SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

B.Tech-Information Technology

CURRICULUM and SYLLABI

[For students admitted in 2021-2022]

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	Total Contact Hours
Theory								
1	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS	60
2	U19ENG101C	Communication skills in English- I	2	0	0	2	HS	30
3	U19PHY103C	Engineering Physics	3	0	0	3	BS	45
4	U19BEE106A	Basic Electrical and Electronics Engineering	3	0	0	3	ES	45
5	U19PPR105	Problem Solving using Python Programming	3	0	0	3	ES	45
Practical								
6	U19PHL110	Engineering Physics Laboratory	0	0	3	1.5	BS	45
7	U19BEEL113A	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	ES	30
8	U19PPL111	Python Programming Laboratory	0	0	2	1	ES	30
9	U19GE101	Basic Aptitude – I	0	0	2	0	EEC	30
Total Credits						**18.5**		
Optional Language Elective*								
10	U19OLE1101	French	0	0	2	1	HS	30
11	U19OLE1102	German						30
12	U19OLE1103	Japanese						30

*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	**Chairperson, Information Technology BoS**	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr. J. Akilandeswari**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

Copy to:-

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
Theory								
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
Practical								
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
Total Credits						**21**		
Optional Language Elective*								
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

Chairperson, Science and Humanities BoS	**Chairperson, Information Technology BoS**	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr. J. Akilandeswari**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

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

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
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	**Mandatory Course**- Essence of Indian Traditional Knowledge	2	0	0	0	30
Practical							
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 Skills Laboratory	0	0	2	1	30
10	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
					Total Credits	**21**	

Approved By

Chairperson, Information Technology BoS **Member Secretary, Academic Council** **Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari **Dr.R.Shivakumar** **Dr.S.R.R.Senthil Kumar**

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

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
Theory							
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	**Mandatory Course-** Environment and climate science	2	0	0	0	30
Practical							
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
					Total Credits	**22**	

Approved By

Chairperson, Information Technology BoS	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**Dr.S.R.R.Senthil Kumar**

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

IT
V
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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 (CBCS)
Branch: Information Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
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	noc23-cs83	**NPTEL-** Introduction to Internet of Things	3	0	0	3	45
	noc23-cs89	Cloud Computing					
	noc23-cs116	Design & Implementation of Human-Computer Interfaces					
Practical							
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
					Total Credits	**22**	

Approved By

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	U19IT601	Full Stack Development	3	0	0	3	45
2	U19IT602	Machine Learning	3	0	0	3	45
3	U19IT912	**Professional Elective** – Total Quality Management	3	0	0	3	45
	U19IT929	**Professional Elective** – Human Computer Interaction					
4	U19IT913	**Professional Elective** – Software Quality Assurance	3	0	0	3	45
5	U19BM1001	**Open Elective-** Hospital Management	3	0	0	3	45
	U19CE1002	Municipal Solid Waste Management					
	U19EE1001	Electric Mobility					
	U19EE1002	Energy Conservation and Management					
	U19EE1004	Renewable Energy Systems					
	U19FT1001	Fundamentals of Fashion Design					
	U19FT1002	Garment Manufacturing Technology					
	U19MC1004	Fundamentals of Robotics					
	U19ME1002	Industrial Safety					
	U19ME1004	Renewable Energy Sources					
		Practical					
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
					Total Credits	**21**	

Approved By

27/12/23 28/12/23

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar 28/12/23

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

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SONA COLLEGE OF TECHNOLOGY, SALEM- 5

DEPARTMENT OF INFORMATION TECHNOLOGY

B Tech- IT- 2019 Regulations

List of Elective's

S. No	Course Code	COURSE TITLE	L	T	P	C
1.	U19IT901	Numerical Methods	3	0	0	3
2.	U19IT902	C# AND .NET	2	0	2	3
3.	U19IT903	Advanced Java Programming	3	0	0	3
4.	U19IT904	Embedded Systems	3	0	0	3
5.	U19IT905	Information Security	3	0	0	3
6.	U19IT906	Graph Theory	3	0	0	3
7.	U19IT907	Wireless Technologies	3	0	0	3
8.	U19IT908	Business Intelligence	3	0	0	3
9.	U19IT909	Image Processing	3	0	0	3
10.	U19IT910	Digital Signal Processing	3	0	0	3
11.	U19IT911	Cloud Computing	3	0	0	3
12.	U19IT912	Total Quality Management	3	0	0	3
13.	U19IT913	Software Quality Assurance	3	0	0	3
14.	U19IT914	Linux Internals	3	0	0	3
15.	U19IT915	Distributed Databases	3	0	0	3
16.	U19IT916	Natural Language Processing	3	0	0	3
17.	U19IT917	Cyber Security	3	0	0	3
18.	U19IT918	Intellectual Property Rights	3	0	0	3
19.	U19IT919	Ethical Hacking	3	0	0	3
20.	U19IT920	Mobile Application Development	3	0	0	3
21.	U19IT921	Wireless Sensor Networks	3	0	0	3
22.	U19IT922	Information Retrieval	3	0	0	3
23.	U19IT923	Mobile Computing	3	0	0	3
24.	U19IT924	Multi-Core Architecture	3	0	0	3
25.	U19IT925	Agile Software Development	3	0	0	3
26.	U19IT926	Robotic Process Automation	3	0	0	3
27.	U19IT927	Data Science	3	0	0	3
28.	U19IT928	Advanced Python Programming for Data Science	3	0	0	3
29.	U19IT929	Human Computer Interaction	2	0	2	3
30.	U19IT930	Block Chain Technology	3	0	0	3
31.	U19IT931	Deep Learning	3	0	0	3

SONA COLLEGE OF TECHNOLOGY (AUTONOMOUS), SALEM-5.

DEPARTMENT OF INFORMATION TECHNOLOGY

B TECH- INFORMATION TECHNOLOGY

LIST OF PROFESSIONAL ELECTIVES FOR HONOURS DEGREE

Vertical 1 **CLOUD COMPUTING**	**Vertical 2** **INTERNET OF THINGS**	**Vertical 3** **CYBER SECURITY**	**Vertical 4** **DATA ANALYTICS**	**Vertical 5** **CREATIVE MEDIA**
Cloud Computing	Introduction to 5G	Fundamentals of Cyber Security	Fundamentals of Data Science	Augmented and Virtual Reality
Virtualization	Introduction to Cyber-Physical System	Cyber Laws and Standards	Exploratory Data Analysis using R and Tableau	Multimedia and Animation
Dockerization and Kubernetes	Wireless Technology	Ethical Hacking	Big Data Analytics	Video Creation and Editing
Big Data on Cloud	Wireless Sensor Networks	Network Vulnerability Assessment	Business Intelligence	UI And UX Design
Cloud Application Development and Deployment	Introduction to IoT	Cyber Forensics	Deep Learning	Digital Marketing
Security and Privacy in Cloud	Software Defined Networks	Information Security Risk Management	Natural Language Processing	Visual Effects
Container Orchestrations and Infrastructure Automation	Network Programming	Security Operations and Incident Management	Social Network and Web Analytics	Game Development
Cloud Networking	Industry 4.0	Cryptocurrency and Blockchain Technologies	Recommender System	Multimedia Data Compression and Storage
Capstone Project in **CLOUD COMPUTING** (*Mandatory Elective Course for Earning Specialization Degree)	Capstone Project in **NETWORKING** (*Mandatory Elective Course for Earning Specialization Degree)	Capstone Project in **CYBER SECURITY** (*Mandatory Elective Course for Earning Specialization Degree)	Capstone Project in **DATA ANALYTICS** (*Mandatory Elective Course for Earning Specialization Degree)	Capstone Project in **CREATIVE MEDIA** (*Mandatory Elective Course for Earning Specialization Degree)
Maximum of two SWAYAM courses in Specific Vertical identified by Department Consultative Committee				

SONA COLLEGE OF TECHNOLOGY (AUTONOMOUS), SALEM-5.

DEPARTMENT OF INFORMATION TECHNOLOGY

B TECH- INFORMATION TECHNOLOGY

Honours Degree- Verticals & Courses

(Offered to UG students admitted during AY 2021- 2022 onwards, Regulation 2019)

VERTICAL 1 – CLOUD COMPUTING

S.No	Course Code	Course Title	L	T	P	Credit
1.	U19IT911	Cloud Computing	3	0	0	3
2.	U19IT2001	Virtualization	3	0	0	3
3.	U19IT2002	Dockerization and Kubernetes	3	0	0	3
4.	U19IT2003	Big Data on Cloud	3	0	2	4
5.	U19IT2004	Cloud Application Development and Deployment	3	0	2	4
6.	U19IT2005	Security and Privacy in Cloud	3	0	2	4
7.	U19IT2006	Container Orchestrations and Infrastructure Automation	3	0	0	3
8.	U19IT2007	Cloud Networking	3	0	2	4
9.	U19IT2008	Capstone Project in Artificial Intelligence and Data Science (*Mandatory for Earning Specialization Degree)	0	0	4	2
Maximum of two SWAYAM courses in CLOUD COMPUTING vertical identified by Department Consultative Committee of the department.						

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	U19IT601	Full Stack Development	3	0	0	3	45
2	U19IT602	Machine Learning	3	0	0	3	45
3	U19IT912	**Professional Elective** – Total Quality Management	3	0	0	3	45
	U19IT929	**Professional Elective** – Human Computer Interaction					
4	U19IT913	**Professional Elective** – Software Quality Assurance	3	0	0	3	45
5	U19BM1001	**Open Elective-** Hospital Management	3	0	0	3	45
	U19CE1002	Municipal Solid Waste Management					
	U19EE1001	Electric Mobility					
	U19EE1002	Energy Conservation and Management					
	U19EE1004	Renewable Energy Systems					
	U19FT1001	Fundamentals of Fashion Design					
	U19FT1002	Garment Manufacturing Technology					
	U19MC1004	Fundamentals of Robotics					
	U19ME1002	Industrial Safety					
	U19ME1004	Renewable Energy Sources					
		Practical					
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
					Total Credits	**21**	

Approved By

27/12/23 28/12/23

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar 28/12/23

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

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VERTICAL 2 – INTERNET OF THINGS

S. No	Course Code	Course Title	L	T	P	Credit
1.	U19IT2009	Introduction to 5G	3	0	0	3
2.	U19IT2010	Introduction to Cyber-Physical System	3	0	0	3
3.	U19IT907	Wireless Technologies	3	0	0	3
4.	U19IT2011	Wireless Sensor Networks	3	0	2	4
5.	U19IT2012	Introduction to IoT	3	0	2	4
6.	U19IT2013	Software Defined Networks	3	0	2	4
7.	U19IT2014	Network Programming	3	0	2	4
8.	U19IT2015	Industry 4.0	3	0	0	3
9.	U19IT2016	Capstone Project in Networking (*Mandatory for Earning Specialization Degree)	0	0	4	2
Maximum of two SWAYAM courses in INTERNET OF THINGS vertical identified by Department Consultative Committee of the department.						

