SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

B.Tech-Artificial Intelligence and Data Science

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: Artificial Intelligence and Data Science

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: Artificial Intelligence and Data Science

S. No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
Theory								
1	U19MAT202F	Probability and Statistics for Data Science-I	3	1	0	4	BSC	60
2	U19ENG201C	Communication Skills in English - II	2	0	2	3	HSMC	60 (30L+30P)
3	U19ADS201	Introduction to Artificial Intelligence	3	0	0	3	PCC	45
4	U19ADS202	Data Structure and Algorithms I	3	0	0	3	PCC	45
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	U19ADS203	Data Structure and Algorithms I Lab	0	0	3	1.5	PCC	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

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Dr. M. Renuga	**Dr. J. Akilandeswari**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

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HOD/ Information Technology, Second Semester BE ADS 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: Artificial Intelligence and Data Science

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MAT301F	Probability and Statistics for Data Science – II	3	1	0	4	60
2	U19ADS301	Operating Systems	3	0	2	4	75
3	U19IT303	Computer Architecture	3	0	0	3	45
4	U19ADS302	Data Structures and Algorithms - II	3	0	0	3	45
5	U19ADS303	Advanced Python Programming for Data Science	2	0	2	3	60
6	U19ADS304	Digital Logic Design	3	0	2	4	75
7	U19GE303	**Mandatory Course-** Essence of Indian Traditional Knowledge	2	0	0	0	30
Practical							
8	U19ADS305	Data Structures and Algorithms Laboratory - II	0	0	2	1	30
9	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
					Total Credits	**23**	

Approved By

Chairperson, Artificial Intelligence and Data Science BoS
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Member Secretary, Academic Council
Dr.R.Shivakumar

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

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HOD/ Artificial Intelligence and Data Science, Third Semester B.Tech ADS 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: Artificial Intelligence and Data Science

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MAT401D	Discrete Mathematical Structure	3	1	0	4	60
2	U19ADS401	Database Management Systems	3	0	0	3	45
3	U19ADS402	Introduction to Data Science	3	0	0	3	45
4	U19ADS403	Java Programming	3	0	0	3	45
5	U19ADS404	Computer Networks	3	0	0	3	45
6	U19ADS405	Agile Software Development	3	0	2	4	75
7	U19GE402	**Mandatory Course-** Environment and climate science	2	0	0	0	30
Practical							
8	U19ADS406	Database Management Systems Laboratory	0	0	4	2	60
9	U19ADS407	Java Programming Laboratory	0	0	4	2	60
10	U19GE401	Soft Skills and Aptitude – II	0	0	2	1	30
					Total Credits	**25**	

Approved By

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

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HOD/ Artificial Intelligence and Data Science, Fourth Semester B.Tech ADS Students and Staff, COE

ADS
V

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19ADS501	Cloud Computing	3	0	0	3	45
2	U19ADS502	Theory of Computation	3	1	0	4	60
3	U19ADS503	Machine Learning	3	0	0	3	45
4	U19ADS504	Big data Technologies	3	0	0	3	45
5	noc23-cs83	**NPTEL-** Introduction to Internet of Things	3	0	0	3	45
Practical							
6	U19ADS505	Machine Learning Laboratory	0	0	4	2	60
7	U19ADS506	Cloud Computing Laboratory	0	0	4	2	60
8	U19ADS507	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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Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**Dr.S.R.R.Senthil Kumar**

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

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1.	U19ADS601	Cryptography and Network Security	3	0	0	3	45
2.	U19ADS602	Full Stack Development	3	0	0	3	45
3.	U19ADS603	Deep Learning	3	0	0	3	45
4.	U19ADS914	**Professional Elective** – Total Quality Management	3	0	0	3	45
5.	U19ADS915	**Professional Elective** – Software Quality Assurance	3	0	0	3	45
6.	U19BM1001	**Open Elective-** Hospital Management	3	0	0	3	45
	U19CE1002	Municipal Solid Waste Management					
	U19EE1001	Electric Mobility					
	U19EE1002	Energy Conservation and Management					
	U19EE1003	Innovation, IPR And Entrepreneurship Development					
	U19EE1004	Renewable Energy Systems					
	U19FT1001	Fundamentals of Fashion Design					
	U19FT1002	Garment Manufacturing Technology					
	U19ME1002	Industrial Safety					
	U19ME1004	Renewable Energy Sources					
		Practical					
7.	U19ADS604	Full stack Development Laboratory	0	0	4	2	60
8.	U19ADS605	Deep Learning Laboratory	0	0	4	2	60
9.	U19GE601	Soft Skills and Aptitude - IV	0	0	2	1	30
					Total Credits	**23**	

Approved By

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

SONA COLLEGE OF TECHNOLOGY, SALEM- 5

DEPARTMENT OF INFORMATION TECHNOLOGY

B Tech- ADS- 2019 Regulations

List of Elective's

S. No	Course Code	COURSE TITLE	L	T	P	C
1.	U19ADS901	Virtual Reality	3	0	0	3
2.	U19ADS902	**Web and Social Media Analytics**	3	0	0	3
3.	U19ADS903	Numerical Methods	3	0	0	3
4.	U19ADS904	**Data Mining**	3	0	0	3
5.	U19ADS905	C# AND .NET	2	0	2	3
6.	U19ADS906	Advanced Java Programming	3	0	0	3
7.	U19ADS907	Embedded Systems	3	0	0	3
8.	U19ADS908	Information Security	3	0	0	3
9.	U19ADS909	Graph Theory	3	0	0	3
10.	U19ADS910	Wireless Technologies	3	0	0	3
11.	U19ADS911	**Business Intelligence**	3	0	0	3
12.	U19ADS912	Image Processing	3	0	0	3
13.	U19ADS913	Digital Signal Processing	3	0	0	3
14.	U19ADS914	Total Quality Management	3	0	0	3
15.	U19ADS915	Software Quality Assurance	3	0	0	3
16.	U19ADS916	Linux Internals	3	0	0	3
17.	U19ADS917	Distributed Databases	3	0	0	3
18.	U19ADS918	**Cyber Security and Forensics**	3	0	0	3
19.	U19ADS919	Intellectual Property Rights	3	0	0	3
20.	U19ADS920	**Ethical Hacking**	3	0	0	3
21.	U19ADS921	Mobile Application Development	3	0	0	3
22.	U19ADS922	Wireless Sensor Networks	3	0	0	3
23.	U19ADS923	Information Retrieval	3	0	0	3
24.	U19ADS924	Mobile Computing	3	0	0	3
25.	U19ADS925	Multi-Core Architecture	3	0	0	3
26.	U19ADS926	**Robotic Process Automation**	3	0	0	3
27.	U19ADS927	Human Computer Interaction	2	0	2	3
28.	U19ADS928	**Predictive Analytics**	3	0	0	3

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

DEPARTMENT OF INFORMATION TECHNOLOGY

B TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

LIST OF PROFESSIONAL ELECTIVES FOR HONOURS DEGREE

Vertical 1 **CLOUD COMPUTING**	**Vertical 2** **CREATIVE MEDIA**	**Vertical 3** **CYBER SECURITY**	**Vertical 4** **INTERNET OF THINGS**
Introduction to Distributed & Grid Computing	Augmented and Virtual Reality	Fundamentals of Cyber Security	Introduction to 5G
Virtualization	Multimedia and Animation	Cyber Laws and Standards	Introduction to Cyber-Physical System
Dockerization and Kubernetes	Video Creation and Editing	Ethical Hacking	Wireless Technologies
Big Data on Cloud	UI And UX Design	Network Vulnerability Assessment	Wireless Sensor Networks
Cloud Application Development and Deployment	Digital Marketing	Cyber Forensics	Introduction to IoT
Security and Privacy in Cloud	Visual Effects	Information Security Risk Management	Software Defined Networks
Container Orchestrations and Infrastructure Automation	Game Development	Security Operations and Incident Management	Network Programming
Cloud Networking	Multimedia Data Compression and Storage	Cryptocurrency and Blockchain Technologies	Industry 4.0
Capstone Project in **CLOUD COMPUTING** (*Mandatory Elective Course for Earning Specialization Degree)	Capstone Project in **CREATIVE MEDIA** (*Mandatory Elective Course for Earning Specialization Degree)	Capstone Project in **CYBER SECURITY** (*Mandatory Elective Course for Earning Specialization Degree)	Capstone Project in **NETWORKING** (*Mandatory Elective Course for Earning Specialization Degree)

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

DEPARTMENT OF INFORMATION TECHNOLOGY

B TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

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.	U19ADS2001	Introduction to Distributed & Grid Computing	3	0	0	3
2.	U19ADS2002	Virtualization	3	0	0	3
3.	U19ADS2003	Dockerization and Kubernetes	3	0	0	3
4.	U19ADS2004	Big Data on Cloud	3	0	2	4
5.	U19ADS2005	Cloud Application Development and Deployment	3	0	2	4
6.	U19ADS2006	Security and Privacy in Cloud	3	0	2	4
7.	U19ADS2007	Container Orchestrations and Infrastructure Automation	3	0	0	3
8.	U19ADS2008	Cloud Networking	3	0	2	4
9.	U19ADS2009	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.						

