideal characteristics of Op-Amp – Inverting amplifier, Non-Inverting amplifier – voltage follower – summing amplifier.

**Rectifiers:** working principle of half wave rectifier, full wave rectifier, bridge rectifier.

**UPS:** components of UPS – working principle of UPS.

**TOTAL: 45 Hours**

### TEXT BOOKS

1. B.L. Theraja, “Fundamentals of Electrical Engineering & Electronics”, S. Chand & Co Ltd, 2015.
2. Muthusubramanian R, Salivahanan S, “Basic Electrical and Electronics Engineering”, 3rd Edition 2007, Tata McGraw-Hill publishing company limited.

### REFERENCES

1. Mehta V.K, Rohit Mehta, “Principles of Electrical Engineering & Electronics”, S.Chand& Co. Ltd., 2011.
2. S.K. Bhattacharya, “Electrical Machines”, Tata MC Graw Hill Publishing company ltd., III edition, 2009.
3. Smarajit Ghosh, “Fundamentals of Electrical and Electronics Engineering”, II revised edition 2010, PHI publications.
4. D. Roy Choudhury and Shail Jain, “Linear Integrated Circuits”, First edition, New age international, 2011.
5. S. Padma, “Basic Electrical and Electronics Engineering”, Sonaversity, Revised edition 2016.

## U19PPR105 - PROBLEM SOLVING USING PYTHON PROGRAMMING

L	T	P	C
3	0	0	3

### Course Outcomes: At the end of course, the students will be able to

1. Develop algorithmic solutions to simple computational problems
2. Write simple Python programs
3. Write programs with the various control statements and handling strings in Python
4. Develop Python programs using functions and files
5. Analyze a problem and use appropriate data structures to solve it.

### UNIT I - ALGORITHMIC PROBLEM SOLVING 9

Need for computer languages, Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).

### UNIT II - BASICS OF PYTHON PROGRAMMING 9

Introduction-Python Interpreter-Interactive and script mode -Values and types, variables, operators, expressions, statements, precedence of operators, Multiple assignments, comments, input function, print function, Formatting numbers and strings, implicit/explicit type conversion.

### UNIT III - CONTROL STATEMENTS AND STRINGS 9

Conditional (if), alternative (if-else), chained conditional (if-elif-else). Iteration-while, for, infinite loop, break, continue, pass, else. Strings-String slices, immutability, string methods and operations.

### UNIT IV - FUNCTIONS AND FILES 9

Functions - Introduction, inbuilt functions, user defined functions, passing parameters - positional arguments, default arguments, keyword arguments, return values, local scope, global scope and recursion. Files -Text files, reading and writing files.

### UNIT V - DATA STRUCTURES: LISTS, SETS, TUPLES, DICTIONARIES 9

Lists-creating lists, list operations, list methods, mutability list functions, searching and sorting, Sets-creating sets, set operations. Tuples-Tuple assignment, Operations on Tuples, lists and tuples, Tuple as return value- Dictionaries-operations and methods, Nested Dictionaries.

**TOTAL: 45 Hours**

## **TEXT BOOK**

- Reema Thareja, "Problem Solving and Programming with Python", Oxford University Press, 2018.
- Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)

## **REFERENCES**

- Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python", Mc-Graw Hill Education, 2018.
- Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
- Timothy A. Budd," Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
- Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
- Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2013.

**U19PHL110 - ENGINEERING PHYSICS LABORATORY**  
**(For B.Tech. Information Technology)**

**L T P C**  
**0 0 3 1.5**

**Course Outcomes: At the end of the course, the students will be able to,**

1. Demonstrate an experimental setup to form interference fringes and use it to determine the thickness of the thin wire.
2. Study the change in properties of ultrasonic waves in a liquid medium and determine the characteristics of the liquid.
3. Demonstrate by means of an appropriate experiment the poor thermal conductivity of a given bad conductor
4. Apply the principle of spectrometry to determine the properties of a given prism.
5. Demonstrate the applications of a diode laser to determine the wave length, particle size in the given powder (Lycopodium) and the characteristics of a given optical fibre.
6. Investigate the non – uniform bending behavior of a given material.
7. Demonstrate the experimental set up to execute torsional oscillations and determine the rigidity modulus of the given wire
8. Determine the specific resistance of the given wire using Carey – Fosters bridge.
9. Demonstrate the experimental setup for stream line flow of low viscus liquid and determine the coefficient of viscosity of the given liquid by Poiseuille's method.
10. Apply the principle of spectrometry to determine the properties of a given prism.
11. Investigate the uniform bending behavior of a given material.
12. Determine the band gap of a semiconductor diode.

**LIST OF EXPERIMENTS**

1. Determination of the thickness of a thin wire by forming interference fringes using air wedge apparatus.
2. Determination of velocity of ultrasonic waves and compressibility of the given liquid using ultrasonic interferometer.
3. Determination of the thermal conductivity of a bad conductor using Lee's Disc apparatus.
4. Determination of dispersive power of the prism for various pairs of colors in the mercury spectrum using a spectrometer.
5. Determination of laser wavelength, particle size (lycopodium powder), acceptance angle and numerical aperture of an optical fibre using diode laser.



6. Determination of the Young's modulus of the given material by non-uniform bending method.
7. Determination of rigidity modulus of the material of wire using torsion pendulum
8. Determination of specific resistance of a given wire using Carey Foster's bridge.
9. Determination of coefficient of viscosity of liquid by Poiseuille's method.
10. Determination of wavelength of prominent colors in mercury spectrum using a spectrometer.
11. Determination of the Young's modulus of the given material by uniform bending method.
12. Determination of band gap of the given semiconductor diode.

**TOTAL: 45 Hours**

# U19BEEL113A - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

L	T	P	C
0	0	2	1

**Course Outcomes: At the end of course, the students will be able to**

- Apply the basic circuit laws for calculating various parameters of DC and AC circuits
- Design the circuit for various applications using electronic devices.
- Analysis the performance characteristics of electronic devices such as SCR, MOSFET, BJT and op-amp.

## **List of experiments**

1. Verification of Ohm's Law.
2. Verification of Kirchhoff's Law.
3. Measurement of power and power factor for RLC circuit.
4. Frequency response of RLC resonance circuit.
5. V-I characteristics of BJT in CB configuration.
6. V-I characteristics of BJT in CE configuration.
7. V-I characteristics of BJT in CC configuration.
8. V-I characteristics of MOSFET.
9. V-I characteristics of SCR.
10. Characteristics of operational amplifier as inverting and non-inverting amplifiers.
11. Measurement of ripple factor for half wave and full wave rectifier circuits.

**Total: 30 Hours**

## U19PPL111 - PYTHON PROGRAMMING LABORATORY

L	T	P	C
0	0	2	1

**Course Outcomes: At the end of course, the students will be able to**

1. Implement the algorithms using basic control structures in Python
2. Develop Python programs to use functions, strings and data structures to solve different types of problems
3. Implement persistent storing information through file operations

### LIST OF EXPERIMENTS

1. Draw flowchart using any open source software.
2. Implement programs with simple language features.
3. Implement various branching statements in python.
4. Implement various looping statements in python.
5. Develop python programs to perform various string operations like concatenation, slicing, indexing.
6. Implement user defined functions using python.
7. Implement recursion using python.
8. Develop python programs to perform operations on list and tuples
9. Implement dictionary and set in python
10. Implement python program to perform file operations.

**TOTAL: 30 Hours**

**U19GE101 - BASIC APTITUDE – I**  
**(Common to All Departments)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

**Course Outcomes: At the end of course, the students will be able to**

1. Solve fundamental problems in specific areas of quantitative aptitude
2. Solve basic problems in stated areas of logical reasoning
3. Demonstrate rudimentary verbal aptitude skills in English with regard to specific topics

**1. Quantitative Aptitude and Logical Reasoning**

**Solving simple problems with reference to the following topics:**

- a. Numbers – HCF & LCM
- b. Decimal fractions
- c. Square roots & cube roots
- d. Surds & Indices
- e. Logarithms
- f. Percentage
- g. Averages
- h. Coding and Decoding & Visual language

**2. Verbal Aptitude**

**Demonstrating plain English language skills with reference to the following topics:**

- a. Synonyms
- b. Antonyms
- c. Verbal analogy
- d. Editing passages
- e. Sentence filler words

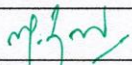
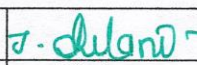
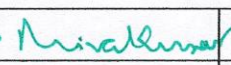
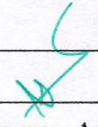
**TOTAL: 30 hours**

**Sona College of Technology, Salem – 636 005**  
**(An Autonomous Institution)**  
**Courses of Study for BE / B Tech Semester II under Regulations 2019 (CBCS)**  
**Branch: Information Technology**

S.No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
<b>Theory</b>								
1	U19MAT202D	Applied Probability and Statistics	3	1	0	4	BSC	60
2	U19ENG201C	Communication Skills in English - II	2	0	2	3	HSMC	60 (30L+30P)
3	U19CHE204B	Applied Chemistry	3	0	0	3	BSC	45
4	U19EGR206A	Engineering Graphics	2	0	2	3	ESC	60 (30L+30P)
5	U19IT201	Programming in C	3	0	0	3	PCC	45
6	U19IT202	Information Technology Essentials	2	0	0	2	ESC	30
<b>Practical</b>								
7	U19IT203	Programming in C Laboratory	0	0	3	1.5	PCC	45
8	U19CHL209	Engineering Chemistry Laboratory	0	0	3	1.5	BSC	45
9	U19GE201	Basic Aptitude – II	0	0	2	0	EEC	30
<b>Total Credits</b>						<b>21</b>		
<b>Optional Language Elective*</b>								
10	U19OLE1201	French	0	0	2	1	HSMC	30
11	U19OLE1202	German						
12	U19OLE1203	Japanese						

\*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (Not accounted for CGPA calculation)

Approved by

			
<b>Chairperson, Science and Humanities BoS</b>	<b>Chairperson, Information Technology BoS</b>	<b>Member Secretary, Academic Council</b>	<b>Chairperson, Academic Council &amp; Principal</b>
<b>Dr. M. Renuga</b>	<b>Dr. J. Akilandeswari</b>	<b>Dr. R. Shivakumar</b>	<b>Dr. S. R. R. Senthil Kumar</b>

Copy to:-HOD/ Information Technology, Second Semester BE IT Students and Staff, COE

**B. TECH. / INFORMATION TECHNOLOGY**

SEMESTER – II	<b>APPLIED PROBABILITY AND STATISTICS</b>	L	T	P	C
U19MAT202D		3	1	0	4

**COURSE OUTCOMES**

At the end of the course, the students will be able to

1. apply the concepts of measure of central tendency, dispersion, correlation to the given data and analyze the results.
2. apply the concepts of random variables and their properties to generate the moments.
3. fit the suitable distribution and its properties to the real world problems and interpret the results.
4. apply the concepts of joint probability distribution and its properties to find the covariance.
5. test the hypothesis of the population using sample information.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	2							2		2
CO2	3	3		3	2							2		2
CO3	3	3		3	2							2		2
CO4	3	3		3	2							2		2
CO5	3	3		3	2							2		2

**UNIT – I BASIC STATISTICS**

12

Measures of central tendency (simple arithmetic mean, median, mode) – Quartile's – Measures of dispersion (range, inter-quartile range, quartile deviation, mean deviation, standard deviation, coefficient of variation) – Simple correlation – Curve fitting (straight line and parabola).

**UNIT – II RANDOM VARIABLES**

12

Discrete and continuous random variables – Probability mass function, probability density function, moments, moment generating function and their properties.

**UNIT – III STANDARD DISTRIBUTIONS**

12

Binomial, Poisson, geometric, uniform, exponential and normal distributions and their properties.

**UNIT – IV TWO DIMENSIONAL RANDOM VARIABLES**

12

Joint distributions, marginal and conditional distributions – Covariance – Correlation – Central limit theorem.

**UNIT – V TESTING OF HYPOTHESIS**

12

Sampling distributions – testing of hypothesis for proportion, mean, standard deviation and differences using normal distribution–  $t$ -test for single mean and difference between means -  $\chi^2$ - tests for independence of attributes and goodness of fit and  $F$ -test for equality of two variances.

Theory: 45 Hours

Tutorial: 15 Hours

Total: 60 Hours

**TEXT BOOKS:**

1. S. C. Gupta, V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 11<sup>th</sup> Edition, Reprint, 2019.
2. T. Veerarajan, "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", McGraw Hill Publishers, 4<sup>th</sup> Edition, 7<sup>th</sup> Reprint, 2018.

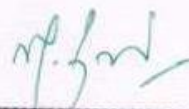
**REFERENCE BOOKS:**

1. R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9<sup>th</sup> Edition, 2018.
2. S. Ross, "A first course in probability", Pearson Publishers, 9<sup>th</sup> Edition, 2019.
3. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall Publishers, Reprint, 2003.
4. W. Feller, "An Introduction to Probability Theory and its Applications", Vol. 1, 3<sup>rd</sup> Edition, Wiley Publishers, 2008.



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**Prof. S. JAYABHARATHI**  
Head / Department of Mathematics  
Sona College of Technology  
Salem – 636 005



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**Dr. M. RENUGA**  
BoS - Chairperson  
Science and Humanities  
Sona College of Technology  
Salem – 636 005

10. 05. 2019

B. E. / B. Tech. Regulations 2019





### **UNIT –I**

- Cause and effect expressions, adjectives, comparative adjectives
- Listening to conversations, welcome speeches, lectures and description of equipment
- Listening to different kinds of interviews (face-to-face, radio, TV and telephone interviews)
- Understanding notices, messages, timetables, advertisements, graphs, etc.
- Reading passages for specific information transfer

### **UNIT – II**

- Prepositions and dependent prepositions
- Understanding short conversations or monologues,
- Taking down phone messages, orders, notes etc
- Listening for gist, identifying topic, context or function
- Reading documents for business and general contexts and interpreting graphical representations

### **UNIT – III**

- Collocations
- Listening comprehension, entering information in tabular form
- Error correction, editing mistakes in grammar, vocabulary, spelling, etc.
- Reading passage with multiple choice questions, reading for gist and reading for specific information, skimming for comprehending the general idea and meaning and contents of the whole text

### **UNIT – IV**

- Articles, adverbs
- Intensive listening exercises and completing the steps of a process.
- Listening exercises to categorise data in tables.
- Short reading passage: gap-filling exercise related to grammar, testing the understanding of prepositions, articles, auxiliary verbs, modal verbs, pronouns, relative pronouns and adverbs, short reading passage with multiple choice questions.

### **UNIT – V**

- Pronouns
- Listening to extended speech for detail and inference
- Listening and developing hints
- gap-filling exercise testing the knowledge of vocabulary, collocations, dependent prepositions, grammatical structures
- Short reading passages for sentence matching exercises, picking out specific information in a short text

**TOTAL: 60 hours**

**The listening test will be conducted for 20 marks and reading for 20 marks internally and evaluated along with Communication Skills in English –II in the End Semester Valuation.**

**Textbook:**

1. Technical English I & II, Dr. M. Renuga et al. Sonaversity, 2016

**Extensive Reading**

1. Who Moved my Cheese? – Spencer Johnson-G. P. Putnam's Sons
2. Discover the Diamond in You – Arindham Chaudhari – Vikas Publishing House Pvt. Ltd.

**Reference**

1. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
2. A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by

## II SEMESTER (IT)

**COURSE CODE U19CHE204B**

**L T P C**

**COURSE NAME APPLIED CHEMISTRY**

**3 0 0 3**

### Course outcome:

At the end of the course the students will be able to

- CO1** Outline the principles and applications of electrochemistry to engineering and technology.
- CO2** Analyze the types of corrosion and describe the methods of corrosion control.
- CO3** Discuss the principle, applications of surface chemistry and catalysis in engineering and technology.
- CO4** Describe the basics of nano chemistry, synthesis, properties and applications of nano materials in engineering and technology.
- CO5** Analyze the types of polymers, methods of polymerization and methods of fabrication.

### CO / PO, PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

Programme Outcomes (POs) and Programme Specific Outcome (PSOs)

COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	2												2
CO - 2	3	2												2
CO - 3	3	2												2
CO - 4	3	2												2
CO - 5	3	2												2

### UNIT I ELECTROCHEMISTRY

**9**

Conductivity of Electrolytes – Kohlrausch’s Law of Independent Migration of Ions and Its Applications – Conductometric Titration (Acid-Base – HCl vs NaOH) – Electrode Potential – Nernst Equation – Derivation and Problems Based on Single Electrode Potential Calculation – Electrochemical Series – Significance – Reference Electrodes - Standard Hydrogen Electrode, Saturated Calomel electrode – Ion selective electrode - glass electrode - determination of pH for unknown solution – Electrochemical Cell – Emf of an Electrochemical Cell – Redox Reactions - Potentiometric Titrations (Redox – Fe<sup>2+</sup> Vs Dichromate).

## **UNIT II CORROSION AND ITS CONTROL**

**9**

Dry or Chemical Corrosion - Pilling-Bedworth Rule – Wet or Electrochemical Corrosion – Mechanism of Electrochemical Corrosion – Galvanic Corrosion – Differential aeration Corrosion - Factors Influencing Corrosion – Corrosion Control - Cathodic Protection - Sacrificial Anodic Protection Method and Impressed Current Cathodic Protection – Protective Coatings – Metallic Coatings – Galvanizing process – Tinning process - Organic Coatings – Paints - Constituents and Functions.

## **UNIT III SURFACE CHEMISTRY AND CATALYSIS**

**9**

Adsorption – types - Physical and chemical adsorption – adsorption of gases on solids - Adsorption isotherms - Freundlich and Langmuir isotherms - Adsorption of solutes from solution – Applications of adsorption - Role of adsorption in catalytic reactions – Adsorption in pollution abatement (granular activated carbon and powdered activated carbon) – Catalysis - Types - Characteristics of catalysts - Autocatalysis - Definition and examples – catalytic promoters – catalytic poisons.

## **UNIT IV NANOCHEMISTRY**

**9**

Basics - Distinction between molecules, nanoparticles and bulk materials – Size-dependent properties – Nanoparticles: nano cluster, nano rod, nanotube (CNT) and nanowire – Synthesis: Precipitation – Thermolysis – Hydrothermal – Solvothermal – Electrodeposition - Chemical vapour deposition - Sol-gel technique – Properties and applications of nano materials.

## **UNIT V POLYMERS AND COMPOSITES**

**9**

Nomenclature of Polymers – Functionality – Types of Polymerization-Addition-Condensation and Copolymerization – Classification of Polymers – Free Radical mechanism of Addition Polymerization – Properties of Polymers - Glass transition temperature – Tacticity - Methods of Polymerization – Bulk, solution, emulsion and suspension – Thermoplastic and Thermosetting Resins – Plastics – Moulding Constituents of Plastic – Moulding of Plastics into Articles- Injection - Compression and Blow Moulding – Composites - Constituents of Composites – Types of FRP Composites.

**TOTAL : 45 HOURS**

### **Text Books:**

1. P. C. Jain and Monica Jain, “Engineering Chemistry” Dhanpat Rai Pub, Co., New Delhi, 2010 (15th Edition).
2. G. Shanthi et al., “Applied Chemistry”, Sonaversity, Sona College of Technology, Salem, 2019.

**Reference Books:**

1. H. K. Chopra, A. Parmer, "Chemistry for Engineers", Narosa Publishing House, New Delhi, 110 002, 2016.
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd., Chennai, 2009.
3. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 2008.
4. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.

## U19EGR206A – ENGINEERING GRAPHICS

**L T P C**

**2 0 2 3**

**Course Outcomes: Upon completion of this course the students will be able to**

- CO1** Predict the construction of various curves in civil elevation, plan and machine components.
- CO2** Analyze the principles of projection of various planes by different angle to project points, lines and planes.
- CO3** Draw the principles of projection of simple solid by the axis is inclined to one reference plane by change of position method.
- CO4** Understand the interior details of complex components, machineries by sectioning the solid body. Study the development of surfaces for prisms and pyramids.
- CO5** Draw the projection of three dimensional objects representation of machine structure and explain standards of orthographic views by different methods.

<b>CO / PO, PSO Mapping</b>														
<b>(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</b>														
<b>Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</b>														
<b>COs, POs PSOs Mapping</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO 1</b>	3	2	2	1	1	1	1	1	3	2	2	3	2	2
<b>CO 2</b>	3	2	2	1	2	1	1	1	3	2	2	3	2	2
<b>CO 3</b>	3	2	2	1	2	1	1	1	3	2	2	3	2	2
<b>CO 4</b>	3	2	2	1	2	1	1	1	3	2	2	3	2	2
<b>CO 5</b>	3	2	2	1	1	1	1	1	3	2	2	3	2	2

### **UNIT I – PLANE CURVES (Manual drafting) 06**

Curves used in engineering practices Conics – Construction of ellipse – Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

### **UNIT II – PROJECTION OF POINTS, LINES AND PLANE SURFACES (CAD software) 12**

Projection of points – Projection of straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to one reference planes.

### **UNIT III – PROJECTION OF SOLIDS (CAD software) 12**

Creation of 3D CAD models of pyramids, prisms and solids of revolutions-Sectional views - **(Not for Examination)**

Projection of simple solids like prisms – pyramids – cylinder and cone when the axis is inclined to one reference plane by change of position method.

**UNIT IV – SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES  
(CAD software) 12**

Sectioning of simple solids like prisms – pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other, (Obtaining true shape of section is not required). Development of lateral surfaces of simple and truncated solids – Prisms – pyramids – cylinders and cones.

**UNIT V – Conversion of Isometric Views to Orthographic Views (Manual drafting)  
12**

Representation of three dimensional objects – General Principles of Orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout of views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

**TOTAL: 60 Hours**

**TEXT BOOKS**

1. P. Suresh et al., “Engineering Graphics and Drawing”, Sonaversity, Sona College of Technology, Salem, Revised edition, 2012.
2. K.V. Natarajan Engineering Graphics by, Chennai, 17<sup>th</sup> edition 2003.

**REFERENCES**

1. Dhananjay A. Jolhe, Engineering Drawing with an introduction to AutoCAD, Tata McGraw Hill Publishing Company Limited, 2008.
2. Basant Agarwal and Agarwal C.M., Engineering Drawing, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. K. R. Gopalakrishnana, Engineering Drawing (Vol. I & II), Subhas Publications, 1998.
4. Bertoline & Wiebe fundamentals of graphics communication III edition McGrawhill 2002

**COURSE OUTCOMES**

At the end of course, the students will be able to

1. Write simple C programs
2. Apply the concepts such as arrays, decision making and looping statements to solve real-time problems
3. Develop C programs using functions and pointers
4. Write a C programs to define own data types using the concept of structures and union
5. Write a C program to store the information persistently using file concepts

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2					3		3	1				3
CO2	3	2					3		3	1		1		3
CO3	3	2	1				3		3	2	2	1		3
CO4	3	2	1				3		3	2	2	1		3
CO5	3	2	1				3		3	2	2	1		3

**UNIT I C PROGRAMMING BASICS****9**

Structure of a C program – Compiling and Debugging a C program - C Character set, Identifiers and Keywords, Data Types, Declarations, Expressions, Statements and Symbolic constants, Operators – Arithmetic Operators – Unary operators – Relational and Logical Operators – Assignment operators – Conditional operators. Managing Input and Output operations, pre-processor directives and storage classes.

**UNIT II CONTROL STATEMENTS, ARRAYS AND STRINGS****9**

Unconditional statements, conditional statements, branching and looping statements - Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

**UNIT III FUNCTIONS AND POINTERS****9**

Function – Library functions and user-defined functions – Function prototypes and function definitions – Call by value – Call by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems – Pointers and Functions

**UNIT IV STRUCTURES AND UNIONS****9**

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Passing structures to functions – Array of structures – Pointers to



structures – Union - Programs using structures and Unions – Dynamic Memory Allocation: malloc and calloc

## **UNIT V – FILE MANIPULATIONS**

**9**

File Manipulations- File operations – Open, Read, Write and Close, Binary files and text files, Input and output file redirection – Stdin and Stdout and Command line arguments.

**Theory : 45 Hours**

**Tutorial: -**

**Practical: -**

**TOTAL: 45 Hours**

### **TEXT**

1. Deitel P and Deitel H, “C How to Program”, Pearson Education, New Delhi, 2016.
2. Venugopal KR and Sudeep R Prasad, “Mastering C”, McGraw Hill, Second edition, 2017.

### **REFERENCES**

1. Byron S Gottfried, “Programming with C”, Schaums Outlines, Second Edition, Tata McGraw-Hill, 2017.
2. Yashavant P. Kanetkar, “Let Us C”, 15<sup>th</sup> Edition, BPB Publications, 2016.
3. Balagurusamy E, “Programming in ANSI C”, sixth edition, Tata McGraw-Hill, 2012.
4. Kernighan, B.W and Ritchie, D.M, “The C Programming language”, Second Edition, Pearson Education, 2006.