VERTICAL 3 – CYBER SECURITY

S. No	Course Code	Course Title	L	T	P	Credit
1.	U19IT2017	Fundamentals of Cyber Security	3	0	0	3
2.	U19IT2018	Cyber Laws and Standards	3	0	0	3
3.	U19IT919	Ethical Hacking	3	0	0	3
4.	U19IT2019	Network Vulnerability Assessment	3	0	2	4
5.	U19IT2020	Cyber Forensics	3	0	2	4
6.	U19IT2021	Information Security Risk Management	3	0	0	3
7.	U19IT2022	Security Operations and Incident Management	3	0	2	4
8.	U19IT2023	Cryptocurrency and Blockchain Technologies	3	0	2	4
9.	U19IT2024	Capstone Project in Cyber Security (*Mandatory for Earning Specialization Degree)	0	0	4	2
Maximum of two SWAYAM courses in CYBER SECURITY vertical identified by Department Consultative Committee of the department.						

VERTICAL 4 – DATA ANALYTICS

S.No	Course Code	Course Title	L	T	P	Credit
1.	U19IT2025	Fundamentals of Data Science	3	0	0	3
2.	U19IT2026	Exploratory Data Analysis using R and Tableau	3	0	2	4
3.	U19IT2027	Big Data Analytics	3	0	2	4
4.	U19IT908	Business Intelligence	3	0	0	3
5.	U19IT2028	Deep Learning	3	0	2	4
6.	U19IT2029	Natural Language Processing	3	0	2	4
7.	U19IT2030	Social Network and Web Analytics	3	0	0	3
8.	U19IT2031	Recommender System	3	0	0	3
9.	U19IT2032	Capstone Project in Data Analytics (*Mandatory for Earning Specialization Degree)	0	0	4	2
Maximum of two SWAYAM courses in DATA ANALYTCS vertical identified by Department Consultative Committee of the department.						

VERTICAL 5 – CREATIVE MEDIA

S. No	Course Code	Course Title	L	T	P	Credit
1.	U19IT2033	Augmented and Virtual Reality	3	0	2	4
2.	U19IT2034	Multimedia and Animation	3	0	2	4
3.	U19IT2035	Video Creation And Editing	3	0	2	4
4.	U19IT2036	UI and UX Design	3	0	2	4
5.	U19IT2037	Digital Marketing	3	0	2	4
6.	U19IT2038	Visual Effects	3	0	2	4
7.	U19IT2039	Game Development	3	0	2	4
8.	U19IT2040	Multimedia Data Compression And Storage	3	0	2	4
9.	U19IT2041	Capstone Project in **CREATIVE MEDIA** (*Mandatory for Earning Specialization Degree)	0	0	4	2
Maximum of two SWAYAM courses in CREATIVE MEDIA vertical identified by Department Consultative Committee of the department.						

SONA COLLEGE OF TECHNOLOGY (AUTONOMOUS), SALEM-5.

DEPARTMENT OF INFORMATION TECHNOLOGY

Minor Degree- Verticals & Courses

(Offered to UG students admitted during AY 2021- 2022 onwards, Regulation 2019)

Vertical : ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

S.No	Course Code	Course Title	L	T	P	Credit
1	U19ADS2035	Python for Data Science	3	0	2	4
2	U19ADS2036	Probability and Statistics	3	0	0	3
3	U19ADS2037	Ethics and AI	2	0	2	3
4	U19ADS2038	Machine Learning	3	0	2	4
5	U19ADS2039	Big Data Analytics`	2	0	2	3
6	U19ADS2040	Business Intelligence	2	0	2	3
7	U19ADS2041	Deep learning	3	0	2	4
8	U19ADS2042	Data Visualization	3	0	2	4
9	U19ADS2043	Capstone Project in Artificial Intelligence and Data Science (Mandatory Elective Course)	0	0	4	2
Maximum of two SWAYAM courses in ARTIFICIAL INTELLIGENCE AND DATA SCIENCE vertical (MINOR) identified by Department Consultative Committee of the department.						

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	Total Contact Hours
Theory								
1	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS	60
2	U19ENG101C	Communication skills in English- I	2	0	0	2	HS	30
3	U19PHY103C	Engineering Physics	3	0	0	3	BS	45
4	U19BEE106A	Basic Electrical and Electronics Engineering	3	0	0	3	ES	45
5	U19PPR105	Problem Solving using Python Programming	3	0	0	3	ES	45
Practical								
6	U19PHL110	Engineering Physics Laboratory	0	0	3	1.5	BS	45
7	U19BEEL113A	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	ES	30
8	U19PPL111	Python Programming Laboratory	0	0	2	1	ES	30
9	U19GE101	Basic Aptitude – I	0	0	2	0	EEC	30
Total Credits						**18.5**		
Optional Language Elective*								
10	U19OLE1101	French	0	0	2	1	HS	30
11	U19OLE1102	German						30
12	U19OLE1103	Japanese						30

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

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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.

	Course Outcomes	Programme Outcomes													
		1	2	3	4	5	6	7	8	9	10	11	12	Pso1	Pso2
1	Frame sentences correctly with accuracy	2	1	1	1	1	2	3	2	2	3	3	3	3	3
2	Write emails and formal letters	3	2	2	3	3	3	3	3	2	3	3	3	3	3
3	Speak effectively in real time and business situations	3	3	2	3	3	3	3	3	3	3	3	3	3	3
4	Write email, formal letters and descriptions of graphics	1	1	1	2	2	1	2	2	1	3	1	1	1	1
5	Develop skills for writing reports and proposals, and for general purpose and technical writing.	2	1	1	3	2	2	3	3	3	3	2	3	3	3

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: 30 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

1. find the rank of the matrix and solve linear system of equations by direct and indirect methods
2. apply the concepts of vector spaces and linear transformations in real world applications
3. 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
4. find the Taylor's series expansion, Jacobians and the maxima and minima of functions of two variables
5. apply appropriate techniques of multiple integrals to find the area and volume.

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	2							2	2	
CO2	3	3	2	3	2							2	2	
CO3	3	3	2	3	2							2	2	
CO4	3	3	2	3	2							2	2	
CO5	3	3	2	3	2							2	2	

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, 1st Edition, 2018.
2. T. Veerarajan, "Engineering Mathematics for Semesters I & II", McGraw Hill Publishers, 1st Edition, 2019.

REFERENCE BOOKS:

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

CO1: Discuss the dual nature of matter and radiation and the application of wave nature of particles.

CO2: Describe the basic components of lasers.

CO3: Analyse the relation between arrangement of atoms and material properties.

CO4: Differentiate the electrical and thermal conductivity of metals.

CO5: Elucidate the classification and theory of semiconducting materials.

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	2	-	3
CO – 2	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO – 3	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO – 4	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO - 5	3	2	-	-	-	-	-	-	-	-	2	2	-	3

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_2 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 K and T > 0 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 K and T > 0 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.

U19BEE106A - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

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.

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

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

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

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	PSO3
CO1	3	3	3	3	3	3	1	1	2	2	1	3	2	3	3
CO2	3	3	3	3	3	2	1	1	1	1	1	3	1	3	3
CO3	3	3	3	3	3	3	2	1	1	1	1	3	1	3	3
CO4	3	3	3	3	3	2	2	1	1	2	1	3	1	3	3
CO5	3	3	3	3	3	3	3	1	1	1	1	3	2	3	3

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,

CO1: Apply the principles of Thermal Physics and Elasticity to determine the Engineering properties of materials.

CO2: Apply the principles of Optics and Electricity to determine the Engineering properties of materials.

CO3: Determine the thickness and resistivitiy of the given copper turn used for house hold applications.

Pre-requisite: Capable of using Screw gauge, Vernier calliper, Travelling microscope and Spectrometer

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	2	-	3
CO – 2	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO – 3	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO – 4	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO - 5	3	2	-	-	-	-	-	-	-	-	2	2	-	3

LIST OF EXPERIMENTS

1. Determination of velocity of ultrasonic waves and compressibility of the given liquid using ultrasonic interferometer.
2. Determination of Young's modulus of the material of the beam by Non-uniform bending method.
3. Determination of the thermal conductivity of a bad conductor using Lee's Disc apparatus.
4. Determination of specific resistance of a given wire using Carey Foster's bridge.
5. Determination of Rigidity Modulus of given wire using Torsion Pendulum.
6. Determination of coefficient of viscosity of liquid by Poiseuille's method.
7. Determination of Young's modulus of the material of the beam by uniform bending method.
8. Determination of laser wavelength using diode laser.
9. Determination of particle size of lycopodium powder using diode laser.
10. Determination of acceptance angle and numerical aperture of an optical fibre using diode laser.

11. Determination of the thickness of a thin wire by forming interference fringes using air wedge apparatus.
12. Determination of dispersive power of the prism for various pairs of colors in the mercury spectrum using a spectrometer.
13. Determination of Wavelength of Mercury spectrum using spectrometer.
14. 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.

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	2	1	1	1	2	2	2	2	1	1
CO2	2	2	2	2	2	1	1	1	2	2	2	2	1	1
CO3	2	2	2	2	2	1	1	1	2	2	2	2	1	1

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

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	PSO3
CO1	3	2	2	3	2	1	0	1	2	2	1	2	3	3	3
CO2	3	3	3	3	2	2	0	1	2	2	1	2	3	3	3
CO3	3	3	3	3	2	2	0	1	2	2	1	3	3	3	3

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)

L	T	P	C
0	0	2	0

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

CO1: Solve fundamental problems in specific areas of quantitative aptitude

CO2: Solve basic problems in stated areas of logical reasoning

CO3: Demonstrate rudimentary verbal aptitude skills in English with regard to specific topics

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	1	2	2	2	1	3	3	3	3	1	1	3	2	2
CO 2	3	3	1	1	2	3	2	3	3	2	2	3	3	3
CO 3	1	2	1	2	1	1	1	3	3	3	1	3	3	3

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: 24 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
Theory								
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
Practical								
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
Total Credits						**21**		
Optional Language Elective*								
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

Chairperson, Science and Humanities BoS	**Chairperson, Information Technology BoS**	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr. J. Akilandeswari**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

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

B. TECH. / INFORMATION TECHNOLOGY

SEMESTER – II	APPLIED PROBABILITY AND STATISTICS	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	P09	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 - χ^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, 11th Edition, Reprint, 2019.
2. T. Veerarajan, "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", McGraw Hill Publishers, 4th Edition, 7th Reprint, 2018.

REFERENCE BOOKS:

1. R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9th Edition, 2018.
2. S. Ross, "A first course in probability", Pearson Publishers, 9th 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, 3rd Edition, Wiley Publishers, 2008.

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

L T P C
2 0 2 3

U19ENG201C-Communication Skills in English - II

First year II semester

IT

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

1. Frame sentences correctly, both in written and spoken forms of language with accuracy and fluency.
2. Develop and demonstrate listening skills for academic and professional purposes.
3. Draw conclusions on explicit and implicit oral information.
4. Develop effective reading skills and reinforce language skills required for using grammar and building vocabulary.
5. Read for gathering and understanding information, following directions and giving responses.