VERTICAL 2 – CREATIVE MEDIA

S. No	Course Code	Course Title	L	T	P	Credit
1	U19ADS2010	Augmented and Virtual Reality	3	0	2	4
2	U19ADS2011	Multimedia and Animation	3	0	2	4
3	U19ADS2012	Video Creation And Editing	3	0	2	4
4	U19ADS2013	UI and UX Design	3	0	2	4
5	U19ADS2014	Digital Marketing	3	0	2	4
6	U19ADS2015	Visual Effects	3	0	2	4
7	U19ADS2016	Game Development	3	0	2	4
8	U19ADS2017	Multimedia Data Compression And Storage	3	0	0	3
9	U19ADS2018	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.						

VERTICAL 3 – CYBER SECURITY

S.No	Course Code	Course Title	L	T	P	Credit
1	U19ADS2019	Fundamentals of Cyber Security	3	0	0	3
2	U19ADS2020	Cyber Laws and Standards	3	0	0	3
3	U19ADS920	Ethical Hacking	3	0	0	3
4	U19ADS2021	Network Vulnerability Assessment	3	0	2	4
5	U19ADS2022	Cyber Forensics	3	0	2	4
6	U19ADS2023	Information Security Risk Management	3	0	0	3
7	U19ADS2024	Security Operations and Incident Management	3	0	2	4
8	U19ADS2025	Cryptocurrency and Blockchain Technologies	3	0	2	4
9	U19ADS2026	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 – INTERNET OF THINGS

S.No	Course Code	Course Title	L	T	P	Credit
1	U19ADS2027	Introduction to 5G	3	0	0	3
2	U19ADS2028	Introduction to Cyber-Physical System	3	0	0	3
3	U19ADS910	Wireless Technologies	3	0	0	3
4	U19ADS2029	Wireless Sensor Networks	3	0	2	4
5	U19ADS2030	Introduction to IoT	3	0	2	4
6	U19ADS2031	Software Defined Networks	3	0	2	4
7	U19ADS2032	Network Programming	3	0	2	4
8	U19ADS2033	Industry 4.0	3	0	0	3
9	U19ADS2034	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.						

Sona College of Technology, Salem

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Courses of Study for B.E/B.Tech. Semester I under

Regulations 2019 (CBCS)

Branch: Artificial Intelligence and Data Science

S. No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
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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

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

U19ENG101C - COMMUNICATION SKILLS IN ENGLISH – I
COMMON TO AI&DS

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,MCT and AI&DS

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	P09	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
(Common to B.Tech IT and AI&DS)

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	PO9	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
(Common to B.Tech. IT and AI&DS)

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: 24hours

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

S. No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
Theory								
1	U19MAT202F	Probability and Statistics for Data Science-I	3	1	0	4	BSC	60
2	U19ENG201C	Communication Skills in English - II	2	0	2	3	HSMC	60 (30L+30P)
3	U19ADS201	Introduction to Artificial Intelligence	3	0	0	3	PCC	45
4	U19ADS202	Data Structure and Algorithms I	3	0	0	3	PCC	45
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	U19ADS203	Data Structure and Algorithms I Lab	0	0	3	1.5	PCC	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 ADS Students and Staff, COE

B. TECH. / ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SEMESTER – II	PROBABILITY AND STATISTICS FOR DATA SCIENCE – I	L	T	P	C
U19MAT202F		3	1	0	4

COURSE OUTCOMES

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

1 represent the data in the form of graph and analyse the characteristics of the data using the concepts of measures of central tendency.

2. apply the concepts of measure of dispersion, skewness and kurtosis to a set of data and analyze the results.

3. compute simple and partial correlation coefficients and analyse regression equations for estimation and prediction purposes.

4. apply the concepts of probability, Baye's theorem, random variable, moments, moment generating function and their properties to solve the problems.

5. fit a suitable distribution and its properties to the real world problems and interpret the results.

CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	2							2		2
CO2	3	3		3	2							2		2
CO3	3	3		3	2							2		2
CO4	3	3		3	2							2		2
CO5	3	3		3	2							2		2

UNIT – I BASIC STATISTICS 12

Collection of data – primary and secondary data – graphical representation of frequency distribution – histogram – frequency polygon – frequency curve – cumulative frequency curve - measure of central tendency (Simple arithmetic mean, median, mode, geometric mean, harmonic mean) – Quartile's.

UNIT – II MEASURES OF DISPERSION, SKEWNESS AND KURTOSIS 12

Measure of dispersion – absolute and relative measures (range, inter-quartile range, quartile deviation, mean deviation and standard deviation) – skewness – Karl Pearson's and Bowley's coefficient of skewness - kurtosis.

UNIT – III CORRELATION AND REGRESSION 12

Simple and rank correlations – multiple and partial correlations – linear regression – multiple and partial regressions.

UNIT – IV BASIC PROBABILITY 12

Baye's theorem – random variable – probability mass function, probability density function, moment generating function and their properties.

UNIT – V THEORETICAL DISTRIBUTIONS 12

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

Theory: **45 Hours** Tutorial: **15 Hours** Total: **60 Hours**

TEXT BOOKS:

1. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 11th Edition, Reprint, 2019.
2. S. P. Gupta, "Statistical Methods", Sultan Chand and Sons Publishers, 15th Edition, 2012.

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. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall Publishers, Reprint, 2003.
3. J. L. Devore, "Probability and Statistics for Engineering and the Sciences", Thomson and Duxbury Publishers, 9th Edition, 2015.
4. T. Veerarajan, "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", McGraw Hill Publishers, 4th Edition, 7th Reprint, 2018.

Prof. S. JAYABHARATHI
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Dr. M. RENUGA
BoS - Chairperson
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U19ENG201C- Communication Skills in English - II L T P C

2 0 2 3

First year II semester

ADS

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,

U19ADS201 INTRODUCTION TO ARTIFICIAL INTELLIGENCE 3 0 0 3

COURSE OUTCOMES

At the end of the course, the student should be able to:

1. Explain the characteristics of intelligent agents and types of problem solving methods
2. Apply uninformed search technique to solve search problems.
3. Write knowledge representation in solving AI problems
4. Design of software agent to solve problems
5. Explain the various applications of AI.

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

UNIT I INTRODUCTION TO Al 9

Introduction–Definition -State of the Art- Agents and Environments- Good Behaviour: The Concept of Rationality- The Nature of Environments- The Structure of Agents – Problem Solving Method-Uninformed Search – General Search Paradigms ,Depth-First Search, Depth-Limited Search, Iterative Deepening Search, Breadth-First Search ,Bidirectional Search, Uniform-Cost Search

UNIT II INFORMED SEARCH 9

Problem solving Methods –Informed – Heuristics – Local Search Algorithms and Optimization Problems -Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

UNIT III KNOWLEDGE REPRESENTATION 9

First Order Logic – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories -Reasoning with Default Information

UNIT IV SOFTWARE AGENTS 9

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware –Perception – Planning – Moving

TOTAL: 45 PERIODS

TEXT BOOKS

1. S.Russell and P.Norvig,"Artificial Intelligence: A Modern Approach", Prentice Hall, 3rd Edition 2010.
2. Gerhard Weiss, "Multi Agent Systems", 2nd Edition ,MIT Press,2013

REFERENCES

1. M. Tim Jones,"Artificial Intelligence: A Systems Approach(Computer Science)",Jones and Bartlett Publishers, Inc, 1st Edition,2008
2. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2018.
3. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2017.
4. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.
5. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.
6. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.