**COURSE OUTCOMES**

At the end of course, the students will be able to

1. Create a web pages using HTML and CSS
2. Explain the basics of networking and its working principles in real world
3. Explain the working principles of mobile communication
4. Perform installation and configuration of operating system, and drivers
5. Explain the basics of Machine Learning, Cloud Computing and IoT

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	3									3	2
CO2	2	2	2	2	2							1	2	2
CO3	2	2	2	2	2							1	2	2
CO4		2	2	2	2							1	2	
CO5	2	2	2	2	2								2	2

**UNIT I WEB ESSENTIALS****6**

Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server.

**UNIT II NETWORKING ESSENTIALS****6**

Fundamental computer network concepts - Types of computer networks - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components.

**UNIT III MOBILE COMMUNICATION ESSENTIALS****6**

Cell phone working fundamentals - Cell phone frequencies & channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies / architecture - Voice calls & SMS

**UNIT IV INSTALLATION AND CONFIGURATION OF PC****6**

Configuration of BIOS - Installing Operating System (Open Source and Proprietary) – Driver installation – Network Configuration – Disk Configuration

**UNIT V RECENT TRENDS IN IT****6**

Introduction to Machine Learning - Application of Machine Learning – Introduction to Cloud Computing – Types of Cloud services – IoT and its applications

**Theory: 30 Hours****Tutorial: -****Practical: -****TOTAL: 30 Hours**

## **TEXTBOOK**

1. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, “Mastering HTML, CSS and Java Script”, BPB Publications, 2017.
2. James F. Kurose, —Computer Networking: A Top-Down Approachll, Sixth Edition, Pearson, 2017.

## **REFERENCES**

1. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.
2. Nathan Clark,” Linux: installation, configuration and command line basics”, Independent Publisher,2018.
3. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.

**COURSE OUTCOMES**

At the end of course, the students will be able to

1. Develop programs in C using basic constructs.
2. Develop applications in C using strings, pointers, functions, structures
3. Develop applications in C using file processing

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2				3		3	2	2	1	1	3
CO2	3	3	2				3		2	2	2	1	1	3
CO3	3	3	2				3		3	2	1	1	1	3

**LIST OF EXPERIMENTS**

- 1 Programs using Input, Output and assignment statements
2. Programs using Branching statements
3. Programs using Looping statements
4. Programs using Functions
5. Programs using one dimensional and two dimensional arrays
6. Programs using Structures and Unions.
7. Programs using Strings
8. Programs using Pointers (both data pointers and function pointers)
9. Programs using Recursion
10. Programs using Command line arguments
11. Programs using Files concepts
12. Programs using Dynamic Memory Allocation

**THEORY :-                      TUTORIAL: -                      PRACTICAL: 45                      TOTAL: 45 HOURS**

<b>U19CHL209</b>		<b>ENGINEERING CHEMISTRY LABORATORY</b>								<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
										<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>	
<b>Course Outcomes</b>														
<b>After successful completion of this course, the students should be able to</b>														
<b>CO1:</b>	Analyse the given water sample to determine the amount of hardness and alkalinity.													
<b>CO2:</b>	Determine the molecular weight of various polymers, analyse the quality of brass by estimating copper and estimate the amount of calcium oxide in the given cement sample. Calculate the amount of chromium present in the given sample of water,													
<b>CO3:</b>	Estimate the amount of DO in water and evaluate the amount of iron content in the given sample using spectrophotometry													
<b>CO/PO, PSO Mapping</b> (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
CO1	3			1		1					1			2
CO2	3			1		1					1			2
CO3	3			1		1					1			2
<b>Course Assessment methods</b>														
<b>Direct</b>												<b>Indirect</b>		
Mean of 1 <sup>st</sup> half of Experiment (10)						Quiz on 2 <sup>nd</sup> half (5)						Course end survey		
Quiz on 1 <sup>st</sup> half (5)						Internal test II (10)								
Internal test I (10)						RTPS (10)								
Mean of 2 <sup>nd</sup> half of Experiment (10)						End semester Examination (40)								
<b>List of Experiments (Chemistry part)</b>														

<b>1</b>	Estimation of hardness of water sample by EDTA method.
<b>2</b>	Estimation of alkalinity of water sample by indicator method.
<b>3</b>	Estimation of copper in brass by EDTA method.
<b>4</b>	Estimation of chloride ion present in the sample water by argentometric method.
<b>5</b>	Estimation of HCl by pH metry.
<b>6</b>	Determination of iron content in water by spectrophotometric method.
<b>7</b>	Estimation of HCl by conductometry. (HCl vs NaOH)
<b>8</b>	Estimation of mixture of acids by conductometry. (HCl + CH <sub>3</sub> COOH vs NaOH)
<b>9</b>	Estimation of ferrous ion by potentiometric titration.
<b>10</b>	Determination of Molecular weight of a polymer by viscosity measurements.
<b>11</b>	Determination of Dissolved Oxygen of water by Winkler's method.
<b>12</b>	Estimation of chromium in waste water.
<b>13</b>	Estimation of corrosion rate by weight loss measurements.
<b>14</b>	Determination of calcium oxide in cement.
	<b>Total Hours: 45 Hrs</b>

## U19GE201 - BASIC APTITUDE - II

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

**Course Outcomes: At the end of the course, the students will be able to CO1**  
solve more elaborate problems than those in BA-I in specific areas of

quantitative aptitude.

**CO2** solve problems of greater intricacy than those in BA-I in stated areas of logical reasoning.

**CO3** demonstrate higher than BA-I level verbal aptitude skills in English with regard to specific topics.

### List of Experiments

#### 1. QUANTITATIVE APTITUDE AND LOGICAL REASONING

Solving quantitative aptitude and logical reasoning problems with reference to the following topics:

- a. Ratio and proportion
- b. Partnership
- c. Chain rule
- d. Ages
- e. Profit, loss and discount
- f. Geometry
- g. Area and volume
- h. Data arrangement

#### 2. VERBAL APTITUDE

Demonstrating verbal aptitude skills in English with reference to the following topics:

- a. Jumbled sentences
- b. Reconstructions of sentences (PQRS)
- c. Sentence fillers two words
- d. Idioms and phrases
- e. Spotting errors
- f. Writing captions for given pictures

**TOTAL : 24 Hours**

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester III Regulations 2019**  
**Branch: Information Technology**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19MAT301D	Discrete and Combinatorial Mathematics	3	1	0	4	60
2	U19IT301	Data Structures	3	0	0	3	45
3	U19IT302	Digital Logic Design	3	0	0	3	45
4	U19IT303	Computer Architecture	3	0	0	3	45
5	U19IT304	Object Oriented Programming in C++	3	0	0	3	45
6	U19GE303	<b>Mandatory Course-</b> Essence of Indian Traditional Knowledge	2	0	0	0	30
<b>Practical</b>							
7	U19IT305	Data Structures using C++ Laboratory	0	0	4	2	60
8	U19IT306	Digital Logic Design Laboratory	0	0	2	1	30
9	U19ENG301	Communications Skill Laboratory	0	0	2	1	30
10	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
<b>Total Credits</b>						<b>21</b>	

**Approved By**

**Chairperson, Information Technology BoS**  
**Dr.J.Akilandeswari**

**Member Secretary, Academic Council**  
**Dr.R.Shivakumar**

**Chairperson, Academic Council & Principal**  
**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/Information Technology, Third Semester B.Tech IT Students and Staff, COE



**B. TECH. / INFORMATION TECHNOLOGY**

SEMESTER – III	<b>DISCRETE AND COMBINATORIAL MATHEMATICS</b>	L	T	P	C
UI9MAT301D		3	1	0	4

**COURSE OUTCOMES**

At the end of the course, the students will be able to

1. check the validity of the arguments in the field of data base and artificial intelligence using the rules of logic.
2. apply the concept of logical theory to validate the correctness of software specifications.
3. apply the combinatorics techniques to count, enumerate, or represent possible solutions in the process of solving application problems in the field of communication networks and string searching algorithm.
4. analyze and simplify the digital (logic) circuits using the concept of lattices.
5. produce an output for each input in computer programming and Turing machine.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	2							2		2
CO2	3	3		3	2							2		2
CO3	3	3		3	2							2		2
CO4	3	3		3	2							2		2
CO5	3	3		3	2							2		2

**UNIT – I PROPOSITIONAL CALCULUS****12**

Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Contra positive – Logical equivalences and implications – DeMorgan's laws – Normal forms – Principal conjunctive and disjunctive normal forms – Rules of inference – Arguments – Validity of arguments.

**UNIT – II PREDICATE CALCULUS****12**

Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – Rules of universal specification and generalization – Validity of arguments.

**UNIT – III COMBINATORICS****12**

Counting principle – Sum and product rule – Pigeonhole principle – Permutations and combinations – Mathematical induction – Recurrence relation – Solution of recurrence relation using generating functions.

**UNIT – IV RELATIONS AND LATTICES****12**

Relations - Types of relations and their properties – Equivalence relations – Partial order relation – Equivalence Classes – Partition of a set – Matrix representation of a relation – Representation of relations by graphs – Poset – Hasse diagram – Lattices and their properties.

20. 05. 2020

**B. E. / B. Tech. Regulations 2019**

**UNIT – V      FUNCTIONS**

**12**

Functions – Classification – Types of functions and examples – Composition of functions – Inverse functions – Characteristic function of a set - Permutation functions.

Theory: **45 Hours**

Tutorial: **15 Hours**

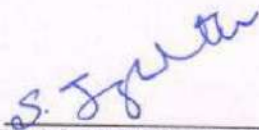
Total: **60 Hours**

**TEXT BOOKS:**

1. K. H. Rosen, "Discrete Mathematics and its Applications", McGraw Hill Publishers, 8<sup>th</sup> Edition, 2019.
2. J. P. Trembly and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill Publishers, 1<sup>st</sup> Edition, 2017.

**REFERENCES:**

1. T. Veerarajan, "Discrete Mathematics with Graph Theory and Combinatorics", McGraw Hill Publishers, 19<sup>th</sup> Reprint, 2014.
2. R. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Pearson Publishers, 5<sup>th</sup> Edition, 2006.
3. <https://nptel.ac.in/courses/106/106/106106094/>



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BoS - Chairperson  
Science and Humanities  
Sona College of Technology  
Salem – 636 005

20. 05. 2020

**B. E. / B. Tech. Regulations 2019**

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Apply and implement linear data structure
2. Apply different nonlinear data structures.
3. Implement variants of different tree data structure.
4. Analyze simple algorithms and develop algorithms using hashing.
5. Develop and apply algorithms for real time applications using graph.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1						1			3	2
CO2	3	2	1	2						1			2	2
CO3	3	2	1	2						1			3	3
CO4	3	2	1	2						1			2	2
CO5	3	2	1	2						1			3	3

**UNIT I LINEAR STRUCTURES****9**

Abstract Data Types (ADT) - List ADT - Array-Based Implementation - Linked List Implementation - Doubly Linked Lists - Applications Of Lists - Stack ADT - Queue ADT - Circular Queue Implementation - Applications of Stacks And Queues

**UNIT II TREE STRUCTURE****9**

Preliminaries of Trees - Implementation of Tree ADT - Tree Traversals - Binary Tree ADT - Expression Trees - Binary Search Tree ADT - AVL Trees - Applications of Trees.

**UNIT III TREE VARIANTS AND BINARY HEAP****9**

Splay Trees - Splaying - B Trees - Priority Queue: Model - Simple Implementation - Binary Heap - Basic Heap Operations - Applications of Priority Queue.

**UNIT IV ALGORITHM ANALYSIS & HASHING****9**

Algorithm Analysis - Asymptotic Notations - Time complexity - Space complexity - Hashing -General idea - Hash Function - Separate Chaining - Open Addressing - Linear Probing - Quadratic Probing - Double Hashing - Rehashing - Extendible Hashing

Definitions - Representation of Graphs - Traversals - Breadth First Search - Depth-first Search - Topological Sort – Shortest path Algorithms - Unweighted Shortest Paths - Dijkstra's Algorithm- Minimum Spanning Tree - Prim's and Kruskal's.

**TOTAL : 45 HOURS**

**TEXT BOOK**

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C++”, Fourth Edition, Pearson Education, 2014.

**REFERENCES**

1. D.S. Malik, “Data Structures Using C++”, 2<sup>nd</sup> edition , Cengage, 2012.
2. Yedidyah Langsan, Moshe J. Augenstein And Aoron M. Tanenbaum,“ Data Structures using C and C++”, Pearson, 2006
3. Sartaj Sahni, “ Data Structures, Algorithm and Application in C++”, 2<sup>nd</sup> edition, Universities Press, 2005.
4. Michael T.Goodrich, R.Tamassia and Mount “Data structures and Algorithms in C++”, 2nd edition, Wiley , 2016.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Simplify the Boolean expression using K-Map and tabulation techniques.
2. Use Boolean simplification techniques to design a combinational circuit.
3. Analysis and Design of a given combinational digital/logic circuits.
4. Analysis and Design of a given sequential digital/logic circuits.
5. Design for Hazard free combinational and sequential circuits.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	1					1			1	1
CO2	3	3	3	2	1					1			1	1
CO3	3	3	3	2	1					1			1	1
CO4	3	3	3	2	1					1			1	1
CO5	3	3	3	2	1					1			1	1

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

Review of Number systems – Complements - Digital Logic gates - Basic theorems and properties of Boolean algebra - Boolean functions – Canonical and Standard forms -Simplifications of Boolean functions using Karnaugh map – three variable, Four variable and Five variable – Product of sum simplification-Don't care conditions – Quine McCluskey(QM) method.

### **UNIT II                      COMBINATIONAL LOGIC                      9**

Combinational circuits – Analysis and design procedures - Code conversion – Binary to Gray, Gray to Binary – BCD to Excess - 3, Excess - 3 to BCD- Circuits for arithmetic operations –Half Adder – Full Adder - Binary Adder– Half subtractor – Full subtractor – Binary subtractor- BCD adder- Binary Multiplier – Magnitude comparator.

### **UNIT III                      MSI LOGIC CIRCUITS AND PROGRAMMABLE LOGIC                      9**

Decoders – combinational logic implementation using decoder – Encoders- Priority encoder-Multiplexers- Boolean function Implementation using multiplexer – Demultiplexer - Programmable logic Array – Implementation of Boolean functions with PLA - Programmable Array logic. Implementation of Boolean functions with PAL.

### **UNIT IV                      SYNCHRONOUS SEQUENTIAL LOGIC                      9**

Sequential circuits – Flip flops – RS, JK, D, T - Analysis of clocked sequential circuits –State equations, State Table, State diagram - Analysis with D, JK and T Flip flops – State reduction and state assignment - Design procedures – Synthesis using D, JK and T – Sequence detector – Parallel counter design using flip-flops.

Introduction- Hazards –Hazards in Combinational Circuits -Hazards in Sequential Circuits – FPGA – Basics – FPGA Vs CPLD – FPGA Architecture – Configurable Logic Block – Basic Architecture of Xilinx XC 4000 series- Design flow –Design entry – Logic Synthesis – Design implementation – Design verification – Types of FPGA based on Application .

**TOTAL: 45 HOURS**

### **TEXT BOOK**

1. M.Morris Mano, Michel D. Ciletti, and John F.Walerly “Digital Design”, 5<sup>th</sup> edition, Pearson Education, 2013.

### **REFERENCES**

1. Larry L Kinney and Charles H.Roth Jr, “Fundamentals of Logic Design”, 5<sup>th</sup> edition, Jaico Publishing House, 2015.
2. Ananda Natarajan, “Digital Design”, PHI learning private Ltd, 2015.
3. Donald P.Leach, Albert Paul Malvino and Saha, “Digital Principles and Applications”, 8<sup>th</sup> edition, TMH, 2014.
4. G.K.Kharate, “Digital Electronics”, Oxford University press, 2012.
5. John F.Wakerly, “Digital Principles and practices”, 4<sup>th</sup> edition, Pearson Education, 2013.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to

1. Explain the processor design concepts in modern computer architecture.
2. Explain the operations and instruction sequences in a basic computer.
3. Apply the concepts of pipelining to solve performance related problems.
4. Explain the hierarchical memory system including cache memory and virtual memory.
5. Choose appropriate I/O devices for embedded system applications.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1						1			2	2
CO2	3	1	1	1						1			1	1
CO3	3	1	1	1						1			3	3
CO4	3	1	1	1						1			3	3
CO5	3	1	1	1						1			3	1

**UNIT I BASIC STRUCTURE OF COMPUTERS****9**

Functional units – Basic operational concepts – Bus structures – Software – Performance and metrics – Multiprocessors and Multicomputer – Memory Locations and Addresses– Instructions and instruction sequencing – Addressing modes – Fixed point and Floating point representations.

**UNIT II BASIC PROCESSING UNIT****9**

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control: Micro Instructions- Micro Instructions with next address field.

**UNIT III PIPELINING****9**

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets –Data path and control considerations – Superscalar operation– Performance considerations.

**UNIT IV MEMORY SYSTEM****9**

Basic concepts – Semiconductor RAM – ROM – Speed Size and cost – Cache memories – performance consideration – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

I/O devices - Accessing I/O devices –Interrupts – Direct Memory Access –Interface circuits – Standard I/O Interfaces (USB, Fire wire, SCSI Bus, SATA) – Examples of Embedded Systems - Microcontroller Chips for Embedded Applications – Introduction to SoC.

**TOTAL: 45 HOURS**

**TEXT BOOK**

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian “Computer Organization and Embedded Systems”, 6<sup>th</sup> edition, McGraw Hill Education, 2017.

**REFERENCES**

1. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 10<sup>th</sup> edition, Pearson Education, 2015.
2. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software interface”, 5<sup>th</sup> edition, Elsevier, 2013.
3. B. Govindarajalu, “Computer Architecture and Organization: Design Principles and Applications”, 2<sup>nd</sup> edition, McGraw Hill Education, 2010.



**COURSE OUTCOMES**

At the end of the course, the student will be able to

- Explain fundamental programming concepts such as variables, conditional statements, looping constructs, and methods (procedures), inline function, friend function.
- Describe how the class mechanism supports encapsulation and information hiding
- Apply the concept of constructors, destructors and operator overloading.
- Apply templates and inheritance mechanism in applications.
- Write C++ programs for applications using files and exceptions.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		1					1			2	2
CO2	3	1	1		1					1			3	3
CO3	3	3	3		2					1			3	3
CO4	3	3	3		2					1			3	3
CO5	3	3	3		2					1			3	3

**UNIT I OBJECT ORIENTED CONCEPTS****9**

Introduction to Object Oriented Programming and C++: Object oriented concepts and its characteristics: abstraction, encapsulation, inheritance, and polymorphism. History of C++ - Structure of C++-Applications of C++- Tokens- Keywords- Identifiers-Basic data types- Derived data types- Symbolic constants- Dynamic initialization -Reference variables- Scope resolution operator-Type modifiers- Type casting.

C++ Operators and control statements- Input and output statements- Function Prototyping-Function components- Passing parameters - call by reference, return by reference- Inline function- Default arguments - Overloaded function- Introduction to friend function.

**UNIT II CLASSES AND OBJECTS, CONSTRUCTORS AND DESTRUCTORS 9**

Classes and Objects: Class specification- Member function definition- Nested member function- Access qualifiers- Static data members and member functions - Instance creation- Array of objects- Dynamic objects-Static Objects- Objects as arguments- Returning objects.

Constructors and Destructors: Constructors – Parameterized constructors- Overloaded Constructors- Constructors with default arguments-Copy constructors- Dynamic constructors-Dynamic initialization using constructors- Destructors.

**UNIT III OPERATOR OVERLOADING AND TEMPLATES****9**

Operator Overloading: Operator function – Overloading unary and binary operator-Overloading binary operator using friend function - Type Conversion.

Generic Programming with Templates: Introduction, class templates – class templates with multiple parameters - Function templates, Function templates with multiple parameters- overloading of function templates, Member function Templates, Non-Type Template Arguments- Inheritance of class template.

## **UNIT IV INHERITANCE AND VIRTUAL FUNCTIONS**

**9**

Inheritance: Defining Derived classes- Single Inheritance- Protected Data with private inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance- Hybrid Inheritance-Multipath inheritance-Virtual Base Classes- Abstract classes -Constructors in derived class- Member Classes

Virtual Function: Definition – Runtime Polymorphism – Array of pointers to base class – virtual functions - Pure virtual functions – Virtual Destructors.

## **UNIT V STREAMS AND EXCEPTION HANDLING**

**9**

Streams: Streams in C++- Stream classes- Formatted and unformatted data- Manipulators- User defined manipulators- File streams-File pointer and manipulation-File open and close- Sequential and random access-Name Space.

Exception Handling: Principle of exception handling-Exception handling mechanism, multiple catch, nested try, rethrowing the exception – specifying exceptions.

**TOTAL: 45 HOURS**

### **TEXT BOOK**

1. Robert Lafore, “Object-Oriented Programming in C++” Pearson Education, 4 Edition, 2008.
2. K R Venugopal, Rajkumar Buyya “Mastering C++” Tata McGraw Hill, New Delhi, Second edition 2015.

### **REFERENCES**

1. H. M. Deitel, P. J. Deitel, “ C++ How to Program”, Fifth Edition, Deitel & Associates, Inc.
2. Nicholas A. Solter, Scott J. Kleper, “Professional C++”, 3<sup>rd</sup> Edition, Wiley Publishing,
3. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004.
4. S. B. Lippman, Josee Lajoie, Barbara E. Moo, “C++ Primer”, Fourth Edition, Pearson Education, 2005.
5. B. Stroustrup, “The C++ Programming language”, 3<sup>rd</sup> edition, Pearson Education, 2004.
6. E. Balaguruswamy, “Object-Oriented Programming with C++” Tata McGraw Hill, New Delhi, Sixth edition 2015.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Implement the basic concept of C++ such as Polymorphism, Inheritance, Friend and virtual Function
2. Implement operations of linear and tree data structures.
3. Implement hashing and graph data structure.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Cos	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1						1	3	1	3	3
CO2	3	1	1	1						1	3	1	3	3
CO3	3	1	1	1						1	3	1	3	3

**LIST OF EXPERIMENTS**

1. Design C++ classes with static members, methods with default argument
2. Practice of dynamic memory allocation using constructor, destructor, copy constructor.
3. Practice of C++ concepts such as polymorphism, inheritance, friend and virtual function.
4. Implement streams and exception handling concept.
5. Implementation of singly linked lists and doubly linked lists.
6. Implement stack and queue data structure using linked list
7. Implement binary search tree and B tree.
8. Implement hashing techniques.
9. Implement depth first traversal and breadth first traversal using STL.
10. Implementation of Prim's and Kruskal's algorithm using STL.

**TOTAL: 60 HOURS**

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Use Boolean simplification techniques to design and construct simple Boolean theorems and functions.
2. Design and implement combinational and sequential circuits.
3. Design the different functional units in a digital computer system.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Cos	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2						2	3	1	1	1
CO2	3	3	3	2						1	3	1	1	1
CO3	3	3	3	2						1	3	1	1	1

**LIST OF EXPERIMENTS**

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions.
3. Design and implementation of Binary to Gray and Gray to Binary code converters.
4. Design and implementation of Half adder / Half subtractor, Full adder / Full subtractor using basic gates.
5. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices.
6. Design and implementation of parity generator / checker using basic gates and MSI devices.
7. Design and implementation of magnitude comparator.
8. Design and implementation of Decoders and encoders.
9. Design and implementation of Multiplexers/Demultiplexers.
10. Design and implementation of Shift registers.
11. Design and implementation of Synchronous counters.
12. Design and implementation of Asynchronous counters.

**TOTAL: 30 HOURS**

Semester-III	U19 GE301- SOFT SKILLS AND APTITUDE – I	L	T	P	C	Marks
		0	0	2	1	100
<b>Course Outcomes</b>						
<b>At the end of the course the student will be able to:</b>						
1. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches						
2. Solve problems of greater intricacy in stated areas of quantitative aptitude and logical reasoning						
3. Demonstrate higher levels of verbal aptitude skills in English with regard to specific topics						
<b>1.Soft Skills</b>	<b>Demonstrating soft-skill capabilities with reference to the following topics:</b>					
	<ul style="list-style-type: none"> <li>a. Attitude building</li> <li>b. Dealing with criticism</li> <li>c. Innovation and creativity</li> <li>d. Problem solving and decision making</li> <li>e. Public speaking</li> <li>f. Group discussions</li> </ul>					
<b>2. Quantitative Aptitude and Logical Reasoning</b>	<b>Solving problems with reference to the following topics:</b>					
	<ul style="list-style-type: none"> <li>a. <b>Vedic Maths:</b> Fast arithmetic, multiplications technique, Criss cross, Base technique, Square root, Cube root, Surds, Indices, Simplification.</li> <li>b. <b>Numbers:</b> Types, Power cycle, Divisibility, Prime factors &amp; multiples, HCF &amp; LCM, Remainder theorem, Unit digit, highest power.</li> <li>c. <b>Averages:</b> Basics of averages and weighted average.</li> <li>d. <b>Percentages:</b> Basics of percentage and Successive percentages.</li> <li>e. <b>Ratio and proportion:</b> Basics of R &amp;P, Alligations, Mixture and Partnership.</li> <li>f. <b>Profit ,Loss and Discount:</b> Basic &amp; Advanced PLD</li> <li>g. <b>Data Interpretation:</b> Tables, Bar diagram, Venn diagram, Line graphs, Pie charts, Caselets, Mixed varieties, Network diagram and other forms of data interpretation.</li> <li>h. <b>Syllogism:</b> Six set syllogism using Venn diagram and tick and cross method</li> </ul>					
<b>3. Verbal Aptitude</b>	<b>Demonstrating English language skills with reference to the following topics:</b>					
	<ul style="list-style-type: none"> <li>a. Verbal analogy</li> <li>b. Tenses</li> <li>c. Prepositions</li> <li>d. Reading comprehension</li> <li>e. Choosing correct / incorrect sentences</li> <li>f. Describing pictures</li> <li>g. Error spotting</li> </ul>					

*S. Ant*

Department of Placement Training  
Sona College of Technology.  
Salem-636 005.