	COURSE OUTCOMES	PROGRAMME OUTCOMES													
		1	2	3	4	5	6	7	8	9	10	11	12	Pso 1	Pso 2
1	Frame sentences correctly, both in written and spoken forms of language with accuracy and fluency.	1	1	3	3	3	3	2	3	3	3	3	3	3	3
2	Develop and demonstrate listening skills for academic and professional purposes	1	2	2	3	3	2	2	2	3	3	2	3	3	3
3	Draw conclusions on explicit and implicit oral information	2	2	2	1	2	2	3	3	3	3	2	3	3	3
4	Develop effective reading skills and reinforce language skills required for using grammar and building vocabulary	2	2	3	3	2	3	3	3	3	3	3	3	3	3
5	Read for gathering and understanding information, following directions and giving responses	2	2	2	3	2	3	3	3	3	3	3	3	3	3

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 Mappin	**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^{2+} 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.

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	1	1	1	1	1	3	2	2	3	2	2
CO 2	3	2	2	1	2	1	1	1	3	2	2	3	2	2
CO 3	3	2	2	1	2	1	1	1	3	2	2	3	2	2
CO 4	3	2	2	1	2	1	1	1	3	2	2	3	2	2
CO 5	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, 17th edition 2003.

REFERENCES

1. Dhananjay A. JoIhe, 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

U19IT201 PROGRAMMING IN C 3 0 0 3

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	P09	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 outout 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", 15th 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.

U19IT202 INFORMATION TECHNOLOGY ESSENTIALS 2 0 0 2

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	P09	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 Approach‖, 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.

U19IT203 PROGRAMMING IN C LABORATORY 0 0 3 1.5

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	P09	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

U19CHL209	ENGINEERING CHEMISTRY LABORATORY	L	T	P	C
		0	0	3	1.5

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Analyse the given water sample to determine the amount of hardness and alkalinity.
CO2:	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,
CO3:	Estimate the amount of DO in water and evaluate the amount of iron content in the given sample using spectrophotometry

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	PO09	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1		1					1			2
CO2	3			1		1					1			2
CO3	3			1		1					1			2

Course Assessment methods

Direct		Indirect
Mean of 1st half of Experiment (10) Quiz on 1st half (5) Internal test I (10) Mean of 2nd half of Experiment (10)	Quiz on 2nd half (5) Internal test II (10) RTPS (10) End semester Examination (40)	Course end survey

List of Experiments (Chemistry part)

1	Estimation of hardness of water sample by EDTA method.
2	Estimation of alkalinity of water sample by indicator method.
3	Estimation of copper in brass by EDTA method.
4	Estimation of chloride ion present in the sample water by argentometric method.
5	Estimation of HCl by pH metry.
6	Determination of iron content in water by spectrophotometric method.
7	Estimation of HCl by conductometry. (HCl vs NaOH)
8	Estimation of mixture of acids by conductometry. (HCl + CH_3COOH vs NaOH)
9	Estimation of ferrous ion by potentiometric titration.
10	Determination of Molecular weight of a polymer by viscosity measurements.
11	Determination of Dissolved Oxygen of water by Winkler's method.
12	Estimation of chromium in waste water.
13	Estimation of corrosion rate by weight loss measurements.
14	Determination of calcium oxide in cement.
	Total Hours: 45 Hrs

U19GE201 - BASIC APTITUDE - II

L	T	P	C
0	0	2	0

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 under Regulations 2019
Branch: Information Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
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	**Mandatory Course**- Essence of Indian Traditional Knowledge	2	0	0	0	30
Practical							
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 Skills Laboratory	0	0	2	1	30
10	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
					Total Credits	**21**	

Approved By

Chairperson, Information Technology BoS **Member Secretary, Academic Council** **Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari **Dr.R.Shivakumar** **Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/Information Technology, Third Semester B.Tech IT Students and Staff, COE

U19IT301 DATA STRUCTURES 3 0 0 3

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	P09	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

UNIT V GRAPH 9

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++", 2nd 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++", 2nd edition, Universities Press, 2005.
4. Michael T.Goodrich, R.Tamassia and Mount "Data structures and Algorithms in C++", 2nd edition, Wiley , 2016.

U19IT302 DIGITAL LOGIC DESIGN 3 0 0 3

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	P09	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.

UNIT V HAZARDS AND FPGA LOGIC 9

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", 5th edition, Pearson Education, 2013.

REFERENCES

1. Larry L Kinney and Charles H.Roth Jr, "Fundamentals of Logic Design", 5th 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", 8th edition, TMH, 2014.
4. G.K.Kharate, "Digital Electronics", Oxford University press, 2012.
5. John F.Wakerly, "Digital Principles and practices", 4th edition, Pearson Education, 2013.

U19IT303 COMPUTER ARCHITECTURE 3 0 0 3

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	P09	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.

UNIT V I/O ORGANIZATION AND EMBEDDED SYSTEMS 9

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", 6th edition, McGraw Hill Education, 2017.

REFERENCES

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

U19IT304 OBJECT ORIENTED PROGRAMMING IN C++ 3 0 0 3

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++", 3rd 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", 3rd edition, Pearson Education, 2004.
6. E. Balaguruswamy, "Object-Oriented Programming with C++" Tata McGraw Hill, New Delhi, Sixth edition 2015.

U19IT305 DATA STRUCTURES USING C++ LABORATORY 0 0 4 2

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	P09	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

U19IT306 DIGITAL LOGIC DESIGN LABORATORY 0 0 2 1

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

U19ENG301- Communication Skills Laboratory (Lab/Practical Course) 0 0 2 1

(Common to all branches of Third / Fourth Semester B.E / B.Tech-programmes)

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

- Communicate confidently and effectively
- Demonstrate active listening skills
- Practice soft skills and interpersonal skills to excel in their jobs.
- Use language efficiently to face interviews, participate in group discussions and present speeches.

1. **Listening Comprehension**: Listening and typing – listening and sequencing of sentences – Filling in the blanks – Listening and answering questions.

2. **Reading Comprehension**: Filling in the blanks – Cloze exercises – Vocabulary building – Reading and answering questions.

3. **Speaking: Phonetics**: Intonation – Ear training – Correct Pronunciation – Sound recognition exercises – Common errors in English.

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

4. Making presentations: introducing oneself – introducing a topic – answering questions – individual presentation practice

5. Creating effective PPTs – presenting the visuals effectively

6. Using appropriate body language in professional contexts – gestures, facialexpressions, etc.

7. Preparing job applications - writing covering letter and résumé

8. Applying for jobs online - email etiquette

9. Participating in group discussions – understanding group dynamics - brainstorming the topic – mock GD

10. Training in soft skills - persuasive skills – people skills - questioning and clarifying skills

11. Writing Project proposals: collecting, analyzing and interpreting data / drafting the final report

12. Attending job interviews – answering questions confidently

13. Interview etiquette – dress code – body language – mock interview

TOTAL: 30 PERIODS

REFERENCE BOOKS:

1. English and Soft Skills, Dhanavel, S.P. Hyderabad: Orient BlackSwan Ltd. 2010.
2. How to Prepare for Group Discussion and Interview, Corneilssen, Joep. New Delhi: Tata-McGraw-Hill, 2009.
3. Group Discussion and Team Building D'Abreo, Desmond A. Mumbai: Better yourself books, 2004.
4. The ACE of Soft Skills, Ramesh, Gopalswamy, and MahadevanRamesh.New Delhi: Pearson, 2010.
5. Corporate Soft Skills, Gulati, Sarvesh. New Delhi: Rupa and Co. 2006.
6. Presentation Skills for Students, Van Emden, Joan, and Lucinda Becker. New York: Palgrave Macmillan, 2004.
7. Dictionary of Common Errors, Turton, N.D and Heaton, J.B. Addision Wesley Longman Ltd., Indian reprint 1998.

EXTENSIVE READING

1. The 7 Habits of Highly Effective People,Covey, Stephen R. New York: Free Press, 1989.

2. The Professional, Bagchi, Subroto.New Delhi: Penguin Books India, 2009.

Semester-III	U19 GE301- SOFT SKILLS AND APTITUDE – I	L T P C Marks 0 0 2 1 100
Course Outcomes **At the end of the course the student will be able to:**		
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		
1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics**: a. Attitude building b. Dealing with criticism c. Innovation and creativity d. Problem solving and decision making **e.** Public speaking **f.** Group discussions	
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** a. **Vedic Maths:** Fast arithmetic, multiplications technique, Criss cross, Base technique, Square root, Cube root, Surds, Indices, Simplification. b. **Numbers:** Types, Power cycle, Divisibility, Prime factors & multiples, HCF & LCM, Remainder theorem, Unit digit, highest power. c. **Averages:** Basics of averages and weighted average. d. **Percentages**: Basics of percentage and Successive percentages. e. **Ratio and proportion:** Basics of R &P, Alligations, Mixture and Partnership. f. **Profit ,Loss and Discount**: Basic & Advanced PLD g. **Data Interpretation**: Tables, Bar diagram, Venn diagram, Line graphs, Pie charts, Caselets, Mixed varieties, Network diagram and other forms of data interpretation. h. **Syllogism:** Six set syllogism using Venn diagram and tick and cross method	
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Verbal analogy b. Tenses c. Prepositions d. Reading comprehension e. Choosing correct / incorrect sentences f. Describing pictures g. Error spotting	

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

Sona College of Technology **Department of Mathematics**

B. TECH. / INFORMATION TECHNOLOGY

SEMESTER – III	DISCRETE AND COMBINATORIAL MATHEMATICS	L	T	P	C
U19MAT301D		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	P09	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.

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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, 8th Edition, 2019.
2. J. P. Trembly and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill Publishers, 1st Edition, 2017.

REFERENCES:

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

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20. 05. 2020

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U19GE303 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE 2 0 0 0

Course Outcomes

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

1. Analyze the basics of Indian traditional knowledge in modern scientific perspectives.
2. Explain the basics of Vedic science and its applications in modern days.
3. Discuss the introduction and objectives of modern science.
4. Describe the contribution of Noble laurates for India's achievements in Science and Technology.
5. Analyze the various traditional practices for holistic health care of human beings.

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

Unit I 6

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

Unit II 6

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

UNIT – III- Modern Science 6

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

UNIT – IV Technology 6

- 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

UNIT – V- Yoga and Holistic Health Care **6**

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

Reference Books

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan,Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, 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. ISBN13: 9780143066385
5. Raja Ram Mohan Roy, Vedic Physics, Mount Meru Publication ISBN : 9781988207049

Total: 30 hours

29/8/22	29/8/2022	29.8.
M. Raja	**Dr. C. Shanthi**	**Dr. M. Renuga**
Course Coordinator / Sciences	HOD / Sciences	Chairperson BOS, Science and Humanities

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
Theory							
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	**Mandatory Course-** Environment and climate science	2	0	0	0	30
Practical							
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
					Total Credits	**22**	

Approved By

Chairperson, Information Technology BoS	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**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
U19MAT401C		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	P09	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, 10th Edition, 2019.
2. J. K. Sharma, "Operations Research: Theory and Applications", Lakshmi Publishers, 6th Edition, Reprint, 2017.