U19ADS202 DATA STRUCTURES AND ALGORITHMS I 3 0 0 3

COURSE OUTCOMES

At the end of the course, the student should be able to:

1. Explain the basis of algorithms and analyse the complexity of algorithms
2. Implement abstract data types for linear data structures – list
3. Apply the linear data structure stack for solving problems
4. Apply the linear data structure queue for solving problems
5. Write programs for sorting list of items and searching an item in a given list

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 BASIC CONCEPTS OF ALGORITHMS 9

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

UNIT II LINEAR DATA STRUCTURES – LIST 9

Abstract Data Types (ADTs) - List ADT – array – based implementation – linked list implementation – singly linked lists – circularly linked lists – doubly – linked lists – applications of lists – polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal)

UNIT III LINEAR DATA STRUCTURES – STACKS 9

Stack ADT – implementation – applications.

UNIT IV LINEAR DATA STRUCTURES –QUEUES 9

Queue ADT – circular queue implementation - Double ended Queues – applications of queues.

UNIT V SORTING AND SEARCHING TECHNIQUES 8

Sorting algorithms: Insertion sort – Selection sort – Bubble sort – Merge sort – Quick Sort – Shell sort – Bucket sort – Searching: Linear Search and Binary Search.

TOTAL:45 HOURS

TEXT BOOKS

1. Brain W. Kernighan and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Person Education, 1988.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1977.

REFERENCE BOOKS

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Cliffort Stein, " Introduction to Algorithms", Second Edition, Megraw Hill, 2002.
2. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011.
3. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
4. Byron S Gottfried, "Programming with C", Schaum"s Outlines, Second Edition. Tata McGraw-Hill, 2006.
5. Yashavant P. Kanetkar. "Let Us C", BpB Publicatons, 2013, Ed 13 th Edition.
6. Deitel and Deitel, "C How to Program", Pearson Education, New Delhi, 2011

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

U19ADS203 DATA STRUCTURE LAB ALGORITHMS- I 0 0 3 1.5

COURSE OUTCOMES

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

1. Develop applications in C using list
2. Develop applications in C using Stack and queue
3. Develop applications in C using Sorting and Searching techniques

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. Implementation of List ADT
2. Implementation of Stack ADT
3. Implementation of stack ADT in balancing the parenthesis
4. Implementation of stack ADT in postfix evaluation
5. Implementation of Queue ADT – array implementation
6. Implementation of Queue ADT – linked list implementation
7. Implementation of circular Queue
8. Implementation of double ended Queue
9. Implementation of SORTING
10. Implementation of SEARCHING TECHNIQUES

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

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: Artificial Intelligence and Data Science

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MAT301F	Probability and Statistics for Data Science – II	3	1	0	4	60
2	U19ADS301	Operating Systems	3	0	2	4	75
3	U19IT303	Computer Architecture	3	0	0	3	45
4	U19ADS302	Data Structures and Algorithms - II	3	0	0	3	45
5	U19ADS303	Advanced Python Programming for Data Science	2	0	2	3	60
6	U19ADS304	Digital Logic Design	3	0	2	4	75
7	U19GE303	**Mandatory Course-** Essence of Indian Traditional Knowledge	2	0	0	0	30
Practical							
8	U19ADS305	Data Structures and Algorithms Laboratory - II	0	0	2	1	30
9	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
					Total Credits	**23**	

Approved By

Chairperson, Artificial Intelligence and Data Science BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

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

Copy to:-

HOD/ Artificial Intelligence and Data Science, Third Semester B.Tech ADS Students and Staff, COE

U19ADS301 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	1		1							3
CO2	3		3	3	3	2	3				2			3
CO3	3		2	2	1		1							3
CO4	3		2	2	1	3	3							3
CO5	3	1	1	1						1			3	2

UNIT I INTRODUCTION 9

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

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.

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.

UNIT V STORAGE MANAGEMENT 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

THEORY: 45hrs 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 2018
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, 3rd edition 2015
3. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall of India, 7th edition, 2015.
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 Banker's Algorithm
6. Implement various page replacement algorithms
7. Implement various disk scheduling algorithms
8. Implement threads and fork
9. Simulate Inter process communications

U19IT303 COMPUTER ARCHITECTURE 3 0 0 3

COURSE OUTCOMES:

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

1. Analyse the performance of the Computer System and understand difference instruction formats.
2. Apply the concepts to design the basic processing unit and control unit.
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.

U19ADS302 DATA STRUCTURES AND ALGORITHMS II 3 0 0 3

COURSE OUTCOMES

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

1. Implement Binary Search Tree ADT and t variants of different tree data structure.
2. Design and implement an binary heap and appropriate hashing function for an application
3. Develop and apply algorithms for real applications using graphs.
4. Represent the algorithmic time complexity for recursive and non-recursive algorithms using different asymptotic notations.
5. Apply the algorithmic techniques - Brute Force, Divide and conquer, Decrease and Conquer, Transform and Conquer and Dynamic Programming to different problems and analyze the time complexity.

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 TREE STRUCTURES 9

Preliminaries of Trees - Implementation of Trees – Tree Traversals with an Application - Binary Trees – Expression trees -Binary Search Tree ADT –AVL trees- Splaying- Red black Trees - B+ trees

UNIT II BINARY HEAP AND HASHING 9

Priority Queue- Model -Simple Implementations –Binary Heap – Basic Heap Operations – Other Heap Operations - Applications of Priority Queues.Hashing –General idea - Hash Function- Separate Chaining – Open Addressing – Linear Probing - Quadratic Probing- Double Hashing - Rehashing – Extendible Hashing

UNIT III GRAPHS 9

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

UNIT IV ANALYSIS OF ALGORITHMS 9

Mathematical analysis of Non-recursive algorithms – Mathematical Analysis of recursive algorithms – Example: Fibonacci numbers – Empirical analysis of algorithms – Algorithm Visualization.

UNIT V ALGORITHM DESIGN TECHNIQUES 9

Brute Force – Divide and Conquer – Quick Sort – Decrease and Conquer – Algorithms for generating combinatorial objects – Transform and Conquer – Presorting – Heap Sort – Dynamic Programming – Warshall's and Floyd's algorithm – Backtracking – Subset Sum Problem – Hamiltonian Circuit Problem – Branch and Bound – Assignment Problem.

TOTAL :45 HOURS

TEXT BOOK

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2002.
2. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, Third edition, 2011.

REFERENCES

1. Jean-Paul Tremblay, Paul Sorenson, "An Introduction to Data Structures with Applications" ,McGraw Hill Publishing company, NewDelhi , Second Edition ,2017.
2. Horwitz E., S. Sahni and S. Anderson, "Fundamentals of Data Structures in C", University Press (India), Second Edition, 2008.
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", PHI Pvt. Ltd., 2001
4. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2003.
5. Robert Sedgewick and Kevin Wayne , "Algorithms",Addison-Wesley Professional,4th edition, 2011

U19ADS303 ADVANCED PYTHON PROGRAMMING FOR DATA SCIENCE 2 0 2 3

COURSE OUTCOMES

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

1. Develop programs using object, module, and package.
2. Analyse and manipulate data using NumPy library.
3. Write programs using Pandas library.
4. Create programs to read and write different file formats.
5. Develop programs for data visualization.

