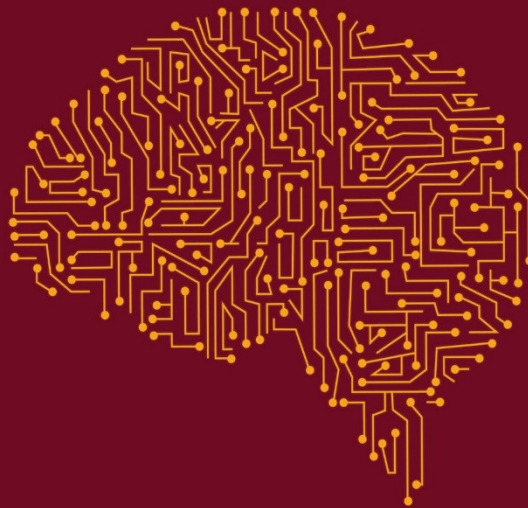# (DEEMED TO BE U N I V E R S I T Y)

ELECTRONICS & COMPUTER ENGINEERING

CURRICULUM & SYLLABUS

APPLICABLE FOR B.TECH. STUDENTS
ADMITTED IN A.Y. 2018-19

Course Structure for 2018-19 Batch

Sl No	Course Code	Course Title	Type	Uni/Sch/Dept	L	T	P	S	Cr	CH
Bridge / Refresher Courses										
1		Mathematics	BS	SCH ELEC	0	0	2	0	0	2
2		Physics	BS	SCH ELEC	0	0	2	0	0	2
3		Chemistry	BS	SCH ELEC	0	0	2	0	0	2
4		English	HSS	SCH ELEC	0	0	2	0	0	2
		Sub-Total			**0**	**0**	**8**	**0**	**0**	**8**
Induction Courses (Non Credit)										
5	18IN1001	Fundamentals of Mathematics	BS	SCH CORE	5	0	0	0	0	5
6	18IN1002	Basics of Physics	BS	SCH CORE	5	0	0	0	0	5
7	18IN1003	Introduction to Engineering	ES	SCH CORE	5	0	0	0	0	5
8	18IN1004	Human Values	HSS	SCH CORE	5	0	0	0	0	5
9	18IN1005	SWEAR Analysis	ES	SCH CORE	5	0	0	0	0	5
10	18IN1006	Cocurricular Activities	GN	SCH CORE	5	0	0	0	0	5
		Sub-Total			**30**	**0**	**0**	**0**	**0**	**30**
Common Courses										
11	18UC1101	Basic English	HSS	UNI CORE	0	0	4	0	2	4
12	18UC1202	English Proficiency	HSS	UNI CORE	0	0	4	0	2	4
13	18UC2103	Professional Communication Skills	HSS	UNI CORE	0	0	4	0	2	4
14	18UC2204	Aptitude Builder -1	HSS	UNI CORE	0	0	4	0	2	4
15	18UC3105	Aptitude Builder -2	HSS	UNI CORE	0	0	4	0	2	4
16	18UC3206	Campus to Corporate	HSS	UNI CORE	0	0	4	0	2	4
17		**Foreign Language**	HSS	UNIV ELEC	2	0	0	0	2	2
18	18UC0007	Indian Heritage and Culture	HSS	UNI CORE	0	0	2	0	0	2
19	18UC0008	Indian Constitution	HSS	UNI CORE	0	0	2	0	0	2
20	18UC0009	Ecology & Environment	HSS	UNI CORE	2	0	0	0	2	2
21	18UC0010	Universal Human Values & Professional Ethics	HSS	UNI CORE	1	0	2	0	2	3
22		**Management Elective**	HSS	SCH ELEC	3	0	0	0	3	35
		Sub-Total			**8**	**0**	**30**	**0**	**21**	**70**
23	18SC1103	Single Variable Calculus and Matrix Algebra	BS	SCH CORE	3	0	0	0	3	3
24	18 MT1202	Multivariate Calculus	BS	SCH ELEC	3	0	2	0	4	5
25	18SC1105	Logic and Reasoning	BS	SCH CORE	0	0	2	0	1	2
26	18SC1104	Foundations of Computational Mathematics	BS	SCH CORE	0	0	2	0	1	2
27	18EM2003	Probability and Statistics	BS	SCH ELEC	2	1	0	0	3	3
28	18BT1001	Biology for Engineer	BS	SCH ELEC	2	0	0	0	2	2
29	18PH1003	Physics of Electrical Circuits	BS	SCH ELEC	3	0	2	0	4	5
30	18 CY1001	Engineering Chemistry	BS	SCH ELEC	3	0	2	0	4	5
		Sub-Total			**16**	**1**	**10**	**0**	**22**	**27**
31	18SC1101	Problem Solving and	ES	SCH CORE	3	0	2	0	4	5

		Computer Programming								
32	18SC1202	Data Structures	ES	SCH CORE	3	0	2	0	4	5
33	18EC1002	Engineering Graphics & Design for Electronic and Computer Engineers	ES	SCH ELEC	0	0	4	0	2	4
34	18 CS1003	Workshop Practice for Computer Engineers	ES	SCH ELEC	0	0	4	0	2	4
35	18SC2009	Object oriented Programming	ES	SCH ELEC	3	0	2	0	4	5
36	18CS1203	Discrete Mathematics	ES	SCH ELEC	2	1	0	0	3	3
37	18 EC1001	Digital System Design	ES	SCH ELEC	3	0	2	0	4	5
38	18EM3106	Signal Modeling and Analysis	ES	SCH ELEC	2	0	2	0	3	4
		Sub-Total			**16**	**1**	**18**	**0**	**26**	**35**
39	18EM1201	Computer Organization and Architecture	PC	DEP CORE	3	0	2	0	4	5
40	18EM2101	Processors and Controllers	PC	DEP CORE	3	0	2	0	4	5
41	18CS2102	Operating Systems	PC	DEP CORE	3	0	2	0	4	5
42	18CS2205	Database Management Systems	PC	DEP CORE	2	1	2	0	4	5
43	18EM2204	Computer Networks and Security	PC	DEP CORE	3	0	2	0	4	5
44	18EM3104	Analog Electronic Circuits	PC	DEP CORE	3	0	4	0	5	7
45	18EM2202	Web Application Development	PC	DEP CORE	3	0	2	0	4	5
46	18CS2206	Artificial Intelligence	PC	DEP CORE	2	0	2	0	3	4
47	18EM2203	Embedded Systems	PC	DEP CORE	3	0	2	0	4	5
48	18CS2103	Software Engineering	PC	DEP CORE	2	1	0	0	3	3
49	18EM3205	Fundamentals of Communication Systems	PC	DEP CORE	3	0	2	0	4	5
		Sub-Total			**30**	**2**	**22**	**0**	**43**	**54**
50		Professional Elective - 1	PE	DEPT ELEC	2	0	2	0	3	4
51		Professional Elective - 2	PE	DEPT ELEC	2	0	2	0	3	4
52		Professional Elective - 3	PE	DEPT ELEC	2	0	2	0	3	4
53		Professional Elective - 4	PE	DEPT ELEC	2	0	2	0	3	4
54		Professional Elective - 5	PE	DEPT ELEC	2	0	2	0	3	4
55		Professional Elective - 6	PE	DEPT ELEC	2	0	2	0	3	4
		Sub-Total			**12**	**0**	**12**	**0**	**18**	**24**
56		Open Elective Course - 1	OE	UNIV ELEC	3	0	0	0	3	3
57		Open Elective Course - 2	OE	UNIV ELEC	3	0	0	0	3	3
58		Open Elective Course - 3	OE	UNIV ELEC	3	0	0	0	3	3
		Sub-Total			*9*	*0*	*0*	*0*	*9*	*9*
59	18IE2246	Industrial Training	PR	SCH CORE	0	0	0	0	2	0
60	18IE3247	Term Paper	PR	SCH CORE	0	0	4	0	2	4
61	18IE4048	Project (Part - 1)	PR	SCH CORE	0	0	0	24	6	24
62	18IE4050	Project (Part - 2)	PR	SCH CORE	0	0	0	24	6	24
	18IE4049	Practice School	PR	SCH CORE	0	0	0	24	6	24
		Sub-Total			*0*	*0*	*4*	*72*	*16*	*52*
63	18SC1106	Technical Skill - 1 (Coding)	SK	SCH CORE	0	0	0	8	2	6