REFERENCE BOOKS:

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

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13. 01. 2021 **B. E. / B. Tech. Regulations 2019**

U19IT401 OPERATING SYSTEMS 3 0 2 4

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	P09	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

LECTURE : 45 HOURS PRACTICAL : 30 HOURS 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, 3rd edition 2016.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, 3rd edition 2013.
3. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall of India, 7th edition, 2013.
4. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Tata Mc-graw Hill Publishing, 3rd 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

U19IT402 PRINCIPLES OF COMMUNICATION 3 0 0 3

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)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
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", 6th Edition, Pearson Education, 2018.
2. Alexander Kukushkinl, "Introduction to Mobile Network Engineering - GSM, 3G-WCDMA, LTE and the Road to 5G" , 1st Edition, Wiley, 2018.

REFERENCES

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

U19IT403 DESIGN AND ANALYSIS OF ALGORITHMS 3 0 2 4

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	P09	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.

LECTURE: 45 HOURS 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", 3rd edition, The MIT Press, 2009.
2. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", 3rd 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

U19IT404 **JAVA PROGRAMMING** **3 0 0 3**

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

UNIT V DATABASE CONNECTIVITY AND FUNCTIONAL PROGRAMMING 9

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", 11th 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", 9th edition, Prentice Hall, 2013.
2. K. Arnold, D. Holmes and J. Gosling, "The JAVA programming language", 4th edition, Addison Wesley Professional, 2005.
3. Timothy Budd, "Understanding Object-oriented programming with Java", 3rd edition, Addison Wesley, 2000.
4. C. Thomas Wu, "An introduction to Object-oriented programming with Java", 5th edition, Tata McGraw-Hill Publishing company Ltd., 2009.

U19IT405 JAVA PROGRAMMING LABORATORY 0 0 2 1

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	P09	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 StringBuffer 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

U19IT406 MICROPROCESSORS LABORATORY 1 0 2 2

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	P09	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 , 6th Edition, 2018.
2. A.K.Ray & K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", 3rd 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”, 2nd edition, Pearson education /Prentice hall of India , 2018.
6. Kenneth J.Ayala, “The 8051 microcontroller and Embedded systems using assembly and C”, 1st edition, Cengage learning publisher,2017.

LECTURE : 15 HOURS PRACTICAL : 30 HOURS TOTAL: 45 HOURS

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.

Semester – IV	U19GE401-SOFT SKILLS AND APTITUDE – II	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes

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

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

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. SWOT b. Goal setting c. Time management d. Stress management e. Interpersonal skills and Intrapersonal skills f. Presentation skills g. Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** a. Equations: Basics of equations , Linear, Quadratic Equations of Higher Degree and Problem on ages. b. Logarithms, Inequalities and Modulus c. Sequence and Series: Arithmetic Progression, Geometric Progression, Harmonic Progression, and Special Series. d. Time and Work: Pipes & Cistern and Work Equivalence. e. Time, Speed and Distance: Average Speed, Relative Speed, Boats & Streams, Races and Circular tracks and Escalators. f. Arithmetic and Critical Reasoning: Arrangement, Sequencing, Scheduling, Network Diagram, Binary Logic, and Logical Connection. g. Binary Number System.- Binary to decimal, Octal, Hexadecimal
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Critical reasoning b. Theme detection c. Verbal analogy d. Prepositions e. Articles f. Cloze test g. Company specific aptitude questions

06/01/2023

Dr.S.Anita

Head/Training

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

MANDATORY COURSE

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..

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, 4th 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., 2nd 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**

IT
V
24/7/23

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
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	noc23-cs83	**NPTEL-** Introduction to Internet of Things	3	0	0	3	45
	noc23-cs89	Cloud Computing					
	noc23-cs116	Design & Implementation of Human-Computer Interfaces					
Practical							
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
					Total Credits	**22**	

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 BE IT Students and Staff, COE

U19IT501 **COMPUTER NETWORKS** **3 0 0 3**

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	P09	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.

PS 17/7

J. Akilandeswari
Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

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, 6th edition 2017.
2. Larry L.Peterson and Peter S. Davie, "Computer Networks: A Systems Approach", Harcourt Asia Pvt. Ltd., 5th 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.

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U19IT502 DATABASE MANAGEMENT SYSTEMS 3 0 0 3

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	P09	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.

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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 ", 6th Edition, Addison-Wesley, 2014

REFERENCES

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

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U19IT503 THEORY OF COMPUTATION 3 1 0 4

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

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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 THEORY: 45 HOURS TOTAL : 60 HOURS

TEXT BOOKS

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman "Introduction to Automata Theory, Languages, and Computation ", 3rd 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", 4th Edition, McGraw-Hill, 2010

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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.

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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", 8th Edition, McGraw-Hill International Edition, 2019.
2. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 2008.

REFERENCES

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

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U19IT505 DATABASE MANAGEMENT SYSTEMS LABORATORY 0 0 4 2

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

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U19IT506 MOBILE APPLICATION DEVELOPMENT LABORATORY 0 0 4 2

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

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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	P09	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: 60 HRS

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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

TOTAL: 45 HOURS

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.

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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

TOTAL: 45 HOURS

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

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noc23-cs116 DESIGN & IMPLEMENTATION OF HUMAN-COMPUTER INTERFACES 3 0 0 3

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

TOTAL: 45 HOURS

BOOKS AND REFERENCES

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

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V Sem

Semester –V	U19GE501 : SOFT SKILLS AND APTITUDE - III	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes

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

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.

1.SOFT SKILLS	**Demonstrating soft-skill capabilities with reference to the following topics:** a. Career planning b. Resume writing c. Group discussion d. Teamwork e. Leadership skills f. Interview skills g. Mock interviews h. Mock GDs
2.QUANTITATIVE APTITUDE AND LOGICAL REASONING	**Solving problems with reference to the following topics :** a. **Geometry:** 2D, 3D, Coordinate Geometry, and Height & Distance. b. **Permutation&Combinations:**Principles of counting, Circular Arrangements and Derangements. c. **Probability:** Addition & Multiplication Theorems, Conditional Probability and Bayes Theorem. d. **Statistics** : Mean Median, Mode, Range and Standard Deviation. e. **Interest Calculation** :Simple Interest and Compound Interest f. **Crypto arithmetic:** Addition and Multiplication based problem. g. **Logical Reasoning** :Blood Relations, Directions Test, Series, Odd man out, Analogy, Coding & Decoding, Problems and Input – Output Reasoning. h. Statement & Assumptions, Statements & Arguments, Inference. i. **Company Specific Pattern** :Infosys and TCS company specific problems
3. VERBAL APTITUDE	**Demonstrating English language skills with reference to the following topics:** a. Subject verb agreement b. Selecting the best alternative for the stated parts of given sentences c. Reading comprehension d. Contextual synonyms e. Sentence fillers f. Writing a story for a given picture g. Company specific aptitude questions

S. Anit 31/07/2023.

Dr.S.Anita

Head/Training

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Syllabi for

B.E/B.Tech Honours (Specialization in the same Discipline)

B.E/B.Tech Honours

B.E/B.Tech Minor

courses

U19IT911 **CLOUD COMPUTING** **3 0 0 3**

COURSE OUTCOMES

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

1. Describe the architecture of Cloud computing and the applications can be deployed.
2. Select suitable deployment models and services from the cloud providers.
3. Identify the suitable technology for networking and storage in the cloud environment.
4. Discuss the various virtualization technologies chosen by the cloud service providers.
5. Examine the network and security issues in 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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2									1			
CO2	3	3	3		2					1				
CO3	3	1	1	1						1				
CO4	3	2	3			1		2			1			
CO5	3	2	2		2				1		1			

UNIT I INTRODUCTION AND CLOUD COMPUTING ARCHITECTURE 9

Computing Paradigms- Cloud Computing Fundamentals- Motivation for Cloud Computing- Defining Cloud Computing- Principles of Cloud computing- Cloud Ecosystem- Requirements for Cloud Services- Cloud Application- Benefits and Drawbacks - Introduction- Cloud Architecture- Anatomy of the Cloud- Network Connectivity in Cloud Computing- Applications on the Cloud- Managing the Cloud- Migrating Application to Cloud

UNIT II CLOUD DEPLOYMENT AND SERVICE MODELS 9

Introduction- Private Cloud- Public Cloud- Community Cloud- Hybrid Cloud- Infrastructure as a Service- Platform as a Service- Software as a Service- Other Cloud Service Models.

UNIT III TECHNOLOGICAL DRIVERS FOR CLOUD COMPUTING 9

SOA and Cloud - Multicore Technology- Virtualization - Memory and Storage Technologies- Networking Technologies – Web 2.0 – Web 3.0 - Pervasive Computing- Power of Cloud Computing in Application Development- Cloud Application Development Platforms – cloud computing APIs.

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UNIT IV VIRTUALIZATION AND PROGRAMMING MODELS FOR CLOUD COMPUTING 9

Virtualization Opportunities- Approaches to Virtualization- Hypervisors- Virtualization to cloud computing - Extended Programming Models for Cloud- Cloud Service Providers- EMC, Google, Amazon Web Services, Microsoft, IBM-Open Source Support for Cloud- Eucalyptus, Red Hat OpenShift Origin, Dropbox, CloudSim.

UNIT V NETWORKING, SECURITY AND ADVANCED CONCEPTS 9

Overview of data center environment – Networking issues – Transport layer issues – TCP enhancements – Security in cloud computing – Introduction – Security aspects – Platform related security – Audit and compliance – Advanced concepts in cloud computing.

TOTAL: 45 HOURS

TEXT BOOK

1. K.Chandrasekaran, "Essentials of Cloud Computing", CRC press, 2015.[1,2,3,4,5]

REFERENCE

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley, 2011.
2. Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009.

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U19IT2001 **VIRTUALIZATION** **3 0 0 3**

COURSE OUTCOMES

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

1. Explain the need, limitations, and challenges in virtualization.
2. Identify the different types of hypervisors and their roles.
3. Create a virtual machine and check for the accessibility.
4. Differentiate between various types of virtualization and cloning of virtual machines.
5. Apply virtualization in real-world scenarios through case studies.

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

UNIT I INTRODUCTION TO VIRTUALIZATION **9**

Understanding Virtualization – Describing Virtualization – Moore's Law – Importance of Virtualization – Virtualization and Cloud Computing – Understanding Virtualization software operations.

UNIT II UNDERSTANDING HYPERVISORS **9**

Hypervisors – History of Hypervisors – Type 1 Hypervisors – Type 2 Hypervisors – Role of Hypervisors – Today's Hypervisors- Vmware ESX – Citrix Xen.

UNIT III UNDERSTANDING AND CREATING VIRTUAL MACHINES **9**

Virtual Machine – How virtual machine works – Working with virtual machines – Performing P2V conversions – Loading your environment – Building a new virtual machine – Loading OS into virtual machine.

UNIT IV MANAGEMENT IN VIRTUAL MACHINE **9**

CPU virtualization – Hyper Threading - Memory Virtualization – Storage virtualization – Network Virtualization – Cloning a virtual machine – saving a virtual machine.

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UNIT V UNDERSTANDING AVAILABIILTY AND APPLICATIONS IN VIRTUALIZATION MACHINES **9**

Increasing availability – protecting a VM, Multiple VM, DC – Examining Virtual Infracture performance capabilities – Deploying applications in a virtual environment – understanding appliances and vApps – open stack and Containers – case studies.