## SEMESTER – III

## MANDATORY COURSE

## U19GE303 - ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

(Common for IT, ECE and BME)

L	T	P	C
2	0	0	0

**Course Outcomes**

At the end of the course, the students will be able to,

1. understand, connect up and explain basics of Indian traditional knowledge in modern scientific perspective.
2. show an ability to comment critically on curriculum proposals that aim to promote science citizenship/scientific literacy
3. communicate using common medical and psychological terminology, including the skill to discuss commonly used medications, supplements, and surgical procedures
4. use effective oral and written language skills to communicate scientific data and ideas
5. describe the fundamentals of yoga and its importance

**Unit I**

- Introduction to Vedas
- Traditional methodology of Veda – Sat Angas
- Types of Vedas and their application
- Sub Veda – Ayurveda - their modern day application

6

**Unit II**

- Basics of Applied Vedic Science
- Modern day application of Vedas and procedure
- Ancient Indian Scientific thoughts
- Introduction to the Vedic language “Sanskrit”

6

**UNIT – III- Modern science**

- Introduction – modern science
- Objectives – modern science
- Architecture in ancient India

6

**UNIT – IV Technology**

- India’s contribution to science and technology (from ancient to modern)
- Nobel laureates of Indian origin and their contribution
- India in space
- Latest achievement from Jan – 2017

6

20.05.2020

B.E. / B.Tech. Regulations 2019

**UNIT – V- Yoga and Holistic Health Care**

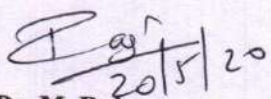
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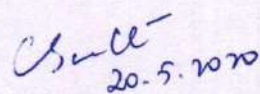
- Fundamentals of yoga and holistic health
- Human biology
- Diet and nutrition
- Life management
- Contemporary yogic models – case study

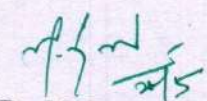
**References**

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016.
4. Roshan Dalal The Vedas: An Introduction to Hinduism's Sacred Texts, Penguin Books 2014. ISBN 13: 9780143066385
5. Raja Ram Mohan Roy, Vedic Physics, Mount Meru Publication ISBN : 9781988207049

**Total: 30 HOURS**

  
**Dr. M. Raja**  
Course Coordinator / Sciences

  
**Dr. C. Shanthi**  
HOD / Sciences

  
**Dr. M. Renuga**  
Chairperson BOS,  
Science and Humanities

20.05.2020

B.E. / B.Tech. Regulations 2019

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester IV Regulations 2019**  
**Branch: Information Technology**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19MAT401C	Operations Research	3	1	0	4	60
2	U19IT401	Operating Systems	3	0	2	4	75
3	U19IT402	Principles of Communication	3	0	0	3	45
4	U19IT403	Design and Analysis of Algorithms	3	0	2	4	75
5	U19IT404	Java Programming	3	0	0	3	45
6	U19GE402	<b>Mandatory Course:</b> Environment and Climate Science	2	0	0	0	30
<b>Practical</b>							
7	U19IT405	Java Programming Laboratory	0	0	2	1	30
8	U19IT406	Microprocessors Laboratory	1	0	2	2	45
9	U19GE401	Soft Skills and Aptitude - II	0	0	2	1	30
<b>Total Credits</b>						<b>22</b>	

**Approved By**

**Chairperson, Information Technology BoS**  
**Dr.J.Akilandeswari**

**Member Secretary, Academic Council**  
**Dr.R.Shivakumar**

**Chairperson, Academic Council & Principal**  
**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/Information Technology, Fourth Semester B.Tech IT Students and Staff, COE



## B. TECH / INFORMATION TECHNOLOGY

SEMESTER – IV	OPERATIONS RESEARCH	L	T	P	C
UI9MAT401C		3	1	0	4

## COURSE OUTCOMES

At the end of the course, the students will be able to,

1. solve the linear programming problem using suitable methods.
2. apply the concept of duality and dual simplex method to solve the linear programming problem.
3. apply the optimization technique to the transportation and assignment problems.
4. analyze project management problems using critical path method and project evaluation and review technique.
5. determine an optimum sequence of performing a number jobs by a number of facilities.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	2							2		2
CO2	3	3		3	2							2		2
CO3	3	3		3	2							2		2
CO4	3	3		3	2							2		2
CO5	3	3		3	2							2		2

## UNIT – I LINEAR PROGRAMMING PROBLEM

12

Linear programming problem - mathematical formulation – graphical solution method – canonical and standard forms of linear programming problem – simplex method (using slack variables only) – use of artificial variables – big-M method.

## UNIT – II DUALITY IN LINEAR PROGRAMMING PROBLEM

12

Duality in linear programming problem – Formulation of dual linear programming problem – primal-dual relationship – solving linear programming problem using dual concepts – dual simplex method.

## UNIT – III TRANSPORTATION AND ASSIGNMENT PROBLEMS

12

Transportation problem – initial basic feasible solution – north west corner rule – least cost method – Vogel's approximation method – modified distribution method – assignment problem – Hungarian method.

## UNIT – IV CPM AND PERT

12

Network construction – critical path method (CPM) – computations of total, free and independent floats – project evaluation and review technique (PERT) analysis – computation of expected time and standard deviation.

## UNIT – V SEQUENCING PROBLEM

12

Sequencing problem – processing  $n$  jobs through two machines – processing  $n$  jobs through three machines – processing  $n$  jobs through  $m$  machines – processing two jobs through  $m$  machines.

Theory: 45 Hours

Tutorial: 15 Hours

Total: 60 Hours

13. 01. 2021

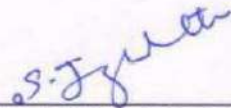
B. E. / B. Tech. Regulations 2019

**TEXT BOOKS:**

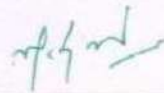
1. H. A. Taha, "Operation Research: An Introduction", Pearson Publishers, 10<sup>th</sup> Edition, 2019.
2. J. K. Sharma, "Operations Research: Theory and Applications", Lakshmi Publishers, 6<sup>th</sup> Edition, Reprint, 2017.

**REFERENCE BOOKS:**

1. R. Panneerselvam, "Operations Research", Prentice Hall of India Publishers, 2<sup>nd</sup> Edition, 2012.
2. K. Swarup, P. K. Gupta and Man Mohan, "Introduction to Operations Research", Sultan Chand and Sons Publishers, 14<sup>th</sup> Edition, 2008.
3. P. K. Gupta and D. S. Hira, "Problems in Operation Research", Sultan Chand and Sons Publishers, 4<sup>th</sup> Edition, 2015.
4. S.D. Sharma, "Operations Research", Kedarnath Publishers, 8<sup>th</sup> Edition, 2007.



**Prof. S. JAYABHARATHI**  
Head / Department of Mathematics  
Sona College of Technology  
Salem – 636 005



**Dr. M. RENUGA**  
BoS - Chairperson  
Science and Humanities  
Sona College of Technology  
Salem – 636 005

13. 01. 2021

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**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Explain structures of Operating System.
2. Apply fundamental Operating System abstractions such as processes, process scheduling, Semaphores, IPC abstractions, shared memory regions, deadlock and threads.
3. Explain the principles of concurrency and synchronization, and apply them to write concurrent programs/software.
4. Implement basic resource management techniques and principles.
5. Describe the types of disk scheduling, disk management and learn the basics of Linux.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	2							2	2	
CO2	3	2	3	3	2							2	2	
CO3	3	2	3	3	2							2	2	
CO4	3	2	3	3	2							2	2	
CO5	3	2	3	3	2							2	2	

**UNIT I INTRODUCTION****9**

**Introduction** - Operating System Structure – Operating system Operations – Operating System Components: Process Management – Memory Management – Storage Management – I/O Management – Network Management - Protection and Security.

**Classes of Operating Systems:** Mainframe Systems – Single Processor System - Multiprocessor Systems - Desktop Systems — Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems - Open Source Operating Systems.

**Operating System Structures:** Operating System Services – User and Operating System Interface – System Calls – Types of System Calls.

**UNIT II PROCESS MANAGEMENT AND THREADING****9**

**Processes:** Process concept – Process scheduling – Operation on Processes - Inter-process Communication: Shared Memory Systems - Message Passing Systems.

**Process Scheduling:** Basic Concepts – Scheduling Criteria – Scheduling Algorithms: First-Come, First-Served – Priority – Round-Robin – Multilevel Queue – Multilevel Feedback Queue.

**Threads:** Overview – Multithreading models - Threading issues.

**UNIT III PROCESS SYNCHRONIZATION AND DEADLOCKS****9**

**Process Synchronization:** Background - The critical-section problem (Software based solution and hardware based solution) – Semaphores – Classic Problems of Synchronization – Monitors.

**Deadlocks:** System model - Deadlock Characterization – Methods for Handling Deadlocks -Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlocks.

**UNIT IV MEMORY MANAGEMENT 9 Memory Management Strategies:** Background – Swapping – Memory allocation: Contiguous Memory Allocation – Non-contiguous Memory Allocation: Segmentation - Paging – Segmentation with Paging - Structure of the Page Table.

**Virtual Memory:** Background - Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

**UNIT V STORAGE MANGEMENT AND CASE STUDY 9**

**Mass Storage Structure:** Overview of Mass Storage Structure – Disk Structure - Disk Scheduling – Disk Management - Swap Space Management.

Case Study: Linux System –Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File System, Inter-process communication

**TOTAL: 75 HOURS**

### **TEXT BOOK**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, Ninth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2018.

### **REFERENCES**

1. Harvey M. Deitel, “Operating Systems”, Pearson Education, 3<sup>rd</sup> edition 2016.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India, 3<sup>rd</sup> edition 2013.
3. William Stallings, “Operating Systems: Internals and Design Principles”, Prentice Hall of India, 7th edition, 2013.
4. D M Dhamdhare, “Operating Systems: A Concept-Based Approach”, Tata Mc-graw Hill Publishing, 3<sup>rd</sup> edition, 2017.

### **LIST OF EXPERIMENTS**

1. Program to report the behaviour of the OS to get the CPU type and model, kernel version.
2. Program to get the amount of memory configured into the computer, amount of memory currently available.
3. Simulate the principles of process management algorithms
4. Implement various memory allocation methods
5. Implement various page replacement algorithms
6. Implement various disk scheduling algorithms
7. Implement threads and fork
8. Simulate Inter process communications

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Explain and apply various types of modulation and demodulation in analog and digital communication.
2. Describe the concept of digital communication techniques.
3. Describe the concept of various digital transmission techniques.
4. Comprehend the Cellular communication techniques.
5. Explain the concepts of 5G Wireless communication.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
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CO1	3			2									2	
CO2	3					1								2
CO3	2				2								2	
CO4					3	2							2	2
CO5	1			2	3	2							2	2

**UNIT I FUNDAMENTALS OF ANALOG COMMUNICATION 9**

Principles of amplitude modulation - AM envelope - frequency spectrum and bandwidth - modulation index and percent modulation - AM Voltage distribution - AM power distribution - Angle modulation - FM and PM waveforms - phase deviation and modulation index - frequency deviation and percent modulation - Frequency analysis of angle modulated waves - Bandwidth requirements for Angle modulated waves.

**UNIT II DIGITAL COMMUNICATION 9**

Shannon limit for information capacity - Digital amplitude modulation - Frequency Shift Keying - FSK bit rate and baud - FSK transmitter - BW consideration of FSK - FSK receiver - Phase Shift Keying – BPSK , QPSK, DPSK transmitter and receiver ,Quadrature Amplitude modulation - bandwidth efficiency.

**UNIT III DIGITAL TRANSMISSION 9**

Pulse modulation - PCM – PCM sampling - Sampling rate - Signal to Quantization noise rate - Companding- analog and digital - Delta modulation PCM - Adaptive Delta modulation PCM - Differential PCM - Intersymbol interference - Eye patterns.

**UNIT IV INTRODUCTION TO MOBILE TECHNOLOGY 9**

Introduction - 2G - General Concept for GSM System Development - GSM System Architecture - SIM Concept - 3G – UMTS Architecture - Major Parameters of 3G WCDMA Air Interface - Spectrum Allocation for 3G WCDMA - 4G - Long Term Evolution (LTE) System - 4G Architecture of an Evolved Packet System - LTE Integration with Existing 2G/3G Network - Overall Operational Requirements for a 5G Network System - Device Requirements - Capabilities of 5G -Spectrum - 5G System Architecture - General Concepts - Architecture Reference Model.

**UNIT V CELLULAR COMMUNICATION 9**

Fundamental concept of Cellular telephone - Frequency reuse, Interference - Co-channel Interference, Adjacent channel Interference - Cell splitting - Cell sectoring - Segmentation and Dualization - Roaming and Handoff.

**TOTAL : 45 HOURS**

***TEXT BOOK***

1. Wayne Tomasi, “Electronic Communication Systems Fundamentals through Advanced”, 6<sup>th</sup> Edition, Pearson Education, 2018.
2. Alexander Kukushkinl, “Introduction to Mobile Network Engineering - GSM, 3G-WCDMA, LTE and the Road to 5G” , 1<sup>st</sup> Edition, Wiley, 2018.

**REFERENCES**

1. H.Taub,D L Schilling ,G Saha ,”Principles of Communication”, 3<sup>rd</sup> edition, 2018.
2. B.P.Lathi,”Modern Analog and Digital Communication systems”, 6<sup>th</sup> edition, Oxford University Press, 2017.
3. Blake, “Electronic Communication Systems”, Thomson Delmar Publications, 2018.
4. Martin S.Roden, “Analog and Digital Communication System”, 3<sup>rd</sup> edition, PHI, 2016.
5. B.Sklar,”Digital Communication Fundamentals and Applications”, 2nd edition, Pearson Education, 2017.
6. Simon Haykin, “Communication Systems”, 5<sup>th</sup> edition, John Wiley & Sons. 2018.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Define algorithm and describe its characteristics.
2. Analyse the algorithmic time complexity for recursive and non-recursive algorithms using different asymptotic notations.
3. Apply the algorithmic techniques - Brute Force, Divide and conquer Decrease and Conquer to different problems and analyse the time complexity.
4. Apply the algorithmic techniques - Transform and conquer, Dynamic Programming and Greedy approach to solve different problems and analyse the time complexity.
5. Explain the algorithm design methods such as backtracking, branch and bound to solve complex problems and express the type of problems as NP, NP-Complete and NP-Hard.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2					2	1	3		3		
CO2	3	3	3		2		1		1			2		
CO3	2	3	3		3			1				2		
CO4	3	3	2			1				2	3			
CO5	3	2	3	3		1		3			3	3		

**UNIT I BASIC CONCEPTS OF ALGORITHMS****8**

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

**UNIT II MATHEMATICAL BACKGROUND AND ANALYSIS OF ALGORITHMS****8**

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

**UNIT III ANALYSIS OF SORTING AND SEARCHING ALGORITHMS** **10**

Brute Force – Selection Sort and Bubble Sort – Sequential Search and Brute-force string matching – Divide and conquer – Merge sort – Quick Sort – Binary Search – Decrease and Conquer – Algorithm for generating combinatorial objects.

## **UNIT IV      ALGORITHMIC TECHNIQUES**

**10**

Transform and conquer – Presorting – Analysis of heap sort – Dynamic Programming – Warshall’s and Floyd’s Algorithm – Optimal Binary Search trees – Greedy Techniques – Approximate bin packing algorithm – Huffman trees.

## **UNIT V      ADVANCED ALGORITHMIC TECHNIQUES**

**9**

Backtracking – n-Queen’s Problem – Hamiltonian Circuit problem – Subset-Sum problem – Branch and bound – Assignment problem – P, NP and NP complete problems – Introduction to approximate algorithms- Approximation algorithms for NP- hard problems -Travelling salesman problem and Knapsack problem.

**PRACTICAL: 30 HOURS TOTAL : 75 HOURS**

### **TEXT BOOK**

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education Asia, Third edition, 2011.

### **REFERENCES**

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, “Introduction to Algorithms”, 3<sup>rd</sup> edition, The MIT Press, 2009.
2. Sara Baase and Allen Van Gelder, “Computer Algorithms - Introduction to Design and Analysis”, 3<sup>rd</sup> Edition, Pearson Education Asia, 2009.
3. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 2009.
4. Ellis Horowitz, Sartaj Sahni , Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, Galgothia publications, 2013.

### **List of experiments**

1. Practice on estimating the running time of an algorithm
2. Implement algorithms using brute force technique
3. Implement algorithms using divide and conquer technique
4. Implement algorithms using decrease and conquer technique
5. Implement algorithms using transform and conquer technique
6. Implement algorithms using dynamic programming technique
7. Implement algorithms using greedy technique
8. Implement approximation algorithms



**COURSE OUTCOMES**

At the end of this course, the students will be able to

1. Apply basic features of Java to write programs.
2. Write efficient programs with inheritance, packages, interface and handle different types of exceptions.
3. Apply collection framework for writing efficient programs to solve real time problems.
4. Apply event handling techniques for interaction with GUI based application with multithreaded.
5. Write programs with functional programming, Lambda Expressions and data driven application using JDBC.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1						2		2
CO2	3	2	2	2	2	1						2		2
CO3	3	2	2	2	2	1						2		2
CO4	3	3	3	2	2	1						2		2
CO5	3	2	2		2	1						2		2

**UNIT I CLASS, METHODS AND STRINGS****9**

History and Evolution of Java – An overview of Java – Data Types, Variables, and Arrays – Operators – Control Statement – Introducing Class – Methods – String, StringBuffer, StringBuilder.

**UNIT II INHERITANCE, PACKAGE AND INTERFACE AND EXCEPTION HANDLING****9**

Inheritance – Packages and Interfaces – Exception Handling Fundamentals – Exception Types – Uncaught Exception – Using try and catch – Multiple catch Clauses – Nested try statements – throw – throws – finally – Built-in Exception – Creating our own Exception class – Chained Exception.

**UNIT III I/O AND THE COLLECTIONS FRAME WORK****9**

I/O Basics – Exploring java.io: Stream class, Character Streams – Serialization – The Collection Framework – The ArrayList class – The HashSet class – Working with Maps – The Vector class - Accessing a Collection via an Iterator.

**UNIT IV GUI, EVENT HANDLING AND THREADS****9**

Introducing Swing – Exploring Swing: JLabel and ImageIcon, JTextField, Swing Buttons, JList, JComboBox, JTable - Event Handling –Threads - Interrupting Threads - Thread States - Thread Properties – Synchronization

JDBC Programming concept – Executing Queries – Scrollable and Updatable Resultset – Auto Boxing – Generics – Lambda Expressions- Functions as First Class Objects – Pure Functions – Higher Order Functions..

**TOTAL: 45 HOURS**

**TEXT BOOK**

1. Herbert Schildt, “Java™ : The Complete Reference”, 11<sup>th</sup> edition, Oracle Press, 2018.
2. Anita Seth, B.L.Juneja, “ JAVA: One Step Ahead”, Oxford University Press, 2017.

**REFERENCES**

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, 9<sup>th</sup> edition, Prentice Hall, 2013.
2. K. Arnold, D. Holmes and J. Gosling, “The JAVA programming language”, 4<sup>th</sup> edition, Addison Wesley Professional, 2005.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, 3<sup>rd</sup> edition, Addison Wesley, 2000.
4. C. Thomas Wu, “An introduction to Object-oriented programming with Java”, 5<sup>th</sup> edition, Tata McGraw-Hill Publishing company Ltd., 2009.

**COURSE OBJECTIVES:**

At the end of a study of the unit concerned, the student should be able to

1. State the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water and food resources.
2. Explain the concepts of an ecosystem and provide an overview of biodiversity and its conservation.
3. Explain environmental based pollution their causes, effects and their remedial measures
4. Discuss their causes, effects and the control measures of Global Warming, Acid Rain, Ozone Layer Depletion
5. Describe the effect of climate change due to pollution.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				2	2							
CO2	2													
CO3	3	2				2	2							2
CO4	3	2				2	2							2
CO5	3	2				2	2							2

**UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES****6**

Definition, Scope and Importance Forest Resources: - Use and over - exploitation, deforestation, Case Studies, Water Resources: - Use and Over-Utilization of Surface and ground water, Floods, Drought, Food Resources- Effects of Modern Agriculture, Fertilizer- Pesticide Problems–Role of an Individual in Conservation of Natural Resources.

**UNIT II ECOSYSTEMS AND BIODIVERSITY****6**

Structure and Function of an Ecosystem– Energy Flow in the Ecosystem -Food Chains, Food Webs and Ecological Pyramids. Introduction to Biodiversity –Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values –India as a Mega-Diversity Nation — Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – Endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ conservation of Biodiversity.

**UNIT III ENVIRONMENTAL POLLUTION****6**

Definition – Causes, Effects and Control Measures of:- (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution, Solid Waste Management- Effects and Control Measures of Acid Rain,– Role of an Individual in Prevention of Pollution..

## **UNIT IV FUNDAMENTALS OF CLIMATE CHANGE**

**6**

Sustainable Development- - Climate Change- Causes and effects of Global Warming - Effect of global warming in food supply, plants, sea, coral reef, forest, agriculture, economy - Kyoto Protocol in reduction of greenhouse gases - Ozone Layer Depletion - mechanism, effects and control measures- Montreal Protocol to protect ozone layer depletion - Rain Water Harvesting - .Effect of climate change due to air pollution Case study - CNG vehicles in Delhi

## **UNIT V EFFECT OF CLIMATE CHANGE**

**6**

Fungal diseases in forests and agricultural crops due to climatic fluctuations - Growing energy needs - effect of climate change due to non-renewable energy resources. Renewable energy resources in the prevention of climatic changes- Effect of climatic changes in ground water table, garments, monuments, buildings, consumption of energy, agriculture and in electric power sector - Carbon credit - carbon footprint - disaster management -Role of an individual to reduce climate change.

**TOTAL: 30 PERIODS**

### **TEXT BOOKS:**

1. Miller, T.G. Jr., “Environmental Science”, Wadsworth Pub. Co. 2018
2. Anubha Kaushik and Kaushik, “Environmental Science and Engineering” New Age International Publication, 4<sup>th</sup> Multicolour Edition, New Delhi, 2014.

### **REFERENCE BOOKS:**

1. S. Radjarejseri et al., “Environmental Science” Sonaversity, Sona College of Technology, Salem, 2018.
2. Masters, G.M., “Introduction to Environmental Engineering and Science”, Pearson Education Pvt., Ltd., 2<sup>nd</sup> Edition, 2004.
3. Erach, B., “The Biodiversity of India”, Mapin Publishing P.Ltd., Ahmedabad, India.
4. Erach Bharucha, “Textbook of Environmental Studies for Undergraduate Courses”, 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Apply the basic features of JAVA such as Control statements, Arrays, Classes, Inheritance, Interface and Packages in solving a problem
2. Apply appropriate IO stream and collection framework for solving real time problem
3. Write multithreaded and GUI based data driven application using JDBC concepts

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3		2					3		3
CO2	3	3	3	2	3		2					3		3
CO3	3	3	3	2	3		2					3		3

**LIST OF EXPERIMENTS**

1. Write the programs using the concept of nested loops, recursion, arrays, String and String Buffer class.
2. Write the programs using the concept of Class, Inheritance, Interface and Packages
3. Write a program that uses the I/O package for reading and writing a text file.
4. Write a program that uses the different exception handling mechanism.
5. Write a program that persistently stores the current state of the object.
6. Write a program that uses generic concept for writing efficient program.
7. Write a program that uses different collection class for managing data of different applications.
8. Implementing a GUI based on Swings and Frames. Also, write the program to handle GUI based events.
9. Write the programs that uses the concept of Threads.
10. Write a program that uses JDBC API for interacting with the database.
11. Implement java programs with Lambda Expressions and Functional Programming

**TOTAL: 30 HOURS**

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Write ALP programs for arithmetic manipulations using Microprocessors.
2. Interface different I/Os with microprocessors and perform arithmetic manipulations using Microcontroller.
3. Solve real time industry based problems with Microprocessors and Microcontrollers.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		1						1			1
CO2	3	3	3		1						1			2
CO3	3	3	3		1						1			2

**UNIT I MICROPROCESSORS****5**

Introduction - 8085 – 8086 Microprocessor- –Register organization of 8086 - Architecture – Signal description of 8086 – Addressing Modes - Instruction Set - Assembly Language Programming

**.UNIT II INTERFACING WITH MICROPROCESSORS****5**

Memory interfacing with Microprocessors – Parallel Communication Interface (8255) – Serial Communication Interface (8251) – Timer (8253) - Keyboard/display controller (8279).