64	18SC1207	Technical Skill - 2 (Coding)	SK	SCH CORE	0	0	0	8	2	6
65	18TS201	Skilling for Engineers - 3 (Java)	SK	SCH ELEC	0	0	0	8	2	8
66	18TS202	Skilling for engineers- 4 (Python Programming)	SK	SCH ELEC	0	0	0	8	2	8
67	18TS301	Skilling for Engineers- 5 (Embedded C)	SK	SCH ELEC	0	0	0	8	2	8
68	18TS303	Skilling for Engineers - 6 (IoT Application Development)	SK	SCH ELEC	0	0	0	8	2	8
		Sub-Total			**0**	**0**	**0**	**48**	**12**	**44**
69	18GN1101	Counseling -1		SCH CORE	0	0	1	0	0	1
70	18GN1202	Counseling -2		SCH CORE	0	0	1	0	0	1
71	18GN2103	Counseling -3		SCH CORE	0	0	1	0	0	1
72	18GN2204	Counseling -4		SCH CORE	0	0	1	0	0	1
73	18GN3105	Counseling -5		SCH CORE	0	0	1	0	0	1
74	18GN3206	Counseling -6		SCH CORE	0	0	1	0	0	1
75	18GN1107	Cocurricular Activity -1		SCH CORE	0	0	0	2	0.5	2
76	18GN1208	Cocurricular Activity -2		SCH CORE	0	0	0	2	0.5	2
77	18GN2109	Cocurricular Activity -3		SCH CORE	0	0	0	2	0	2
78	18GN2210	Cocurricular Activity -4		SCH CORE	0	0	0	2	0	2
79	18GN3111	Cocurricular Activity -5		SCH CORE	0	0	0	2	0	2
80	18GN3212	Cocurricular Activity -6		SCH CORE	0	0	0	2	0	2
		Sub-Total			*0*	*0*	*6*	*12*	*1*	*18*
		Campus Recruitment and Training Courses								
81	18TS302	Technical Proficiency & Training -1	HSS & ES	SCH ELEC	0	0	0	8	2	8
82	18TS304	Technical Proficiency & Training -2	HSS & ES	SCH ELEC	0	0	0	8	2	8
		Sub-Total			**0**	**0**	**0**	**16**	**4**	**16**
		Total			91	4	102	148	172	349

SKILL BASED - PROFESSIONAL ELECTIVES - EMBEDDED SYSTEMS								
S#	course code	course Title	L	T	P	S	CR	CH
1	18EM5101	Sensors and Actuators	2	0	2	0	3	4
2	18EM5102	Advanced Microprocessors and Micro Controllers	3	0	0	0	3	3
3	18EM5103	Hardware and Software Co-Design	3	0	0	0	3	3
4	18EM5210	Networking Embedded Systems	3	0	0	0	3	3
5	18EM5211	Cloud Computing	2	0	2	0	3	4
6	18EM5212	Data Science and Big Data Analytics	2	0	2	0	3	4

		SKILL BASED - PROFESSIONAL ELECTIVES - WEB TECHNOLOGIES						
1	18EM5104	Web Programming with Python	2	0	2	0	3	4
2	18EM5105	Web Services	2	0	2	0	3	4
3	18EM5106	Web Security	3	0	0	0	3	3
4	18EM5213	Web Semantics	3	0	0	0	3	3
5	18EM5211	Cloud Computing	2	0	2	0	3	4
6	18EM5212	Data Science and Big Data Analytics	2	0	2	0	3	4
		SKILL BASED - PROFESSIONAL ELECTIVES - INTERNET OF THINGS						
1	18EM5101	Sensors and Actuators	2	0	2	0	3	4
2	18EM5107	Fundamentals of Internet of Things	2	0	2	0	3	4
3	18EM5108	IoT Application Development	2	0	2	0	3	4
4	18EM5109	Wireless and Mobile Communication	3	0	0	0	3	3
5	18EM5214	Wireless Sensor Networks	3	0	0	0	3	3
6	18EM5215	Cloud Computing for Internet of Things	2	0	2	0	3	4
		SKILL BASED - PROFESSIONAL ELECTIVES - AI						
1	18EM5110	SOFTCOMPUTING	3	0	0	0	3	3
2	18EM5111	NATURAL LANGUAGE PROCESSING	3	0	0	0	3	3
3	18EM5112	MACHINE LEARNING	3	0	0	0	3	3
4	18EM5216	Deep Learning	3	0	0	0	3	3
5	18EM5211	Cloud Computing	2	0	2	0	3	4
6	18EM5212	Data Science and Big Data Analytics	2	0	2	0	3	4
		SKILL BASED - PROFESSIONAL ELECTIVES - CYBER SECURITY						
1	18EM5311	Fundamentals of Cyber Security	3	0	0	0	3	3
2	18EM5312	Mobile and Wireless Security	2	0	2	0	3	4
3	18EM5313	Security in Internet of Things	2	0	2	0	3	4
4	18EM5314	Computer Forensics	3	0	0	0	3	3
5	18EM5317	Intrusion Detection Systems	3	0	0	0	3	3
6	18EM5318	Ethical Hacking and Web Security	2	0	2	0	3	4
		SKILLING COURSES						
1	18SC1106	Coding Skill 1	0	0	0	8	2	8
2	18SC1207	Coding Skill 2	0	0	0	8	2	8
3	18TS201	Skilling for Engineers3 –(JAVA)	0	0	0	8	2	8
4	18TS202	Skilling for engineers-4(Python Programming)	0	0	0	8	2	8
5	18TS301	Skilling for Engineers-5(Embedded C)	0	0	0	8	2	8
6	18TS303	Skilling for Engineers-6(IoT programming)	0	0	0	8	2	8

		OPEN AND MANAGEMENT ELECTIVES						
1	18EM40B1	Linux Programming	3	0	0	0	3	3
2	18EM40B2	E-Commerce	3	0	0	0	3	3
3	18EM40B3	Web technologies	3	0	0	0	3	3
4	18 BT 40A1	IPR & Patent Laws	3	0	0	0	3	3
5	18CE 40A2	Environmental Pollution Control Methods	3	0	0	0	3	3
6	18 CE 40A3	Solid and Hazardous waste management	3	0	0	0	3	3
7	18 CE 40A4	Remote Sensing & GIS	3	0	0	0	3	3
8	18 CE 40A5	Disaster Management	3	0	0	0	3	3
9	18 CS 40A6	Fundamentals of DBMS	3	0	0	0	3	3
10	18 CS 40A7	Fundamentals of Software Engineering	3	0	0	0	3	3
11	18 CS 40A8	Fundamentals of Information Technology	3	0	0	0	3	3
12	18 EC 40A9	Image Processing	3	0	0	0	3	3
13	18 EE 40B3	Renewable Energy Sources	3	0	0	0	3	3
14	18 ME 40B4	Robotics	3	0	0	0	3	3
15	18 ME 40B5	Mechatronics	3	0	0	0	3	3
16	18ME 40B6	Operations Research	3	0	0	0	3	3
17	18PH 40B7	Nano Materials & Technology	3	0	0	0	3	3
18	18PE 40B8	Subsea Engineering	3	0	0	0	3	3
19	18PE 40B9	Oil and Gas Management	3	0	0	0	3	3
20	18GN 40C1	SelfDevelopment	3	0	0	0	3	3
21	18GN 40C2	Indian Culture and History	3	0	0	0	3	3
22	18GN 40C3	Emotional Intelligence	3	0	0	0	3	3
23	18GN 40C5	Behavioural Sciences	3	0	0	0	3	3
24	18MB 4057	Economics for Engineers	3	0	0	0	3	3
25	18GN 40C4	Professional Ethics and Values	3	0	0	0	3	3
26	18MB 4051	Paradigms in Management thought	3	0	0	0	3	3
27	18MB 4052	Indian Economy	3	0	0	0	3	3
28	18 MB 4053	Managing Personal Finances	3	0	0	0	3	3
29	18MB 4054	Basics of Marketing for Engineers	3	0	0	0	3	3
30	18MB 4055	Organization Management	3	0	0	0	3	3
31	18 MB 4056	Resources Safety and Quality Management	3	0	0	0	3	3