TOTAL: 45 HOURS

TEXT BOOK

1. Matthew Portnoy, "Virtualization Essentials", Wiley Publishing Limited, 2023.

REFERENCES:

1. Michael Michael, Hector Linares, "Mastering Virtual Machine Manager", Sybex, 2020.
2. Dac-Nhuong Le, Raghvendra Kumar, Gia Nhu Nguyen, Jyotir Moy Chatterjee "Cloud Computing And Virtualization", Wiley-Scrivener, 2018.
3. Robert Method Karamagi, "Core Networks, Virtualization and Cloud Computing", 2020.
4. Gerardus Blokdyk, "Network Function Virtulization A complete guide", 5 starcooks, 2021.

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Minor

COURSE CODE		L	T	P	C
U19CE927	ENVIRONMENTAL IMPACT ASSESSMENT	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Define the terminologies related to Environmental Impacts
2.	Understand the various methodologies used in environmental Impact assessment procedure
3.	Recognize the various mitigation measures for effective environmental management plan
4.	Analyze and Apply the various EIA acts for resolving environmental issues
5.	Interpret the various real time scenarios where EIA effectively used for mitigating future issues.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Summarize the environmental attributes to be considered for the EIA study
CO2	Formulate the objectives of the EIA studies
CO3	Identify the methodology to prepare rapid EIA
CO4	Prepare EIA reports and environmental management plans
CO5	Illustrate the various EIA case studies for future needs

Knowledge Level: K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	POs												PSOs	
	PO1	PO	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	1	2	1	1	1	1	1	1	1	2	-	-	-
CO2	2	2	-	2	1	2	-	2	-	1	-	1	-	-
CO3	2	1	1	3	-	1	1	3	3	1	1	-	-	-
CO4	-	2	-	1	1	-	-	3	1	2	-	1	1	2
CO5	3	1	2	1	-	2	1	3	1	1	1	1	3	1
CO (Avg)	2.3	1.4	1.7	1.6	0.6	1.5	1	2.4	2	1.2	1.3	1	2	1.5

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	EIA INTRODUCTION	9 Hours

The Need for EIA - The EIA Cycle and Procedures-Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process.

UNIT-II	EIA METHODOLOGY	9 Hours

Environmental attributes-Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods - Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods - EIA review- Baseline Conditions - Construction Stage Impacts - post project impacts.

UNIT-III	ENVIRONMENTAL MANAGEMENT PLAN	9 Hours

EMP preparation - Monitoring Environmental Management Plan - Identification of Significant or Unacceptable Impacts Requiring Mitigation - Mitigation Plans and Relief & Rehabilitation - Stipulating the Conditions, Monitoring Methods, Pre-Appraisal and Appraisal.

UNIT-IV	ENVIRONMENTAL LEGISLATION AND LIFE CYCLE ASSESSMENT	9 Hours

Environment (Protection) Act 1986 - The Water Act 1974 - The Air act 1981 - Wild Life act 1972 -Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste management rules – Ecological sensitive places - International agreements - Life cycle assessment- Life cycle analysis, Methodology, Management, Flow of materials - cost criteria-Government of India Ministry of Environment and Forest Notification (2000) - List of projects requiring Environmental clearance - Application form - Composition of Expert Committee

UNIT-V	ENVIRONMENTAL IMPACT ASSESSMENT CASE STUDIES	9 Hours

Preparation of EIA for developmental projects - Factors to be considered in making assessment decisions – Violation of Environmental issues and its remedial measures in areas such as Water Resources Project, Pharmaceutical industry, thermal power plant, Nuclear fuel complex, Highway project, Sewage treatment plant and Municipal Solid waste processing plant.

	TOTAL: 45 PERIODS
TEXT BOOKS:	
1.	Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2017
2.	Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers, 2018
	N. S. Raman, A. R. Gajbhiye, and S. R. Khandeshwar, "Environmental Impact Assessment", I.K.International Publishing House Pvt.Ltd. 2014.
REFERENCES:	
1.	Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand Reinhold Co., New York, 1991.
2.	Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996.

minor

COURSE CODE	COURSE NAME	L	T	P	C
U19CE2022	GREEN BUILDING AND SUSTAINABLE MATERIALS	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Gain the overall knowledge on fundamentals of green buildings
2.	Understand the availability & properties of different waste materials for green construction
3.	Know how to select the suitable location for structure and different ways to preserve water
4.	Realize the effects of global warming and the value of solar to conserve energy
5.	Assess the green building by different rating systems

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	State the Concept & Objectives of the cost effective construction and green building (K1)
CO2	Select different building materials for green construction (K3)
CO3	Identify and plan the proper site and make use of water effectively in green construction (K4)
CO4	Understand the problems due to Global Warming and employ alternative source of energy (K2)
CO5	Analyze buildings for Green rating systems (K4)

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		1	-	-	1	-	-	1	-	2	2	2
CO2	2	2	2	3	3	1	3	2	1	1	2	2	3	3
CO3	3	3	2	2	2		2	3	3	1	2	2	3	2
CO4	3	2	2	2	1	1	3	-	-	1	2	2	3	2
CO5	2	2	3	2	-	-	-	3	3	1	-	2	3	3
CO (Avg)	2.6	2	1.8	2	1.2	0.4	1.8	1.6	1.4	1	1.2	2	2.8	2.4

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	INTRODUCTION	9 Hours

Definition, Features, Necessity, Environmental benefit, Economical benefits, Health and Social benefits. Green Materials-Comparison of Initial cost of Green V/s Conventional Building, Life cycle cost of Buildings.

UNIT-II	BUILDING MATERIALS FOR GREEN BUILDINGS	9 Hours

Methods to reduce embodied energy in building materials: (a) local building materials (b) Use of natural and renewable materials like bamboo, timber, stabilized mud blocks, (c) use of materials with recycled content such as cements, fly ash bricks, vitrified tiles, materials from agro and industrial waste. (d) Reuse of waste materials. Waste Management: Handling of construction waste materials, on-site and off-site organic waste management

UNIT-III	SITE SELECTION AND PLANNING	9 Hours

Criteria for site selection, preservation of landscape, soil erosion control, minimizing urban heat island effect, maximize comfort by proper orientation of building facades, day lighting, ventilation, etc.
Water conservation and efficiency: Rainwater harvesting methods for roof & non-roof, water demand by proper irrigation systems, water efficient plumbing systems, waste water treatment, recycle and reuse systems.

UNIT-IV	GLOBAL WARMING AND ENERGY EFFICIENCY	9 Hours

Global Warming : Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions, Utility of Solar Energy in Buildings: Utility of Solar energy in buildings, concepts of Solar Passive Cooling and Heating of Buildings.

UNIT-V	BIM MODELLING	9 Hours

BIM basic introduction, softwares for BIM, Revit introduction- demonstration, 6D BIM sustainability model, Architecture and MEP modelling in BIM, case studies

TOTAL: 45 Hours

TEXT BOOKS:

1.	Harhara Iyer G, Green Building Fundamentals, Notion Press 2022.
2.	Dr.Adv.Harshulsavla ,Green Building Principles & Practices, Kindle Edition, 2021
3.	K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao, Alternative building materials and technologies, New Age International Publisher, 2007.
4.	G. D. Rai , Non-Conventional Energy Resources, Khanna Publishers,1988.
5.	IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green Building Council Publishers.
REFERENCES:	
1.	GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
2.	Charles J. Kibert, Sustainable Construction – Green Building Design and Delivery, John Wiley & Sons, New York, 2008.

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Courses of Study for B.E/B.Tech. Semester VI under Regulations 2019 (CBCS)
Branch: Information Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	U19IT601	Full Stack Development	3	0	0	3	45
2	U19IT602	Machine Learning	3	0	0	3	45
3	U19IT912	**Professional Elective** – Total Quality Management	3	0	0	3	45
	U19IT929	**Professional Elective** – Human Computer Interaction					
4	U19IT913	**Professional Elective** – Software Quality Assurance	3	0	0	3	45
5	U19BM1001	**Open Elective-** Hospital Management	3	0	0	3	45
	U19CE1002	Municipal Solid Waste Management					
	U19EE1001	Electric Mobility					
	U19EE1002	Energy Conservation and Management					
	U19EE1004	Renewable Energy Systems					
	U19FT1001	Fundamentals of Fashion Design					
	U19FT1002	Garment Manufacturing Technology					
	U19MC1004	Fundamentals of Robotics					
	U19ME1002	Industrial Safety					
	U19ME1004	Renewable Energy Sources					
		Practical					
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
					Total Credits	**21**	

Approved By

27/12/23 28/12/23

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar 28/12/23

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

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

U19IT601 **FULL STACK DEVELOPMENT** **3 0 0 3**

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

UNIT IV **REACT JS** **9**

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,

UNIT V **NODE.JS, EXPRESS AND MONGO DB** **9**

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, Mongodb,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", 5th 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",2nd edition, 2018

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Date: 22-12-2023

U19IT602 **MACHINE LEARNING** **3 0 0 3**

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	P09	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

UNIT V OTHER TOPICS **9**

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", 1st edition, McGraw Hill Education, 2017.
4. Ethem Alpaydın, "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.

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Date: 22-12-2023

U19IT603 FULL STACK DEVELOPMENT LABORATORY 0 0 4 2

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

Date: 22-12-2023

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

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U19IT604 SOFTWARE DESIGN AND TESTING LABORATORY 0 0 4 2

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	P09	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

HOURS: 60 HOURS

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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	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. 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: 60 Hours

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Date: 22-12-2023

U19IT912 TOTAL QUALITY MANAGEMENT 3 0 0 3

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.Besterfiled, et al., "Total Quality Management", Pearson Education, Inc. 2019.

REFERENCES

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

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U19IT913 **SOFTWARE QUALITY ASSURANCE** **3 0 0 3**

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	P09	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 developmenting – 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.

J. Dilandi

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U19IT929 HUMAN COMPUTER INTERACTION 3 0 0 3

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	P09	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.

UNIT V INTERACTION DEVICES 9

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. Barfied, 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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Semester –VI	U19GE601: SOFT SKILLS AND APTITUDE – IV (Common to all dept except Civil)	L	T	P	C	Marks
		0	0	2	1	100

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

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

1. Soft Skills	**Demonstrating Soft -Skills capabilities with reference to the following topics:** a. Mock group discussions b. Mock interviews c. Mock stress interviews
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** 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
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** 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

30 Hours

S. Anita
18/12/2023

Dr.S.Anita
Professor and Head
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U19BM1001	HOSPITAL MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Describe the basics of Hospital Management.
CO2	•	Illustrate the knowledge of Human resource management and marketing in hospitals.
CO3	•	Apply various Quantitative methods in healthcare management.
CO4	•	Amalgamate their knowledge in Hospital information system and supportive services.
CO5	•	Explain the quality and safety aspects in Hospital.