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

UNIT I OBJECT, MODULE AND PACKAGE 6

Objects in Python – Creating Objects – Attributes – Methods - Self keyword – Polymorphism – Inheritance – Modules And Namespaces – Importing Module – User Defined Module – Random Module – Data And Time Module

UNIT II AN INTRODUCTION TO DATA ANALYSIS AND NUMPY LIBRARY 6

Knowledge Domain Of The Data Analyst - Understanding The Nature Of Data - Data Analysis Process - Quantitative and Qualitative Data - Open Data - Python And Data Analysis

Numpy Installation - Ndarray - Basic Operation - Indexing, Slicing and Iterating - Shape Manipulation - Array Manipulation - General Concepts - Structured Arrays - Reading Writing Array Data on Files

UNIT III THE PANDAS LIBRARY - AN INTRODUCTION 6

Installation - Introduction to Pandas Data Structure - Functionalities on Indexes - Operation Between Data Structure - Function Application and Mapping - Sorting and Ranking - Correlation and Covariance - Nan Data - Hierarchical Indexing and Levelling

UNIT IV PANDAS READING AND WRITING DATA 6

Pandas : Reading and Writing Data - Reading Data in CSV or Text Files - Reading and Writing Html Files - Reading from Xml - Reading Writing Excel File - JSON Data - Pickle - Loading and Writing Data With Sqlite3

UNIT V DATA VISUALIZATION WITH MATPLOTLIB 6

Installation - Architecture - Pyplot - Plotting Windows - kwargs - Adding Elements to Chart - Saving Charts -Handling Data Values - Chart Topology - Line Chart - Histogram - Bar Chart - Pie Chart

THEORY:30 HRS PRACTICALS:30 HRS TOTAL: 60 HOURS

TEXT BOOK

1. Fabio Nelli, " Python Data Analytics with Pandas, NumPy, and Matplotlib", Apress, 2nd Edition, 2018

REFERENCES

1. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2nd Edition, 2017.
2. Daniel Chen, "Pandas for Everyone: Python Data Analysis (Addison-Wesley Data & Analytics Series)", Addison-Wesley Professional, 2016.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 2nd Edition, 2017.

LIST OF EXPERIMENTS

1. Implement OOP concepts using python.
2. Write python program using random and date time module.
3. Implement various functionalities available in numPy library using python.
4. Implement various functionalities available in pandas library using python.
5. Write python programs to read and write data using different file format using pandas.
6. Demonstrate various charts using matplotlib.

U19ADS304 DIGITAL LOGIC DESIGN 3 0 2 4

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 of 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 – Binary Ripple Counters – Binary Synchronous Counters.

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.

PRACTICAL: 30 HOURS THEORY : 45 HOURS TOTAL: 75 HOURS

TEXT BOOK

1. M.Morris Mano, Michel D. Ciletti, and John F.Walerly "Digital Design", 5th edition, Pearson Education, 2019.

REFERENCES

1. Larry L Kinney and Charles H.Roth Jr, "Fundamentals of Logic Design", 5th edition, Jaico Publishing House, 2018.
2. Ananda Natarajan, "Digital Design", PHI learning private Ltd, 2017.
3. Donald P.Leach, Albert Paul Malvino and Saha, "Digital Principles and Applications", 8th edition, TMH, 2018.
4. G.K.Kharate, "Digital Electronics", Oxford University press, 2016.
5. John F.Wakerly, "Digital Principles and practices", 4th edition, Pearson Education, 2018.

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 magnitude comparator.
7. Design and implementation of Decoders and encoders.
8. Design and implementation of Multiplexers/Demultiplexers.
9. Design and implementation of Shift registers.
10. Design and implementation of Synchronous and Asynchronous counters.

U19ADS305 DATA STRUCTURES AND ALGORITHMS LABORATORY II 0 0 2 1

COURSE OUTCOMES

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

1. Implement expression tree, BST, AVL tree and Priority Queue.
2. Implement Hashing concepts and different graph concepts.
3. Write program to implement quick sort and heap sort.

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. Implementation of an expression tree. Produce its prefix, infix and postfix expressions.
2. Implement Binary Search Tree.
3. Implementation of Search in AVL trees
4. Implementation of Priority Queue.
5. Implementation of Hashing Techniques.
6. Implementation of Depth first traversal and Breadth first traversal.
7. Implementation of Kruskal's Algorithm
8. Implementation of Quick sort Algorithm
9. Implementation of Heap sort
10. Implementation of Floyd's algorithm

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
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Salem-636 005.

Sona College of Technology **Department of Mathematics**

B. TECH. / ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SEMESTER – III	PROBABILITY AND STATISTICS FOR DATA SCIENCE – II	L	T	P	C
U19MAT301F		3	1	0	4

COURSE OUTCOMES

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

1 apply the concepts of joint probability distribution and its properties in finding the covariance.

2. analyse the characteristics of the estimators, find the estimate of the parameters using maximum likelihood estimation and method of moments.

3. test the hypothesis for proportions, mean and standard deviation using Z – test.

4. test the significance of the hypothesis using t, χ^2 and F distributions.

5. analyse the variances of several variables using standard designs.

CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	2							2		2
CO2	3	3		3	2							2		2
CO3	3	3		3	2							2		2
CO4	3	3		3	2							2		2
CO5	3	3		3	2							2		2

UNIT – I TWO DIMENSIONAL RANDOM VARIABLES **12**

Joint distributions, marginal and conditional distributions – covariance – correlation – central limit theorem.

UNIT – II ESTIMATION THEORY **12**

Estimators – unbiasedness, consistency, efficiency and sufficiency (definitions and simple problems only) – maximum likelihood estimation – method of moments.

UNIT – III TESTING OF HYPOTHESIS FOR LARGE SAMPLES **12**

Parameter and statistic – null and alternative hypothesis – errors in sampling, critical region and level of significance – one tailed and two tailed tests – large sample tests for proportions, mean, difference between means and standard deviation.

UNIT – IV EXACT SAMPLING DISTRIBUTIONS **12**

t-test for single mean, difference between means – paired t-test – χ^2-test for independence of attributes, goodness of fit – F-test for equality of two variances.

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UNIT – V DESIGN OF EXPERIMENTS **12**

Analysis of variance – one way classification– two way classification – completely randomised design– randomised block design – Latin square design.

Theory: **45 Hours** Tutorial: **15 Hours** Total: **60 Hours**

TEXT BOOKS:

1. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 11th Edition, Reprint, 2019.
2. R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9th Edition, 2018.

REFERENCE BOOKS:

1. R. E. Walpole, R. H. Myers, S. L. Myers and K. E. Ye, "Probability and Statistics for Engineers and Scientists", Pearson Publishers, 9th Edition, 2010.
2. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall Publishers, Reprint, 2003.
3. J. L. Devore, "Probability and Statistics for Engineering and the Sciences", Thomson and Duxbury Publishers, 9th Edition, 2015.
4. S. P. Gupta, "Statistical Methods", Sultan Chand and Sons Publishers, 15th Edition, 2012.
5. T. Veerarajan, "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", McGraw Hill Publishers, 4th Edition, 7th Reprint, 2018.
6. S. C. Gupta and V. K. Kapoor, "Fundamentals of Applied Statistics", Sultan Chand and Sons Publishers, 4th Edition, Reprint, 2019.

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Salem – 636 005

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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: Artificial Intelligence and Data Science

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MAT401D	Discrete Mathematical Structure	3	1	0	4	60
2	U19ADS401	Database Management Systems	3	0	0	3	45
3	U19ADS402	Introduction to Data Science	3	0	0	3	45
4	U19ADS403	Java Programming	3	0	0	3	45
5	U19ADS404	Computer Networks	3	0	0	3	45
6	U19ADS405	Agile Software Development	3	0	2	4	75
7	U19GE402	**Mandatory Course-** Environment and climate science	2	0	0	0	30
Practical							
8	U19ADS406	Database Management Systems Laboratory	0	0	4	2	60
9	U19ADS407	Java Programming Laboratory	0	0	4	2	60
10	U19GE401	Soft Skills and Aptitude – II	0	0	2	1	30
					Total Credits	**25**	

Approved By

Chairperson, Artificial Intelligence and Data Science BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

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

Copy to:-

HOD/ Artificial Intelligence and Data Science, Fourth Semester B.Tech ADS Students and Staff, COE

Sona College of Technology **Department of Mathematics**

B. TECH. / ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SEMESTER – IV		L	T	P	C
U19MAT401D	**DISCRETE MATHEMATICAL STRUCTURES**	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 bi conditional 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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U19ADS401 DATABASE MANAGEMENT SYSTEMS 3 0 0 3

COURSE OUTCOMES

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

1. Realize 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. Apply the principles of normalization to evaluate the normality of a logical data model and correct any anomalies, and design normalized schemas.
4. Demonstrate the general idea of data storage, indexing techniques and query processing.
5. Illustrate the transaction management concurrency control and recovery management techniques adopted in database management 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						1	1		1	2	3
CO2	3	3	2	1	1				1	1		1	2	2
CO3	3	3	3	1	1				1	1		1	2	2
CO4	3	3	3	1	1				1	1		1	2	2
CO5	3	1							1	1		1		

UNIT I INTRODUCTION 9

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

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

UNIT II RELATIONAL MODEL 9

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

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

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

UNIT III RELATIONAL DATABASE DESIGN 9

Functional dependencies: Design Issues**,** Definition, functional-dependency theory, dependency preservation property of a decomposition, Lossless decomposition

Normalization: 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", 7th Edition, Addison-Wesley, 2016

REFERENCES

1. Abraham Silberschatz, Henry F. Korth and Sudarshan. S, "Database System Concepts", 7th Edition, McGraw-Hill, 2016
2. Raghu Ramakrishnan Johannes Gehrke , "Database Management Systems", 3rd Edition, McGraw-Hill Education, 2014
3. Date. C. J, Kannan. A, Swamynathan. S, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2012
4. Rajesh Narang, "Database Management systems", Second Edition, PHI Learning pvt. Ltd, New Delhi, 2018.