		FORIGEN/NON NATIVE LANGUAGES						
33	18FC3056	HINDI	3	0	0	0	3	3
34	18 GN 3051	Arabic Language	3	0	0	0	3	3
35	18GN 3052	Bengali Language	3	0	0	0	3	3
36	18 GN 3053	Chinese Language	3	0	0	0	3	3
37	18GN 3054	French Language	3	0	0	0	3	3
38	18 GN 3055	German Language	3	0	0	0	3	3
39	18 GN 3056	Hindi Language	3	0	0	0	3	3
40	18GN 3057	Italian Language	3	0	0	0	3	3
41	18 GN 3059	Kannada Language	3	0	0	0	3	3
42	18 GN 3060	Russian Language	3	0	0	0	3	3
43	18GN 3061	Simhali Language	3	0	0	0	3	3
44	18GN 3062	Spanish Language	3	0	0	0	3	3
		Honours in computer science stream Courses						
1	18EM7001	Automata and Formal Languages	3	1	0	0	4	4
2	18EM7002	Compiler design	3	1	0	0	4	4
3	18EM7003	Data Mining	3	1	0	0	4	4
4	18EM7004	**Distributed Systems**	3	1	0	0	4	4
5	18EM7005	Object oriented analysis and Design	3	1	0	0	4	4
		Total	**15**	**5**	**0**	**0**	**20**	**24**
		Honours in ECSE- Electronics stream						
1	18EM7101	Digital Image processing	3	1	0	0	4	4
2	18EM7102	Digital Audio Processing	3	1	0	0	4	4
3	18EM7103	Digital Video processing	3	1	0	0	4	4
4	18EM7104	Digital Signal processing	3	1	0	0	4	4
5	18EM7105	FPGA based Design	3	1	0	0	4	4
		Total	**15**	**5**	**0**	**0**	**20**	**24**
		Minor in Web Technologies						
1	18EM6001	Foundations of WEB Technologies	3	1	0	0	4	4
2	18EM6002	Internet programming	3	1	0	0	4	4
3	18EM6003	Enterprise programming	3	1	0	0	4	4
4	18EM6004	WEB security	3	1	0	0	4	4
5	18EM6005	WEB services	3	1	0	0	4	4
		Total	**15**	**5**	**0**	**0**	**20**	**24**

HUMANITIES AND SOCIAL SCIENCES

BASIC ENGLISH

Course	Basic English		
Course Code	18UC1101	**L-T-P-S**	0-0-4-0
Pre-Requisites	Nil	**Credits**	2

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO 1	Apply the practical knowledge of using action words in sentence construction.	PO10	3
CO 2	Apply and analyse the right kind of pronunciation with regards to speech sounds and able to get different types of pronunciations.	PO10	3
CO 3	Apply the concept of fundamental principle of counting to solve the problems on linear, circular permutations and also for the problems on selections. Apply the concept of probability, while doing the problems on Leap year & Non-Leap year problems, coins, dice, balls and cards.	PO1	3
CO 4	Analyze the given conditions and finding out all the possible arrangements in linear & circular order. Analyze the given numbers or letters to find out the hidden analogy and apply that analogy to find solutions. Finding the odd man out by observing the principle which makes the others similar.	PO5	4

Syllabus

Interactive Grammar: Action Words-Modifiers, Intensifiers, Connectives,5 Passages- 5 Worksheets (Revision tests of Bridge Course topics) -Parsing.
Sentence Skills: Tense, Voice, Case, Gender, Reported Speech, Syntax, Types of Sentences, Syntactic Ordering.
Introduction to the Sounds of English: Basic English Sounds, Distinctive Sounds of English, Assimilation, Contraction, Elision, Twinning, Stress, Syllables, and Word- stress, Tone and Intonation- Rising, Falling, Rise-fall and Fall-rise.
Language Laboratory Interactive: Esca talk, JAM, Ranking, Shrinking Story, Desperate Decision, Listening for Specifics, Pronunciation Practice.
Quantitative Aptitude: Permutations and Combinations, Probability
Reasoning: Number and Letter Analogy, Odd Man out, Analytical Reasoning-I
Reference Books

1. Kerry Patterson, Joseph Grenny, Ron McMillan: Crucial Conversations: Tools for Talking When Stakes Are High. Switzler: Paperback – Animated, September 9, 2011.
2. Douglas Stone, Bruce Patton, Sheila Heen, and Roger Fisher :Difficult Conversations: How to Have Conversations that Matter the Most .Paperback – November 2, 2010
3. R.K. Bansal, J.B. Harrison: Spoken English. Delhi: Orient Black Swan.2009.
4. Language Laboratory Teacher Manual, KLEFU

ENGLISH PROFICIENCY

Course	English Proficiency		
Course Code	18UC1202	L-T-P-S	0-0-4-0
Pre-Requisites	Nil	Credits	2

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO 1	Apply the concepts of accurate English while writing and become equally at ease in using good vocabulary and language skills.	PO8,POPO9, PO10	3
CO 2	Understand the importance of pronunciation and apply the same day to day conversation.	PO8, PO9, PO10	3
CO 3	Apply the concepts of Ratios, Percentages, Averages and Analysing the given information, a student is required to understand the given information and thereafter answer the given questions on the basis of comparative analysis of the data in the form of tabulation, bar graphs, pie charts, line graphs. Analyse the given data to find whether it is sufficient or not.	PO1,PO 4	3
CO 4	Apply the basic functionality of Clocks and Calendars to find the solutions for the problems. Analyze the given symbols to understand the hidden meaning of the given expression and finding the solutions. Analyze the given conditions and finding out all the possible arrangements in linear & circular order.	PO1,PO 5	4

Syllabus

Writing Skills: How to Write a Definition, Defining Technical Terms**,** Product and Process Description

Advanced Grammar Skills: Transformation of Sentences, Phrases, Clauses, Sentences, Simple, Compound, Complex Sentences, Concord, And Lexis 1**:** Synonyms**,** Antonyms, Analogies, And Sentence Equivalence-One-Word Substitutes.

Language Laboratory Interactives: Debate, Blind-fold, Role Play, Situation Reaction Test, Build an Island nation

Quantitative Aptitude: Data Interpretation, Data Sufficiency

Reasoning: Symbols and Notations, Clocks and Calendars, Analytical Reasoning-II

Reference Books:

1. Dictionary of Technical Terms
2. Dr. Meenakshi Raman and Dr. Sangeetha Sarma: Technical Communication. Oxford University Press: Delhi.2016.
3. The Ultimate Verbal and Vocabulary Builder. Texas: Lighthouse Review.2000.
4. Rajeev Vasisth: Interactive Vocabulary Drills. New Delhi: Arihant Publications Limited. 2011.

5. Language Laboratory Teacher Manual, KLEFU

PROFESSIONAL COMMUNICATION SKILLS

Course	Professional communication skills		
Course Code	18UC2103	L-T-P-S	0-0-4-0
Pre-Requisites	Nil	Credits	2

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO 1	Able to spot the common grammatical errors related to Sentence Structure, Preposition, Concord, Relative and Conditional Clauses, and Parallel Structures. The learner should be efficient to construct a context-determined text in addition to learning Technical Writing Skills. One should be enabled to use English Language efficiently in the written medium to communicate Personal as well as Professional.	PO9,PO10	3
CO 2	Able to read, understand, and interpret a text intrinsically as well as extrinsically. The learner can browse a text quickly to come-up with a gist and personal interpretation. One is able to create a healthy work-environment and prove to be an asset or one of the most reliable resources to the Organization. As a professional, one is mature to bridge the gulf between the existing behavior/ lifestyle and the expected corporate behaviour cum lifestyle.	PO8	4
CO 3	Apply the concepts of Time and Work, the students will be able to solve the questions related to Men-Time-Work, problems based on wages, pipes and cisterns. Apply the concepts of Time and Distance and solve the problems related to average speed, relative speed, problems based on trains, boats, circular tracks, races and games.	PO1	3
CO 4	Apply Venn diagrams to the given statements to find out whether the given conclusions can be deducted from the given statements. Apply the logical implications and also the negations of various connectives to find the solutions. Analyze the given data and representing the data in the form of Venn Diagrams to find relations between any given set of elements.	PO1,PO5	3

Syllabus

Grammar and Usage: Error Analysis.
Writing Skills: Topic sentence, Linkers, Connectors and Transition, Paragraph Writing, Letter Writing
Reading Comprehension: Techniques, Skimming and Scanning, Vertical Reading, Reading
Perception Tests (RPT): (Graphic) Reading Perception Tests (RPT), Semantic Interpretation of the Text, Reading Speed Enhancement.
Soft Skills:Interpersonal Skills**,** Adjusting Your Attitude-Arrogance has no Place in the Workplace, Cultural Sensitivity in the Workplace**,** Corporate Culture: Learning How to Fit In.
Quantitative Aptitude: Time and Work, Time and Distance
Reasoning: Deductions, Logical Connectives, Venn Diagrams
Reference Books:

1. Gajendra Singh Chauhan and SmitaKashiramka. *Technical Communication.* Delhi:Cengage Learning India.2018.
2. Andrea Penruddocke and Christopher A. Warnasch.English for the Real World.USA:Living Language.2004
3. GeraldJ Alfred, Charles T Brusaw and Walter E.Oliu. *Hand Book of Technical Writing.* USA:Betford.2000.
4. Asher Cashdan: *Language, Reading and Learning.*Oxford:Basil Blackwell.1979.