CO/PO, PSO Mapping

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

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	-	-	2	1	2	2	1	2	1	-	2	1
CO2	2	1	1	-	-	2	1	2	3	1	2	1	-	2	1
CO3	2	1	1	-	-	2	1	2	3	1	1	1	-	2	1
CO4	2	1	1	-	-	2	1	2	2	1	1	1	-	2	1
CO5	2	1	1	-	-	2	1	2	2	1	1	1	-	2	1

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 Hours

TEXTBOOKS:

1. R.C. Goyal, Hospital Administration and Human Resource Management, PHI, 4th Edition, 2006.
2. G.D. Kunders, Hospitals – Facilities Planning and Management, TMH, New Delhi, 5th Reprint, 2007.

REFERENCES:

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.

COORDINATOR

K.MANIKANDAN

Asst. Prof /BME

CHAIRMAN

BoS-BME

Dr.S.PRABAKAR, M.E.,Ph.D.,
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PREAMBLE
To
Municipal Solid Waste Management

Solid wastes represent one of the main environmental problems in India that needs to be dealt with. In order to minimize environmental impacts and pave the way for a sustainable development, integrated and specific actions need to be adopted and implemented. Due to rapid increase in the production and consumption processes, societies generate as well as reject solid materials regularly from various sectors – agricultural, commercial, domestic, industrial and institutional. The present course covers evaluation on the type and nature of wastes, estimation of total volumes and assessment of handling, storage, transportation and disposal methods to be adopted and the potential environmental impacts.

The overall objectives of the course:

- To assess the activities involved for the proposed and determine the type, nature and estimated volumes of waste to be generated.
- To identify any potential environmental impacts from the generation of waste at the site;
- To recommend appropriate waste handling and disposal measures / routings in accordance with the current legislative and administrative requirements; and
- To categories waste material where practicable (inert material / waste fractions) for disposal considerations i.e. public filling areas / landfill.

COURSE CODE	COURSE NAME	L	T	P	C
U19CE1002	MUNICIPAL SOLID WASTE MANAGEMENT	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:	
1.	Provide a broader understanding on various aspects of sources and solid waste management.
2.	Impart the basic knowledge in the methods and processing of on-site storage.
3.	Provide the basic knowledge of types of collection vehicles and transfer stations.
4.	Aware the students about different techniques involved in off-site processing.
5.	Awareness to be given on disposing the wastes using sanitary landfills.
Course Outcome (s) (COs): At the end of this course, the students will be able to:	
CO1	Identify the sources, types and characteristics of solid wastes. **(K1)**
CO2	Choose the on-site storage methods and processing techniques. **(K2)**
CO3	Summarize the methods of collection and its components. **(K2)**
CO4	Outline the off-site processing techniques & equipment's and resource recovery from solid wastes. **(K3)**
CO5	Evaluate the processing techniques and disposal methods for managing the municipal solid wastes. **(K4)**
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	2	-	-	-	2	2	1	-	-	-	-	2	-
CO2	3	-	-	-	-	3	2	-	-	-	-	-	2	-
CO3	3	-	-	-	-	2	2	1	-	-	-	3	2	-
CO4	3	-	-	-	3	3	2	1	-	-	-	3	2	3
CO5	3	3	3	-	3	3	2	1	-	-	-	3	2	3
CO (Avg)	3	1	0.6	-	1.2	2.6	2	0.8	-	-	-	1.8	2	1.2

Correlation Level:	1:Slight (Low)	2:Moderate (Medium)	3:Substantial (High)

UNIT-I	SOURCES AND TYPES	9 Hours

Sources and types of solid wastes - Quantity - factors affecting generation of solid wastes; characteristics - methods of sampling and characterization; Effects of improper disposal of solid wastes - public health effects. Principle of solid waste management –IOT Applications in Waste management; Public awareness; Role of NGOs; Solid waste management rules 2016 - Construction and demolition Wastes

UNIT-II	ON-SITE STORAGE AND PROCESSING	9 Hours

On-site storage methods - Materials used for containers - on-site segregation of solid wastes - public health & economic aspects of storage - options under Indian conditions - Critical evaluation of options.

UNIT-III	COLLECTION AND TRANSFER	9 Hours

Methods of Residential and commercial waste collection - Collection vehicles - Manpower- collection routes - Analysis of collection systems; Transfer stations - Selection of location, operation & maintenance; options under Indian conditions - Field problems- solving

UNIT-IV	OFF-SITE PROCESSING	9 Hours

Processing techniques and equipment; Resource recovery from solid wastes - Composting, incineration, Pyrolysis - Options under Indian conditions - Case studies.

UNIT-V	DISPOSAL	9 Hours

Dumping of solid waste; Sanitary landfills - Site selection, design and operation of sanitary landfills -Leachate collection and treatment, Land fill bio reactor, Landfill capping, Landfill mining.

TOTAL: 45 Hours

TEXT BOOKS:

1. George Tchobanoglous, "Integrated Solid Waste Management", McGraw-Hill Publishers,2003.
2. Vesilind P.A. and Rimer A.E, "Unit Operations in Resource Recovery Engineering", Prentice Hall, Inc., 1981

REFERENCES:

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000.
2. Landreth R.E, and P.A and Rebers, "Municipal Solid Wastes –problems and Solutions", Lewis Publishers, 2000.
3. Ramachandra T.V, "Management of Municipal Solid Waste", TERI press, New Delhi, 2009.
4. Paul T Willams, "Waste Treatment and Disposal", John Wiley and Sons, 2000
5. http://nptel.iitm.ac.in

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O.E

EEE
VI

U19EE1001 **ELECTRIC MOBILITY** **3 0 0 3**

COURSE OUTCOMES

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

- Explain the need for electric and hybrid vehicles fundamentals.
- Describe the energy sources of types of batteries and fuel cells.
- Discuss the various types of motor control design features of Electric vehicle.
- Illustrate the design of various considerations of electric vehicle.
- Explain the hybrid design vehicle technology.

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

UNIT I INTRODUCTION **9**

Need for electric and hybrid vehicles-Comparative study of electric and hybrid vehicles-Limitations of electric vehicles- Petroleum resources- Global warming-Fuel cell vehicles-Optimum solutions for motor, drives and batteries.

UNIT II ENERGY SOURCES **9**

Battery Parameters-Power requirement of electric vehicles- Different types of batteries - Lead acid- Nickel based-Sodium based-Lithium based- Metal Air based. Battery charging- Charger design- Quick charging devices- Battery Modeling. Different type of energy storage – Solar, wind, compressed fluid. Fuel Cell- Fuel cell characteristics- Fuel cell types-Hydrogen fuel cell-Connecting cell in series.

UNIT III PROPULSION MOTORS AND CONTROLLERS **9**

Characteristic of permanent magnet and separately exited DC motors.–Basic Principles of BLDC Motor Drives-Performance Analysis and Control of BLDC Machines- Inverters – DC and AC motor speed controllers.

S. Padma 23.12.23

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UNIT IV DESIGN OF ELECTRIC VEHICLES FUNDAMENTALS 9

Aerodynamic-Rolling resistance- Transmission efficiency- Grading Resistance -Vehicle mass-Electric vehicle chassis and Body design considerations- Heating and cooling systems-Controllers- Power steering-Vehicle Performance.

UNIT V HYBRID VEHICLES 9

Types of Hybrid- Series, parallel, parallel - Advantages and Disadvantages-Hybrid drive prospects-Hybrid technology case studies - Production hybrid-drive cars -Hybrid passenger and goods vehicles.

Lecture: 45; Tutorial: 0; Total: 45 Hrs

TEXT BOOKS:

1. 1.Mehrdad Ehsani, " Modern Electric, Hybrid Electric and Fuel Cell Vehicles", CRC Press, 2009.
2. Ron HodKinson, " Light Weight Electric/Hybrid Vehicle Design", Butterworth Heinemann Publication, 2005.

REFERENCE BOOKS

1. Iqbal Husain, " Electric and Hybrid Vehicles-Design Fundamentals", CRC Press, 2003.
2. Jack Erjavec, "Hybrid, Electric & Fuel-Cell Vehicles", Delmar, Cengage Learning, 2013.
3. James Larminie and John Lowry, "Electric Vehicle Technology Explained " John Wiley &Sons, 2003.

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U19EE1002 **ENERGY CONSERVATION AND MANAGEMENT** **300 3**

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	P09	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.

23.12.23
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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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U19EE1004 **RENEWABLE ENERGY SYSTEMS** **3 00 3**

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	P09	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 energyutilization – Energy plantation- Renewable energy resources and their importance-Prospects of Renewable energy sources.

UNIT II SOLARENERGY 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 ENERGYSYSTEMS 9

Introduction – Wind Energy conversion- Wind speed and power relation – Power extracted from wind – wind distributionand 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 GEOTHERMAL, 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.

S. Padma 23.12.23

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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. MukundR.Patel, "Wind and Solar Power Systems", CRC Press LLC.

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U19FT1001 FUNDAMENTALS OF FASHION DESIGN 3 0 0 3

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.

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	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**

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Professor & Head
Department of Fashion Technology
Sona College of Technology
Salem - 636 005. Tamil Nadu

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

Dr. D. RAJA, M.Tech., Ph.D.,
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Sona College of Technology
Salem-636 005. Tamil Nadu

TEXT BOOKS

1. Munslow, Janine, McKelvey, Kathryn "**Fashion Design Process Innovation and Practice**", 2nd 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.

U19FT1002 GARMENT MANUFACTURING TECHNOLOGY 3 0 0 3

COURSE OUTCOMES

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

1. Explain the basics of garment technology.
2. Explain in detail about the various seams, stitches, needle type, sewing thread and types of sewing machines.
3. Explain in detail about the various garment accessories.
4. Explain the sewing quality parameters and method of garment laundering.
5. Discuss the quality standards of apparel industry and finishing of garments.

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	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2						3	3	2
CO2	3	3	3	3	3	3	1					3	3	2
CO3	2	3	3	3	3	3	3					3	3	3
CO4	3	3	3	3	3	3	3	3				3	3	2
CO5	2	3	2	3	3		3	2				3	3	2

UNIT-I Basics of apparel industry - lay out, process sequence 9

Introduction: Apparel industry in world, types of workers in apparel industry, typical layout of apparel industry.

Garment Production Sequence: Fabric selection, pattern making, grading, marker planning, spreading, cutting and sewing , finishing and packing.

UNIT II Seams, Stitches, Needle and Sewing Threads, Types of sewing Machines 9

Seam and Stitches: Classification of seams and stitches, single needle lock stitch machine, parts and functions.

Needle and Sewing Thread: Needle, functions, special needles, needle size, numbering, needlepoint, sewing thread construction, material, thread size, sewing thread packages.

Basics of sewing machines: Single needle Lock stitch, Double needle lock stitch, Over lock, Flat lock, Feed of the arm, Button Attaching, Button hole machine.

Unit III Garment Accessories 9

Garment add-on: Labels, linings, interlinings, wadding, lace, braid, elastic, hook and loop fastening, shoulder pads, eyelets and laces, zip fasteners, buttons, Tapes, Tags.

UNIT IV Overview of garment making and care labelling of garment 9

Sewing Process: Garment basic components and assembly process.

Alternative sewing process: Fusing, welding, adhesive, seamless garments, moulding, robotics in sewing.