U19ADS402 INTRODUCTION TO DATA SCIENCE 3 0 0 3

COURSE OUTCOMES

At the end of the course, student will able to

1. Explain the life cycle of data analytics project
2. Apply Exploratory Data Analysis over the dataset
3. Apply data pre-processing and feature selection techniques over the dataset
4. Apply association rule mining to find the frequent item set in business data repository
5. Built the different type of regression model for different business use cases

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

UNIT I INTRODUCTION 9

Need for data science – benefits and uses – facets of data – Data Analytics Lifecycle: Data Analytics Lifecycle Overview - Discovery – Data Preparation – Model Planning –Model Building – Communicate Results

UNIT II EXPLORATORY DATA ANALYTICS 9

Introduction to R – Exploratory Data Analysis: Visualization before Analysis, Dirty Data, Examining Single and Multiple Variable, Data Exploration- Statistical Methods for Evaluation: Hypothesis Testing, Difference of Means, Wilcoxon Rank-Sum Test, Type I and Type II errors, Powers and Sample Size, ANOVA

UNIT III DATA PRE-PROCESSING AND FEATURE SELECTION 9

Data cleaning - Data integration - Data Reduction - Data Transformation and Data Discretization, Feature Generation and Feature Selection, Feature Selection algorithms: Filters- Wrappers, and Embedded

UNIT IV DATA ANALYTICS METHOD – ASSOCIATION RULE MINING 9

Association Rules: Apriori Algorithm, Evaluation of Candidate rules, Application of Association Rules, Frequent Pattern Growth Algorithm, Validation and Testing, Rule based Classifiers – Use case: Grocery Stores, Recommendation System

UNIT V REGRESSION MODELS **9**

Regression Models – Use of Regression Analysis – Types of Regressions: Linear Regression, Logistic Regression, Polynomial Regression, Stepwise Regression, Ridge Regression, Lasso Regression, and ElasticNet Regression- Selection of Right Regression Model –Use Case: Sales Forecasting, Credit Card industry

TOTAL: 45 HOURS

TEXT BOOKS

1. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics: Discovering, Analysing, Visualizing, and Presenting Data ", Wiely 2015

REFERENCES

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016.
2. Jiawei Han, Micheline Kamber and Jian Pei ,"Data Mining: Concepts and Techniques", 3rd Edition , Morgan Kaufmann,2011
3. Jay Liebowitz, "Big Data and Business Analytics", CRC Press, 2013
4. Cathy O'Neil and Rachel Schutt, "Doing Data Science". O'Reilly, 2014.

U19ADS403 JAVA PROGRAMMING 3 0 0 3

COURSE OUTCOMES

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

6. Apply basic features of Java to write programs
7. Write programs to read and write files using stream classes
8. Apply generics and collection framework for writing efficient programs for real time applications and handle different type of exceptions
9. Apply event handling techniques for interaction with GUI based application.
10. Write multithreaded 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	3						1	1		2	2	3
CO2	3	3	2	2					1	1		1	2	2
CO3	3	3	3	2	2				1	1		1	2	2
CO4	3	3	3	2	2				1	1		2	2	2
CO5	3	1							1	1		1		

UNIT I CLASS, INHERITANCE, PACKAGE AND INTERFACE 9

History and Evolution of Java - An Overview of Java – Data types, variables, and Arrays- Operators – Control Statement – Introducing Class- Methods – Inheritance –Packages and Interfaces – java.lang package: String, StringBuffer, StringBuilder, Primitive Type Wrappers, Object, Class and Reflect

UNIT II INPUT/OUTPUT(I/O): EXPLORING java.io 9

- I/O Basics – Exploring java.io: Stream Class, Byte Streams and Character Streams – Predefined Streams – Reading Console input – writing Console output – PrintWriter Class – Reading and Writing Files – Serialization – Stream Benefits

UNIT III EXCEPTION HANDLING ,ENUMERATIONS, GENERICS AND COLLECTION 9

Exception Handling Fundamentals – Exception Types – Uncaught Exception – Using try and catch – Multiple catch Clauses – Nested try statement – throw – throws – finally –Built-in Exception- Creating our own Exception class – Chained Exception- Enumerations – Auto boxing – Generics – Lambda expressions – The Collections Framework – The Collection Interface- The Collection Classes – Accessing a Collection via an Iterator

UNIT IV GUI AND EVENT HANDLING 9

Event Handling – Introducing Swing – Exploring Swing: JLabel and ImageIcon, JTextField, Swing Buttons, JTabbedPane, ,JList, JComboBox, Trees , JTable,JMenuBar, JMenu and JMenuItem - GUI Programming using JavaFX – Exploring events and controls – JavaFX Menus

UNIT V THREADS AND DATABASE CONNECTIVITY 9

What Are Threads? - Interrupting Threads - Thread States - Thread Properties – Synchronization – Inter thread communication - JDBC Programming concept – Executing Queries – Scrollable and Updatable Resultset.

Total: 45 Hours

TEXT BOOK

1. Herbert Schildt, "Java™ : The Complete Reference", 9th edition, Oracle Press, 2014.

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.

U19ADS404 **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. Analyse the functions and components of the SDN architecture.

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.

UNIT III NETWORK LAYER **9**

Services, Packet Switching – Internet Protocol-Datagram Format – Fragmentation – Options - Routing Algorithms – Distance Vector Routing – Link-state Routing - Unicast Routing Protocols – Autonomous Systems – Routing Information Protocol– Open Shortest Path First Protocol.

UNIT IV TRANSPORT LAYER & APPLICATION LAYER 10

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 – Introduction to DNS – HTTP – WWW.

UNIT V INTRODUCTION TO SOFTWARE DEFINED NETWORKING 8

Introduction – Network Limitations – Network Control Plane – Applications – SDN Implementation – SDN design – Separation of the control and data planes –Edge Oriented Networking - SDN Operations.

TOTAL: 45 HOURS

TEXT BOOK

1. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw-Hill, 5th Edition 2018. (Unit-1 to Unit-4).
2. Patricia A Morreale, James M Anderson "Software Define Networking Design and Deployment", CRC Press, 2018. (Unit-5).

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.

COURSE OUTCOMES

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

1. Explain the genesis of Agile and driving forces for choosing Agile techniques.
2. Comprehend the Agile Scrum framework and development practices.
3. Assess the software product using Agile testing methodologies and perform testingactivities within an agile project.
4. Apply software design principles and refactoring techniques to achieve agility.
5. Evaluate the agile approach impact on cutting-edge technologies and realize the business value for adopting agile software development.

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

UNIT I FUNDAMENTALS OF AGILE 9

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Extreme Programming, Feature Driven development, Lean Software Development, Adaptive Software development, Dynamic System Development Method, Crystal, Agile Modeling, Agile Unified Process, Kanban, Agile project management, Continuous Integration, Pair Programming, Simple Design.

UNIT II AGILE SCRUM FRAMEWORK 9

Introduction to Scrum, Project phases, Agile Estimation, Planning game in XP, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Burnup chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team.