APTITUDE BUILDER -1

Course	Aptitude Builder 1		
Course Code	18UC2204	**L-T-P-S**	0-0-4-0
Pre-Requisites	Nil	**Credits**	2

CO No	Course outcome's	PO No	BTL
CO 1	Apply the concept of Critical Reading and Analytical Reading and comprehend the keyideas and gist of a passage.Understand the importance of the presentation skills, analyze the given topic, apply various strategies and the principles of grammar in written expression.	PO5,PO6	3
CO 2	Apply the concepts of grammar, various strategies and the usage of formal language in written expression. By using synonyms rewrite the same text in the same format and meaning. Write the gist of the given text.	PO7,PO10	3
CO 3	Apply the concepts of Numbers to solve the problems related to divisibility rules, problems based on Unit's digit, Remainders, Successive Division, Prime Factorization, LCM & HCF problems. Apply the concepts of Averages &Alligations, students will be able to solve the problems related to Averages as well as problems based on Mixtures.	PO1,PO 5	3
CO 4	Apply the various concepts of cubes to find out how to cut a cube to get the maximum number of smaller identical pieces, how to minimize the number of cuts required to cut a cube into the given number of smaller identical pieces, how to count the number of smaller cubes which satisfy the given painting scheme. Apply the principles of binary logic to solve problems involving truth-tellers, liars and alternators. Analyze the given data to form an ordered arrangement from an unorganized raw data.	PO1,PO 5	4

Syllabus

Directed Listening and Thinking Activity (DLTA) Skills:Reading, Listening, Thinking, Writing, and Presentation - Method: Flipped Classroom.
Writing Skills: Paraphrasing, Summarizing, Notice, Circular, Agenda, Minutes, Memo
Body Language (Kinesics):postures, gestures, eye contact
Self-confidence: Self-esteem
Soft Skills: The Art of Compromise, Learn to Say: "I don't know", being organized, showing Self-Awareness, An eye on success, being self- motivated, showing self-awareness, Find Direction from Someone Who Is Lost: "The Drifter"
Self- Assessment for Attainable Career Objectives - Defining a Career Objective
Quantitative Aptitude: Numbers, Averages and Allegations, Mensuration
Reasoning: Cubes, Binary Logic, Ordering and Sequencing

Reference Books:

1. Daniel G.Riordan and Steven E. Pauley: *Technical RePOrt Writing Today.* New Delhi*:* Biztantra.2004.
2. Ken Taylor, Telephoning *and Teleconferencing Skills*. Hyderabad:Orient Black Swan.2008.
3. E. Suresh Kumar, B. Sandhya. *Communication for Professional Success.* Delhi: Orient Black Swan.2013
4. *Reasoning Trainer Plus*.: Hyderabad : Brain Mapping Academy.2012

APTITUDE BUILDER -2

Course	Aptitude Builder 2		
Course Code	18UC3105	L-T-P-S	0-0-4-0
Pre-Requisites	Nil	Credits	2

CO No	Course outcome's	PO No	BTL
CO 1	Apply the strategies and techniques learnt in carrying out conversations in different contexts. Analyse the different parameters and formats of written technical communication and apply in everyday work and life.	PO8, PO 10	3
CO 2	Analyse the concepts of critical and analytical reading skills. Apply the strategies and techniques learnt in handling interviews in different contexts.	PO8, PO10	3
CO 3	Apply the concepts of Ratio & Proportion, Percentages, Profit &Loss, Simple & Compound Interest, students will be able to solve the problems based on Ratios, problems involving Percentages, problems related to cost price, selling price, profit, loss, marked price and discounts, problems involving interest.	PO1, PO5	3
CO 4	Analyze the given series of numbers to predict the next number in the series. Analyze the given set of numbers or letters to find the analogy. Analyze the given data to find the code which is used to encode a given word and use the same code in the process of decoding. Apply the given set of conditions to select a team from a group of members.	PO1	4

Syllabus

Critical Reading: Reading to Identify the Theme**,** Reading to Identify the Central Idea**;** Reading to Identify the Tone, Reading to Identify Writer's Attitude, Reading to Identify Parallel Ideas, and Reading to Identify Logical Conclusions.

Writing Skills**:** Note- making, Note- taking, Report Writing.

Presentation Skills- Preparing for the Presentation, Audience Analysis, Processing Information, Ice-breakers, Quotations, Presentation Structure**,** Say what you want to say- Say it, Say what you have said to say**,** Preparing for Question Hour, Funnel Effect and How to Overcome it.

Trinity Guild Hall - Communication Skills - Graded Evaluation and Testing- 1-8 grades

Quantitative Aptitude: Ratio and Prportion, Percentages, Profit and Loss, Simple Interest and Compound Interest

Reasoning: Number and Letter Series, Number and Letter Analogy, Coding and decoding, Odd man out. Selections

Reference Books

1. Dr.Meenakshi Raman and Dr. Sangeetha Sarma: *Technical Communication*. Oxford University Press: Delhi.2016.
2. M. Ashraf Rizvi: *Effective Technical Communication.* New Delhi: McGraw Hill Education(India) Private Limited
3. Tom Rath: Strengths Finder2.0. New York: Gallup Press.2007.
4. C. Weaver. *Reading Process and Practice*. portsmouth US: Heinemann Educational Bokks.1988.

CAMPUS TO CORPORATE

Course	Campus to Corporate		
Course Code	18UC3206	**L-T-P-S**	0-0-4-0
Pre-Requisites	Nil	**Credits**	2

Course outcome's

CO No	Course Outcome's (COs)	PO /PSO	BTL
CO 1	Analyzebasicconcepts ofcriticalandanalyticalreasoningskills applystrategies to analyse issues,arguments and some aspects ofcorporate communication.	PO5,PO6,PO9	3
CO 2	Creativity in writing of any given context like sending Emails, Reports, Proposals etc. Make the student to face HR interviews.	PO7,PO8,PO10	4
CO 3	Apply the concepts of Arithmetic, the students enhance their problem-solving skills which helps themto succeed in campus drives, grooming the younglearners into the corporate world.	PO1,PO 4, PO5	3
CO 4	AnalysethebasicconceptsofCriticalandAnalyticalReasoning in meetingthechallengesoftheprofessionalworld.	PO1, PO5	3

Syllabus

Lexis -2: Vocabulary-Analogies–Advanced Level, Words often Confused, Word Classification, Idioms and Phrases, Sentence Completions, Paragraph Jumble.

Writing Skills: Resume, Email Writing, Company Profile, Briefing and Debriefing, Press note, Catch Phrases, Caption Writing

Critical Thinking: Engineering Ethics through Case Analysis: Ford Pinto, Chernobyl, Hyatt Residency, Bhopal Gas Tragedy, Boys of Football Team-Rescue Operation from the ThanLuangCave in Thailand

Interview Skills: Personal Interview-Concept and Practice**,** Telephone-Etiquettes, Email-Etiquettes, Dress code and Grooming, Preparing portfolio, Group Discussion**,** Mock Interviews, Unconventional HR questions

Simulated Testing: Co-Cubes, E-Litmus and AMCAT Practice, Infosys Placement Papers, Wipro Placement Papers, CTS and Accenture Paper Pattern

Reference Books

1. Ken Taylor. *Telephoning and Teleconferencing Skills*. Hyderabad: Orient Black Swan.2008.
2. E. Suresh Kumar, B. Sandhya. *Communication for Professional Success.* Delhi: Orient Black Swan.2013
3. Judith Verify: *Succeeding at Interview*. Mumbai: Viva Books Private Limited.2000
4. Norman L. Frigon, Sr.& Harry K.Jackson, Jr. *The Leader- Developing the Skills and Personal Qualities.* Mumbai*:* Magna Publishing Co Ltd.2000.