Basic sizes of mens wear, women's wear, childrens wear and its description.

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Types of labels: Size label, brand label, wash care label, designer label.

UNIT V Defects in garment, pressing and Packing 9

Defects: Common defects in woven fabric, knitted fabric and garment.
Garment pressing: Pressing types and pressing equipments.
Packing: Types of packing and different types of packing materials.

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TOTAL: 45 hours

TEXT BOOKS

1. Rajkishore Nayak Rajiv Padhye, "**Garment Manufacturing Technology**" 1st Edition, woodhead publication, 2015.
2. Ganesan, P., Gopalakrishnan, D., Karthik, T, **"Apparel manufacturing technology",** CRC Publication, 2016.
3. Gerry Cooklin, Steven George Hayes, John McLoughlin, Dorothy Fairclough. "**Cooklin's Garment Technology for Fashion Designers"**, John Wiley & Sons, 2011.

REFERENCE

1. EIRI Consultants and Engineers, **"Hand book of garment manufacturing technology",** 2017.
2. Janace E. Bubonia, **"Apparel production terms and processes",** 2017.
3. Harold Carr, Barbara Latham, **"The Technology of Clothing Manufacture",** Wiley, 1994.

Department of Mechatronics Engineering

Open Elective

U19MC1004	FUNDAMENTALS OF ROBOTICS	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Understand the basic robotic concepts
CO2:	Select the suitable drive system for robot application
CO3:	Select the suitable sensors and grippers for the respective application
CO4:	Develop VAL Programming for simple applications
CO5:	Illustrate the robotic application in various sectors

Pre-requisite

NIL

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			3	2		3		3	3	3	3
CO2	2	2	2		3				3		2	3	2	3
CO3	3	2	2		3				3		2	3	3	3
CO4	3	3	3	3	3				3		2	3	3	2
CO5	3	3	3	3	3	3	3		3			2	3	3

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: INTRODUCTION TO ROBOTICS — **9 Hours**

Introduction to Robotics – History of Robotics – Laws of Robotics - Anatomy of a Robot – Classification of Robots – Robot Configurations - Robot subsystems: Motion subsystem, Recognition subsystem, Control subsystem – Robot Links – Joints in robot –Robot Specifications.

Unit 02: ROBOT MOTIONS AND DRIVE SYSTEMS	9 Hours
Degrees of freedom – DOF associated with arm and body - DOF associated with wrist –Joint Notation scheme-Robot Kinematics – Robot Drive systems – Hydraulic Actuators – Pneumatic actuators – Electrical actuators: Stepper motors, DC motors, Servomotor.	
Unit 03: ROBOT SENSORS AND END EFFECTORS	**9 Hours**
Classification of Robotic sensors and their functions – Tactile sensors – Inductive Proximity sensor – Hall effect sensor – Range sensor –Force ant Torque sensors- Types of end effectors – Mechanical grippers – Vacuum cups – Magnetic grippers – Adhesive grippers – Tools as end effectors.	
Unit 04: ROBOT PROGRAMMING	**9 Hours**
Methods of Robot Programming: Lead through methods, Textual robot Languages – Robot language structure – First generation Languages – Second generation Languages – VAL Programming – Simple Programming examples.	
Unit 05: ROBOT APPLICATIONS	**9 Hours**
Robotics Applications in Manufacturing: Welding Robot, AGVs– Healthcare: Surgery Robot, Therapeutic Robot – Agriculture: Crop Harvesting & Fruit Picking Robot – Defence & Space: Exoskeleton Robot, Telerobotics.	

Theory: 45 Hrs	Tutorial: --	Practical: --	Total Hours: 45 Hrs

TEXT BOOKS

1. M.P.Groover, M.Weiss,R.N. Nagal,N.G.Odrey, "Industrial Robotics - Technology, programming and Applications" Tata McGraw-Hill Publication, 2012.

REFERENCES

1. Richard D.Klafter, "Robotics Engineering" PHI Learning Private Limited, 2009.
2. Ganesh S.Hedge, "A text book in Industrial Robotics", Laxmi Publications, 2006.
3. S K Saha, "Introduction to Robotics", Tata McGraw-Hill Publication, 2012.
4. Sathya Ranjan Deb, "Robotics Technology & flexible Automation" Second edition, Tata McGraw-Hill Publication, 2009.

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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 sprine 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
CO – 1	3	3	3	-	3	3	3	2	3	3	2	3	3	3
CO – 2	3	-	3	3	3	3	3	-	3	3	3	3	3	3
CO – 3	3	3	3	2	3	3	3	-	3	3	3	3	3	3
CO – 4	3	3	3	2	3	3	3	-	3	3	2	3	3	3
CO – 5	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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Syllabi for

B.E/B.Tech Honours (Specialization in the same Discipline)

B.E/B.Tech Honours

B.E/B.Tech Minor

courses

U19IT2002 DOCKERIZATION AND KUBERNETES 3 0 2 4
U19ADS2003

COURSE OUTCOMES

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

1. Create and run Docker images using various commands and techniques.
2. Analyze and evaluate different Docker networking options, such as Docker swarm and overlay networks.
3. Create and manage pods in Kubernetes, utilizing namespace and virtual cluster concepts.
4. Design and implement storage solutions in Kubernetes using storage providers, persistence volumes, and storage classes.
5. Analyze and evaluate different security features and best practices, such as network policies, runtime class, and image security, in Kubernetes deployments.

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

UNIT – I INTRODUCTION TO DOCKER 9

Overview of Docker - Containers vs. virtual machines - Installing Docker - Creating and running Docker images - Managing Docker containers - Docker engine - Images - Containers.

UNIT – II DOCKER NETWORKING AND STORAGE 9

Docker swarm – Docker networking – volume and persistent data – deploying apps with docker stacks – security in docker.

UNIT – III INTRODUCTION TO KUBERNETES 9

Introduction - Kubernetes architecture and components - Kubernetes installation and configuration – Working with pods, virtual cluster with Namespace , Kubernetes deployments.

UNIT – IV SERVICES AND STORAGE 9

Kubernetes services: service theory - hands on with services - Ingress: settings – architecture – clean up, Service discovery: service registration – discovery -namespace and troubleshooting, Storage: storage provider – container storage interface – persistence volume – storage classes.

UNIT – V **DEPLOYMENTS AND SECURITY** **9**

Deployment : Creating – managing – updating – scaling. Deployment strategies: recreate – rolling update, Deleting and monitoring deployment, Understanding security context, pod security, service account management, role-based access control, runtime class, network policy, service mesh, image security.

THEORY: 45 HRS **PRACTICALS: 30 HRS** **TOTAL: 75 HOURS**

TEXT BOOK

1. Nigel Poulton, "Docker Deep Dive", 1st Edition , Shroff Publishers & Distributors, 2023. (Unit I and II)
2. Nigel Poulton, "The Kubernetes Book", 1st Edition, Shroff Publishers & Distributors, 2023. (Unit III and IV)
3. Brendan Burns, "Kubernetes: Up and Running: Dive into the Future of Infrastructure", 3rd edition, O'Reilly Media, 2022. (Unit V)

REFERENCES

1. Sean P. Kane and Karl Matthias, "Docker: Up & Running", 2nd Edition , O'Reilly Media, 2018.
2. Jeff Nickoloff and Stephen Kuenzli, "Docker in Action, 2nd Edition" , Manning Publications, 2020.
3. Joseph D. Moore, "Kubernetes: The Complete Guide To Master Kubernetes", Independently published. 2019
4. Marko Luksa, "Kubernetes in Action", 2nd Edition, Manning Publications, 2021.
5. John Arundel , Justin Domingus, "Cloud Native DevOps with Kubernetes: Building, Deploying, and Scaling Modern Applications in the Cloud", 1st Edtion, O'Reilly Media, 2019.

LIST OF EXPERIMENTS

1. Create a Docker image using a Dockerfile and run a container based on that image to deploy a web application.
2. Set up a Docker swarm cluster, create a service spanning multiple nodes, and configure Docker networking to ensure network connectivity between containers.
3. Deploy an application in a Kubernetes cluster using a Deployment manifest and verify its functionality within the cluster.
4. Configure a Kubernetes Service to expose an application within the cluster and set up Ingress to route external traffic to the Service for access.
5. Manage Kubernetes deployments, perform rolling updates, and apply security contexts to pods to control access and container-level security settings.

J. Akilandeswari

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U19IT2006/ U19ADS2007 **CONTAINER ORCHESTRATION AND INFRASTRUCTURE AUTOMATION** **3 0 0 3**

COURSE OUTCOMES

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

1. Describes the basics of Container technology used in cloud computing.
2. Elaborate the Container Technology, Dockers and apache mesos.
3. Formulate and design the Container Orchestration Engine.
4. Describe the basics of Automation, automation replication and parallelism.
5. Formulate infrastructure Automation using terraform.

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

UNIT I INTRODUCTION CONTAINER TECHNOLOGY 9

Introduction to containers – Container components – Types of Containers: Machine containers, application containers – Types of container run time tools- Working with Dockers: images, containers.

UNIT II FORMULATING CONTAINERS 9

Creating Containerized Services: Working with Containers, Architecture, Container and hosts Configuring, Containers & Shells, File. Build in Files, public Repositories, Managing ports, Private Registries, Build in a Web Server Docker File.

UNIT III CONTAINER ORCHESTRATION ENGINE 9

Introduction to Container Orchestration Engine – Docker swarm: Docker swarm components, Task, services, discovery services, scheduler – Apache Mesos: components of apache mesos.

UNIT IV AUTOMATION 9

The need for Automation in data center - What can be Automated – Levels of Automation – Automation Tools and its evolution - **Automation replication and parallelism:** Automation with a larger scope.

UNIT V INFRASTRUCTURE AUTOMATION USING TERRAFORM 9

Introduction to Cloud Infrastructure Automation tools – Ansible, chef, puppet, saltstack, terraform – Terraform basics and configuration, modules and terraform cloud.

TOTAL: 45 HOURS

TEXT BOOKS:

1. Comer, Dogulas E. The Cloud Computing Book: The Future of Computing Explained. Champman and Hall/CRC, 2021 (Unit – IV)
2. "Cloud Native: Using containers, functions, and data to build next-generation applications", by Boris Scholl , Trent Swanson , Peter Jausovec , 2019 (Unit – III)
3. "Containers in OpenStack: Leverage OpenStack services to make the most of Docker, Kubernetes and Mesos",by Pradeep kumar singh, Madhuri Kumari, 2017 (Unit I, Unit – II, Unit - III)
4. "Infrastructure automation with terraform", by Ankita Patil, Mitesh Soni, 2022 (Unit – V)

REFERENCES:

1. Sayfan. Gigi, "Hands-on Microservices with Kubernetes: Build, deploy, and manage scalable microsrvices on Kubernetes", packt publishing Ltd, 2019.
2. "Infrastructure Automation with Terraform" by Ankita Patil, Mitesh Soni, **2022.**
3. **"**Practical Process Automation" by Bernd Ruecker, published by O'Reilly 2021
4. "Network Automation Cookbook," by Author:Karim Okasha Publisher:Packt Publishing, 2020.
5. "Network programmability and automation", by Jason Edelman , Matt Oswalt , Scott Lowe (Author) 1st edition 2018.