**UNIT III MICROCONTROLLER****5**

8051 Microcontroller- Architecture – signals descriptions of 8051– Register set of 8051- Addressing modes - Assembly Language Programming.

**REFERENCES BOOKS**

1. Ramesh S. Gaonkar ,”Microprocessor – Architecture, Programming and Applications with the 8085” Penram International Publisher , 6<sup>th</sup> Edition, 2018.
2. A.K.Ray & K.M Bhurchandi, “Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing”, 3<sup>rd</sup> edition, Tata Mc Graw Hill, 2017.
3. Douglas V.Hall and SSSP Rao, “ Microprocessors and Interfacing”, third edition , Tata Mc Graw Hill ,2016.
4. Yn-cheng Liu,Glenn A.Gibson, “Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design”, second edition, Prentice Hall of India , 2018 .

5. Mohamed Ali Mazidi, Janice Gillispie Mazidi, "The 8051 microcontroller and embedded systems using Assembly and C", 2<sup>nd</sup> edition, Pearson education /Prentice hall of India , 2018.
6. Kenneth J. Ayala, "The 8051 microcontroller and Embedded systems using assembly and C", 1<sup>st</sup> edition, Cengage learning publisher, 2017.

## **LIST OF EXPERIMENTS**

1. 8-bit and 16 bit Manipulations- Addition, Subtraction, Multiplication and Division using Microprocessors.
2. Code conversions - BCD to Binary and Binary to BCD using Microprocessors.
3. Decimal Arithmetic and Bit Manipulation using Microprocessors.
4. Double precision – Addition and subtraction using Microprocessors.
5. 8255 Interface -Experiments with mode 0 and mode1 using Microprocessors.
6. 8279 Interface -Keyboard/ Display Interface with Microprocessors.
7. 8253 Interface -Timer Interface with Microprocessors.
8. 8-bit and 16 bit Manipulations- Addition, Subtraction and Multiplication using 8051.
9. Array Operations-Sum of N Elements using 8051.
10. Applications – Traffic light controller and stepper motor using Microprocessors and Microcontroller.

**TOTAL: 45 HOURS**

Semester – IV	U19GE401-SOFT SKILLS AND APTITUDE – II	L	T	P	C	Marks
		0	0	2	1	100
<b>Course Outcomes</b>						
<b>At the end of the course the student will be able to:</b>						
1. Demonstrate capabilities in additional soft-skill areas using hands-on and/or case-study approaches						
2. Solve problems of increasing difficulty than those in SSA-I in given areas of quantitative aptitude and logical reasoning and score 65-70% marks in company-specific internal tests						
3. Demonstrate greater than SSA-I level of verbal aptitude skills in English with regard to given topics and score 65-70% marks in company-specific internal tests						
<b>1.Soft Skills</b>	<b>Demonstrating soft-skill capabilities with reference to the following topics:</b> <ol style="list-style-type: none"> <li>SWOT</li> <li>Goal setting</li> <li>Time management</li> <li>Stress management</li> <li>Interpersonal skills and Intrapersonal skills</li> <li>Presentation skills</li> <li>Group discussions</li> </ol>					
<b>2. Quantitative Aptitude and Logical Reasoning</b>	<b>Solving problems with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Equations: Basics of equations , Linear, Quadratic Equations of Higher Degree and Problem on ages.</li> <li>Logarithms, Inequalities and Modulus</li> <li>Sequence and Series: Arithmetic Progression, Geometric Progression, Harmonic Progression, and Special Series.</li> <li>Time and Work: Pipes &amp; Cistern and Work Equivalence.</li> <li>Time, Speed and Distance: Average Speed, Relative Speed, Boats &amp; Streams, Races and Circular tracks and Escalators.</li> <li>Arithmetic and Critical Reasoning: Arrangement, Sequencing, Scheduling, Network Diagram, Binary Logic, and Logical Connection.</li> <li>Binary Number System.- Binary to decimal, Octal, Hexadecimal</li> </ol>					
<b>3. Verbal Aptitude</b>	<b>Demonstrating English language skills with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Critical reasoning</li> <li>Theme detection</li> <li>Verbal analogy</li> <li>Prepositions</li> <li>Articles</li> <li>Cloze test</li> <li>Company specific aptitude questions</li> </ol>					



**Dr.S.Anita**

**Head/Training**



## MANDATORY COURSES

Sona College of Technology, Salem

Department of Sciences (Chemistry)

SEMESTER – IV

MANDATORY COURSE

**U19GE402 - ENVIRONMENT AND CLIMATE SCIENCE**

(Common for MCT, IT, FT, ECE and BME)

**L T P C**  
**2 0 0 0**

**Course Outcomes:**

At the end of the course, the student will be able to

1. state the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water and food resources.
2. explain the concepts of an ecosystem and provide an overview of biodiversity and its conservation.
3. explain environmental based pollution their causes, effects and their remedial measures
4. discuss their causes, effects and the control measures of Global Warming, Acid Rain, Ozone Layer Depletion
5. describe the effect of climate change due to pollution

**UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES** **6**

Definition, Scope and Importance Forest Resources:- Use and over - exploitation, deforestation, Case Studies, Water Resources:- Use and Over-Utilization of Surface and ground water , Floods, Drought, Food Resources- Effects of Modern Agriculture, Fertilizer- Pesticide Problems–Role of an Individual in Conservation of Natural Resources.

**UNIT II ECOSYSTEMS AND BIODIVERSITY** **6**

Structure and Function of an Ecosystem– Energy Flow in the Ecosystem -Food Chains, Food Webs and Ecological Pyramids.

Introduction to Biodiversity –Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values –India as a Mega-Diversity Nation — Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – Endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ conservation of Biodiversity.

**UNIT III ENVIRONMENTAL POLLUTION** **6**

Definition – Causes, Effects and Control Measures of:- (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution, Solid Waste Management- Effects and Control Measures of Acid Rain,– Role of an Individual in Prevention of Pollution..

23.01.2021

B.E. / B.Tech. Regulations 2019

**UNIT IV CLIMATE CHANGE ON THE ENVIRONMENT**

6

Sustainable Development- - Climate Change- Causes and effects of Global Warming - Effect of global warming in food supply, plants, sea, coral reef, forest, agriculture, economy - Kyoto Protocol in reduction of greenhouse gases - Ozone Layer Depletion - mechanism, effects and control measures- Montreal Protocol to protect ozone layer depletion - Rain Water Harvesting - .Effect of climate change due to air pollution Case study - CNG vehicles in Delhi

**UNIT V EFFECT OF CLIMATE CHANGE ON POLLUTION**

6

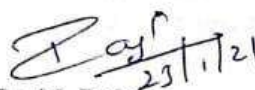
Fungal diseases in forests and agricultural crops due to climatic fluctuations - Growing energy needs - effect of climate change due to non-renewable energy resources. Renewable energy resources in the prevention of climatic changes- Effect of climatic changes in ground water table, garments, monuments, buildings. consumption of energy, agriculture and in electric power sector - Carbon credit - carbon footprint - disaster management -Role of an individual to reduce climate change.

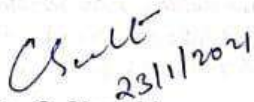
**TOTAL: 30 HOURS****Text Books:**

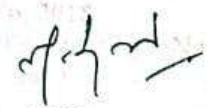
1. Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co. 2018
2. Anubha Kaushik and Kaushik, "Environmental Science and Engineering" New Age International Publication, 4<sup>th</sup> Multicolour Edition, New Delhi, 2014.

**References:**

1. S. Radjarejesri et al., "Environmental Science" Sonaversity, Sona College of Technology, Salem, 2018.
2. Masters, G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., 2<sup>nd</sup> Edition, 2004.
3. Erach, B., "The Biodiversity of India", Mapin Publishing P.Ltd., Ahmedabad, India.
4. Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad - 500029.

  
23/1/21  
**Dr. M. Raja**  
Course Coordinator / Sciences

  
23/1/2021  
**Dr. C. Shanthi**  
HOD / Sciences

  
**Dr. M. Renuga**  
Chairperson BOS,  
Science and Humanities

23.01.2021

**B.E. / B.Tech. Regulations 2019**

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester V under Regulations 2019**  
**Branch: Information Technology**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19IT501	Computer Networks	3	0	0	3	45
2	U19IT502	Database Management Systems	3	0	0	3	45
3	U19IT503	Theory of Computation	3	1	0	4	60
4	U19IT504	Software Engineering	3	0	0	3	45
5	noc22_cs96	NPTEL- Introduction to Internet of Things	3	0	0	3	45
	noc22_cs87	NPTEL- Cloud computing					
	noc22_cs125	NPTEL- Design and Implementation of Human-Computer Interfaces					
<b>Practical</b>							
6	U19IT505	Database Management Laboratory	0	0	4	2	60
7	U19IT506	Mobile Application Development Laboratory	0	0	4	2	60
8	U19IT507	Internet of Things Laboratory	0	0	2	1	30
9	U19GE501	Soft Skills and Aptitude – III	0	0	2	1	30
<b>Total Credits</b>						<b>22</b>	

**Approved By**

**Chairperson, Information Technology BoS**  
**Dr.J.Akilandeswari**

**Member Secretary, Academic Council**  
**Dr.R.Shivakumar**

**Chairperson, Academic Council & Principal**  
**Dr.S.R.R.Senthil Kumar**

**Copy to:-**

HOD/Information Technology, Fifth Semester B.Tech IT Students and Staff, COE

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Describe the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
2. Analyze the link layer concepts of error-detection and correction techniques, multiple access protocols, point-to-point protocols and characteristics of link layer media (including wireless links).
3. Explain the transport layer concepts and protocol design including connection oriented and connection-less models, techniques to provide reliable data delivery and algorithms for congestion control and flow control.
4. Apply subnetting and supernetting concepts to maintain networks and explain the network layer concepts and protocol design including datagram forwarding, routing algorithms, and network interconnections.
5. Explain the basic concepts of application layer protocol design including client/server models, peer-to-peer models, and network naming.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3							3	3	2
CO2	2	2	3	3	3							3	3	2
CO3	2	2	3	3	3							3	3	2
CO4	2	2	3	3	3							3	3	2
CO5	2	2	3	3	3							3	3	2

**UNIT I INTRODUCTION 9**

Data Communications Networks, Network Types- Standards and administration- OSI Model- TCP/IP Protocol Suite.

Physical layer: Performance - Transmission Media: Guided and Unguided media –Switching: Circuit switched networks and Packet Switched Networks.

**UNIT II DATA LINK LAYER 9**

Introduction – Link Layer addressing - Error Detection: Types of Errors, Redundancy, Cyclic Codes - Cyclic Redundancy Check- Check Sum.

DLC Services – Data Link Layer Protocols, Media Access Control – Random Access, Controlled Access - Ethernet protocol – Standard Ethernet.

**UNIT III NETWORK LAYER 9**

Services, Packet Switching – Internet Protocol-Routing Algorithms - Unicast Routing Protocols - IPv6 Protocol.

**UNIT IV TRANSPORT LAYER****9**

Introduction - User Datagram Protocol (UDP) - User Datagram, UDP Services, UDP applications  
Transmission Control Protocol (TCP) - Services-Features-segment - TCP connection - Windows in TCP -  
Flow Control - Error Control - TCP Congestion Control.

**UNIT V APPLICATION LAYER****9**

Application Layer – WWW and Http, FTP – Two connections, Control connection, Data connection,  
security of FTP – Electronic Mail – Architecture, web based mail – Email security.

**TOTAL: 45 HOURS****TEXT BOOK**

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 5th Edition 2017.

**REFERENCES**

1. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 6<sup>th</sup> edition 2017.
2. Larry L.Peterson and Peter S. Davie, “Computer Networks: A Systems Approach”, Harcourt Asia Pvt. Ltd., 5<sup>th</sup> edition, 2015.
3. Andrew S. Tanenbaum, “Computer Networks”, Prentice Hall PTR, 5th Edition, 2013
4. Halsall, Fred, “Computer Networking and Internet”, Pearson Education, 5th edition, 2015.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Comprehend the need, background, architecture and evolution of database management system and design ER diagram for database design
2. State the characteristics of relational model with an emphasis on how to organize, maintain, retrieve and secure information efficiently and effectively from a RDBMS and write queries to retrieve and manipulate databases
3. Design and evaluate the normality of a logical data model, and correct any anomalies
4. Explain the general idea of data storage, indexing techniques and query processing
5. Summarize the transaction management and recovery management techniques adopted in database management system

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3						1	1		1	2	3
CO2	3	3	2	1	1				1	1		1	2	2
CO3	3	3	3	1	1				1	1		1	2	2
CO4	3	3	3	1	1				1	1		1	2	2
CO5	3	1							1	1		1		

**UNIT I INTRODUCTION****9**

**Database and Database Users:** Characteristics of database approach, Advantages of DBMS Approach, Database Applications.

**Database system concepts and architecture:** Data models, Schemas, Instance, Three schema architecture and data independence, DBMS languages, DBMS interfaces, database system Environment, ER model, EER data model.

**UNIT II RELATIONAL MODEL****9**

**Relational data model, relational constraints and relational Algebra:** Relational model concepts, Relational constraints and Relational data base schema, update operations, basic Relational algebra operations, additional relational operations.

**SQL:** Data definition and constraints, Basic queries, insert, delete, update, complex queries, views, assertions and triggers, embedded SQL, dynamic SQL.

**Database security and Authorization:** security issues, grant/revoke privileges, SQL injections.

**UNIT III RELATIONAL DATABASE DESIGN****9**

**Functional dependencies and normalization:** Functional dependencies, Normal forms: 1NF, 2NF, 3NF, Boyce Codd NF, decomposition, multivalued dependencies and 4NF, join dependencies and 5NF.

## UNIT IV DATA STORAGE AND QUERY PROCESSING

9

**Disk Storage, Basic File Structures, and Hashing:** Secondary Storage Devices, RAID, Operations on Files, Heap Files, Sorted Files, Hashing Techniques.

**Indexing Structures for Files:** Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B+-Trees.

**Query Processing:** Translating SQL Queries into Relational Algebra, Algorithms for External Sorting, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and Set Operations.

## UNIT V TRANSACTION MANAGEMENT

9

**Transaction Processing:** Introduction, Transaction and System Concepts, desirable Properties of Transactions, Schedules based on Recoverability, Schedules based on Serializability.

**Concurrency Control Techniques:** Two-Phase Locking Techniques for Concurrency Control, Timestamp Ordering.

**Database Recovery Techniques:** Recovery Concepts, Deferred Update, Immediate Update, Shadow Paging, ARIES recovery algorithm.

**TOTAL: 45 HOURS**

### TEXT BOOK

1. Ramez Elmasri and Shamkant Navathe, “Fundamentals of Database Systems ”, 6<sup>th</sup> Edition, Addison-Wesley, 2014

### REFERENCES

1. Abraham Silberschatz, Henry F. Korth and Sudarshan. S, “Database System Concepts”, 6<sup>th</sup> Edition, McGraw-Hill, 2016
2. Raghuram Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003
3. Date. C. J, Kannan. A, Swamynathan. S, “An Introduction to Database Systems”, 8<sup>th</sup> Edition, Pearson Education, 2012
4. Rajesh Narang, “Database Management systems”, PHI Learning pvt. Ltd, New Delhi,2011.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Prove results using proof by induction, contradiction and understand formal definitions of automata, languages and Grammars.
2. Apply the models of Finite automata and explain the properties of languages with applications.
3. Explore the models of Pushdown automata, context free languages and describe the different forms of context free grammars.
4. Classify the different representations, techniques, extensions and simulating a Turing machine by Computer.
5. Describe concrete examples of computationally undecidable or inherently infeasible problems from different fields.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2									1			
CO2	3		3							1	1			
CO3	3	3	3		2					1				
CO4	3	3	3		2					1				
CO5	3	1	1	1						1				

**UNIT I AUTOMATA THEORY****15**

**Finite Automata:** Constructing Automata, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA) Equivalence of DFA and NFA: Finite Automata with Epsilon Transitions, Finite Automata without Epsilon Transitions, Subset Construction Method, Minimizing Automata - Applications of Finite Automata

**UNIT II REGULAR EXPRESSIONS AND CONTEXT FREE GRAMMARS 15**

**Regular Expressions and Properties:** Constructing Regular Expressions, Finite Automata and Regular Expressions - Conversion of RE to Automata and Automata to RE, Applications of Regular Expressions, Pumping Lemma, Closure Properties.

**Context Free Grammars:** Definitions and Derivations, Parse trees, Applications, Ambiguity in Grammars and Languages.

**UNIT III PUSHDOWN AUTOMATA AND CONTEXT FREE LANGUAGES 15**

**Pushdown Automata:** Definition, The Languages of a PDA, Constructing PDA's, Equivalence of PDA and CFG, Deterministic Pushdown Automata

**Normal Forms and Properties:** Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Pumping Lemma and Closure Properties of CFL.



## **UNIT IV TURING MACHINE AND RECURSIVE ENUMERABLE LANGUAGE**

**15**

**Introduction:** Definition, Constructing Simple TM's, Representations, Programming Techniques – Automata with storage, Multi-tape tracks, Checking of symbols, Subroutines, Universal Turing Machine, Turing Machines and Computers

## **UNIT – V UNDECIDABILITY AND COMPLEXITY**

**15**

**Undecidability:** Language that is not Recursively Enumerable, Undecidable Problem that is Recursive Enumerable, Undecidable Problem about Turing Machine, Post Correspondence Problem, Modified PCP

**P and NP:** The Class P, The class NP, The NP-Complete Problem

**TUTORIALS: 15 HOURS TOTAL: 60 HOURS**

### **TEXT BOOKS**

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman “Introduction to Automata Theory, Languages, and Computation “, 3<sup>rd</sup> Edition, Pearson Education, 2008

### **REFERENCES**

1. Kavi Mahesh “Theory of Computation – A Problem-Solving Approach”, John Wiley-India, First Edition, 2012
2. A.M. Natarajan, A. Tamilarasi, P. Balasubramani “Theory of Computation “, New Age International Publishers, 2007
3. Raymond Greenlaw, H. James Hoover “Fundamentals of the Theory of Computation: Principles and Practice”, Morgan Kaufmann Publishers, 1998
4. John C. Martin “Introduction to Languages and the Theory of Computation”, 4<sup>th</sup> Edition, McGraw-Hill, 2010

**COURSE OUTCOMES**

At the end of this course, the students will be able to

1. Identify the scope and requirements of software engineering in IT industry and apply different SDLC models in different applications.
2. Prepare Software Requirements Specification (SRS) document for real time applications.
3. Explain the object-oriented methodologies and workflows and apply object-oriented principles, techniques, appropriate UML models, and other artifacts to construct a design for a real-world problem.
4. Analyze and design system requirements using UML model to determine the use cases and identifying classes and their relationships.
5. Describe the different kind of software testing, System Usability Testing, User Satisfaction Testing.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3		3					3		2	2	3
CO2	2	3	3		3				3	3		2	2	3
CO3	2	3	3		3			3		3		2	2	3
CO4	1	3	3		3					3		2	2	3
CO5	1	3	3		3		3			3		2	2	3

**UNIT I SOFTWARE PRODUCT AND PROCESS****9**

Introduction: The Nature of Software, Software Process, Process Models - A Generic Process Model, Prescriptive Process Models: The Waterfall Model, Incremental Model, Evolutionary Process Models, Concurrent Model, Agile Development- Agile process, Scrum.

**UNIT II SOFTWARE REQUIREMENTS AND ANALYSIS****9**

Software Requirements: Functional and Non-Functional requirements, Requirements Engineering: Requirement Engineering Process -Establishing the Groundwork, Eliciting requirements, Negotiating requirements, Validating requirements. Feasibility Studies, Software Requirement Specification (SRS) Document.

**UNIT III METHODOLOGY, MODELING, AND UNIFIED MODELING LANGUAGE****9**

Object Oriented Systems Development Life Cycle - Object Oriented Methodologies: Rumbaugh Methodology, Booch Methodology, Jacobson Methodology and Unified Approach.

Unified Modeling Language: UML diagrams: Use case diagram, Activity Diagram, Class diagram, Sequence and collaboration diagram, Component Diagram, Deployment diagram.

**UNIT IV                      OBJECT ORIENTED ANALYSIS AND DESIGN                      9**

Object Oriented Analysis: Identifying use cases, Classification, Identifying Object relationships. Software Design: Modular Design, Architectural Design, User Interface Design. Object Oriented Design: Axioms, Corollaries, Designing Classes.

**UNIT V                      SOFTWARE QUALITY AND USABILITY TESTING                      9**

Introduction, Software Quality Assurance Testing, Testing strategies: Black Box Testing, White Box Testing, Top-Down Testing, Bottom-Up Testing. Test cases, Test Plan, Continuous Testing, Myer's Debugging Principles, System Usability Testing, User Satisfaction Testing.

**TOTAL: 45 HOURS**

**TEXT BOOKS**

1. Roger S. Pressman, "Software Engineering – A practitioner's Approach", 8<sup>th</sup> Edition, McGraw-Hill International Edition, 2019.
2. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 2008.

**REFERENCES**

1. Ian Sommerville, "Software Engineering", 10<sup>th</sup> Edition, Pearson Education Asia, 2017.
2. Carlo Ghezzi, "Fundamentals of Software Engineering, 2/e", Pearson Education, 2016.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Build tables, construct relationships among them and retrieve data with simple and complex queries
2. Build various constraints, triggers and indexes on the tables
3. Design and implement a database and to integrate into a simple application

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3							3	3	2
CO2	3	3	3	3	3							3	3	2
CO3	3	3	3	3	3							3	3	2

**LIST OF EXPERIMENTS**

1. Create a relational database system using DDL commands with constraints.
2. Update the database system using DML commands.
3. Query the database using simple and complex queries.
4. Create and update views.
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Create triggers.
7. Create assertions and indexes.
8. Queries working on transaction control, .locking rows for update and creating password and security features.
9. Use of front end tools to manipulate the database.
10. Generate reports using a reporting tool.
11. Database Design and implementation of an application system. (Suggested Mini Project)

**TOTAL: 60 HOURS**

**COURSE OUTCOMES**

At the end of the course, the students will be able to

1. Write android based programs to create simple applications using communication features and multimedia
2. Write android based programs with maps and database connectivity
3. Build an iOS application using Xcode

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1						1				
CO2	3	3	3	3	2					3	3		2	
CO3	3	3	3	3	3					3	3			3

**LIST OF EXPERIMENTS**

1. Calculator with simple operations.
2. Android application for the demonstration of date time picker and alarm manager.
3. Creating an application with multiple activities and a simple menu using listview.
  - A. Sending SMS with toast notification from android application,
  - B. Sending an email from android application.
4. Implement an application that implements Multi-threading
5. Using audio and video functions in android application.
6. Develop an application that makes use of RSS Feed.
7. Application development using web service in android.
8. Android application for obtaining user location using GPS.
9. Android application for database connectivity with MySQL.
10. Implement an application that writes data to the SD card.
11. Develop an iOS application that uses GUI components.
12. Develop an iOS application to demonstrate the use of imageview.

**TOTAL: 60 HOURS**

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Interface various sensors with Arduino and Raspberry pi boards.
2. Implement the control applications using Arduino programming
3. Experiment the different IoT applications with Raspberry pi using Python Programming.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3	2	2									3
CO2		3	3	2	2									3
CO3		3	3	2	2									3

**List of Experiments**

1. Installation of Arduino IDE and Blink LED
2. Creating different LED Patterns using Loops and functions
3. Interfacing Arduino Nano with Joystick
4. Control the brightness of an LED by using PWM
5. Control servo motor using Joystick
6. Control LED, Buzzer and Relay from smart phone using Bluetooth Module.
7. Interface DHT 11 sensor with Arduino Nano and upload the humidity and temperature on the cloud.
8. Familiarization of Raspberry pi by blink LED program
9. Interface PIR sensor with Raspberry pi for motion detection.
10. Control the stepper motor using Raspberry pi based on specific input
11. Measure the humidity and temperature using DHT sensor and display the data readings on the LCD screen.
12. Build a secret code based security system using Raspberry pi
13. Interface ultrasonic sensor with Raspberry PI for distance measurement

**TOTAL: 30 HRS**

**ABOUT THE COURSE :**

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

**COURSE LAYOUT**

**Week 1:** Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I

**Week 2:** Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II

**Week 3:** Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II

**Week 4:** Sensor Networks: Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications

**Week 5:** Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II

**Week 6:** Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi

**Week 7:** Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT

**Week 8:** SDN for IoT (contd), Data Handling and Analytics, Cloud Computing

**Week 9:** Cloud Computing(contd), Sensor-Cloud

**Week 10:** Fog Computing, Smart Cities and Smart Homes

**Week 11:** Connected Vehicles, Smart Grid, Industrial IoT

**Week 12:** Industrial IoT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

**BOOKS AND REFERENCES**

1. S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.
2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.

**ABOUT THE COURSE :**

Cloud computing is a scalable services consumption and delivery platform that provides on-demand computing service for shared pool of resources, namely servers, storage, networking, software, database, applications etc., over the Internet. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources, which can be rapidly provisioned and released with minimal management effort. This course will introduce various aspects of cloud computing, including fundamentals, management issues, security challenges and future research trends. This will help students (both UG and PG levels) and researchers to use and explore the cloud computing platforms.