ECOLOGY & ENVIRONMENT

Course	Ecology and Environment		
Course Code	18UC0009	**L-T-P-S**	**2-0-0-0**
Pre-Requisites	Nil	**Credits**	**2**

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand the importance of Environmental education and conservation of natural resources.	PO 6	1
CO2	Understand the importance of ecosystems and biodiversity.	PO 12	1
CO3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.	PO 6	3

Syllabus:

The Multidisciplinary nature of Environmental Studies - Natural Resources- Forest resources - Mining its impact on environment - Water resources - Mineral resources-. Energy resources - Land resource s- Soil erosion - Ecosystems - Biodiversity and its ConservationEnvironnemental pollution - Soil waste management - Electronic waste management, biomedical waste management - Disaster management –.Environmental Legislation Environmental Impact Assessment Process.

Text Book

1. Anubha Kaushik, C. P. Kaushik, "Environmental Studies", New Age International, (2007).
2. Benny Joseph, "Environmental Studies", Tata McGraw-Hill companies, New Delhi, (2009).

INDIAN HERITAGE & CULTURE

Course	Indian Heritage		
Course Code	18UC0007	L-T-P-S	0-0-2-0
Pre-Requisites	Nil	Credits	0

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Must be aware of the basic concepts of Indian culture and civilization	PO 8	2
CO2	Must be aware of the History of Indian culture	PO 8	4
CO3	Must be aware of the impact created by west on Indian social and religious reforms	PO 8	4

Syllabus

Introduction-Concept of Culture-Culture and Civilization-General Characteristics of Indian Culture-Importance of Culture-Unity in Diversity

History and Culture through the Ages – Fundamental Unity of Harappan and Vedic Culture – Jainism and Buddhism - Mauryan Period-Post-Mauryan Period-Gupta Period - Pallavas and Cholas

Advent of Islam in India-Islam and Sufism-Islamic Art and Architecture-Bhakti Movement - Vijayanagar Period-Art and Architecture and Literature

Rise of the West and its impact on India-Social and Religious reformers in the 18th and 19th centuries-Press and growth of modern Indian literature-Rise of Indian Cinema-Indian Independence

Reference Books:

1. Facets of Indian Culture- Spectrum Publications
2. Ancient India: National Council of Educational Research and Training
3. Medieval India: Part I & Part II: National Council of Educational Research and Training.
4. Modern India: National Council of Educational Research and Training.
5. An Advance History of India: R.C. Majumdar, H.C. Raychaudhuri &KalikinkarDatt: Macmillan India Ltd.
6. The Wonder that was India: A. L. Bhasham.

UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS

Course	Universal Human values and Professional Ethics		
Course Code	18UC0010	**L-T-P-S**	1-0-2
Pre-Requisites	Nil	**Credits**	2

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand and identify the basic aspiration of human beings	PO 8	2
CO2	Envisage the roadmap to fulfil the basic aspiration of human beings.	PO 8	4
CO3	Analyse the profession and his role in this existence.	PO 8	4

Syllabus

Introduction to Value Education: Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity - The Basic Human Aspirations, Right Understanding, Relationship and Physical Facilities, Happiness and Prosperity – Current Scenario, Method to fulfill the Basic Human Aspirations.

Harmony in the Human Being: Understanding the Human Being as Co-existence of Self ('I') and Body, Discriminating between the Needs of the Self and the Body, The Body as an Instrument of 'I', Understand Harmony in the Self ('I'), Harmony of the Self ('I') with the Body, Program to Ensure Sanyam and Svasthya.

Harmony in the Family and Society: Harmony in the Family - the Basic Unit of Human Interaction, Values in Human-to-Human Relationships, 'Trust' – the Foundational Value in Relationships, 'Respect' – as the Right Evaluation, Understand Harmony in the Society, Vision for the Universal Human Order.

Harmony in the Nature (Existence): Understand Harmony in the Nature, Interconnectedness, Self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing 'Existence is Co-existence' at All Levels, The Holistic Perception of Harmony in Existence.

Implications of the Right Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models - Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

Text Book:

1. R R Gaur, R Sangal and G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 1st Ed, Excel Books.

INDIAN CONSTITUTION

Course	Indian Constitution		
Course Code	18UC0008	**L-T-P-S**	**0-0-2-0**
Pre-Requisites	**Nil**	**Credits**	**0**

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Must be aware of the way the Indian constitution is made and also must be aware of the features of the Indian constitution	PO 8	2
CO2	Must be aware of the Union Government works	PO 8	2
CO3	Must be aware of the way the state government works	PO 8	2
CO4	Must be aware of the Indian judicial system and the election commission	PO 8	2

Syllabus

Making of the Constitution: A brief analysis of National Movement. Constitutional Development with reference to Government of India Act 1909, 1919, 1935 and Indian Independence Act 1947. The Constituent Assembly of India. **Basic features of the Indian Constitution:** the Preamble, Fundamental Rights, Directive Principles of State Policy – Fundamental Duties

Government of the Union : The Union Executive – the President and the Vice-President – The Council of Ministers and the Prime Minister – Powers and functions, The Union legislature – The Parliament – The Lok Sabha and the Rajya Sabha, Composition, Powers and functions – the role of the Speaker. **Government of the State:** The Governor – the Council of Ministers and the Chief Minister – Powers and Functions, The State Legislature – composition, Powers and functions.

The Indian Judicial System: the Supreme Court and the High Courts – composition, Jurisdiction and functions, judicial review, judicial activism, Independence of Judiciary In India. **Election Commission:** Role and Functioning, Chief Election Commissioner and Election Commissioners

Reference Books

1.   Indian Polity, Laxmikanth
2.   Indian Administration, Subhash Kashyap
3.   Indian Constitution, D.D. Basu
4.   Indian Administration, Avasti and Avasti
5.   Constitutional Law of India, Seervai H.M.
6.   Constitution Of India, Shukla V.N.
7.   The Indian Constitution, Cornerstone of a Nation' by Granville Austiin
8.   Indian Constitutional Law, M.P. Jain

SINGLE VARIABLE CALCULUS AND MATRIX ALGEBRA

Course	Single Variable Calculus and matrix Algebra		
Course Code	18SC1103	**L-T-P-S**	**3-0-0-0**
Pre-Requisites	**Nil**	**Credits**	**3**

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Model the physical laws and relations mathematically as a first order differential equations, solve by analytical and numerical methods also interpret the solution.	PO 1	3
CO2	Model physical laws and relations mathematically as a second/higher order differential equations, solve by analytical method and interpret the solution.	PO 1	3
CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve ordinary differential equations.	PO 1	3
CO4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values.	PO 1	3

Syllabus

Differential Equations: Definitions and terminology and mathematical models used in differential equations. First-order and higher-order differential equations, along with the methods of solutions and their applications. Modeling with first and higher-order also systems of linear first-order differential equations. Solutions of first order ordinary differential equations by Numerical methods. **Fourier series**: Definitions and Fourier series for a periodic signal. Fourier series for simple functions. Fourier series of the summation of sinusoids directly from the definition by using Euler's formula. Solving particular solution to differential equation by Fourier series.**Matrix algebra**: Solving linear System of equations by Gauss-elimination, L U decomposition and Jacobi, Gauss Seidal iteration methods, orthogonal, symmetric, skew-symmetric, Hermitian, Skew-Hermitian and unitary matrices, Eigen values, Eigen vectors and their properties, Cayley -Hamilton theorem (without proof) and its applications, and quadratic forms.

Text books:

1. Advanced Engineering Mathematics, Erwin Kreyszig. John Wiley & Sons, Inc. 10 th Edition.
2. Advanced Engineering Mathematics, Greenberg, PHI Publishers, 2nd Edition.

Reference Books:
1. Differential Equations for Engineers, Wei-Chau Xie, Cambridge University Press, New York. R1
2. Higher Engineering Mathematics, BS Grewal. Publisher: Khanna, New Delhi. R2
3. Advanced Numerical Methods with MATLAB, SC Chapra, Tata McGraw-Hill. R3

MULTIVARIATE CALCULUS

Course	Multivariate Calculus		
Course Code	18 MT1202	**L-T-P-S**	**3-0-2-0**
Pre-Requisites		Credits	4

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Determine extreme values for functions of several variables	PO 1	3
CO2	Determine area, volume and moment of inertia through multiples integrals	PO 1	3
CO3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length, areas of surfaces and volume of solids in practical problems	PO 1	3
CO4	Obtain analytical and numerical solutions of Heat and wave equations	PO 1	3
CO5	Verify the solution of problems through MATLAB	PO 1	6

 Syllabus

Differential Calculus: Partial derivatives, Jacobian, total differentiation and their applications, chain rule, Taylor's series for function of two variables, maxima and minima of functions of two variables, Lagrange's multipliers method. **Integral Calculus:** Line integrals- double and triple integrals and applications to area, volume, mass & moment of inertia. Change of order of integration, change of variables in Polar, cylindrical and spherical Polar coordinates**Vector Calculus**: Scalar and vector Point functions, gradient and directional derivative of a scalar Point function, divergence and curl of a vector   Point function. Line, surface and volume integrals, Green's, Gauss divergence and Stoke's theorems and their applications .
Partial differential equations: Formation of partial differential equations, solutions of first order linear and nonlinear PDEs by Lagrange method, solution of second order PDEs by method of separation of variables i.e., one dimensional wave and heat equations, Laplace equation in two dimensions. Solving Laplace equation by Finite difference method.