UNIT III AGILE TESTING 9

The Agile lifecycle and its impact on testing, Agile Testing Methodologies – Test Driven development, Acceptance Test Driven development, Behavior Driven development, Role of Tester in Agile Team, Tracking Testing activities, Agile Testing in Scrum, Agile Testing in Kanban, Agile Testing Techniques- Exploratory testing, Risk based testing, Regression tests, Agile Testing Work products.

UNIT IV AGILE SOFTWARE DESIGN AND DEVELOPMENT 10

Agile design practices, Design Principles - Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles and Dependency Inversion Principle, Need and significance of Refactoring, Refactoring Techniques.

UNIT V INDUSTRY TRENDS 8

Agile Application Lifecycle Management (ALM), Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile rapid development technologies.

LECTURE: 45 Hrs PRACTICAL:-30 Hrs Total: 75 hours

REFERENCES

1. Ken Schwaber, Mike Beedle, "Agile Software Development with Scrum", Pearson,2014.
2. Robert C. Martin, "Agile Software Development, Principles, Patterns andPractices"Pearson, 2003.
3. Lisa Crispin, Janet Gregory," Agile Testing: A Practical Guide for Testers and AgileTeams" Addison Wesley, 2008.
4. Alistair Cockburn," Agile Software Development: The Cooperative Game"AddisonWesley, Second Edition, 2006.
5. Mike Cohn," User Stories Applied: For Agile Software" Addison Wesley, 2004.

Lab Exercises

1. Agile Project Setup and exploration of ALM Tool
   a. Setup of ALM Tool
   b. Creation of Scrum Team setup in ALM Tool
   c. Creation of KANBAN Team setup for ALM Tool
2. Agile Backlog Management
   a. For a given Requirement, breakdown to EPIC, Features, User Stories with clear Definition of Ready and Definition of Done.
   b. Prioritize the backlog based on dependency across the stories.
   c. Estimate the stories and do a Sprint planning
3. Agile Reporting and Dashboards
   a. Configure a Task Board in ALM Tool
   b. Breakdown the user stories to Tasks
   c. Create a Task Burn down chart
   d. Create Project Dashboard to list number of EPICs, number of Features and User stories
4. Agile Testing
   a. Create Test cases for the requirements given with clear test steps and expected results, document same in ALM Tool
   b. Write a BDD for creation of KANBAN Board in the ALM Tool to visualize the tasks

Total: 30 hours

U19ADS406 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 in Oracle
2. Build various constraints, triggers and indexes on the tables
3. Design and implement a database in Oracle 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 in Oracle 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 in PL/SQL).
6. Create triggers.
7. Create assertions and indexes.
8. Execute 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.

TOTAL: 60 HOURS

U19ADS407 JAVA PROGRAMMING LABORATORY 0 0 4 2

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	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. 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. Implement GUI programming with events and controls using JavaFX.
9. Write the programs that uses the concept of Threads.
10. Write a program that uses JDBC API for interacting with the database.

TOTAL: 60 HOURS

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**

ADS
V

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19ADS501	Cloud Computing	3	0	0	3	45
2	U19ADS502	Theory of Computation	3	1	0	4	60
3	U19ADS503	Machine Learning	3	0	0	3	45
4	U19ADS504	Big data Technologies	3	0	0	3	45
5	noc23-cs83	**NPTEL-** Introduction to Internet of Things	3	0	0	3	45
Practical							
6	U19ADS505	Machine Learning Laboratory	0	0	4	2	60
7	U19ADS506	Cloud Computing Laboratory	0	0	4	2	60
8	U19ADS507	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	**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, Fifth Semester BE IT Students and Staff, COE

U19ADS501 **CLOUD COMPUTING** **3 0 0 3**

COURSE OUTCOMES

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

1. Describe the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.
2. Explain the different cloud deployment models and virtualization.
3. Explain the types of services that a cloud computing can provide. Apply the appropriate cloud computing solutions and recommendations according to the applications used.
4. Describe different cloud computing tools.
5. Explain about the core issues of cloud computing such as security and privacy.

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

UNIT I HISTORY OF CLOUD COMPUTING **9**

Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network based systems- System models for Distributed and cloud computing- Software environments for distributed systems and clouds.

UNIT II CLOUD COMPUTING DEPLOYMENT MODELS AND VIRTUALIZATION 9

Cloud issues and challenges - Properties - Characteristics - Deployment models. Cloud resources: Network and API - Virtual and Physical computational resources - Data-storage. Virtualization concepts - Types of Virtualization

UNIT III CLOUD COMPUTING SERVICES **9**

Infrastructure as a Service (IaaS) - Resource Virtualization: Server, Storage, Network - Case studies. Platform as a Service (PaaS) - Cloud platform & Management: Computation, Storage - Case studies. Software as a Service (SaaS) - Anything as a service (XaaS).

UNIT IV CLOUD COMPUTING TOOLS **9**

Overview of services - Conceptual architecture - Controller - Compute - Block Storage - Object Storage – Networking - Environment – Security - Identity service - Image service -

17/7

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

Installation - Google Web Services- Amazon Web Services- Microsoft Cloud Services- Openstack –Introduction to OpenNebula Architecture- Introduction to Aneka.

UNIT V MANAGING AND SECURING THE CLOUD 9

Administrating the cloud – Cloud Management Products – Cloud Management Standards - Securing the cloud – Securing Data –Establishing Identity and Presence.

TOTAL: 45 HOURS

TEXT BOOK

1. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, "Distributed and cloud computing from Parallel Processing to the Internet of Things", Morgan Kaufmann, Elsevier – 2013

REFERENCE BOOKS

1. Barrie Sosinsky, " Cloud Computing Bible" John Wiley & Sons, 2015
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy An Enterprise Perspective on Risks and Compliance, O'Reilly 2009

17/7

J. Dilandi

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
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SALEM-636 005

U19ADS502 **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

P8 17/7

J. Akilandeswari

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

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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U19ADS503 **MACHINE LEARNING** **3 0 0 3**

COURSE OUTCOMES

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

1. Demonstrate 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. Apply the concepts of Neural networks and support vector machines for designing ML models.
4. Evaluate the hypothesis based on factors like bias and variance and the performance of the model.
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

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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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COURSE OUTCOMES

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

1. Explain the need and challenges of Big data and analytics
2. Apply and write jobs in Hadoop and map reduce framework
3. Create NoSQL database and apply CRUD operations in MongoDB
4. Create database and apply CRUD operations in Cassandra and Hive
5. Write PigLatin scripts for database maintenance and explore application areas and techniques applied in different domains

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 9

Types of Digital Data – Introduction to Big Data - Big Data Analytics - classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data - Why is Big Data Analytics Important? - Data Science - Terminologies Used in Big Data Environment - Few Top Analytics Tools.

UNIT II TECHNOLOGIES, HADOOP AND MAP REDUCE 9

The big data technology landscape – NoSQL – Hadoop - Introduction to Hadoop - RDBMS versus Hadoop - RDBMS versus Hadoop - Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Application with Hadoop YARN - Hadoop Ecosystem – Introduction to Map reduce Programming – Introduction to Apache SPARK

UNIT III MONGODB 9

Introduction to MongoDB - What is MongoDB? - Why MongoDB? - RDBMS and MongoDB - Data Types in MongoDB – MongoDB Query Langauge

UNIT IV CASSANDRA AND HIVE 9

Introduction to Cassandra -_Features of Cassandra - CQL Data Types – CQLSH – Keyspaces - CRUD – Collections – Alter - Import and Export – querying system tables

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Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language- RCFILE Implementation – SERDE – User Defined Functions

UNIT V PIG AND RECENT TRENDS **9**

Introduction to Pig -_The Anatomy of Pig - Pig on Hadoop - Pig Latin Overview - Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational operators - Eval Function - Complex Data Type - User Defined Function - parameter Substitution - Diagnostic Operator - Word Count Example - When to use Pig? - When NOT to use Pig? - Pig versus Hive - Reporting tool – Trends – Case study

TOTAL: 45 HOURS

TEXT BOOK

1. Seema Acharya and Subhashini C, "Big Data and Analytics", Wiley India, 2014.

REFERENCES

1. Judith Hurwitz, Alan Nugent,Fern Halper, Marcia Kaufman, "Big data for dummies", Wiley, 2013.
2. Chuck Lam, "Hadoop in action", Manning Publications, 2010.
3. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Pearson Education, 2012.
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
6. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
7. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
8. Alan Gates, "Programming Pig", O'Reilley, 2011.