**COURSE LAYOUT**

**Week 1:** Introduction to Cloud Computing

**Week 2:** Cloud Computing Architecture

**Week 3:** Service Management in Cloud Computing

**Week 4:** Data Management in Cloud Computing

**Week 5:** Resource Management in Cloud

**Week 6:** Cloud Security

**Week 7:** Open Source and Commercial Clouds, Cloud Simulator

**Week 8:** Research trend in Cloud Computing, Fog Computing

**Week 9:** VM Resource Allocation, Management and Monitoring

**Week 10:** Cloud-Fog-Edge enabled Analytics

**Week 11:** Serverless Computing and FaaS Model

**Week 12:** Case Studies and Recent Advancements

**BOOKS AND REFERENCES**

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010



**ABOUT THE COURSE :**

Human-computer interfaces have become very much part of our lives, due to the proliferation of large number of consumer electronic products. The key issue is to make the products usable to lay-persons. As a result, the main concern is usability and how to ensure it for the product. As it happens, development of a usable system follows a process consisting of stages. In this course, we shall learn the stages a system should follow to be usable. In the first few lectures (first week), we will get introduced to the human-computer interfaces, concept of usability and its engineering (including the stages). In the subsequent lectures, the stages will be covered. Weeks 2 and 3 are devoted to the topics on identification of usability requirements. In week 4, we shall learn about the fundamental concepts involved in usable design. Evaluation of the design to ensure usability is covered in week 5. Weeks 6 and 7 contains lectures on converting the design to an information system. Implementation of the system is discussed in weeks 8-10. Week 11 will cover the concepts related to the evaluation for system usability. In the final week (12), we will cover few related topics and conclude the course.

**COURSE LAYOUT**

**Week 1:** Introduction

**Week 2:** Identification of usability requirements I

**Week 3:** Identification of usability requirements II

**Week 4:** Usable interface design

**Week 5:** Rapid usability evaluation

**Week 6:** Converting design to system I

**Week 7:** Converting design to system II

**Week 8:** System implementation I

**Week 9:** System implementation II

**Week 10:** System implementation III

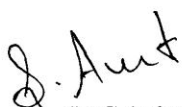
**Week 11:** Empirical usability evaluation

**Week 12:** Conclusion

**BOOKS AND REFERENCES**

1. Samit Bhattacharya. (2019). Human-Computer Interaction: User-Centric Computing for Design, McGraw Hill Education (1<sup>st</sup> ed).
2. Bruce R Maxim & Roger S Pressman (2019). Software Engineering: A Practitioner's Approach. (8th ed). McGraw Hill Education.

Semester –V	U19GE501 : SOFT SKILLS AND APTITUDE - III	L	T	P	C	Marks
		0	0	2	1	100
<b>Course Outcomes</b>						
<b>At the end of the course the student will be able to:</b>						
1. Demonstrate capabilities in supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches						
2. Solve problems of advanced levels than those in SSA-II in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests						
3. Display effective language knowledge to construct sentences with subject verb agreement and select the best alternative for the underlined parts of the sentences, and fill in the blanks in the given passages with suitable forms of words and their synonyms.						
<b>1.SOFT SKILLS</b>	<b>Demonstrating soft-skill capabilities with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Career planning</li> <li>Resume writing</li> <li>Group discussion</li> <li>Teamwork</li> <li>Leadership skills</li> <li>Interview skills</li> <li>Mock interviews</li> <li>Mock GDs</li> </ol>					
<b>2.QUANTITATIVE APTITUDE AND LOGICAL REASONING</b>	<b>Solving problems with reference to the following topics :</b> <ol style="list-style-type: none"> <li><b>Geometry:</b> 2D, 3D, Coordinate Geometry, and Height &amp; Distance.</li> <li><b>Permutation&amp;Combinations:</b>Principles of counting, Circular Arrangements and Derangements.</li> <li><b>Probability:</b> Addition &amp; Multiplication Theorems, Conditional Probability and Bayes Theorem.</li> <li><b>Statistics :</b> Mean Median, Mode, Range and Standard Deviation.</li> <li><b>Interest Calculation :</b>Simple Interest and Compound Interest</li> <li><b>Crypto arithmetic:</b> Addition and Multiplication based problem.</li> <li><b>Logical Reasoning :</b> Blood Relations, Directions Test, Series, Odd man out, Analogy, Coding &amp; Decoding, Problems and Input – Output Reasoning.</li> <li>Statement &amp; Assumptions, Statements &amp; Arguments, Inference.</li> <li><b>Company Specific Pattern :</b>Infosys and TCS company specific problems</li> </ol>					
<b>3. VERBAL APTITUDE</b>	<b>Demonstrating English language skills with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Subject verb agreement</li> <li>Selecting the best alternative for the stated parts of given sentences</li> <li>Reading comprehension</li> <li>Contextual synonyms</li> <li>Sentence fillers</li> <li>Writing a story for a given picture</li> <li>Company specific aptitude questions</li> </ol>					

  
Dr.S.Anita

Head/Training

Department of Placement Training  
Sona College of Technology,  
Salem-636 005.

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester VI Regulations 2019**  
**Branch: Information Technology**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19IT601	Full Stack Development	3	0	0	3	45
2	U19IT602	Machine Learning	3	0	0	3	45
3	U19IT905	<b>Professional Elective</b> – Information Security	3	0	0	3	45
	U19IT912	<b>Professional Elective</b> – Total Quality Management					
4	U19IT913	<b>Professional Elective</b> – Software Quality Assurance	3	0	0	3	45
	U19IT918	<b>Professional Elective</b> – Intellectual Property Rights					
	U19IT926	<b>Professional Elective</b> – Robotic Process Automation					
5	<b>Open Elective</b>		3	0	0	3	45
	U19BM1001	Hospital Management					
	U19BM1002	Basic Life Support					
	U19CE1002	Municipal Solid Waste Management					
	U19CE1003	Energy Efficiency and Green Building					
	U19EE1002	Energy Conservation and Management					
	U19EE1004	Renewable Energy Systems					
	U19FT1001	Fundamentals of Fashion Design					
	U19MC1004	Fundamentals of Robotics					
U19ME1004	Renewable Energy Sources						
<b>Practical</b>							
6	U19IT603	Full stack Development Laboratory	0	0	4	2	60
7	U19IT604	Software Design and Testing Laboratory	0	0	4	2	60
8	U19IT605	Machine Learning Laboratory	0	0	2	1	30
9	U19GE601	Soft Skills and Aptitude - IV	0	0	2	1	30
<b>Total Credits</b>						<b>21</b>	

**Approved By**

**Chairperson, Information Technology BoS**  
**Dr.J.Akilandeswari**

**Member Secretary, Academic Council**  
**Dr.R.Shivakumar**

**Chairperson, Academic Council & Principal**  
**Dr.S.R.R.Senthil Kumar**

**Copy to:-**

HOD/Information Technology, Sixth Semester B.Tech IT Students and Staff, COE

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Design a front end of web application using HTML and CSS
2. Write a java script code to validate the user data and asynchronously invoke backend application
3. Design a front end of web application using Bootstrap
4. Develop a front end of web application using a React JS library and make a call to server side programs
5. Develop a back end of web application using Node JS and Mongo DB.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1		2	2		2									2
CO2	2	3	3		3									3
CO3		2	2		2									2
CO4		3	3		3									3
CO5	2	3	3		3									3

**UNIT I****HTML and CSS****9**

Introduction to www, HTML: Tags, Lists, Images, Forms, Links, Tables, iframes, videos, anchors, HTML Divs – CSS : Inline, Internal, External, CSS Display, CSS Backgrounds, Borders, Margins, Padding, CSS Font Styling, Stylings Lists, Tables, Forms, Gradients, Font, Tool tips, Buttons, Transitions, Transformation, Animations Box sizing, Flex, Grid

**UNIT II****JAVA SCRIPT AND jQuery****9**

Introduction to Javascript, Variables, scoping, Data type, Strings, Numbers, Operators, Loops, Functions, Objects, Events, Working with DOM, AJAX, ES5 vs ES6 Vs ES7, jQuery – Introduction to jQuery, Syntax, Selectors, Events, Effects, Traversing, and jQuery AJAX

**UNIT III****BOOTSTRAP****9**

Introduction to Bootstrap , Bootstrap Basics – Container, Color, Table, Images, Alerts, Buttons, Badges, Bars, Spinner, Cards, Pagination, Drop down, Carousel, Bootstrap Grids, Bootstrap Themes, Bootstrap CSS, Bootstrap JS

Introduction to React, Install node, JSX, Virtual DOMs, Single Page Apps, React Lifecycle, States, Class Component Vs Function Component, Event Handling, Props, Routes, Hooks ,Conditional rendering, Pure Components, High order components , Controlled Vs uncontrolled components, Redux, Babel, webpack, Axios,

Introduction, Environmental setup, Simple Server, Response Type – HTML, JSON, Routing, Express Introduction, Express params and query string, Express Middleware, API Authentication  
SQL Vs NO SQL, Mongo DB overview, Installation, connecting and performing CRUD operations

**TOTAL: 45 HOURS****TEXT BOOK**

1. Eric Bush, “Node.Js, Mongoddb,React, React native Full Stack Fundamentals and Beyond”, Blue sky productions, 2018

**REFERENCE BOOKS**

1. P.Deitel, H.Deitel, and A.Deitel, “ Internet and World Wide Web – How to program”, 5<sup>th</sup> Edition, Pearson, 2019.
2. B. Jakobus, J.Maraj, “ Mastering Bootstrap 4”, Packt publisher, 2016
3. Kirupa Chinnathambi, “Learning React”, Addison-Wesley Professional, 2018
4. Marc Wandschneider, “Learning Node.js:A Hands-on guide to building web applications in javascript”, 2<sup>nd</sup> edition, 2018

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Explain the concepts of different types of learning and apply linear regression
2. Summarize the concepts of logistic regression and implement the same with python
3. Explain and apply the concepts of Neural networks and support vector machines
4. Evaluate the hypothesis based on factors like bias and variance
5. Explain the concepts of clustering, dimensionality reduction and anomaly detection.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	1				1	1		1	2	2
CO2	3	3	3	3	3				1	1		1	2	2
CO3	3	3	3	3	3				1	1		1	2	2
CO4	3	3	3	1	1				1	1		1	2	2
CO5	3	3	1	1	1				1	1		1	2	2

**UNIT I INTRODUCTION AND LINEAR REGRESSION****9**

Introduction to Artificial Intelligence - What is machine learning? – Supervised Learning – unsupervised learning – Linear Regression – cost function – gradient descent algorithm – normal equation - Gradient descent for multiple variables – feature scaling – learning rate – polynomial regression – normal equation

**UNIT II LOGISTIC REGRESSION****9**

Hypothesis representation – decision boundary – nonlinear decision boundaries – cost function – gradient descent – advanced optimizations – multi class classification problems – **Regularization** - Problem of overfitting – cost function optimization for regularization – regularized linear regression – regularization with normal equation - regularized logistic regression

**UNIT III NEURAL NETWORKS AND SUPPORT VECTOR MACHINES****9**

Overview and summary – neurons and brain – model representation – artificial neural networks representation – example – multiclass classification – cost function – back propagation algorithm – gradient checking – random initialization – Support vector machines – optimization objective – cost function – large margin intuition – decision boundary – kernels – adapting to nonlinear classifiers- Introduction to Decision Trees – K-NN classifier

**UNIT IV ADVICE FOR APPLYING MACHINE LEARNING****9**

Debugging a learning algorithm – evaluating a hypothesis – model selection and training, validation test sets – bias Vs variance – regularization and bias/variance – learning curves machine learning system design

Unsupervised learning – k-means algorithm – optimization objective – choosing number of clusters - Dimensionality reduction – principle component analysis - Anomaly detection – algorithm – developing and evaluating the algorithm – anomaly detection Vs supervised algorithm -Case study – recommender system – collaborative filtering - Large scale machine learning – online learning – map reduce and parallelism.

**TOTAL: 45 HOURS**

**REFERENCES**

1. Stanford's machine learning course presented by Professor Andrew Ng – online resource - <http://www.holehouse.org/mlclass/>
2. James, G., Witten, D., Hastie, T., Tibshirani, R, “An Introduction to Statistical Learning with Applications in R”, Springer, 2013.
3. Tom M. Mitchell, “Machine Learning”, 1<sup>st</sup> edition, McGraw Hill Education, 2017.
4. Ethem Alpaydm, “Introduction to Machine Learning”, The MIT Press, 2nd edition, 2013.
5. Christopher M. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.
6. Sebastianraschka, “Python Machine Learning”, Packt Publishing Ltd., 2017.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Design a Front End of application using HTML,CSS,BOOTSTRAP
2. Write programs to validate data and initiate a call to backend using javascript code and jQuery
3. Develop a Full Stack application using React JS, Node JS and Mongo DB

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1		2	2		2									2
CO2	2	3	3		3									3
CO3	2	3	3		3									3

**LIST OF PROGRAMS**

1. Create your own Blog page using HTML/CSS
2. Create a home page of your website using Bootstrap
3. Add a functionality to your Blog using Javascript and jQuery
4. Create a front end of online assessment pages using React JS
5. Build a Node.js server to say a given string is palindrome or not (Explore a node server with only API)
  - input: localhost:8080/is\_palindrome?text=madam
  - output: true/false
6. Node.js with SQL Database (nodejs with DB access)
  - a) Create a database and insert the given data into the table
  - b) Fetch the record based by
    - joining the tables
    - Search criteria
    - recent data order
    - Limit first 5 records
7. a) Whenever a user is logged in set the email in the MongoDB
  - b) Write a nodejs script to pull the MongoDB email value which is set and provide as a api end point
8. Email
  - a) Build a script in nodejs to send a email with a default content
  - b) Use task '7-b' and integrate the task '8-a' to send a email to the user that they have logged in from this IP
9. Create a back end of backend of online assessment using Node JS and Mongo DB
10. Create a full stack application comprising React JS, Node JS and Mongo DB to manage information of employees working in the organization. Admin of the application should able to perform CRUD operation on the employee database.

**TOTAL: 60 Hours**



**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Understand the problem statement of the real-time application.
2. Use the UML review to do analysis through gathering all requirement of the system.
3. Apply appropriate design patterns by design UML diagrams and develop software/application using new Information Technology such as Machine learning, Deep learning, Full stack development, IoT, Black chain and Cloud Computing.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	3					2		3
CO2	3	3	3	2	2	1	1					2		3
CO3	3	3	2	2		2						2		3

**EXPERIMENTS**

To develop a mini-project by following the exercises listed below application using software engineering methodology.

**1. PROGRAM ANALYSIS AND PROJECT PLANNING**

- Thorough study of the problem – Identify project scope, Objectives and Infrastructure.

**2. REQUIREMENT ENGINEERING**

- Develop a complete problem statement.
- Write the IEEE standard SRS (Software Requirement Specification) document.

**3. ANALYSIS AND DESIGN**

- Identify the stockholder and use case requirement
- Using the identified requirement, do the analysis (view) activity in Rational Requisite Pro software.
- Identify Use Cases and develop the Use Case model.
- Identify the business activities and develop an UML Activity diagram.
- Identify the conceptual classes and develop a domain model with UML Class diagram.
- Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and collaboration diagrams
- Draw relevant state charts diagram.
- Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML component and deployment diagram notation.

**4. SOFTWARE DEVELOPMENT AND DEBUGGING**

- Implement the real-time application using any one of new information technology such that Machine learning, Deep learning, Full stack development, IoT, Black chain and Cloud Computing

**TOTAL: 60 Hours**

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Apply data preprocessing and visualization techniques required for implementing ML algorithms
2. Make use of Data sets in implementing machine learning algorithms
3. Implement the machine learning concepts and algorithms

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2	2		2									2
CO2	2	3	3		3									3
CO3	2	3	3		3									3

**LIST OF PROGRAMS**

1. Write a program to perform simple computations on the given dataset using numpy and pandas.

Sample Exercises:

Write a Python program to load the data from a given csv file into a dataframe and print the shape of the data, type of the data, first 3 rows, number of rows-columns, feature names and missing values.

Write a Python program to view basic statistical details like percentile, mean, std etc. of given dataset.

Write a Python program to access first four cells from a given Dataframe using the index and column labels.

2. Write a program to visualize the data and features in the given dataset using matplotlib and pyplot.

Sample Exercise:

Write a Python program to create a plot to get a general Statistics of the given dataset. Draw box plot, joinplot, scatterplot, pairplot, kernel density estimate plot(using seaborn) to explore the frequency of data in the dataset.

3. Write a program to implement simple linear regression to minimize the cost function.

Sample Exercise:

In AB Company, there is a salary distribution table based on Year of experience. You are a HR officer and you got a candidate with 5 years of experience. Plot the given data. and find the best salary to offer the candidate.

4. Write a program to implement multivariate linear regression.

Sample Exercise:

Consider a housing price data set with 2 variables (size of the house in square feet and number of bedrooms) and a target (price of the house). Write a program to normalize the features and predict the price of a new house (given the size and the number of bedrooms) by minimizing the cost function.

5. Build a logistic regression model to classify the data in the given dataset.  
Sample Exercise:  
Suppose that you are the administrator of a university department and you want to determine each applicant's chance of admission based on their results on two exams. You have historical data from previous applicants that you can use as a training set. For each training example, you have the applicant's scores on two exams and the admissions decision. Write a program to build a classification model (logistic regression) that estimates the probability of admission based on the exam scores.
6. Write a program to fit a logistic regression model with regularization to avoid overfitting of the given dataset.
7. Write a program to implement a Neural Network model to classify the data in the given dataset.
8. Implement a ML model for the given datasets using Support Vector Machines(SVM).  
Sample Exercise: Classify emails as spam or not spam using SVM classifier.
9. Load the given dataset, split it into train and test sets, then estimate the mean squared error (MSE) for a linear regression as well as the bias and variance for the model error over 100 bootstrap samples.
10. Apply K means algorithm to cluster a set of data stored in a .CSV file and plot the clusters.

**TOTAL: 30 Hours**

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Define the essential fundamentals of information security
2. Apply the Laws and code of Ethics in Information Security
3. Identify the vulnerability of an information system and establish a plan for risk management
4. Describe the access control mechanism used for user authentication and authorization
5. Develop the different security infrastructure

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2					1				
CO2	3	3	3		2					1				
CO3	3	1	1	1						1				
CO4	3	3	3								1	1		
CO5	3	3	3							1	1	1		

**UNIT I INTRODUCTION****9**

An overview of Information Security, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

**UNIT II SECURITY INVESTIGATION****9**

Need for Security - Business Needs, Threats, and Attacks. Legal, Ethical and Professional Issues - Law and Ethics in Information Security, International Laws and Legal Bodies, Ethics and Information Security.

**UNIT III RISK MANAGEMENT AND SECURITY POLICY AND STANDARDS 9**

Risk Management: Risk Identification, Risk Assessment, and Risk Control Strategies. Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model.

**UNIT IV SECURITY TECHNOLOGY****9**

Access Control, Firewalls, Protecting Remote Connections, Intrusion Detection and Prevention Systems, Scanning and Analysis Tools.

**UNIT V IMPLEMENTING INFORMATION SECURITY AND SECURITY MAINTENANCE****9**

Information Security Project Management, Technical and non-technical Aspects of Implementation, Security Management Maintenance Models, Digital Forensics.

**TOTAL: 45 HOURS**

## **TEXT BOOK**

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003.

## **REFERENCES**

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3, CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.
4. Charles P.Pfleeger, Shari Lawrence Pfleeger, "Security in computing", 4<sup>th</sup> Edition, Pearson Publication, 2012.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Implement the concepts of planning, leadership to achieve quality.
2. Apply the principles of Total Quality Management in the projects.
3. Apply the statistical process to measure the quality.
4. Apply various tools available in Total Quality Management to improve FMEA.
5. Select appropriate software quality model to design better quality systems.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2					1				
CO2	3	3	3		2					1				
CO3	3	1	1	1						1				
CO4	3	3	3								1	1		
CO5	3	3	3							1	1	1		

**UNIT I INTRODUCTION****9**

Definition of Quality-Basic Approach –TQM frame work – Awareness – Defining quality – Dimensions of Quality - Obstacles – Benefits of TQM - Leadership – Characteristics – Concepts - Deming Philosophy - Role of TQM Leaders - Strategic Planning,.

**UNIT II TQM PRINCIPLES****9**

Customer satisfaction – Customer Perception of Quality, Feedback - Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Unions and Employee Involvement- Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen.

**UNIT III STATISTICAL PROCESS CONTROL****9**

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Concept of six sigma.

**UNIT IV TQM TOOLS****9**

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – QFD Team – Benefits of QFD – Voice of the Customer - QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs.

**UNIT V QUALITY MANAGEMENT SYSTEMS 9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO IEC 9126 Model.

**TOTAL: 45 HOURS**

## **TEXT BOOK**

1. Dale H.Besterfield, et al., “Total Quality Management”, Pearson Education, Inc. 2019.

## **REFERENCES**

1. Oakland.J.S. “Total Quality Management”, Butterworth – Heinemann Ltd., Oxford.2005
2. Narayana V. and Sreenivasan, N.S. “Quality Management – Concepts and Tasks”, New Age International 2003.

**COURSE OUTCOMES**

At the end of the course the students will be able to:

1. Select the factors and plans required for software development life cycle.
2. Implement the appropriate testing policies and tools used for software quality.
3. Develop the templates and checklists for software document process.
4. Implement the metrics to assess the cost of software quality.
5. Support the necessary SQA standards and responsibilities towards organization management.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		2	2		1	2				3			
CO2	2		2	2		1	1				3			3
CO3	2		2	2		1	1			2	3		2	
CO4	3		2	2		1	1			3	3			
CO5	2		2	2		1	1				3			

**UNIT I INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE 9**

Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall's quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans.

**UNIT II SQA COMPONENTS AND PROJECT LIFE CYCLE 9**

Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management.

**UNIT III SOFTWARE QUALITY INFRASTRUCTURE 9**

Procedures and work instructions – Templates – Checklists – 3S development – Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval.

**UNIT IV SOFTWARE QUALITY MANAGEMENT & METRICS 9**

Project process control – Computerized tools – Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model.

**UNIT V : STANDARDS, CERTIFICATIONS & ASSESSMENTS 9**

Quality management standards – ISO 9001 standards – capability Maturity Models – CMM and CMMI assessment methodologies – Bootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities

**TOTAL: 45 PERIODS**



**TEXT BOOK:**

1. Daniel Galin, "Software Quality Assurance", Pearson Publication, 2009.

**REFERENCES:**

1. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Publication, 2016.
2. Mordechai Ben-Menachem "Software Quality: Producing Practical Consistent Software", International Thompson Computer Press, 2014.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Explain the Importance of intellectual property rights
2. File Trademark application under the international Madrid Protocol.
3. Independently file, prosecute and obtain Patents and Copyrights in India.
4. Claim a breach of contract if the person who let the trade secret out had nondisclosure in the contract.
5. Analyse ethical and professional issues which arise in the intellectual property law context.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1						1				
CO2	3	3	3								1	1		
CO3	3	3	3							1	2	1		
CO4	3	2									1			
CO5	3	3								1				

**UNIT I INTRODUCTION****9**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT II TRADE MARKS****9**

Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

**UNIT III LAW OF COPY RIGHTS AND PATENTS****9**

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

**UNIT IV TRADE SECRETS****9**

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

**UNIT V NEW DEVELOPMENTS****9**

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

**TOTAL: 45 HOURS**

### **TEXT BOOKS**

1. Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets", Delmar Cengage Learning, 4<sup>th</sup> Edition, 2012.
2. Prabuddha Ganguli, "Intellectual Property Rights: Unleashing the Knowledge Economy", Tata Mc Graw Hill Education, 1<sup>st</sup> Edition, 2008.

### **REFERENCES**

1. D Llewelyn & T Aplin W Cornish, "Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights", Sweet and Maxwell, 1<sup>st</sup> Edition, 2016.
2. Ananth Padmanabhan, "Intellectual Property Rights-Infringement And Remedies", Lexis Nexis, 1<sup>st</sup> Edition, 2012.
3. Ramakrishna B and Anil Kumar H.S, "Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers", Notion Press, 1<sup>st</sup> Edition, 2017.