Text books:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th Edition, John Wiley &Sons, Inc, Network(2015)
2. Nakhle H Asmar, Partial differential equations with Fourier series and boundary value problems, Second edition Pearson Pub.

Reference Books:
1. Michael Greenberg, Advanced Engineering Mathematics. Second edition, Prentice **Hall, USA.**
2. Zafar Ahsan, Differential equations and their applications, second edition, PHI
3. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, India.

FOUNDATIONS OF COMPUTATIONAL MATHEMATICS

Course	Foundations of computational Mathematics		
Course Code	18SC1104	**L-T-P-S**	0-0-2-0
Pre-Requisites	Nil	**Credits**	1

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Identify the quantities of Real world problems by using the concepts of arithmetic.	PO 1	2
CO2	Computing the areas of regular and irregular solids of real world problems.	PO 1	2
CO3	Identifying the numbers by successive division also finding the solution of equations.	PO 1	2
CO4	Estimating the roots of an equations and find the unknown values from the data by numerical methods	PO 1	2

Syllabus

Numbers: Bodmas Rule, Fractions & Decimals, Classification of numbers, Divisibility rules, factorization, Division & Successive division, Remainders in divisions involving higher Powers, LCM and HCF and Number systems.

Algebra: Powers, roots and Indices, Venn diagrams, Surds, Logarithms, Quadratic Equations & Inequalities, Progressions, Simple Equations. Transposing formulae and solving simultaneous equations.

Arithmetic: Ratios, Proportion, Variation, Percentages, Profit & Loss, Simple &Compound Interest, Averages, Mixtures and Allegations,Time and Distance, Time and Work, Clocks, Calendars and Blood relations

Geometry and Mensuration: Lines & angles, triangles, quadrilaterals, Polygons, circles, surface areas, volumes of 3D figures, graphs reducing non-linear laws to linear form and graphs of exponential functions.

Text Books
1. Basic Engineering Mathematics**,** John Bird, Fourth Edition, Elsevier.

Reference Text Books
1. Quantitative Aptitude, R. S. Aggarwal, Schand Publications.
2. Quantitative Aptitude - G. L. Barrons.
3. Quantitative Aptitude - Abhijit Guha, Mc Graw Hills.

LOGIC AND REASONING

Course	Logic and reasoning		
Course Code	18SC1105	**L-T-P-S**	**0-0-2-0**
Pre-Requisites	**Nil**	**Credits**	**1**

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO 1	Understand how to use Venn diagrams to find the conclusion of statements, solve puzzles using binary logic.	PO 1	2
CO 2	Understand to solve problems on clocks, calendars and problems on Non verbal reasoning.	PO 1	2
CO 3	Understand the available models for Venn diagrams with given data, solve problems relating to cubes and number and letter series.	PO 1	2
CO 4	Understand the techniques used to solve problems puzzles using analytical reasoning on coding and decoding and blood relations	PO 1	2

Syllabus

Permutation and Combinations: Fundamental Principle of Counting, Counting Methods, Definition of permutation, Linear Permutations, Rank of a word, Circular Permutations, Definition of Combinations, Problems on Combinations
Probability: Definitions of Probability, Addition and Multiplication Theorems.
Deductions: Introduction, expressing different types of statements using Venn diagrams, Definition of complimentary pairs, finding the conclusions using Venn diagrams for two and more statements.
Logical Connectives: Definition of simple statement, Definition of compound statement, finding the implications for compound statements, Finding the negations for compound statements.
Binary Logic: Definition of a truth-teller, Definition of a liar, Definition of an alternator, solving problems using method of assumptions, solving analytical puzzles using binary logic.
Cubes: Basics of a cube, finding the minimum number of cuts when the number of identical pieces are given, Finding the maximum number of pieces when cuts are given, Problems on painted cubes of same and different colours, Problems on cuboids, Problems on painted cuboids, Problems on Dice.
Data Sufficiency: Different models in Data Sufficiency, Problems on Data sufficiency, Problems on data redundancy.
Data Interpretation: Problems on tabular form, Problems on Line Graphs, Problems on Bar Graphs, Problems on Pie Charts.
Analytical Reasoning puzzles: Problems on Linear arrangement, Problems on Circular arrangement, Problems on Double line-up, Problems on Selections, and Problems on Comparisons.
Number and letter series: Difference series, Product series, Squares series, Cubes series, Alternate series, Combination series, miscellaneous series, Place values of letters.
Number and Letter Analogies: Definition of Analogy, Problems on number analogy, Problems on letter analogy, Problems on verbal analogy.

Odd man out: Problems on number Odd man out, Problems on letter Odd man out, Problems on verbal Odd man out.

Coding and decoding: Coding using same set of letters, Coding using different set of letters, Coding into a number Comparison & Elimination

Text Books

1. A modern approach to Logical reasoning, R S Agarwal, S. Chand Publications.

Reference Text Books

1. Logical Reasoning, Arun Sharma, Mc Graw Hill.
2. Analytical & Logical Reasoning, Peeyush Bhardwaj, Arihant Publications.

PHYSICSOF ELECTRICAL CIRCUITS

Course	Physics of Electrical Circuits		
Course Code	18PH1003	**L-T-P-S**	**3-0-2-0**
Pre-Requisites	Nil	**Credits**	**4**

CO No	Course Outcome (CO)	PO/PSO	BTL
CO1	To understand the basic electrical elements response in the presence of A.C fields.	PO 2/PSO2	2
CO2	Understand basic concepts of DC and AC circuit behaviour	PO 2/PSO2	2
CO3	Understand the use of circuit analysis theorems and methods	PO 2/PSO2	2
CO4	Understand the frequency response of high- and low-pass filters. Learn to calculate the cut off frequency, describe the phase response and bode plots.	PO 2/PSO2	2
CO5	To apply the knowledge of above Co's and to analyse D.C & A.C circuits.	PO 2/PSO2	3

Syllabus:

AC fundamentals Introduction, Sinusoidal ac Voltage Characteristics and Definitions, Frequency Spectrum, The Sinusoidal Waveform, General Format for the Sinusoidal Voltage or Current, Phase Relations, Average Value, Effective (rms) Values, Response of Basic R, L, and C Elements to a Sinusoidal Voltage or Current, Frequency Response of the Basic Elements, Average Power and Power Factor. Complex Numbers, Rectangular Form, Polar Form, Conversion between Forms, Mathematical Operations with Complex Numbers, Calculator Methods with Complex Numbers, Phasors**Series & Parallel AC and DC Circuits**

Resistive Elements, Inductive Elements, Capacitive Elements, Impedance Diagram, Series Configuration, Voltage Divider Rule, Frequency Response for Series ac Circuits, Phase Measurements, Applications.
Introduction, Total Impedance, Total Admittance, Parallel ac Networks, Current Divider Rule, Frequency Response of Parallel Elements, Equivalent Circuits, Applications.
Methods of Analysis (DC/AC)
Introduction, Independent versus Dependent (Controlled) Sources, Source Conversions, Mesh Analysis, Nodal Analysis. Superposition Theorem, Theremin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Applications.