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COURSE OUTCOMES

After completion of the course, students will be able to

1. Make use of appropriate Data sets for implementing machine learning algorithms
2. Apply data preprocessing and visualization techniques required for implementing ML 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.(Do not use any built-in functions or package for applying linear regression. Write a subroutine/function of your own).
   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.

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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. Write an algorithm for performing K means clustering to cluster a set of data stored in a .CSV file and plot the clusters. (Do not use built-in packages for performing K-means)

TOTAL: 60 HOURS

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U19ADS506 **CLOUD COMPUTING LABORATORY** **0 0 4 2**

COURSE OUTCOMES

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

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

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				
CO2	3	3	3		2					2	2		1	
CO3	3	3	3	3	3					1	2			2

LIST OF EXPERIMENTS:

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

TOTAL: 60 HRS

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U19ADS507 INTERNET OF THINGS LABORATORY 0 0 2 1

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: 30 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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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

AD S
(HONS)

U19ADS2001 INTRODUCTION TO DISTRIBUTED & GRID COMPUTING

3 0 0 3

COURSE OUTCOMES

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

1. Distinguish between various distributed computing models.
2. Implement Remote Procedure Call (RPC) in practical scenarios.
3. Implement the Distributed File system.
4. Explain the concepts and technologies related to the Semantic Grid and autonomic computing.
5. Identify and mitigate potential security vulnerabilities in grid 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	1	1	1		2`								2	2
CO2	1	1	1		2								2	2
CO3	2	1	1		2								2	2
CO4	2	1	1		2								2	3
CO5	2	1	1		2								2	3

UNIT I INTRODUCTION TO DISTRIBUTED AND GRID COMPUTING 9

Introduction to Distributed Computing-Distributed Computing Models-Software Concepts-Issues in Designing Distributed Systems-Introduction to Grid Computing-Early Grid Activities-Current Grid Activities-An Overview of Grid Business Areas-Grid Applications.

UNIT II REMOTE COMMUNICATION 9

Introduction to Remote Communication-Remote Procedure Call Basics-RPC Implementation-RPC Communication-Other RPC Issues-Remote Method Invocation Basics-RMI Implementation.

UNIT III DISTRIBUTED FILE SYSTEMS 9

Introduction to Distributed File Systems-File Modes-DFS Design-Semantics of File Sharing-DFS Implementation-File Caching in DFS-Replication in DFS.

UNIT IV THE SEMANTIC GRID AND AUTOMATIC COMPUTING 9

Introduction-Metadata and Ontology in the semantic Web-Sematic Web Services-A Layered Structure of the Semantic Grid-Semantic Grid Activities-Autonomic Computing.

UNIT V GRID SECURITY 9

Introduction to Grid Security-Cryptography-Grid Security: The Grid Security Infrastructure, Authorization modes in GSI-Putting it all together: Getting an e-Science certificate, Managing credentials in Glogus, Generate a client Proxy, Firewall traversal-Possible Vulnerabilities.

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TOTAL HOURS : 45

TEXT BOOKS:

1. Sunitha Mahajan, Seema Shah, "Distributed Computing" Second Edition, OXFORD University Press, 2015. (Unit: 1, 2, 3)

2. Maozhen Li, Mark Baker, "The Grid Core Technologies" WILEY, 2013. (Unit:1, 4, 5)

REFERENCE BOOKS:

1. George Coulouris, Jean Dollimore, and Tim Kindberg , "Distributed Systems: Concepts and Design" Fifth Edition, Pearson, 2011.
2. Hagit Attiya, Jennefer Welch, "Distributed Computing Fundamentals, Simulations amd Advanced Topics" Second Edition WILEY, 2016
3. Andrew S. Tanenbaum and Maarten Van Steen , "Distributed Systems: Principles and Paradigms" Second Edition, Prentice Hall India, 2016.
4. Ajay D. Kshemkalyani and Mukesh Singha, "Distributed Computing: Principles, Algorithms, and Systems", Cambridge University Press, 2011.

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U19ADS2002 **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.

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.

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1.	U19ADS601	Cryptography and Network Security	3	0	0	3	45
2.	U19ADS602	Full Stack Development	3	0	0	3	45
3.	U19ADS603	Deep Learning	3	0	0	3	45
4.	U19ADS914	**Professional Elective** – Total Quality Management	3	0	0	3	45
5.	U19ADS915	**Professional Elective** – Software Quality Assurance	3	0	0	3	45
6.	U19BM1001	**Open Elective-** Hospital Management	3	0	0	3	45
	U19CE1002	Municipal Solid Waste Management					
	U19EE1001	Electric Mobility					
	U19EE1002	Energy Conservation and Management					
	U19EE1003	Innovation, IPR And Entrepreneurship Development					
	U19EE1004	Renewable Energy Systems					
	U19FT1001	Fundamentals of Fashion Design					
	U19FT1002	Garment Manufacturing Technology					
	U19ME1002	Industrial Safety					
	U19ME1004	Renewable Energy Sources					
		Practical					
7.	U19ADS604	Full stack Development Laboratory	0	0	4	2	60
8.	U19ADS605	Deep Learning Laboratory	0	0	4	2	60
9.	U19GE601	Soft Skills and Aptitude - IV	0	0	2	1	30
					Total Credits	**23**	

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, Sixth Semester BE IT Students and Staff, COE

U19ADS601 CRYPTOGRAPHY AND NETWORK SECURITY 3 0 0 3

COURSE OUTCOMES

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

1. Describe various types of attacks with their characteristics and apply classical encryption algorithms, number theory concepts and theorem.
2. Select and apply appropriate Symmetric and Asymmetric cryptographic algorithms like DES,AES,RSA Encryption, Diffie-Hellman Key Exchange and Elliptic Curve Cryptography to ensure the confidentiality with the concept of number theory.
3. Apply Hash and MAC algorithms to ensure integrity of data by analyzing authentication requirements.
4. Describe and apply various protocols to ensure Email security, IP security and Web Security.
5. Apply system level security with design of firewalls, intrusion detection techniques, and virus and worms analysis

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

UNIT I CLASSICAL CIPHERS AND MATHEMATICAL FOUNDATION ON CRYPTOGRAPHY 9

Introduction to Cryptography - Security Attacks, Security Services, and Security Mechanisms in OSI Security Architecture - Model for Network Security - Classical Encryption techniques: Substitution and Transposition Techniques- Steganography – Basic concepts in Number Theory - Euclidean algorithm, Properties of Modular arithmetic - Euler's totient function - Fermat's theorem - Euler's Theorem.

UNIT II SYMMETRIC CIPHER AND ASYMMETRIC CIPHER 9

Symmetric Ciphers -Block Cipher design Principles – Data Encryption Standard (DES) - Advanced Encryption Standard (AES) – Block Cipher Modes of Operation.

Asymmetric Ciphers: Principles of Public-Key Cryptosystem- RSA algorithm – Diffie-Hellman Key Exchange algorithm – Elliptic Curve Cryptography.

UNIT III AUTHENTICATION AND DATA INTEGRITY ALGORITHMS 9

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

UNIT IV KEY MANAGEMENT AND INTERNET SECURITY 9

Symmetric Key Distribution using Symmetric Encryption and Asymmetric Encryption – Distribution of Public keys – Public-Key Infrastructure – Transport-Level Security: SSL Architecture -JWT – Electronic Mail Security : Pretty Good Privacy (PGP) – IP Security : IP Security Encapsulating Security Payload (ESP)- Transport mode and Tunnel mode-Antireply mechanism

UNIT V NETWORK SECURITY 9

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

TOTAL: 45 HOURS

TEXT BOOK

1. William Stallings, "Cryptography and Network Security – Principles and Practice", Pearson Education, Eight Edition, 2020.

REFERENCES

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, Second Edition, 2008.
2. Alfred J. Menezes, "Handbook of Applied Cryptography", CRC Press, 1997.
3. Bragg, "Network Security: The Complete Reference", Tata McGraw-Hill Education, 2004.
4. Jeff Duntemann, "Degunking your email, spam, and viruses", Paraglyph Press, 2004
5. Douglas Robert Stinson, "Cryptography: Theory and Practice", Chapman & Hall/CRC, 2006.