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Explain RPA and able to demonstrate recorder studio.
2. Develop bots using sequence and flowchart. Process data tables with excel and files
3. Create bots that can automate user events and .read text with OCR.
4. Apply exception handling and debugging techniques in developing bots.
5. Develop and deploy bot using uipath and control using orchestrator.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2	3		3							1		2
CO2	1	2	3		3							1		2
CO3		2	3	2	3							1		2
CO4		2	3	2	3							1		2
CO5		2	3	2	3							1		2

**UNIT I INTRODUCTION****9**

What is Robotic Process Automation?, Scope and techniques of automation - Robotic process automation - About UiPath - The future of automation

Record and Play - UiPath stack - Downloading and installing UiPath Studio - Learning UiPath Studio - Task recorder - Step-by-step examples using the recorder

**UNIT II SEQUENCE, FLOWCHART, AND CONTROL FLOW****9**

Sequencing the workflow - Activities - Control flow, various types of loops, and decision making Step-by-step example using Sequence and Flowchart - Step-by-step example using Sequence and Control flow

Data Manipulation: Variables and scope – Collections - Arguments – Purpose and use - Data table usage with examples - Clipboard management - File operation with step-by-step example CSV/Excel to data table and vice versa (with a step-by-step example)

**UNIT III TAKING CONTROL OF THE CONTROLS****9**

Finding and attaching windows - Finding the control - Techniques for waiting for a control - Act on controls – mouse and keyboard activities - Working with UiExplorer - Handling events - Revisit recorder - Screen Scraping - When to use OCR - Types of OCR available - How to use OCR - Avoiding typical failure points

**UNIT IV EXCEPTION HANDLING, DEBUGGING, AND LOGGING****9**

Exception handling - Common exceptions and ways to handle them - Logging and taking screenshots - Debugging techniques - Collecting crash dumps - Error reporting

**UNIT V DEPLOYING AND MAINTAINING THE BOT****9**

Publishing using publish utility - Overview of Orchestration Server - Using Orchestration Server to control bots - Using Orchestration Server to deploy bots - License management - Publishing and managing updates

**Total: 45 hours**

## **TEXT BOOK**

1. Alok Mani Tripathi, “Learning Robotic Process Automation”, Packt Publishing Limited, 2018.

## **REFERENCES**

1. Gerardus Blokdyk, “Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant”, 5starcooks 2018.
2. Nandan Mullakara, “Robotic Process Automation Projects”, Packt Publishing Limited, 2020.

Semester –VI	U19GE601-SOFT SKILLS AND APTITUDE – IV (Common to All except Civil)	L	T	P	C	Marks
		0	0	2	1	100
<b>Course Outcomes</b>						
<b>At the end of the course the student will be able to:</b>						
1. Demonstrate capabilities in job-oriented company selection processes using the hands-on approach						
2. Solve problems of any given level of complexity in all areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests						
3. Demonstrate advanced-level verbal aptitude skills in English and score 70-75% marks in company-specific internal tests						
<b>1. Soft Skills</b>	<b>Demonstrating Soft -Skills capabilities with reference to the following topics:</b>					
	a. Mock group discussions					
	b. Mock interviews					
	c. Mock stress interviews					
<b>2. Quantitative Aptitude and Logical Reasoning</b>	<b>Solving problems with reference to the following topics:</b>					
	a. Functions and Polynomials					
	b. Clocks and Calendars					
	c. Data Sufficiency: Introductions, 3 Options Data Sufficiency, 4 Options Data Sufficiency and 5 Options Data Sufficiency.					
	d. Logical reasoning: Cubes, Non Verbal reasoning and Symbol based Reasoning.					
	e. Decision making table and Flowchart					
	Campus recruitment papers: Solving of previous year questions paper of all major recruiters					
	f. Miscellaneous: Cognitive gaming Puzzles-(Picture, Word and Number based), IQ Puzzles, Calculation Techniques and Time Management Strategies.					
	g. Trigonometry.- Concepts					
<b>3. Verbal Aptitude</b>	<b>Demonstrating English language skills with reference to the following topics:</b>					
	a. Writing captions for given pictures					
	b. Reading comprehension					
	c. Critical reasoning					
	d. Theme detection					
	e. Jumbled sentences					
	f. Writing a story on given pictures					
	g. Company specific verbal questions					

*S. Anita*  
06/01/2023

Dr.S.Anita

Head/Training

Department of Placement Training  
Sona College of Technology,  
Salem-636 005.

**PREAMBLE**

The students opting for this course will learn to code in Java and improve the programming and problem-solving skills. Through this course, the students will acquire appropriate skills to design algorithms as well as develop and debug programs. We are excited to offer a unique course structure, designed to support learners of different engineering departments and to fulfill their dreams of pursuing a career in an IT industry.

This course aims to satisfy the curiosity of the learners who wants to know how a ticket is booked in railways, or how an electricity consumption bill is generated. After the completion of the course, learners will be able to code real time problems in JAVA programming language.

**COURSE OUTCOMES**

1. Apply Object Oriented Programming concepts and basic features of Java to write programs for solving problems
2. Write java programs with objects and classes of java
3. Develop real time systems using java inheritance concepts
4. Build java applications using exceptions and I/O
5. Solve real time problems using java packages and connect java applications with relational databases using JDBC for storing and retrieving sensitive data

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3	2	3									3
CO2		3	3	2	3									3
CO3		3	3	2	3									3
CO4		3	3	2	3									3
CO5		3	3	2	3									3

**UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9**

Introduction to Object Orientation- Need for Object Oriented Paradigm- Characteristics of Object Oriented Programming - The History and Evolution of Java – An Overview of Java – Java Virtual Machine - Data Types –Variables - Arrays – Operators- Control Statements - Command Line Arguments

**UNIT II OBJECTS AND CLASSES 9**

Introducing Classes - Class fundamentals - Declaring Objects – Introducing Methods – Constructors- Parameterized Constructor – Copy Constructor – this keyword- Method Overloading – Constructor Overloading –Access control – Static keyword– Nested and Inner classes – Local Inner class

**UNIT III INHERITANCE AND INTERFACE****9**

Inheritance basics – Types of Inheritance – Super keyword – Method Overriding – Abstract Classes - final keyword- Interfaces- Default Interface Methods-Use static methods in an interface- Nested interfaces

**UNIT IV EXCEPTION HANDLING AND I/O****9**

Exception Handling Fundamentals – Exception Types – Uncaught Exception – Using try and catch – Multiple catch clauses – Nested try statements – throw – throws – finally - finalize method - I/O FileInputStream – I/O FileOutputStream

**UNIT V PACKAGES AND JDBC CONNECTIVITY****9**

Working with predefined and user defined packages - Access Protection – Importing Packages - Basics of JDBC Connectivity – SQL Queries – create – insert – select - delete – update.

**TOTAL: 45 HOURS****TEXT BOOK**

1. Herbert Schildt, “Java™: The Complete Reference”, Ninth Edition, Tata McGraw Hill, 2014.

**REFERENCES**

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Ninth Edition, Prentice Hall, 2013.
2. K. Arnold, D. Holmes and J. Gosling, “The JAVA programming language”, Fourth Edition, Addison Wesley Professional, 2005.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, Third Edition, Addison Wesley, 2000.
4. C. Thomas Wu, “An introduction to Object-oriented programming with Java”, Fifth Edition, Tata McGraw-Hill Publishing company Ltd., 2009.



Sona College of Technology, Salem  
(An Autonomous Institution)  
Courses of Study for B.E/B.Tech Semester VII under 2019 (CBCS)  
Branch: Information Technology

IT  
VII

S.No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19GE701 /	Professional Ethics and Human Values /	3 /	0	0	3 /	45 /
2	U19IT701 /	Cryptography and Network Security /	3 /	0	0	3 /	45 /
3	U19IT907 /	<b>Professional Elective</b> – Wireless Technologies /	3 /	0	0	3 /	45 /
	U19IT918 /	<b>Professional Elective</b> – Intellectual Property Rights /					
4	U19IT905 /	<b>Professional Elective</b> – Information Security /	3 /	0	0	3 /	45 /
	U19IT912 /	<b>Professional Elective</b> – Total Quality Management /					
5	U19IT929 /	<b>Professional Elective</b> – Human Computer Interaction /	3 /	0	0	3 /	45 /
6	U19BM1001 /	<b>Open Elective</b> – Hospital Management /	3 /	0	0	3 /	45 /
	U19BM1002 /	Basic Life Support /					
	U19CE1001 /	Building Services and Safety Regulations /					
	U19EC1003 /	Sensors and Smart Structures Technologies /					
	U19EC1006 /	Mobile Technology and its Applications /					
	U19EC1007 /	CMOS VLSI Design /					
	U19EE1002 /	Energy Conservation and Management /					
	U19EE1003 /	Innovation, IPR and Entrepreneurship Development /					
	U19EE1004 /	Renewable Energy Systems /					
	U19FT1001 /	Fundamentals of Fashion Design /					
	U19ME1002 /	Industrial Safety /					
U19ME1004 /	Renewable Energy Sources /						
<b>Practical</b>							
7	U19IT702 /	Cloud computing Laboratory /	0	0	4 /	2 /	60
8	U19IT703 /	Mini Project /	0	0	4 /	2 /	60
<b>Total</b>						<b>22 /</b>	

Approved By

*J. Akilandeswari*  
Chairperson, Information Technology BoS  
Dr.J.Akilandeswari

*R. Shivakumar*  
Member Secretary, Academic Council  
Dr.R.Shivakumar

*S.R.R. Senthil Kumar*  
Chairperson, Academic Council & Principal  
Dr.S.R.R.Senthil Kumar

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**COURSE OUTCOMES:**

At the end of the course, the student will be able to

1. Identify the core values that shape the ethical behavior of an engineer.
2. Analyze and practice engineering ethics in their profession.
3. Apply codes of ethics in the context of social experimentation.
4. Explore various safety issues and ethical responsibilities of an engineer.
5. Adopt ethical practices pertaining to global issues.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						3		3	2		1			
CO2			2	2		3		3	2		1			
CO3			2	2		3		3	2		3			
CO4			3	2		3		3	2		1			
CO5			3			3	3	3	2		1			

**UNIT-I HUMAN VALUES**

9

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Introduction to Yoga and meditation for professional excellence and stress management.

**UNIT -II ENGINEERING ETHICS**

9

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Profession and Professionalism – Professional Ideals and Virtues – Theories of Right action- Self Interest- Customs and Religion -Uses of Ethical Theories.

**UNIT-III ENGINEERING AS SOCIAL EXPERIMENTATION**

9

Engineering as Experimentation – Contrasts with standard experiments- Engineers as Responsible Experimenters – Importance and limitations of Codes of Ethics - Industrial Standards - A Balanced Outlook on Law – Industrial Standards- Case Study: Space shuttle challenger disaster.

**UNIT-IV SAFETY, RESPONSIBILITIES AND RIGHTS**

9

Safety and Risk – Types of risk - Assessment of Safety and Risk – Risk Benefit analysis- Reducing Risk – Case Studies - Chernobyl and Bhopal plant disaster.

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Collegiality and Loyalty –Respect for Authority- Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Importance and consequences of whistle blowing - Professional Rights – Employee Rights – Intellectual Property Rights (IPR) and its components– Discrimination.

#### **UNIT-V GLOBAL ISSUES**

9

Multinational Corporations – Environmental Ethics – Computer Ethics and Internet-Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Participation in professional societies- –Code of Conduct – Corporate Social Responsibility.

**TOTAL: 45 HOURS**

#### **TEXT BOOKS**

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, Indian Edition, Tenth reprint, 2017.
2. Professional Ethics and Human values- Sonaversity, Edition 2018.

#### **REFERENCES**

1. Charles D Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, 2012.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2016.
3. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2000.
4. R.Subramanian, “Professional Ethics “,Oxford University Press , Second Edition, 2017.

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**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Apply classical encryption algorithms, Data Encryption Standard and Advanced Encryption standard to encrypt a data.
2. Apply appropriate public key cryptographic algorithms RSA Encryption, Diffie-Hellman Key Exchange and Elliptic Curve Cryptography to ensure the confidentiality with the concept of number theory.
3. Implement Hash Functions and Message Authentication code to ensure integrity of data with the authentication requirements.
4. Describe the concepts of Email security, IP security and Web Security.
5. Analyze the vulnerabilities in any network and able to provide a security solution with the concepts of firewalls, intrusion detection techniques, and virus countermeasures.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	3						3	3	2	
CO2	3	3		3	3						3	3	2	
CO3	3	3		3	3						3	3	1	1
CO4	3	3		3	3						3	3	1	1
CO5	3	3		3	3						3	3	1	1

**UNIT I SYMMETRIC CIPHERS****9**

OSI Security Architecture: Security Attacks, Security Services, and Security Mechanisms - Classical Encryption techniques: Substitution Techniques, Transposition Techniques, Steganography – Block Cipher Principles – Data Encryption Standard (DES) – DES algorithm, Avalanche effect, Strength of DES – Advanced Encryption Standard (AES): AES Structure, AES Transformation Functions, AES Key Expansion – Block Cipher Modes of Operation.


**UNIT II ASYMMETRIC CIPHERS****9**

Basic concepts in Number Theory–Euclidean algorithm, Modular arithmetic - Prime Numbers, Fermat's and Euler's Theorem, Discrete Logarithms – Principle of Public-Key cryptosystem- RSA algorithm – Diffie-Hellman Key Exchange – Elliptic Curve Arithmetic – Elliptic Curve Cryptography.

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### **UNIT III AUTHENTICATION AND DATA INTEGRITY ALGORITHMS 9**

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two simple hash Functions, Requirements and Security, SHA-512 – Message Authentication Code: Message Authentication Requirements, Message Authentication Functions, Requirements for MACs, Security of MACs, HMAC – Digital Signature: Properties and Requirements, Digital Signature Standard (DSS).

### **UNIT IV KEY MANAGEMENT AND INTERNET SECURITY 9**

Symmetric Key Distribution using Symmetric Encryption and Asymmetric Encryption – Distribution of Public keys – Public-Key Infrastructure – Transport-Level Security: SSL Architecture, – Electronic Mail Security : Pretty Good Privacy (PGP) – IP Security : IP Security overview, Encapsulating Security Payload (ESP).

### **UNIT V APPLICATIONS OF CRYPTOGRAPHY IN NETWORKS 9**

Intrusion Techniques- Statistical Anomaly Detection-Rule-Based Intrusion Detection - Password Management – Types of Malicious Software- Nature of Viruses- Virus Classification - Virus Countermeasures- Distributed Denial of Service Attacks- DDoS Attack Description, Constructing the Attack Network, DDoS Countermeasures – Firewall-Need for Firewalls, Firewall Characteristics-,Types of Firewalls.

**TOTAL: 45 HOURS**

#### **TEXT BOOK**

1. William Stallings, “Cryptography and Network Security – Principles and Practice”, Pearson Education, Seventh Edition, 2017.

#### **REFERENCES**

1. Douglas Robert Stinson, “Cryptography: Theory and Practice”, Chapman & Hall ,CRC, 2019.
2. Lawrie Brown , “Computer Security” , Principles and Practice , Fourth Edition , Pearson, 2019
3. Charlie Kaufman , Radia Perlman , Mike Speciner , “Network Security: Private Communication in a Public World”, Prentice Hall ,2016
4. Forouzan, “ Cryptography And Network Security” 3rd Edition , McGraw Hill Education, 2015
5. Atul Kahate, “Cryptography and Network Security”, Tata McGraw-Hill, Second Edition, 2008.
6. Alfred J. Menezes, “Handbook of Applied Cryptography”, CRC Press, 1997.
7. Bragg, “Network Security: The Complete Reference”, Tata McGraw-Hill Education, 2004.

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**COURSE OUTCOMES**

At the end of the course, the students will be able to

1. Run virtual machines of different configuration, install programs in virtual machines and run the programs
2. Install cloud platforms and write applications
3. Explore different cloud services and identify their applications

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1							1				
CO2	3	3	3		2					2	2		1	
CO3	3	3	3	3	3					1	2			2

**LIST OF EXPERIMENTS:**

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at a particular time. Use VMware workstation to do the configuration.
2. Install a C compiler in the virtual machine and execute a sample program. Use VMware workstation for execution.
3. Use VMware workstation to show the virtual machine migration based on the certain condition from one node to the other.
4. Install Google App Engine. Create hello world app and other simple web applications using python/java. Use GAE launcher to launch the web applications.
5. Install and Configure Hadoop.
6. Use Apache Hadoop to write a program to use the API's of Hadoop to interact with it.
7. Use Apache Hadoop write a word count program to demonstrate the use of Map and Reduce tasks.
8. Installation of Manjarasoft Aneka.
9. Case study on AWS.
10. Case study on Google Cloud.
11. Find a procedure to launch virtual machine using TryStack.

**TOTAL: 60 HOURS**

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**COURSE OUTCOMES:**

At the end of the course, the students will be able to

1. Apply the relevant knowledge and skills where are acquired within the technical area to a given project.
2. Design and Develop a software system capturing the user and system requirements.
3. Demonstrate leadership, effective communication, ethical sense and team work.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3	2	2	3	2				3	3	
CO2	3	3	3	1	3	3	1	2			2	3		3
CO3								3	3	3	3	3		2

**EVALUATION METHOD: HACKATHON MODEL****THE RULES OF THE HACKATHON**

1. There is a maximum team size of 3 people.
2. Teams can work on project listed that has already been done.
3. Teams can use libraries, frameworks, or open-source code in their projects.
4. Adding new features to existing projects is allowed. Judges will only consider new functionality introduced or new features added during the hackathon.
5. Any plagiarism in projects will not be entertained.

**JUDGING CRITERIA**

Teams will be judged on these four criteria. Judges will weigh the criteria according to their discretion. During judging, participants should try to describe what they did for each criterion in their project.

- **Technology:** How technically impressive was the project? Was the technical problem the team tackled difficult? Did it use a particularly clever technique or did it use many different components? Did the technology involved make you go "Wow"?

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- **Design:** Did the team put thought into the user experience? How well designed is the interface? For a website, this might be about how beautiful the CSS or graphics are. For a hardware project, it might be more about how good the human-computer interaction is (e.g. is it easy to use or does it use a cool interface?).
- **Completion:** Does the project work? Did the team achieve everything they wanted?
- **Learning:** Did the team stretch themselves? Did they try to learn something new? What kind of project?

**TOTAL: 60 HOURS**

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**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Explain the. Importance of intellectual property rights
2. File Trademark application under the international Madrid Protocol.
3. Independently file, prosecute and obtain Patents and Copyrights in India.
4. Claim a breach of contract if the person who let the trade secret out had nondisclosure in the contract.
5. Analyse ethical and professional issues which arise in the intellectual property law context.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1						1				
CO2	3	3	3								1	1		
CO3	3	3	3							1	2	1		
CO4	3	2									1			
CO5	3	3								1				

**UNIT I INTRODUCTION**

9

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT II TRADE MARKS**

9

Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

**UNIT III LAW OF COPY RIGHTS AND PATENTS**

9

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

**UNIT IV TRADE SECRETS**

9

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

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New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

**TOTAL: 45 HOURS**

**TEXT BOOKS**

1. Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets", Delmar Cengage Learning, 4<sup>th</sup> Edition, 2012.
2. Prabuddha Ganguli, "Intellectual Property Rights: Unleashing the Knowledge Economy", Tata Mc Graw Hill Education, 1<sup>st</sup> Edition, 2008.

**REFERENCES**

1. D Llewelyn & T Aplin W Cornish, "Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights", Sweet and Maxwell, 1<sup>st</sup> Edition, 2016.
2. Ananth Padmanabhan, "Intellectual Property Rights-Infringement And Remedies", Lexis Nexis, 1<sup>st</sup> Edition, 2012.
3. Ramakrishna B and Anil Kumar H.S, "Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers", Notion Press, 1<sup>st</sup> Edition, 2017.

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**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Define the essential fundamentals of information security
2. Apply the Laws and code of Ethics in Information Security
3. Identify the vulnerability of an information system and establish a plan for risk management
4. Describe the access control mechanism used for user authentication and authorization
5. Develop the different security infrastructure

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2					1				
CO2	3	3	3		2					1				
CO3	3	1	1	1						1				
CO4	3	3	3								1	1		
CO5	3	3	3							1	1	1		

**UNIT I INTRODUCTION****9**

An overview of Information Security, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

**UNIT II SECURITY INVESTIGATION****9**

Need for Security - Business Needs, Threats, and Attacks. Legal, Ethical and Professional Issues - Law and Ethics in Information Security, International Laws and Legal Bodies, Ethics and Information Security.

**UNIT III RISK MANAGEMENT AND SECURITY POLICY AND****STANDARDS****9**

Risk Management: Risk Identification, Risk Assessment, and Risk Control Strategies. Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model.

**UNIT IV SECURITY TECHNOLOGY****9**

Access Control, Firewalls, Protecting Remote Connections, Intrusion Detection and Prevention Systems, Scanning and Analysis Tools.

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## UNIT V IMPLEMENTING INFORMATION SECURITY AND SECURITY MAINTENANCE

9

Information Security Project Management, Technical and non-technical Aspects of Implementation, Security Management Maintenance Models, Digital Forensics.

**TOTAL: 45 HOURS**

### TEXT BOOK

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003.

### REFERENCES

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3, CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.
4. Charles P.Pfleeger, Shari Lawrence Pfleeger, "Security in computing", 4<sup>th</sup> Edition, Pearson Publication, 2012.

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**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Implement the concepts of planning, leadership to achieve quality.
2. Apply the principles of Total Quality Management in the projects.
3. Apply the statistical process to measure the quality.
4. Apply various tools available in Total Quality Management to improve FMEA.
5. Select appropriate software quality model to design better quality systems.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2					1				
CO2	3	3	3		2					1				
CO3	3	1	1	1						1				
CO4	3	3	3								1	1		
CO5	3	3	3							1	1	1		

**UNIT I INTRODUCTION**

9

Definition of Quality-Basic Approach –TQM frame work – Awareness – Defining quality – Dimensions of Quality - Obstacles – Benefits of TQM - Leadership – Characteristics – Concepts - Deming Philosophy - Role of TQM Leaders - Strategic Planning..

**UNIT II TQM PRINCIPLES**

9

Customer satisfaction – Customer Perception of Quality, Feedback - Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Unions and Employee Involvement- Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen.

**UNIT III STATISTICAL PROCESS CONTROL**

9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Concept of six sigma.

**UNIT IV TQM TOOLS**

9

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – QFD Team – Benefits of QFD – Voice of the Customer - QFD

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Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs.

**UNIT V QUALITY MANAGEMENT SYSTEMS**

**9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO IEC 9126 Model.

**TOTAL: 45 HOURS**

**TEXT BOOK**

1. Dale H. Besterfield, et al., “Total Quality Management”, Pearson Education, Inc. 2019.

**REFERENCES**

1. Oakland J.S. “Total Quality Management”, Butterworth – Heinemann Ltd., Oxford. 2005
2. Narayana V. and Sreenivasan, N.S. “Quality Management – Concepts and Tasks”, New Age International 2003.

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**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Define the various components of GSM and describe the architecture of GSM
2. Summarize the principles and applications of GPRS
3. Describe the concepts of UMTS and Compare the various packet access techniques.
4. Discuss the radio network interfaces and interconnection between the networks
5. Analyze the measures to increase the performance of IEEE 802.16 and WiMAX networks

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	3	2	1								1	1		
CO3	3	1	1	1						1	1	1		
CO4	3	3	3							1	1	1		
CO5	3	3	3							1	1	1		

**UNIT-I GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS (GSM) 9**

Circuit-Switched Data Transmission- Standards- Transmission Speeds- GSM Subsystems- The GSM Subsystems- Base Station Subsystem (BSS) and Voice Processing- Mobility Management and Call Control- Mobile Device and SIM card

**UNIT-II GENERAL PACKET RADIO SERVICE (GPRS) AND EDGE 9**

Packet-Switched Data Transmission over GPRS- e GPRS Air Interface -GPRS State Model- GPRS Network Element- GPRS Radio Resource Management - GPRS Interfaces - GPRS Mobility Management and Session Management (GMM/SM)- The Multimedia Messaging Service (MMS) over GPRS- Web Browsing via GPRS.

**UNIT-III UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEMS (UMTS) AND HIGH-SPEED PACKET ACCESS (HSPA) 9**

Overview, History and Future- Concepts of UMTS- Code Division Multiple Access (CDMA)- UMTS Channel Structure on the Air Interface- The UMTS Terrestrial Radio Access Network (UTRAN)- Core Network Mobility Management -Radio Network Mobility Management- High-Speed Downlink Packet Access (HSDPA) and HSPA+- High-Speed Uplink Packet Access (HSUPA).

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**UNIT-IV LONG TERM EVOLUTION (LTE)**

9

Introduction -Network Architecture and Interfaces FDD Air Interface and Radio Network- Cell Search- Default and Dedicated Bearers- Interconnection with UMTS and GSM- Voice and SMS over LTE.

**UNIT-V IEEE 802.16 AND WIMAX**

9

Evolution - WiMAX PHYs for Point-to-Multipoint FDD or TDD Operation- Physical Layer Framing- Ensuring Quality of Service- MAC Management Functions- MAC Management of User Data- Mobile WiMAX: 802.16e.

**TOTAL: 45 HOURS****TEXT BOOK**

1. Martin Sauter "From GSM to LTE-Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband", 3<sup>rd</sup> Edition, Wiley publications, 2017.

**REFERENCES**

1. Kaveh Pahlavan, "Principles of wireless networks", Prentice-Hall of India, 2008.
2. Vijay K.Garg, "Wireless Network Evolution- 2G & 3G" Pearson, 2013.
3. Clint Smith,P.E, Dannel Collins, "3G Wireless Networks" 2nd edition, Tata McGraw-Hill, 2008.
4. Jochen H.Schiller, "Mobile Communications", 2/e, Pearson, 2014.
5. Sassan Ahmadi, "LTE-Advanced – A practical systems approach to understanding the 3GPP LTE Releases 10 and 11 radio access technologies", Elsevier, 2014.