Important AC/DC Devices: Decibels, Filters and Bode Plots

Properties of Logarithms, Decibels, Filters, R-C Low-Pass Filter, R-C High-Pass Filter, Band-Pass Filters, Band-Stop Filters, Double-Tuned Filter, Other Filter Configurations, Bode Plots, Sketching the Bode Response, Low-Pass Filter with Limited Attenuation, High-Pass Filter with Limited Attenuation, Additional Properties of Bode Plots, Applications

Text books:

1. Introductory Circuit Analysis   13[th]EdGlobal Edition by Robert L. Boylestad
2. Kasap, s.o Principles of electronic materials and Devices McGraw-Hill 3/e
3. Electrical Technology by B. L. Tareja
4. Simulation: NIMulti sim

ENGINEERING CHEMISTRY

Course	Engineering chemistry		
Course Code	18 CY1001	L-T-P-S	3-0-2-0
Pre-Requisites	Nil	Credits	4

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Ability to determine characteristics of a Battery given an application	PO3,PO 4	3
CO2	Ability to demine properties of material formed out of combining various chemicals or metals in engineering setting	PO3,PO 4	3
CO3	Ability to Explain the role of chemical kinetics in the formation and destruction of ozone in the atmosphere and predict the connection between molecular behaviour and observable physical properties.	PO3,PO 4	4
CO4	Ability to analyse the results obtained through conducting various experiments in the chemistry LAB	PO3,PO 4	4
CO5	An ability to analyse& generate experimental skills	PO3,PO 4	4

Syllabus:

Energy and Chemistry:

Energy Use and the World Economy, Defining Energy, Energy Transformation and Conservation of Energy, Heat Capacity and Calorimetry. Enthalpy, Hess's Law and Heats of Reaction, Energy and Stoichiometry.

Electro Chemistry:

Single electrode Potential and its measurement, Electrochemical cells, EMF series, Nernst equation, Cell emf measurement, Reversible and irreversible cells, Concentration cells, Reference electrodes--Determination of pH using glass electrode. Gas Sensors: Capacitance Manometer and Mass Spectrometer. **Batteries:** Chemistry, construction and engineering aspects of Primary (mercury battery) and secondary (lead-Acid cell, Ni-Metal hydride cell, Lithium cells) and fuel cells– Hydrogen–Oxygen fuel cell, advantages of fuel cell.

CORROSION & ITS CONTROL:

Causes and different types of corrosion and effects of corrosion. Theories of corrosion– Chemical, Electrochemical corrosion, Pitting corrosion, stress corrosion, Galvanic corrosion.Factors affecting corrosion– Nature of metal, galvanic series, over voltage, purity of metal, nature of oxide film, nature of corrosion product. Nature of environment- effect of temperature, effect of pH, Humidity, effect of oxidant. Cathodic protection, sacrificial anode, impressed current cathode, electroplates.

Chemical Kinetics:

Ozone Depletion, Rates of Chemical Reactions, Rate Laws and the Concentration Dependence of Rates, Integrated Rate Laws, Temperature and Kinetics, Reaction Mechanisms, Catalysis, insight into Troposphere Ozone.

Molecules and Materials: Polymers

Types of Polymerization-Mechanisms, Plastics – Thermoplastic resins and thermosetting resins - Preparation, properties and engineering applications of: Polyethylene, PVC, Teflon, Bakelite, Urea Formaldehyde. **Conducting Polymers**: Polyacetylene, Polyaniline, conduction, doping and applications. Carbon Nano tubes and Applications.

Text Books

1. EngineeringChemistry,Jain&Jain,DhanpatRaiPublishingCompany.NewDelhi.
2. Engineering Chemistry, O G Palanna, The Tata McGraw Hill, NewDelhi.

Reference Books:

1. ChemistryinEngineeringandTechnology,Volume2,JCKuriacose&JRajaram,TataMcGrawHill,NewDelhi.
2. Chemistry for Engineers Rajesh Agnihotri, Wiley, NewDelhi.
3. EngineeringChemistry,B.Sivasankar,TheTataMcGrawHill,NewDelhi.
4. AtextbookofEngineeringChemistry,ShashiChawla,DhanpatRai&Co.NewDelhi.
5. Engineering Chemistry, C Parameswara Murthy, C V Agarwal and Andra Naidu, B S Publications,Hyderabad.
6. Engineering Chemistry, Shikha Agarwal, Cambridge University Press.

BIOLOGY FOR ENGINEERS

Course	Biology for Engineers		
Course Code	18BT1001	L-T-P-S	2-0-0-0
Pre-Requisites	Nil	Credits	2

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand the basis of Life, Living organisms and human body systems	PO 7,PO9	1
CO2	Understand the importance of Diet and Nutrition	PO 7,PO9	2
CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors	PO 7,PO9	2

Syllabus

BASIC BIOLOGY: Introduction, living organisms, Cell structure and Organelles, Organogenesis, Human Anatomy, Systems of Life: Digestion, Respiration, Circulation, Excretion, Reproduction, Thinking and coordination and Defense, Diet and Nutrition: Macro (Carbohydrates, proteins, lipids) - and

Micronutrients (vitamins: Essential minerals and their role; deficiency symptoms; and their role; deficiency symptoms. Microorganisms: Classification of Microorganisms, beneficial and harmful effects of Bacteria, Fungi and Viruses. Biosensors, biomechanics and Medical Imaging technology, Applications of Biosensor in Food and Agriculture.

Text books:

1. Advanced Biotechnology; Dr RC Dubey; S Chand Publications.
2. Elements of Biotechnology; P K Gupta; RASTOGI Publications.

PROBABILITY AND STATISTICS

Course	Probability and Statistics		
Course Code	18MT2101	L-T-P-S	2-1-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes (

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Identify the types of random variables and apply discrete distributions to analyse various real-world situations	PO 1, PO5	2
CO2	Construct the probability distribution of a continuous random variable based on a real-world problem, and predict the linear and non-linear relationship between the two variables	PO 1, PO5	2
CO3	Apply statistical tests for large and small samples to test the hypothesis.	PO 1, PO5	2
CO4	Testing the hypothesis to analyse the variance by applying suitable design.	PO 1, PO5	2

Syllabus:

Probability and Random variables: Definitions of probability, Sample space, Axioms of probability, Conditional probability, Addition, Multiplication and Bayes' theorem, Random variables, Joint and marginal probabilities, Mathematical expectation.
Standard discrete and continuous distributions: Definitions and simple properties of Binomial, Poisson, Geometric, Hypergeometric, Uniform, Exponential, Weibull and Normal distributions, Applications of the above distributions.
Correlation and Regression: Correlation coefficient for grouped and ungrouped data, Rank correlation. Linear and Non-Linear Regression.
Tests of Hypothesis: Sampling distributions- Point and interval estimation. Confidence limits for interval of mean and standard deviation. Small sample tests - Test for mean, variance using t, chi-square and F distributions. Chi-square test for independence of attributes and goodness of fit. Large sample tests: Test for mean with known and unknown standard deviation and test for standard deviation.
Analysis of Variance: General principles, completely randomized design, Randomized block designs and Latin square design.

Text Book:

1. Ronald E. Walpole, Sharon L. Myers, Keying Ye, "Probability and Statistics for Engineers and Scientists", 8th Edition Pearson Pub

Reference Books:

1. Richard A Johnson, "Miller & Freund's Probability and Statistics for Engineers", PHI, New Delhi, 11th Edition (2011).
2. S C Gupta and V K Kapoor, "Fundamentals of Mathematical Statistics", 11th Edition, S Chand & Sons, New Delhi

PROBLEM SOLVING & COMPUTER PROGRAMMING

Course	Problem Solving and Computer Programming		
Course Code	18SC1101	**L-T-P-S**	3-0-2-0
Pre-Requisites	Nil	**Credits**	4

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Illustrate how problems are solved using computers and programming.	P01, PO2	3
CO2	Illustrate and use Control Flow Statements in C.	P01, PO2	3
CO3	Interpret & Illustrate user defined C functions and different operations on list of data.	P01, PO2	3
CO4	Implement Linear Data Structures and compare them.	P01, PO2	3
CO5	Apply the knowledge obtained by the course to solve real world problems.	P01, PO2	3

 Syllabus

Problem Solving Approach, **Algorithms and Algorithm Analysis**, Program Development Steps, Structure of C Program, Pre-Processor Directives, **Formatted I/O**, **C Tokens, Data Types**: Primitive, Extended and Derived Including Pointers, Operators, Precedence, Associativity,

Redirecting I/O: Files and File Operations, **Control Flow Statements, Functions, Recursion**, Scope of Variables and Storage classes, **Arrays,** 2-DimensionalArrays, Dynamic Memory Allocation, Searching**:** Linear Search and Binary Search, **Sorting:** Bubble Sort,

Strings, **Structures and Unions:** Introduction to **Stacks-**Implementation using array, Introduction to Queues – Linear **Queue-**Implementation using array, Introduction to **Lists:** Single Linked List- Insertion, Deletion, and Display.

Text Books:

1. Brian W. Kernighan, Dennis M. Ritchie, "The C Programming Language: ANSI C Version", 2/e, Prentice-Hall/Pearson Education-2005.
2. E. Balagurusamy,"Programming in ANSI C" 4th ed., Tata McGraw-Hill Education, 2008**.**
3. R. F. Gilberg, B. A. Forouzan, "Data Structures", 2nd Edition, Thomson India Edition-2005.