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Date: 22-12-2023

U19ADS602 **FULL STACK DEVELOPMENT** **3 0 0 3**

COURSE OUTCOMES

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

1. Design a front end of web application using HTML, CSS and Bootstrap Front End Framework
2. Write a java script code to validate the user data and asynchronously invoke backend application
3. Develop a front end of web application using a React JS library and make a call to server-side programs
4. Develop a back end of web application using Node JS and Express Framework
5. Perform CRUD operations in MongoDB and deploy web application in Cloud

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								2	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.

Bootstrap : 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 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 **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 IV NODE.JS AND EXPRESS 9

Introduction, Environmental setup, Simple Server, Response Type – HTML, JSON, Routing, Express Introduction, Express params and query string, Express Middleware, API Authentication, Sending Mail, and DB connectivity

UNIT V MONGO DB AND APPLICATION DEPLOYMENT IN CLOUD 9

SQL Vs NO SQL, Mongo DB overview, Installation, connecting and performing CRUD operations. Introduction to Cloud – Deploy a web application using IBM Cloud and AWS cloud.

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.

J. Dulano

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Date: 22-12-2023

U19ADS603 **DEEP LEARNING** **3 0 0 3**

COURSE OUTCOMES

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

1. Explain the basic concepts of Neural Networks.
2. Design and implement Feed Forward Neural Networks along with regularization.
3. Design and implement Convolutional Neural Networks.
4. Design and implement Recurrent Neural Networks.
5. Apply Deep Learning models in various 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	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 BASICS OF NEURAL NETWORKS **9**

Introduction to Deep Learning: Basics: Biological Neuron, Idea of Computational Units, McCulloch – Pitts Unit and Thresholding Logic – Linear Perceptron, Perceptron Learning Algorithm – Linear Seperability, Convergence Theorem for Perceptron Learning Algorithm.

UNIT II FEED FORWARD NEURAL NETWORKS **9**

Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout – Optimization Techniques: Stochastic, Mini-batch and Adagrad optimization.

UNIT III CONVOLUTIONAL NEURAL NETWORKS **9**

CNN Architectures – Convolution Operation – Variants of the Basic Convolution Function – Structured Outputs – Data Types – Efficient Convolution Algorithm – Random or Unsupervised Features – LeNet, AlexNet.

UNIT IV RECURRENT NEURAL NETWORKS AND OTHER DEEP LEARNING ARCHITECTURES 9

Recurrent Neural Networks – Bidirectional RNNs – Deep Recurrent Networks – Recursive Neural Networks – LSTM and Other Gated RNNs – Autoencoders – Stochastic Encoders and Decoders, Denoising Autoencoders, Contractive Autoencoders, Applications of Autoencoders.

UNIT V DEEP LEARNING APPLICATIONS 9

Large Scale Deep Learning – Object Detection - One Stage Algorithm: YOLO – Two Stage Algorithm: RCNN – Image Segmentation – Speech Recognition – Natural Language Processing – Other Applications.

TOTAL: 45 HOURS

TEXT BOOK:

1. Ian Good Fellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2017.

REFERENCES:

1. Pablo Rivas, Laura Montoya, "Deep Learning for Beginners: A beginner's guide to getting up and running with deep learning from scratch using python", Packt Publishing, 2020.
2. Francois Chollet, "Deep Learning with Python", Manning Publications, 2018.
3. Phil Kim, "Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence", Apress , 2017.
4. Ragav Venkatesan, Baoxin Li, "Convolutional Neural Networks in Visual Computing", CRCPress, 2018.
5. Navin Kumar Manaswi, "Deep Learning with Applications Using Python", Apress, 2018.
6. Joshua F. Wiley, "R Deep Learning Essentials", Packt Publication

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SALEM-636 005

Date: 22-12-2023

COURSE OUTCOMES

At the end of the course, students 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 and Deploy it in Cloud.

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. Study of most popular full stack such as MEAN, PERN, LAMP and MERN
2. Create your own Blog page using HTML/CSS
3. Create a home page of your website using BootStrap
4. Add a functionality to your Blog using Javascript and jQuery
5. Create a front end of online assessment pages using React JS
6. 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
7. Node.js with MONGO DB (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

   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

Date: 22-12-2023

8. Email
    a) Build a script in nodejs to send a email with a default content
    b) Use task '7-b' and integrate the task '8-a' to send a email to the user that they have logged in from this IP

9. Create a back end of online assessment using Node JS and Mongo DB

10. Create a full stack application comprising React JS, Node JS, Express 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.

11. Deploy a Full Stack based web application into IBM Cloud

12. Deploy a Full Stack based web application into AWS Cloud.

TOTAL: 60 HOURS

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COURSE OUTCOMES

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

1. Apply TensorFlow and PyTorch in Deep Learning Applications.
2. Design and implement Deep Learning Applications.
3. Analyze different Deep Learning Models in Image Related Projects.

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 PROGRAMS

1. Implement a simple problem like regression model in TensorFlow.
2. Implement a perceptron in TensorFlow Environment.
3. Implement a Feed-Forward Network in TensorFlow.
4. Implement an Image preprocessing using TensorFlow.
5. Implement an Image Classifier using CNN in TensorFlow.
6. Implement a Transfer Learning concept in Image Classification.
7. Implement an Object Detection using PyTorch.
8. Implement Recurrent Neural network in PyTorch.
9. Implement a SimpleLSTM using PyTorch.
10. Implement an Autoencoder in PyTorch.

TOTAL: 60 HOURS

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Date: 22-12-2023

U19ADS914 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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Date: 22-12-2023

U19ADS915 **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.

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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

Total: 30 Hours

S. Anita
18/12/2023

Dr.S.Anita
Professor and Head
Department of Training

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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.,
Professor and Head
Department of Biomedical Engineering
Sona College of Technology, Salem-5

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

22/12/23.

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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.

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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.

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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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U19EE1003 INNOVATION, IPR AND ENTREPRENEURSHIP DEVELOPMENT 3 0 0 3

COURSE OUTCOMES

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

1. Acquire the knowledge for establishment of an enterprise and management,
2. Derivetheinnovative ideas, right approach to the problem and arrive solution for problem with IPR and its legal aspects.
3. Prepare the project report preparation and assessment of Business.
4. Acquire the knowledge on costing, Techno-economic aspects, find out the sources of finance and opportunities in business.
5. Identify the support system for Entrepreneurs by Government and venture capitals.

CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1			3			3	3		3	3	3	3		3
CO2			3			3	3	3	3	3	3	3		3
CO3			3			3	3	3	3	3	3	3		3
CO4			3			3	3	3	3	3	3	3		3
CO5			3			3	3	3	3	3	3	3		3

UNIT I ENTREPRENEURSHIP&MOTIVATION 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth. Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

UNIT II INNOVATION, CREATIVITY, DEVELOPMENT PROCESS AND LEGAL ASPECTS 9

Innovation and Creativity- An Introduction, Innovation in Current Environment, Types of Innovation Sources of new Ideas, Methods of generating innovative ideas, creating problem solving, product planning and development process. Legal aspects of business (IPR, Labor law).

UNIT III BUSINESS 9

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING 9

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, GST.

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UNIT V SUPPORT TO ENTREPRENEURS 9

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures - Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

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

TEXT BOOKS:

1. Khanka. S.S., "Entrepreneurial Development" S.Chand& Co. Ltd., Ram Nagar, New Delhi, 2013. 99
2. Donald F Kuratko, "Entreprenuership – Theory, Process and Practice", 9 th Edition, Cengage Learning, 2014.

REFERENCES:

1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2013.
2. Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis" 2 nd Edition Dream tech, 2005.
3. Rajeev Roy, "Entrepreneurship" 2 nd Edition, Oxford University Press, 2011.
4. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development", Institute of India, Ahmadabad, 1986.
5. Innovation and Entrepreneurship Book by Peter Drucker,
6. James Larminie and John Lowry, "Electric Vehicle Technology Explained " John Wiley & Sons, 2003.

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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.

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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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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

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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.

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.

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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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