PS  
10/17



**COURSE OUTCOMES**

At the end of the course, the student will be able to,

1. Identify the usability levels for interactive systems.
2. Analyse the development process involved in user interface.
3. Develop skills in handling virtual environments and its exploitation.
4. Explain the different languages available to communicate with computers.
5. Comprehend the diverse input methods available for interfacing.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1								1			
CO2	3	3	3								1	2		
CO3	3	3	3							2	1	1		
CO4	3	3									2			
CO5	3		3						2		1			

**UNIT I INTRODUCTION 9**

Usability of Interactive systems: Usability Goals and Measures – Usability Motivations – Universal Usability – Guidelines, Principles, and Theories: Guidelines – Principles – Theories.

**UNIT II MANAGING DESIGN PROCESS 9**

Managing Design Process: Introduction – Organizational Design to Support Usability – Four Pillars of Design – Development Methodologies – Ethnographic Observation – Participatory Design – Scenario Development-Evaluating Interface Design: Expert Reviews – Usability Testing and Laboratories – Survey Instruments – Acceptance Test – Evaluation During Active Use – Controlled Psychologically Oriented Experiments.

**UNIT III MANIPULATION AND VIRTUAL ENVIRONMENTS 9**

Introduction-Examples of Direct Manipulation Systems –Discussion of Direct Manipulation-3D Interfaces – Teleoperation – Virtual Augmented Reality – Menu Selection, Form Fill-in, and Dialog Boxes: Task-Related Menu organization –Single Menus – Combinations of Multiple Menus – Form Fill-in, Dialog Boxes, and Alternatives.

**UNIT IV COMMAND AND NATURAL LANGUAGES 9**

Command and Natural Languages: Command –Organization Functionality, Strategies, and Structure – Naming and Abbreviations – Natural Language in Computing.

10-07-2023

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**Dr. J. AKILANDESWARI**  
 PROFESSOR & HEAD  
 Department of Information Technology  
 SONA COLLEGE OF TECHNOLOGY  
 SALEM - 636 005

IT - VII Semester Regulations 2019

Introduction – Keyboards and Keypads – Pointing Devices – Speech and Auditory Interfaces – Small and Large Displays – Collaboration and Social Media Participation: Goals of Collaboration and Participation – Asynchronous Distributed Interfaces – Synchronous Distributed Interfaces – Face to Face Interfaces.

**TOTAL: 45 HOURS**

**TEXT BOOK**

1. Ben Shneiderman, Plaisant, Cohen, Jacobs, "Designing the User Interface", 5th Edition, Addison-Wesley, 2013.

**REFERENCES**

1. Barfield, Lon, "The User Interface: Concepts and Design", Addison –Wesley, 2004.
2. Wilbert O. Galiz, "The Essential guide to User Interface Design", Wiley Dreamtech, 2010.
3. Alan Cooper, "The Essentials of User Interface Design", Wiley India Pvt. Ltd, 2010.
4. Alan Dix et al, "Human - Computer Interaction ", Prentice Hall, 1993.

  
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O.E

BME  
VI

U19BM1001

HOSPITAL MANAGEMENT

L T P C  
3 0 0 3

**COURSE OUTCOMES:**

**At the end of the course, the students will be able to,**

- Describe the basics of Hospital Management.
- Illustrate the knowledge of Human resource management and marketing in hospitals.
- Apply various Quantitative methods in healthcare management.
- Amalgamate their knowledge in Hospital information system and supportive services.
- Explain the quality and safety aspects in Hospital.

<b>CO/PO, PSO Mapping</b>															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	<b>Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</b>														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO1	PSO2	PSO3
CO1	-	-	3	-	2	3	3	-	-	-	-	1	-	-	3
CO2	-	-	3	-	2	3	3	-	-	-	-	1	-	-	3
CO3	-	-	3	-		3	3	-	-	-	-	1	-	-	3
CO4	-	-	3	-	3	2	-	-	-	-	-	1	-	-	3
CO5	-	-	3	-	-	3	3	3	-	-	-	1	-	-	3

**UNIT I INTRODUCTION TO HOSPITAL ADMINISTRATION 9**

Distinction between Hospital and Industry, Challenges in Hospital Administration, Hospital Planning, Equipment Planning, Functional Planning, Current Issues in Hospital Management, Role of Manager, Leadership, Motivation, Organizational behaviour, Strategic planning, Ethics and Law, Fraud and abuse.

**UNIT II HUMAN RESOURCE MANAGEMENT AND MARKETING 9**

Principles of HRM, Functions of HRM, Profile of HRD Manager, Tools of HRD, Human Resource Inventory, Manpower Planning. Different Departments of Hospital, Recruitment, Selection, Training Guidelines, Methods of Training, Leadership grooming and Training, Promotion, Transfer.

**UNIT III QUANTITATIVE METHODS IN HEALTHCARE MANAGEMENT 9**

Introduction to quantitative decision-making methods in healthcare management, Forecasting, Decision making in healthcare facilities, Facility location, Facility layout, Reengineering, Staffing, Scheduling, Productivity, Resource allocation, Supply chain and inventory management, Quality Control, Project Management, Queuing models and capacity planning.

#### **UNIT IV HOSPITAL INFORMATION SYSTEM AND SUPPORTIVE SERVICES 9**

Clinical Information Systems, Administrative Information Systems, Support Service Technical Information Systems, Medical Records Department, Central Sterilization and Supply Department – Pharmacy, Food Services, Laundry Services, Telemedicine.

#### **UNIT V QUALITY AND SAFETY ASPECTS IN HOSPITAL MANAGEMENT 9**

Quality system, Elements, implementation of quality system, Documentation, Quality auditing, International Standards ISO 9000 – 9004. Features of ISO 9001, ISO 14000, Environment Management Systems. NABA, JCI, NABL. Security, Loss Prevention, Fire Safety, Alarm System, Safety Rules.

**TOTAL: 45 PERIODS**

#### **TEXT BOOKS:**

1. R.C. Goyal, Hospital Administration and Human Resource Management, PHI, 4th Edition, 2006.
2. G.D. Kundurs, Hospitals – Facilities Planning and Management, TMH, New Delhi, 5th Reprint, 2007.

#### **REFERENCE BOOKS:**

1. Sharon B. Buchbinder and Nancy H. Shanks, Introduction to Healthcare Management, Jones and Bartlett Learning, 2017
2. Blane, David, Brunner, Health and SOCIAL Organization: Towards a Health Policy for the 21st Century, Eric Calrendon Press, 2002.
3. Yasar A. Ozcan, Quantitative Methods in Healthcare management, Jossey Bass- John Wiley and Sons, 2009.

  
Chairperson

BOS-BME

**Dr. S. PRABAKAR, M.E., Ph.D.,**  
Professor and Head  
Department of Biomedical Engineering  
Sona College of Technology, Salem-5

**COURSE OUTCOMES:**

**At the end of the course, the students will be able to**

- Analyze Various BLS and First Aid Techniques
- Understand the Essentials of Anatomy and Physiology
- Analyze Various BLS techniques for adults.
- Analyze Various BLS techniques for children and infants
- Apply Respiratory techniques and AED in critical conditions

<b>CO/PO, PSO Mapping</b>															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	<b>Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</b>														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	1	1	1	-	-	1	-	-	-
CO2	3	-	-	-	-	1	2	1	-	-	-	1	1	-	-
CO3	3	-	-	-	-	1	1	1	1	-	-	1	-	-	-
CO4	3	-	-	-	-	3	2	1	-	-	-	1	-	-	1
CO5	3	-	-	-	-	2	1	1	1	-	-	1	1	-	1

**UNIT I INTRODUCTION TO BASIC LIFE SUPPORT**

9

General Concepts of Basic Life Support (BLS)-Chain of survival, BLS Algorithm, First Aid: Basic First Aid techniques- first aid kit, Law, Resuscitation, Top to Toe Assessment, Hygiene and Hand Washing.

**UNIT II ESSENTIALS OF ANATOMY AND PHYSIOLOGY OF HUMAN BODY**

9

Levels of Organization-Chemicals-Cells-Tissues-Organs-Organ Systems, Metabolism and Homeostasis, Terminology and General Plan of the Body-Case Studies.

**UNIT III ADULT BASIC LIFE SUPPORT**

9

BLS for adults: Adult BLS Algorithm, CPR, One Rescuer and Two Rescuer BLS for Adults- Adult Mouth-to-Mask Ventilation, Adult Bag-Mask Ventilation, Self-Assessment for Adult BLS

**UNIT IV PAEDIATRIC BASIC LIFE SUPPORT**

9

BLS for children: BLS Algorithm children, One Rescuer and Two Rescuer BLS for children, Child Ventilation. BLS for Infants: One Rescuer and Two Rescuer BLS for infants-Case Studies.

**UNIT V AUTOMATED EXTERNAL DEFIBRILLATOR AND FOREIGN BODY AIRWAY OBSTRUCTION**

9

AED for Adults, AED for Children and Infant, Self-Assessment for AED, FBAO- Respiration, Difficult Breathing, Drowning, Strangulation and Hanging, Chocking, Suffocation - Airway Management-Chest Discomforts-Case Studies.

**TOTAL PERIODS:45**

## REFERENCES:

1. Dr. Karl Disque, Basic Life Support Provider Handbook, Satori Continuum Publishing, USA, 2021.
2. INDIAN FIRST AID MANUAL – 7th Edition, St. John Ambulance Association (India) – Indian Red Cross Society National Headquarters, New Delhi, 2016.
3. Basic Life Support Training Manual, 1st Edition, Published by in Medical Development Division, Ministry of Health Malaysia, Malaysia in December 2017.
4. Valerie C. Scanlon, Tina Sanders, Essentials of Anatomy and Physiology, 5th Edition, F. A. Davis Company.

  
Chairperson  
BOS-BME

  
**Dr. S. PRABAKAR, M.E., Ph.D.,**  
Professor and Head  
Department of Biomedical Engineering  
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O.E

Civil  
VII

**PREAMBLE**  
**To**  
**Building Services and Safety Regulations**

- Building services engineers are responsible for the design, installation, operation and monitoring of the mechanical, electrical and public health systems required for the safe, comfortable and environmentally friendly operation of modern buildings.
- Building services engineers work closely with other construction professionals such as architects, structural engineers and quantity surveyors. They influence the architecture of a building and play a significant role on the sustainability and energy demand of a building.
- Within building services engineering, new roles are emerging, for example in the areas of renewable energy, sustainability, low carbon technologies and energy management.
- With buildings accounting for around 50% of all carbon emissions, building services engineers play a significant role in combating climate change.

COURSE CODE	COURSE NAME	L	T	P	C
U19CE1001	BUILDING SERVICES AND SAFETY REGULATIONS	3	0	0	3

**Course Objective (s): The Purpose of learning this course is to:**

1. Provide knowledge on the building electrification systems.
2. Impart the basic knowledge in the design of lighting systems in the buildings.
3. Provide the basic knowledge of providing air conditioning systems in the various types of buildings.
4. Aware the students about fire safety regulations and installation systems in the building.
5. Provide basic knowledge in the water supply and sewerage systems for the buildings.

**Course Outcome (s) (COs): At the end of this course, the students will be able to:**

- CO1 Acquire the basics knowledge in electrical and wiring systems for the buildings. (K1)
- CO2 Design the lighting system for the various buildings and disabled peoples. (K3)
- CO3 Know the basic provisions for air conditioning systems for various types of buildings. (K4)
- CO4 Plan to install the fire safety equipment system in the buildings by obeying the regulations. (K3)
- CO5 Explain the various plumbing fittings in the water supply and rainwater harvesting system for buildings. (K2)

**Knowledge Level:** K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

**CO – PO Mapping**

Cos	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS
CO1	3	1	3	1	1	1	3	1	1	-	-	2	1	2
CO2	3	2	3	1	2	1	3	-	1	-	-	2	1	2
CO3	3	2	3	1	2	1	3	-	1	-	-	2	1	2
CO4	1	2	3	2	2	2	3	3	2	-	-	2	2	2
CO5	1	3	3	2	2	2	3	1	2	-	-	2	2	2
CO (Avg)	2.2	2	3	1.4	1.8	1.4	3	1	1.4	-	-	2	1.4	2

**Correlation Level:** 1:Slight (Low)                      2:Moderate (Medium)                      3:Substantial (High)

**UNIT-I      ELECTRICAL SYSTEMS IN BUILDINGS      9 Hours**  
 Basics of electricity- Single / Three-phase supply- Protective devices in electrical installations- Earthing for safety- Types of earthing- ISI specifications- Types of wires, wiring systems, and their choice- Planning electrical wiring for building- Main and distribution boards- Transformers and switch-gears- Layout of substations.

**UNIT-II      PRINCIPLES OF ILLUMINATION & DESIGN      9 Hours**  
 Visual tasks- Factors affecting visual tasks- Modern theory of light and colour- Synthesis of light- Additive and subtractive synthesis of colour- Luminous flux- Candela- Solid angle illumination- Utilisation factor- Depreciation factor- MSCP- MHCP- Lams of illumination- Classification of lighting- Artificial light sources- Spectral energy distribution- Luminous efficiency- Colour temperature- Colour rendering. Design of modern lighting- Lighting for stores, offices, schools, hospitals, and house lighting. Elementary idea of special features required and minimum level of illumination required for

physically handicapped and elderly in building types.

UNIT-III	REFRIGERATION PRINCIPLES & APPLICATIONS	9 Hours
Thermodynamics- Heat- Temperature, measurement transfer- Change of state- Sensible heat- Latent heat of fusion, evaporation, sublimation- saturation temperature- Superheated vapour- Subcooled liquid- Pressure temperature relationship for liquids- Refrigerants- Vapour compression cycle- Compressors- Evaporators- Refrigerant control devices- Electric motors- Starters- Air handling units- Cooling towers- Window type and packaged air-conditioners- Chilled water plant- Fan coil systems- Water piping- Cooling load- Air conditioning systems for different types of buildings- Protection against fire to be caused by A.C. Systems		
UNIT-IV	FIRE SAFETY REGULATIONS AND INSTALLATION	9 Hours
Causes of fire in buildings- Safety regulations- NBC- Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes, and A.C. systems. Special features required for physically handicapped and elderly in building types- Heat and smoke detectors- Fire alarm system, snorkel ladder- Fire lighting pump and water storage- Dry and wet risers- Automatic sprinklers		
UNIT-V	WATER SUPPLY AND SEWERAGE SYSTEM FOR BUILDINGS	9 Hours
Plumbing fixtures and fixture fittings- Water-conserving fittings- Overflows- Strainers and connectors- Prohibited fixtures- Special fixtures- Installation of water closet- Urinals - Flushing devices- Floor drains- Shower stall- Bathtub- Bidets- Minimum plumbing facilities- Rainwater harvesting systems- Necessity- Construction- Different types		
		<b>TOTAL: 45 Hours</b>
TEXT BOOKS:		
1.	R. Udaykumar, "A text book on Building Services", Eswar Press, Chennai, ISBN13, 9788178740638. ISBN-10, 817874063X	
2.	David V. Chadderton , Building Services Engineering Taylor & Francis, 2000.	
REFERENCES:		
1.	Handbook for Building Engineers in Metric systems, NBC, New Delhi, 2011.	
2.	Philips Lighting in Architectural Design, McGraw-Hill, New York, Latest edition.	
3.	R.G.Hopkinson and J.D.Kay, "The Lighting of buildings", Faber and Faber, London, 1972.	
4.	William H.Severns and Julian R.Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 1988.	
5.	A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 2007.	

*P. J.*





O.E

ECE  
VII Sem

U19EC1003

SENSORS AND SMART STRUCTURES TECHNOLOGIES

3 0 0 3

**Course Outcomes**

At the end of the course, the student will be able to

- 1) Insight into the basic concept regarding smart materials and their use in structures.
- 2) Analyze the use of measuring techniques in smart materials and structures.
- 3) Identify the suitable sensors for smart materials.
- 4) Apply the techniques of actuators in smart structures.
- 5) Relate the data acquisition techniques, signal processing and control for smart structures.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	1	2	1						3	2	1
CO2	2	1	2	1	2	1	2					3	2	1
CO3	2	1	2	1	2	1						3	2	1
CO4	2	1	2	1	2	1	2					3	2	1
CO5	2	1	2	1	2	1						3	2	1

**Unit I INTRODUCTION TO SMART MATERIALS AND STRUCTURES**

9

Introduction to Smart Materials and Structures – Instrumented Structures Functions and Response –Sensing Systems – Smart Bridge – Self Diagnosis – Signal Processing Consideration for bridges – Actuation Systems and Effectors.

**Unit II MEASURING TECHNIQUES**

9

Strain Measuring Techniques using Electrical Strain Gauges, Types – Resistance – Capacitance – Inductance – Wheatstone Bridges – Pressure Transducers – Load Cells – Temperature Compensation – Strain Rosettes.

05/07/23

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05.07.2023

Regulations 2019

### Unit III SENSORS

9

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain Measurement – Inductively Read Transducers – The LVDT – Fiber Optic Techniques. Chemical and Bio-Chemical Sensing in Structural Assessment – Absorptive Chemical Sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed Measurement – Fire Sensor – Emergency Fire Alarm – Humidity Sensor – Accelerometers – Motion Sensors and Pressure Sensors

### Unit IV ACTUATORS

9

Actuator Techniques – Actuator and Actuator Materials – Piezoelectric and Electrostrictive Material – Magnetostrictive Material – Shape Memory Alloys – Electro Rheological Fluids– Electro Magnetic Actuation – Role of Actuators and Actuator Materials.

### Unit V SIGNAL PROCESSING AND CONTROL SYSTEMS

9

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors : Signal Processing – Control System – Linear and Non-Linear systems.

**TOTAL : 45 HOURS**

#### Text Book

- 1) A.K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpat rai and co pvt limited, 2015.
- 2) Brain Culshaw, "Smart Structure and Materials", Artech House, Borton. London, 1996.

#### References

- 1) L. S. Srinath, "Experimental Stress Analysis", Tata McGraw, 1998.
- 2) J. W. Dally & W. F. Riley, "Experimental Stress Analysis", Tata McGraw, 1998.
- 3) Srinivasan, A.V and Michael McFarland. D, "Smart Structures -Analysis and Design", Cambridge University Press, 2001

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**Salem - 636 005. Tamilnadu, India.**

**Course Outcomes**

At the end of the course, the student will be able to

- 1) Analyze the 1G and 2G Technologies.
- 2) Explain the 2.5G evolutions
- 3) Analyze the principles of 3G and UMTS
- 4) Analyze the evolutions of 4G.
- 5) Summarize the various wireless security applications and solve the mobile phone faults.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	3		1		1	1	3		
CO2	3	3	3	3	3	3		1		1	1	3		
CO3	3	3	3	3	3	3		1		1	1	3		
CO4	3	3	3	3	3	3		1		1	1	3		
CO5	3	3	3	3	3	3		1		1	1	3		

**Unit I 1G and 2G**

9

First Generation (1G): 1G Systems – General 1G System Architecture – Generic MTSSO Configuration – Generic Cell Site Configuration – Call Setup Scenarios – Handoff – Frequency Reuse – Spectrum Allocation – Channel Band Plan

Second generation (2G): Enhancements over 1G Systems – Integration with Existing 1G Systems – GSM - iDEN – CDPD

**Unit II 2.5G Generation**

9

Enhancements over 2G – Technology Platforms – General Packet Radio Service (GPRS) – Enhanced Data Rates for Global Evolution (EDGE) – High-Speed Circuit Switched Data (HSCSD) – CDMA2000 (1XRTT) – WAP-Migration Path from 2G to 2.5G to 3G..

05.07.2023

*Dr. R. S. Sabeenian*  
**Dr. R. S. SABEENIAN, M.E., MBA., Ph.D., FIETE,**  
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**SONA COLLEGE OF TECHNOLOGY,**  
**Salem - 636 005, Tamilnadu, India.**

Regulations 2019

**Unit III 3G Generation**

9

Introduction – Universal Mobile Telecommunications Service (UMTS), UMTS Basics, The UTRAN Architecture, Handover, UMTS Services – The UMTS Air Interface – Overview of the 3GPP Network Architecture – Overview CDMA2000 – Commonality Between WCDMA/CDMA2000/CDM

**Unit IV 4G and Beyond**

9

Introduction to LTE - Network architectures – EPC – E-UTRAN architecture – Mobility management – Resource management – Services – Channel – logical and transport channel mapping – downlink/uplink data transfer – MAC control element – PDU packet formats – scheduling services – random access procedure – Objectives of 5G-Architecture – Features and benefits.

**Unit V Wireless Security and Mobile Phone service**

9

Introduction – Fingerprint – Classification of major security attacks against RFID systems  
\* GSM Security – Barcode scanner technology features and applications – QR code – BAR code – OTP – AirDrop.  
Mobile phone Service: Parts in the mobile phones -Mobile phones assembling and disassembling –motherboard - Mobile Operating Systems - Fault finding - Advanced troubleshooting techniques.

**TOTAL : 45 HOURS**

**Text Book**

- 1) Clint Smith, P.E, Dannel Collins, “3G Wireless Networks” 2nd edition, Tata McGraw-Hill, 2008.
- 2) Vijay K.Garg, “Wireless Network Evolution- 2G & 3G” Pearson, 2013.

**References**

- 1) T.S Rapp port, “Wireless Communications” Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint, 2013.
- 2) JochenH.Schiller, “Mobile Communications”, 2/e, Pearson, 2014
- 3) SassanAhmadi, “LTE-Advanced – A practical systems approach to understanding the 3GPP LTE Releases 10 and 11 radio access technologies”, Elsevier, 2014

27/05/2023  
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Salem - 636 005, Tamilnadu, India.

**Course Outcomes**

After successful completion of this course, the students should be able to

- 1) Design HDL code for combinational circuits and sequential circuits
- 2) Analyze MOS transistor theory
- 3) Illustrate the fabrication processes of CMOS
- 4) Design combinational circuit design.
- 5) Architectural choices and performance tradeoffs involved in designing

**Pre-requisite**

Digital Electronics

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	3	1	3	3	1	1	2	1	3	3
CO2	1	2	2	2	2		2	3		1	2	1	3	3
CO3	2	2	3	3	2		2	2		2	1	1	3	3
CO4	2	2	2	3	2		2	3		2	2	1	3	3
CO5	1	2	3	3	2	1	3	2	1	2	1	2	3	3

**Unit I VERILOG HDL**

9

Overview of Digital Design with Verilog HDL – Hierarchical Modeling Concepts – Basic Concepts – Modules and Ports – Gate-Level Modeling – Dataflow Modeling – Behavioral Modeling – Test Benches

**Unit II MOS TRANSISTOR THEORY**

9

Introduction – MOS Transistors – CMOS Logic – Inverter – NAND gate – CMOS Logic Gates – Compound - MOS Transistor Theory – MOS Structure - nMOS and pMOS Transistor Operation – Long Channel V-I Characteristics – C-V Characteristics – Non-ideal I-V Effects

05.07.2023

*R. S. Sabeenian*  
**Dr. R. S. SABEENIAN, M.E., MBA., Ph.D., FIETE,**  
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<b>Unit III</b>	<b>CMOS INVERTER AND ITS TECHNOLOGY</b>	<b>9</b>
	DC Transfer Characteristics CMOS Inverter – CMOS Technologies – nMOS Fabrication – n-well Process – SOI – Twin Well Process - Layout Design Rules – CMOS Process Enhancement - Stick Diagram – Inverter – CMOS NAND – CMOS NOR.	
<b>Unit IV</b>	<b>COMBINATIONAL CIRCUIT DESIGN</b>	<b>9</b>
	Static CMOS – Pseudo logic– Dynamic Circuits – Pass-Transistor Circuits – CMOS with Transmission Gates – Source of Power Dissipation.	
<b>Unit V</b>	<b>DESIGNING ARITHMETIC BUILDING BLOCKS AND FPGA</b>	<b>9</b>
	Data path circuits, architectures for ripple carry adders (RCA), high speed adders, carry look ahead adder (CLA), Accumulators, Multipliers, Barrel shifters – Introduction to FPGA - FPGA Architecture – FPGA implementation	


**TOTAL : 45 HOURS**

**Text Book**

- 1) Neil H. E Weste and David Money Harris, "CMOS VLSI Design a circuits and systems perspective", 4th Edition, Pearson, 2015..
- 2) Ciletti, "Advanced Digital Design with the Verilog HDL, 2nd Edition ", Pearson Education, Second Edition, 2011

**References**

- 1) Jan M. Rabaey, Anantha Chandrakasan ,Borivoje Nikolic, "Digital Integrated Circuits a design perspective", Pearson Education, 2nd edition, 2016
- 2) Charles H. Roth, Jr., Lizy Kurian John, "Digital System Design using VHDL", Cengage, 3rd edition, 2018
- 3) Pucknell D.A and Eshraghian K., "Basic VLSI Design", Third Edition, PHI, 2003.