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U19ADS2042 **DATA VISUALIZATION** **3 0 2 4**

COURSE OUTCOMES

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

1. Explain the fundamentals of Exploratory Data Analysis.
2. Explore the significance of different data transformation techniques.
3. Implement correlation and time series data analysis.
4. Evaluate different datasets with NumPy and Pandas.
5. Apply data exploration and visualization techniques with Matplotlib on different datasets.

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	2			2	2	2	2	2	2
CO2	3	3	3	3	3	2			2	2	2	2	2	2
CO3	3	3	3	3	3	2			2	2	2	2	2	2
CO4	2	3	3	3	3	2			2	2	2	2	3	3
CO5	2	3	3	3	3	2			2	2	2	2	3	3

UNIT I INTRODUCTION TO DATA VISUALIZATION IN EDA 9

Exploratory Data Analysis (EDA) fundamentals – Understanding data science – Significance of EDA – Making sense of data – Comparing EDA with classical and Bayesian analysis – Software tools for EDA - Visual Aids for EDA.

UNIT II DATA TRANSFORMATION TECHNIQUES 9

Technical requirements - merging database, reshaping and pivoting, Transformation techniques - Grouping Datasets - data aggregation – Pivot tables and cross-tabulations.

UNIT III CORRELATION AND TIME SERIES ANALYSIS 9

Introducing Correlation – Types of analysis – Discuss multivariate analysis using the Titanic dataset – Outline Simpson's paradox – Understand the time series dataset – TSA with open power system data.

UNIT IV BUILDING VISUALIZATIONS 9

Chart your data - Chart design principles, Google sheet charts, Bar and Column charts, Histograms, Pie, Line and Area charts, Data wrapper charts, Annotated charts, Range charts, Scatter and Bubble charts, Tableau public charts, Filtered Line chart – Map your data – Table your data.

UNIT V CODE TEMPLATES AND ADVANCED TOOLS 9

Edit and Host code with GitHub – Chart.js and Highcharts templates – Leaflet map templates – Transform your map data – Geospatial data and GeoJSON, Find GeoJSON Boundary files, Draw and edit GeoJson.io, Edit and join with Mapshaper.

THEORY: 45 HRS **PRACTICALS: 30 HRS** **TOTAL: 75 HOURS**

TEXT BOOKS:

1. Suresh Kumar Mukhiya, Usman Ahmed, "Hands-On Exploratory Data Analysis with Python", Packt Publishing, 2020. (Unit 1, 2 and 3)
2. Jack Dougherty, Ilya Ilyankou, "Hands-On Data Visualization", O'Reilly Media, Apr 2021. (Unit 4 and 5)

REFERENCES:

1. Eric Pimpler, Data Visualization and Exploration with R, GeoSpatial Training service, 2018.
2. Claus O. Wilke, "Fundamentals of Data Visualization", O'reilly publications, 2019.
3. Matthew O. Ward, Georges Grinstein, Daniel Keim, "Interactive Data Visualization: Foundations, Techniques, and Applications", 2nd Edition, CRC press, 2015.
4. Fabio Nelli, "Python Data Analytics with Pandas, Numpy and Matplotlib", Apress, 2nd Edition, 2018.

LIST OF EXPERIMENTS:

1. Perform exploratory data analysis (EDA) on with datasets like email data set. Export all your emails as a dataset, import them inside a pandas data frame, visualize them and get different insights from the data.
2. Perform Time Series Analysis and apply the various visualization techniques.
3. Perform Data Analysis and representation on a Map using various Map data sets with Mouse Rollover effect and user interaction.
4. Build cartographic visualization for multiple datasets involving various countries of the world, states, and districts in India etc.
5. Perform EDA on Wine Quality Data Set and Map data transformation using advanced tools.

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U19ADS2038 **MACHINE LEARNING** **3 0 2 4**

COURSE OUTCOMES

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

1. Classify different types of learning and apply linear regression
2. Illustrate the concepts of logistic regression and implement the same with python.
3. Apply the concepts of Neural networks and support vector machines
4. Evaluate the hypothesis based on factors like bias and variance
5. Demonstrate 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	P09	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

UNIT V OTHER TOPICS 9

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

THEORY: 45 HRS **PRACTICALS: 30 HRS** **TOTAL: 75 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", 1st edition, McGraw Hill Education, 2017.
4. Ethem Alpaydın, "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.

LIST OF EXPERIMENTS

1. 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. Y*ou 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.

2. 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.

3. Write a program to fit a logistic regression model with regularization to avoid overfitting of the given dataset.

4. 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.

5. Apply K means algorithm to cluster a set of data stored in a .CSV file and plot the clusters

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE2019	GREEN BUILDING RATING SYSTEMS	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Explore various green building rating systems prevail in India
2.	To know about the various rating systems and its procedures
3.	To study various policies and laws related to green buildings
4.	To know about various rating systems applicable for residential buildings
5.	To explore rating systems for commercial building applications

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Understand various green building rating system prevail in India.(K1)
CO2	Study of different types of rating system for implementation (K3)
CO3	Understand various laws and policies by government for green building implementation. (K1)
CO4	Analyze rating systems for residential buildings (K4)
CO5	Understand various rating system for commercial 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	2	3	1	1	3	3	2	1	-	-	2	3	2
CO2	3	3	2	2	2	3	2	1	1	-	-	3	1	2
CO3	3	2	2	2	2	2	3	-	1	-	-	2	1	2
CO4	2	2	3	2	2	2	3	3	2	-	-	2	2	2
CO5	2	3	3	2	2	2	3	1	2	-	-	2	2	2
CO (Avg)	3.2	2.4	2.6	1.8	1.8	2.4	2.8	1.4	1.4			2.2	1.8	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	INTRODUCTION	9 Hours

Rating system, objectives, need, Green building system in India, Energy Efficiency Ratings & ECBC – 2007 – Various Energy Efficiency Rating Systems for Buildings, Registration procedure for rating systems, case studies in India.

UNIT-II	RATING SYSTEMS	9 Hours

NBC code- Criteria and its implementation, LEED rating system, BEE rating system, BREEAM rating system, ECBC codal provisions, ASHRAE code and its requirements, UPC etc, Procedure for project certification, IGBC rating system for new buildings, IGBC net zero waste rating system, Role of ASSOCHAM, Green and Eco friendly movement-roles and responsibilities

UNIT-III	LAW AND POLICIES	9 Hours

Integrated energy policy for building, government policies and incentives for green building projects, Documentation works, Byelaws and government organisations involved in development of rating systems

UNIT-IV	RATING SYSTEM FOR RESIDENTIAL BUILDING	9 Hours

Rating system for new building, existing buildings, case studies, Rating system for residential colonies, Rating system for affordable housing, Green township, Green SEZs, Green landscapes, Net zero waste rating system, Net zero water buildings, Benefits and registration procedures, Procedure for green interiors

UNIT-V	RATING SYSTEM FOR COMMERCIAL BUILDINGS	9 Hours

Rating system for resorts, factory buildings, Railway stations-procedure and its implementation, Rating system for ware house building and logistics parks, rating system for green cities. Case studies.

TOTAL: 45 Hours

REFERENCES:

1.	Guide to Green Building Rating Systems: Understanding LEED, Green Globes, Energy Star, the National Green Building Standard, and More (Wiley Series in Sustainable Design), 6 April 2010
2.	Green Building: Guidebook for Sustainable Architecture by Michael Bauer (Author), Peter Mösle (Author), Michael Schwarz (Author), Springer, 2009
3.	"BEE Star rating for buildings" (PDF). *Ministry of New & Renewable Energy, Indian Government.*

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE2021	ENERGY AND WATER EFFICIENCY IN BUILDINGS	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Familiarize with energy methods and present energy
2.	Understand the necessity of electrical systems and use of waste materials
3.	Know how to select the suitable location for structure and different ways to preserve water
4.	Elaborate energy assessment and clean development mechanism
5.	Explain the different technology available to preserve energy

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Explain energy utilization based on the categorization and energy sector wise consumption(K1)
CO2	Assess the building based on different rating systems (K4)
CO3	Identify and plan the proper site and make use of water effectively in green construction (K2)
CO4	Estimate efficiency of major utilities and elaborate energy management, demand and pricing. (K3)
CO5	Analyze the technology and characteristics for fuels(K4)

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		1			1			1		2	2	2
CO2	2	2	2	3	3	1	3	2	1	1	2	2	3	3
CO3	3	3	2	2	2		2	3	3	1	2	2	3	2
CO4	3	2	2	2	1	1	3			1	2	2	3	2
CO5	2	2	3	2				3	3	1		2	3	3
CO (Avg)	2.6	2	1.8	2	1.2	0.4	1.8	1.6	1.4	1	1.2	2	2.8	2.4

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	BASICS OF ENERGY	9 Hou

Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors).Impact of energy usage on climate

UNIT-II	WATER CONSERVATION IN BUILDINGS	9 Hours

Introduction to soil and water conservation and causes of soil erosion. Water harvesting techniques - Lining of ponds, tanks and canal systems. Water conservation in buildings, sustainable practices, fixtures and plumbing systems for water conservation. Hot and Cold Water. Case studies

UNIT-III	ENERGY AND WATER EFFICIENCY BUILDINGS	9 Hours

Zero Energy Building. Space Design to Minimize the Need for Lighting - Efficient Lamps and Fixtures - Exterior Lighting – Indoor Environmental Quality - Thermal Comfort - Acoustics - Advanced and Emerging Systems. Materials - Reused and Salvaged Materials - Less Waste through Material

UNIT-IV	ENERGY CONSERVATION AND MANAGEMENT	9 Hours

Energy Conservation In Major Utilities: Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration And Air Conditioning Systems –Cooling Towers, Energy Management: Principles of Energy Management and pricing

UNIT-V	ENERGY CONSERVATION TECHNOLOGY	9 Hours

Introduction - classification of fuels - physico-chemical characteristics - renewal energy sources- biomass energy analysis Biomass and its availability - Biogas technology. Analysis of factors affecting biogas yield.

TOTAL: 45 Hours

TEXT BOOKS:

1.	Witte. L.C., P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
2.	Dryden. I.G.C., "The Efficient Use Of Energy" Butterworths, London, 1982
3.	Turner, W. C., Doty, S. and Truner, W. C., "Energy Management Hand book", 7thedition, Fairmont Press, 2009. 6.De,

4.	Daniel Vallero and Chris Baiser. 2008. Sustainable Design. John Wiley and Sons. New Jersey Ching and Shapiro. 2014. Green Buildings Illustrated. John Wiley and Sons. New Jersey
5.	Mittal, K.M. 1996. Biogas system: principles and applications. New age international (P) Ltd., New Delhi.
REFERENCES:	
1.	Energy Manager Training Manual (4 Volumes) www.energymanagertraining.com, Bureau Of Energy Efficiency (BEE), A Statutory Body Under Ministry Of Power, Government Of India, 2004.
2.	ECBC Code 2007 (Edition 2008) published by Bureau of Energy Efficiency, New Delhi

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