  
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**PREAMBLE  
TO  
RENEWABLE ENERGY SYSTEMS**

Energy is an important source of all technological developments as well as for all basic needs. The usage of renewable energy sources are the only way for sustainable development and future energy requirements. Renewable energy encourages the generation of electricity without any environmental impact and improves the economic growth of the country.

By choosing this elective the students will be able to know the importance of renewable energy sources for power generation. And also they could understand how the fossil fuels are made an impact on environmental issues. They will be familiar with the following

1. Concept of solar energy power production and solar photovoltaic cells and the application of solar PV system and Bio Mass power generation system.
2. Principle of conversion of wind energy in to electric energy
3. Working of geothermal and hydro power stations.
4. Principle of the conversion of tidal and wave energy in to electric energy.
5. The emerging technology of power generation.

After completion of this subject students will know how the energy can be produced locally. This knowledge would provide an opportunity to install small capacity power generation units independently for their needs.

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**COURSE OUTCOMES**

At the end of this course the students will be able to,

1. Describe the power demand scenario in world level and impact of various renewable energy sources in satisfying power demand.
2. Explain the principle of operation and the application of solar system.
3. Outline in the components and to find the suitability based on the performance of wind energy and Conversion system, biomass energy system
4. Describe the principle of operation and the application of geo thermal power tidal power generation scheme, wave energy and OTEC scheme.
5. Illustrate the emerging energy generation systems of MHD, Thermal and fuel cells applications.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		2					2		2	3	3	3
CO2	3	3	3	2	1	3	3	1	2		3	3	3	3
CO3	3	3	3	2	2	3	3	1	2		3	3	3	3
CO4	3	3	3	2	2	3	3	1	2		3	3	3	3
CO5	3	3	3	2	2	3	3	1	2		3	3	3	3

**UNIT I INTRODUCTION**

9

World energy futures–Energy sources and their availability – Energy cycle of the earth – environmental aspects of energy utilization – Energy plantation- Renewable energy resources and their importance- Prospects of Renewable energy sources.

**UNIT II SOLAR ENERGY SYSTEMS**

9

Introduction –Solar radiation and measurements-Solar energy collectors-solar energy storage systems- Solar pond and applications- Applications of solar energy: solar pumping, solar cooking, solar distillation and solar greenhouse.

**UNIT III WIND AND BIOMASS ENERGY SYSTEMS**

9

Introduction – Wind Energy conversion- Wind speed and power relation – Power extracted from wind – wind distribution and wind speed predictions – types of Wind power systems.  
Bio mass conversion technologies-Biogas generation-Types of biogas plants-Bio gas from plant wastes- Utilization of Bio gas and applications.

**UNIT IV GEO THERMAL, TIDAL AND OCEAN ENERGY SYSTEMS**

9

Geothermal energy – Estimates of Geothermal power- site selection for geothermal power plant- Applications of Geothermal energy.  
Origin of tides – Basic principle of Tidal power- Operation of a Tidal power plant. Ocean Thermal Energy conversion system- Open and closed OTEC cycles- Prospects of ocean thermal energy conversion in India.

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## UNIT V EMERGING ENERGY SYSTEMS

9

Magneto Hydro Dynamic (MHD) Power Generation- MHD systems and its operation. Thermo Electric power generation- Basic principle- Thermo electric power generator.

Thermonuclear fusion energy-Nuclear fusion and reactions- Advantages. Fuel cell- classification of fuel cells- Fuel cell based electrical power generation scheme- Applications.

**Lecture: 45; Tutorial: 0; Total: 45 Hours**

### TEXT BOOKS:

1. Rai, G.D., "Non-Conventional Energy Sources", Khanna Publishers, Sixth Edition 2017.
2. Khan, B.H, Non- Conventional Energy Resources", Mc. Graw Hill Education Ltd, third reprint 2017.

### REFERENCE BOOK

1. Rao S. Paruklekar,B.B, "Energy Technology – Non Conventional, Renewable and Conventional", KhannaPublishers,1994.
2. F.Kreith and J.F.Kreider, "Principles of Solar Engineering", McGraw Hill.
3. T.N.Veziroglu, "Alternative Energy Sources", Vol 5 and 6, McGraw Hill.
4. Mukund R.Patel, "Wind and Solar Power Systems", CRC Press LLC.

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**PREAMBLE**  
**TO**  
**Innovation, IPR and Entrepreneurship Development**

The open elective course syllabus has been framed by Entrepreneurship Development Cell of Sona College of Technology on above mentioned title for even semester. The course covers a wide range of topics from Innovation, Intellectual Property Right and entrepreneurial Competitiveness and competency, basic requirements of setting of an enterprise/startups, factors influencing entrepreneurship, Barriers to Entrepreneurship & Concepts, Issues of Entrepreneurship Failure, Idea selection, Innovation & creativity, design thinking.

The course also covers identifying and selecting a good business opportunity, market survey & research, techno-economic feasibility assessment and preparation of preliminary project reports, management of working capital, costing, break even analysis, taxation, income tax, GST, provision of incentives, subsidies & concessions, entrepreneurship finance and angels & ventures capital fund etc. Benefit out of Government policies to small scale industries and business incubators.

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**COURSE OUTCOMES**

At the end of this course the students will be able to,

- Acquire the knowledge for establishment of an enterprise and management,
- Derive the innovative ideas, right approach to the problem and arrive solution for problem with IPR and its legal aspects.
- Prepare the project report preparation and assessment of Business.
- Acquire the knowledge on costing, Techno-economic aspects, find out the sources of finance and opportunities in business.
- Identify the support system for Entrepreneurs by Government and venture capitals.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			3			3	3		3	3	3	3		3
CO2			3			3	3	3	3	3	3	3		3
CO3			3			3	3	3	3	3	3	3		3
CO4			3			3	3	3	3	3	3	3		3
CO5			3			3	3	3	3	3	3	3		3

**UNIT I ENTREPRENEURSHIP & MOTIVATION 9**

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth. Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

**UNIT II INNOVATION, CREATIVITY, DEVELOPMENT PROCESS AND LEGAL ASPECTS 9**

Innovation and Creativity- An Introduction, Innovation in Current Environment, Types of Innovation Sources of new Ideas, Methods of generating innovative ideas, creating problem solving, product planning and development process. Legal aspects of business (IPR, Labor law).

**UNIT III BUSINESS 9**

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

**UNIT IV FINANCING AND ACCOUNTING 9**

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, GST.

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## UNIT V SUPPORT TO ENTREPRENEURS

9

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures - Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

**Lecture: 45; Tutorial: 0; Total: 45 Hrs**

### TEXT BOOKS:

1. Khanka. S.S., "Entrepreneurial Development" S.Chand & Co. Ltd., Ram Nagar, New Delhi, 2013. 99
2. Donald F Kuratko, "Entrepreneurship – Theory, Process and Practice", 9 th Edition, Cengage Learning, 2014.

### REFERENCES:

1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2013.
2. Mathew J Manimala, "Entrepreneurship theory at cross roads: paradigms and praxis" 2 nd Edition Dream tech, 2005.
3. Rajeev Roy, "Entrepreneurship" 2 nd Edition, Oxford University Press, 2011.
4. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development", Institute of India, Ahmadabad, 1986.
5. Innovation and Entrepreneurship Book by Peter Drucker,
6. James Larminie and John Lowry, "Electric Vehicle Technology Explained " John Wiley & Sons, 2003.

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**PREAMBLE  
TO  
ENERGY CONSERVATION AND MANAGEMENT**

Energy is one of the most important resources to sustain our lives. At present we still depend a lot on fossil fuels and other kinds of non-renewable energy. The extensive use of renewable energy including solar energy needs more time for technology development. In this situation Energy Conservation (EC) is the critical needs in any countries in the world.

Energy saving is important and effective at all levels of human organizations – in the whole world, as a nation, as companies or individuals. Energy Conservation reduces the energy costs and improves the profitability.

Energy costs are often treated as a fixed overhead by organisations. But, by taking the right approach to energy management it is possible to make considerable savings. Successful energy management must combine an effective strategy with the right practical interventions. Many organisations would like to save energy, but they need to make energy management an integral part of running the organisation to ensure success. Energy Management is very important for the management of factories/companies, and Energy Conservation is one of its major topics.

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**COURSE OUTCOMES**

At the end of the course the students will be able to

1. Assess role of energy in global economic development.
2. Explain methodology of energy audit and concept of instruments used.
3. Discuss various lamps and design energy efficient illumination schemes.
4. Apply energy conservation concepts in buildings.
5. Identify the energy conserving opportunities in utilities.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3		2			2	3	3	3	2
CO2	2	2	3	3	3				2			3	3	2
CO3	2	2	3	3	3	3			3		2	3	3	2
CO4	2	2	3	3	3	2		3				3	3	2
CO5	2	2	3	3	3		3			3		3	3	2

**UNIT- I ENERGY SCENARIO AND BASICS**

9

Classification of Energy – Purchasing Power Parity – Energy Security – Strategy to meet future energy requirements – Objectives and features for electricity act 2003 – Energy efficiency standards and labeling – Study of Global and Indian primary energy reserves – Study of energy scenario for India – Energy and environment – Global environmental issues – Types of Energy – Electrical and Thermal energy basics – Energy units and conversions.

**UNIT- II ENERGY MANAGEMENT AND AUDIT**

9

Definition and objectives of energy management and audit – Need for energy audit – Types of energy audit – Methodology for conducting detailed energy audit – ENCON opportunities and measures – Energy audit report. Energy costs – Benchmarking – Energy performance – Fuel and Energy substitution – Instruments and metering for energy audit – Basic principles, components of material and energy balance – Sankey diagram – Financial analysis terms – Payback period, ROI, NPV, IRR.

**UNIT- III LIGHTING SYSTEMS**

9

Introduction – Terms in Lighting and Illumination – Light sources - Lamp types – Arc Lamps, Vapour lamps – Incandescent lamp, Fluorescent lamp – Energy saving lamps – CFL, LED – Lighting design for interiors – Indoor and outdoor lighting schemes – Energy saving opportunities – Energy efficient lighting controls.

**UNIT- IV ENERGY CONSERVATION IN BUILDINGS**

9

Energy conservation building code (ECBC) – Compliance approaches – ECBC guidelines on Building envelope, HVAC system, Service hot water, Water pumps – Energy consumption in Escalators and Elevators – Building Energy Management Systems – Star ratings – Energy Efficiency Measures in AC and Lighting system.

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## UNIT- V ENERGY EFFICIENT OPPORTUNITIES IN UTILITIES

9

Introduction to Compressed air system components – Heat transfer loops in refrigeration systems – Standards and labelling of room air conditioners – Introduction to Fans, Blowers and Compressors – Types of pumps, Pump curves – Efficient operation of pumps – Components of cooling towers and its efficient operation - Introduction to DG set system.

Energy Efficiency and energy savings in Compressed Air System, HVAC system, Fans and Blowers, Pumping system, Cooling towers, and DG sets.

**Lecture: 45; Tutorial: 00; Total: 45**

### TEXT BOOKS:

1. "General Aspects of Energy Management and Energy Audit", Bureau of Energy Efficiency, Fourth Edition, 2015.
2. "Energy Efficiency in Electrical Utilities", Bureau of Energy Efficiency, Fourth Edition, 2015.

### REFERENCE BOOKS:

1. Chakrabarti A, "Energy Engineering and Management", PHI, 2011.
2. Murphy W R, McKay G, "Energy management", Elsevier, 2009.
3. Rajput R K, "Utilization of Electrical Power", Lakshmi Publications, 2006.

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**COURSE OUTCOMES**

At the end of the study of this course the students will be able to,

1. Define and discuss the fashion and related terms and reason for change in fashion and the classification
2. Describe clothing and its purpose, Role of clothing and its status.
3. Describe the selection of clothing for various age groups, Fashion apparel and wardrobe planning.
4. Explain the elements and principles of the design, with the effects in the apparel
5. Bounce out the theme and development of portfolio.

<b>CO/PO, PSO Mapping</b>														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PSO1	PSO2	PSO3
CO1	3	3	3							3	3	3	3	3
CO2	3	3	3									3	3	3
CO3	3	3	3								3	3	3	3
CO4	3	3	3								3	3	3	3
CO5	3	3	3							3	3	3	3	3

**UNIT I Introduction to Fashion**

9

Origin of fashion - terms and definitions - reasons for change in fashion - classification of fashion – Style, Classic, FAD, Trend – theories of fashion – movement of fashion - fashion cycle.

**UNIT II Introduction to Clothing**

9

Understanding clothing - Purpose of clothing: protection, modesty, attraction etc - Importance of clothing - Clothing Culture, Men and Women clothing and ornamentation - Role and status of clothing - Clothing according to climatic conditions – factors to be considered in the selection of clothing

**UNIT III Selection of clothes**

9

Clothes for children, middle-aged and adults. Types of clothes according to different types of human figure, Different materials for different clothes, Fabrics and colours suitable for different garments.

**Planning for clothing needs:** Formal clothing, Clothes for parties, Clothes for sports, Casual Clothes for casualwear. **Wardrobe Planning:** Wardrobe for men and women

**UNIT IV Elements and Principles of Design**

9

**Elements of Design:** Introduction on basics Elements of design - Silhouette, Details, Texture, Color, Lines,



**Principle of design:** Introduction to principles of Elements of design - Proportion, Balance, Rhythm, Center of Interest, Harmony

**UNIT 5 Design and Development**

9

**Boards:** Mood board, fabric board, colour board, accessory board. Fashion illustration – head theories, Illustration techniques – strokes, hatching, shading; Colouring techniques – Medias for colouring. Portfolio presentation – styles of presentation - Fashion shows.

**TOTAL: 45 hours**

**TEXT BOOKS**

1. Munslow, Janine, McKelvey, Kathryn “**Fashion Design Process Innovation and Practice**”, 2<sup>nd</sup> Edition , wiley , 2012.
2. Nicola White, Ian Griffiths, “**The Fashion Business Theory, Practice, Image**”, Berg, 2000.

**REFERENCE**

1. Sumathi, G. J. **Elements of fashion and apparel design**. New Age International, 2007.
2. Kathryn McKelvey “**Fashion Source Book**” Balckwell Publishing New Delhi.
3. Mills, Jane, and Janet K. Smith. **Design concepts**. Fairchild Books, 1985.
4. Rasband J. **Wardrobe strategies for women**. Fairchild Publications; 2002.
5. Jarnow JA, Judelle B, Guerreiro M. **Inside the fashion business**. Wiley; 1981.

5/8

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**COURSE CODE U19ME1002**

L T P C

**COURSE NAME INDUSTRIAL SAFETY**

3 - - 3

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Summarize various legal provisions available in safety regulation.
- CO2** Analyze industrial environment hygiene and develop precautionary measure to avert occupational diseases.
- CO3** Demonstrate the uses of different grades of fire protection systems related with different classes of fire.
- CO4** Develop Agronomical study of different work environment in industries.
- CO5** Discuss the importance of safety training and its impact on shop floor of factories.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	-	-	-	1	3	3	3	2	2	3	3	2	2
CO - 2	3	2	2	1	3	3	3	3	2	2	-	2	2	3
CO - 3	2	3	2	3	3	3	3	3	3	3	3	2	2	3
CO - 4	2	1	3	3	3	3	2	3	1	2	-	2	3	3
CO - 5	1	3	3	3	-	3	-	3	3	3	2	3	2	2

**Unit I BASICS OF SAFETY ENGINEERING & ACTS**

L 9 T 0

Evolution of modern safety concept –safety performance monitoring. Acts – factories act – 1948 – Statutory authorities – inspecting staff – Tamilnadu Factories Rules 1950 under Safety and health – environment act – 1986 – Air act 1981, water act 1974 – other acts. Safety in industries – General safety concepts, machine guarding, hazards in metal removing process, welding process, cold and hot working process.

**Unit II OCCUPATIONAL HEALTH AND INDUSTRIAL HYGIENE**

L 9 T 0

(Basic concepts, related hazards and exposure limits)

Physical Hazards – Noise, heat, radiation, vibration, recognition of chemical hazards-dust, fumes, mist, vapour, fog, gases. Biological and Ergonomical Hazards-Basic concepts. Occupational Health-Concept and spectrum of health – functional units and activities of occupational health services, pre-employment and post-employment medical examinations – occupational related diseases, levels of prevention of diseases, notifiable occupational diseases. Hazard assessment, procedure, methodology; safety audit, checklist analysis, what-if analysis, safety review, Preliminary Hazard Analysis (PHA), human error analysis, hazard operability studies (HAZOP), safety warning systems.

**Unit III FIRE ENGINEERING AND EXPLOSIVE CONTROL**

L 9 T 0

Fire properties of solid, liquid and gases – fire triangle – principles of fire extinguishing – active and passive fire protection systems – various classes of fires – A, B, C, D, E – types of fire extinguishers – Principles of explosion – Explosion Protection – Electrical Safety. Electrical Hazards – Primary and Secondary hazards – concept of earthing – protection systems – fuses, circuit breakers and over load relays – first aid cardiopulmonary resuscitation techniques.

**Unit IV ERGONOMICS**

L 9 T 0

Introduction to ergonomics: The focus of ergonomics, ergonomics and its areas of application in the work system, modern ergonomics, and future directions for ergonomics. Anatomy, Posture and Body Mechanics: anatomy of the spine and pelvis related to posture, posture stability and posture adaptation, low back pain, risk factors for musculoskeletal disorders in the workplace, effectiveness and cost effectiveness. Anthropometry and its uses in ergonomics, Applications of human factors engineering, man as a sensor, man as information processor, man as controller – Ergonomics in IT industries.

**Unit V SAFETY EDUCATION AND TRAINING**

L 9 T 0


Importance of training – identification of training needs – training methods – programs, seminars, conferences, competitions – motivation – communication – role of government agencies and private consulting agencies in safety training – creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme, safety campaign – Domestic Safety Training.

**Total Number of hours: 45****Learning Resources****Text Books**

1. Krishnan N.V., "Safety Management in Industry", Jaico Publishing House, Bombay, 1997.
2. Hand book of "Occupational Safety and Health", National Safety Council, Chicago, 1982.

**Reference Books**

1. Derek, James, "Fire Prevention Hand Book", Butter Worths and Company, London, 1986.
2. Guidelines for Hazard Evaluation Procedures Centre for Chemical Process Safety, AICHE 1992.
3. The factories Act 1948, Madras Book Agency, Chennai, 2000.
4. Introduction to Ergonomics, R.S. Bridger, Taylor & Francis.



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**COURSE CODE U19ME1004**

L T P C

**COURSE NAME RENEWABLE ENERGY SOURCES**

3 - - 3

**Prerequisites- subject:** Environmental Sciences.**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Discuss the power demand scenario in world level and impact of various renewable energy sources in satisfying power demand.
- CO2** Explain the different components and the principle of operation and the application of solar PV system and Bio Mass power generation system.
- CO3** Outline in the components and to find the suitability based on the performance of wind energy conversion system, geothermal and hydel power system.
- CO4** Describe the components of tidal power generation scheme and wave energy scheme and to discuss the performance of two schemes.
- CO5** Compare and contrast the various components and methods of Ocean Energy Conversion Systems.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO - 1</b>	3	3	3	-	3	3	3	2	3	3	2	3	3	3
<b>CO - 2</b>	3	-	3	3	3	3	3	-	3	3	3	3	3	3
<b>CO - 3</b>	3	3	3	2	3	3	3	-	3	3	3	3	3	3
<b>CO - 4</b>	3	3	3	2	3	3	3	-	3	3	2	3	3	3
<b>CO - 5</b>	3	2	3	3	3	3	3	2	3	3	2	3	3	3

**Unit I INTRODUCTION**

L 9 T 0

World energy use – reserves of energy resources – energy cycle of the earth – environmental aspects of energy Utilization – renewable energy resources and their importance.

**Unit II SOLAR & BIO ENERGY**

L 9 T 0

Introduction – extra-terrestrial solar radiation – radiation at ground level – collectors – solar cells – applications of solar energy – Biomass Energy – Introduction – Biomass Conversion – Biogas Production – Ethanol Production – Pyrolysis and Gasification – Direct Combustion – Applications.

**Unit III GEO THERMAL AND HYDRO ENERGY SOURCES**

L 9 T 0

Geothermal energy – types of geothermal energy sites, site selection, and geothermal power plants, Hydro energy – Feasibility of small, mini and micro hydro plants: scheme, layout and economics.

**Unit IV WIND AND TIDAL ENERGY**

L 9 T 0

Introduction – Wind Energy – Wind speed and power relation – Power extracted from wind – wind distribution and wind speed predictions – types of Wind power systems.

Introduction – origin of tides – power generation schemes – Wave Energy – basic theory – wave power Devices.

**Unit V OTHER RENEWABLE ENERGY SOURCES**

L 9 T 0


Introduction – Open and Closed OTEC cycles – Ocean Currents – Salinity Gradient Devices – Potential impacts of harnessing the different renewable energy resources.

**Total Number of hours: 45****Learning Resources****Text Books**

1. Twidell John; Weir, Tony, "Renewable energy resources", Taylor & Francis, 2010
2. Godfrey Boyle, "Renewable energy – power for a sustainable future", Oxford University Press, 2010
3. Kothari DP, Singal KC and Rakesh Ranjan, 'Renewable Energy Sources and Emerging Technologies' PHI Learning Pvt. Ltd.2011.
4. S.A. Abbasi and Naseema Abbasi, "Renewable energy sources and their environmental impact", Prentice- Hall of India, 2001.

**Reference Books**

1. T.N.Veziroglu, Alternative Energy Sources, Vol 5 and 6, McGraw Hill, 1978.
2. G D Rai, "Non-conventional sources of energy", Khanna Publishers, 2002.
3. G D Rai, "Solar energy utilization", Khanna Publishers, 2005.
4. MukundR.Patel, "Wind and Solar Power Systems", CRC Press, Taylor and Francis, 2005.
5. Yogi Goswami, 'Principles of Solar Engineering' CRC Press, 2015, ISBN 10: 1466563788

  
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PROFESSOR & HEAD  
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SONA COLLEGE OF TECHNOLOGY  
JUNCTION MAIN ROAD, SALEM-5.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to

- Identify the core values that shape the ethical behavior of an engineer.
- Analyze and practice engineering ethics in their profession.
- Apply codes of ethics in the context of social experimentation.
- Explore various safety issues and ethical responsibilities of an engineer.
- Adopt ethical practices pertaining to global issues.

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	1	2	3	3	3	2	2	3
CO2	2	1	1	1	2	2	3	3	3	3	3	3
CO3	2	1	3	1	2	3	3	3	3	3	3	3
CO4	2	1	3	1	1	3	3	3	3	2	3	3
CO5	2	1	3	1	1	3	3	3	3	3	3	3

**UNIT-I HUMAN VALUES**

9

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Introduction to Yoga and meditation for professional excellence and stress management.

**UNIT -II ENGINEERING ETHICS**

9

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Profession and Professionalism – Professional Ideals and Virtues –Theories of Right action- Self Interest- Customs and Religion-Uses of Ethical Theories.

**UNIT-III ENGINEERING AS SOCIAL EXPERIMENTATION**

9

Engineering as Experimentation – Contrasts with standard experiments- Engineers as Responsible Experimenters – Importance and limitations of Codes of Ethics - Industrial Standards - A Balanced Outlook on Law – Industrial Standards- Case Study: Space shuttle challenger disaster.

**UNIT-IV SAFETY, RESPONSIBILITIES AND RIGHTS**

9

Safety and Risk – Types of risk - Assessment of Safety and Risk – Risk Benefit analysis-Reducing Risk – Case Studies - Chernobyl and Bhopal plant disaster.

Collegiality and Loyalty –Respect for Authority- Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Importance and consequences of whistle blowing - Professional Rights – Employee Rights – Intellectual Property Rights (IPR) and its components– Discrimination.

**UNIT-V GLOBAL ISSUES**

9

Multinational Corporations – Environmental Ethics – Computer Ethics and Internet- Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Participation in professional societies- –Code of Conduct – Corporate Social Responsibility.

**Lecture: 45, Tutorial: 0, TOTAL: 45 Hours**

## **TEXT BOOKS**

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, Indian Edition, Tenth reprint, 2017.
2. Professional Ethics and Human values- Sonaversity, Edition 2018.

## **REFERENCES**

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 2012.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2016.
3. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
4. R.Subramanian, "Professional Ethics ",Oxford University Press , Second Edition, 2017.

*Neeraj Kumar*  
5/7/2022

Member Secretary-Academic Cell  
SONA COLLEGE OF TECHNOLOGY  
SALEM - 636 005.

IT  
VIII

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**


**Courses of Study for B.E/B.Tech. Semester VIII under Regulations 2019 (CBCS)**


**Branch: Information Technology**

S.No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Practical</b>							
1	U19IT801 ✓	Project Work ✓	0	0	24	12	360 ✓
<b>Total</b>						<b>12</b> ✓	

**Approved By**


  
**Chairperson, Information Technology BoS**  
**Dr.J.Akilandeswari**

  
**Member Secretary, Academic Council**  
**Dr.R.Shivakumar 26/12/23**

  
**Chairperson, Academic Council & Principal**  
**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/Information Technology, Eighth Semester BE IT Students and Staff, COE

  
22-12-2023

Regulations-2019