Reference Books

1. Mark Allen weiss, Data Structures and Algorithm Analysis in C, 2008, Third Edition, Pearson Education.
2. Horowitz, Shani, Anderson Freed, "Fundamentals of Data structures in C", 2nd Edition-2007.

DATA STRUCTURES

Course	Data Structures		
Course Code	18CS1202	L-T-P-S	3-0-2-0
Pre-Requisites	18SC1101	Credits	4

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Apply measures of efficiency on algorithms and Analyse different Sorting Algorithms.	PO1, PO2,PSO2	4
CO2	Analyse and compare stack ADT and queue ADT implementations using linked list and applications.	PO1, PO4/,PSO2	4
CO3	Analyse the linked implementation of Binary, Balanced Trees and different Hashing techniques.	PO1,PO 4,PSO2	4
CO4	Analyse different representations, traversals, applications of Graphs and Heap organization.	PO2, PO4/PSO2	4
CO5	Develop and Evaluate common practical applications for linear and nonlinear data structures.	PO1, PO2, PSO2	5

Syllabus

Algorithm Analysis: Mathematical Background, Model, Analyse, Running Time Calculations, Lists**. Stacks and Queues:** Abstract Data Types (ADTs), The List ADT, The Stack ADT, The Queue ADT. **Trees:** Preliminaries, Binary Trees, The Search Tree ADT—Binary Search Trees, AVL Trees, Splay Trees, Tree Traversals (Revisited), B-Trees, Red black trees **Hashing:** General Idea, Hash Function, Separate Chaining, Hash Tables without Linked Lists, Rehashing, Hash Tables in the Standard Library, Extendible Hashing. **Priority Queues (Heaps):** Model, Simple Implementations, Binary Heap, Applications of Priority Queues. **Sorting:** Preliminaries, Insertion Sort, A Lower Bound for Simple Sorting Algorithms, Shell sort, Heap sort, Merge sort, Quick sort, Indirect Sorting, A General Lower Bound for Sorting, Bucket Sort, External Sorting. **Graph Algorithms:** Definitions, Topological Sort, Shortest-Path Algorithms, Minimum Spanning Tree.

Text Books

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2010, Second Edition, Pearson Education.
2. Ellis Horowitz, Fundamentals of Data Structures in C: Second Edition, 2015

Reference Books

1. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, First Edition Reprint 2003.
2. Horowitz, Shani, Anderson Freed, "Fundamentals of data structures in C", Second Edition-2007.
3. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2005
4. Robert Kruse, C.L. Tondo, Bruce Leung, Shashi Mogalla, "Data Structures & Program Design in C", Fourth Edition-2007.

ENGINEERING GRAPHICS & DESIGN FOR ELECTRONIC AND COMPUTER ENGINEERS

Course	Engineering Graphics and design for Electronics and Computer Engineers		
Course Code	18 EC1002	**L-T-P-S**	**0-0-4-0**
Pre-Requisites	**Nil**	**Credits**	**2**

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Apply orthographic projections	PO 1, PO3/PSO2	3
CO2	Apply projection of planes and solids	PO 1,PO5/PSO2	3
CO3	Apply isometric projections	PO 1,PO3/PSO2	3
CO4	Apply CAD drawing	PO 1,PO2, /PSO2	3
CO5	Apply PCB and circuit design	PO 1,PO2, /PSO2	3

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance – Drawing Instruments and their Use- Conventions in Drawing – Lettering – Geometric Constructions – Scales: Plain and Vernier scales

Orthographic Projection in First Angle Projection: Principles of Orthographic Projections-conventions- First and Third Angle, Projections of Points and Lines inclined to both planes, True lengths, traces.

Projections of Planes & Solids: Projections of regular planes inclined to both planes. Projections of Regular solids inclined to one plane

Sections and Sectional Views: -Right Regular Solids - Prism, Cylinder, Pyramid, Cone

Engineering Curves used in Engineering Practice & their Constructions:

Conic Sections: Ellipse, Parabola, Hyperbola and Rectangular Hyperbola – oblong, concentric method

Special Curves: Cycloid, Epicycloid, Hypocycloid and Involute

Developments of solids: Development of surfaces of right regular solids – Prisms, Cylinder, Pyramid cone and their parts

Isometric Projections: Principles of Isometric Projection- Isometric Scale- Isometric view conventions- Isometric View of Lines, Plane Figures, simple problems

Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions

Introduction of Computer Graphics covering & Customisation & CAD Drawing

Demonstrating knowledge of the theory of CAD software, Drawing Area, Dialog boxes and windows, Shortcut menus, Command Line, Status Bar, Different methods of zoom, erase objects. scale settings,applying dimensions to objects and annotate; use of Layers, Create, edit and use customized layers.

Electrical and Electronics drawings

Difference between electronic drawing and other practiced engineering drawing, types of electronics drawing used in the industry, standardized schematic symbols for electronic devices, identify different types of circuit board drawings. PCB structure and its components, PCB Terminology, PCB layers and its shapes, House wiring diagrams, Electric line diagrams

Text Books:

1. Engineering Drawing, N.D.Bhat/ Charotar
2. Engineering Drawing, N.S. Parthasarathy, VelaMurali
3. Dash.S. S, Subramani.C, Vijayakumar.K," Basic Electrical Engineering", First edition, Vijay Nicole Imprints Pvt.Ltd,2013
4. Printed Circuit Boards, Design, Fabrication, Assembly and testing,Dr.R.S. Khandpur
5. Printed Circuit Board Designer's, Christopher T. Robertson

REFERENCE BOOKS:

1. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
4. (CorresPOnding set of) CAD Software Theory and User Manuals
5. Electrical and Electronics Drawing, C.J. Baer
6. Printed Circuit Boards: Design and Technology,By Bosshart

WORKSHOP PRACTICE FOR COMPUTER ENGINEERS

Course	Workshop Practice for computer Engineers		
Course Code	18CS1003	L-T-P-S	0-0-4-0
Pre-Requisites	Nil	Credits	2

Syllabus

CARPENTRY - Hands on practice on wood working operation using hand tools to prepare Lap T joint and plus joint.
FITTING - Hands on practice on preparing square fit and L fits.
TIN SMITHY - Hands on practice on sheet metal working for preparing cylindrical pipe and rectangular tray / Pipe T joint.
HOUSE WIRING - Hands on practice on electrical house stair-case and go down connections
WELDING - Hands on practice joining of metal plates using arc welding equipment
CASTING – Hands on practice on Gravity die casting for preparation of wax pipe flange / dumb bell.
MACHINE SHOP – Hands on practice on Lathe, Drilling machine tools
SPECIFIC TO ELECTRONICS AND COMPUTER SCIENCE ENGINEERING BRANCH:

- Identification of components in a computer system & network
- Assembling and disassembling of a computer system
- Installation of operating system and software
- Networking of computers
- Webpage design
- Use of open source software tools like Raptor.

Textbooks:

1. P. Kannaiah and K. L. Narayana, EngineeringPractices   Laboratory, 2009, SciTech Publications, Chennai

REFERENCE BOOKS:

1. KLEF workshop lab manual
2. K. Venkata Reddy, "Workshop Practice Manual", Sixth edition, 2011 print, BS Publications, Hyderabad.
3. B S Nagendra Parashar and R K Mittal, "Elements of Manufacturing Process", 2010 print, Prentice Hall of India, New Delhi

OBJECT ORIENTED PROGRAMMING

Course	Object oriented programming		
Course Code	18SC2009	**L-T-P-S**	**3-0-2-0**
Pre-Requisites		**Credits**	**4**

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	The student will be able to understand basic Concepts of OOP, fundamentals of java and apply the concepts of classes and objects through Java Language.	PO1, 2/ PSO2	3
CO2	The student will be able to apply constructors, Overloading, parameter passing, in Java programming.	PO1, 2/ PSO2	3
CO3	The student will be able to apply access control, Inheritance, Packages.	PO1, 2/ PSO2	3
CO4	The student will be able to apply, Interfaces, Exception Handling	PO1, 2/ PSO2	3
CO5	Students will be able to apply object-oriented programming concepts to write programs.	PO1, 2/ PSO2	3

Syllabus

Introduction: Object-Oriented Programming, OOP Principles, Encapsulation, Inheritance and Polymorphism Java as a OOPs & Internet Enabled language, The Byte code, Data types, Variables, dynamic initialization, scope and life time of variables, Arrays, Operators, Control statements, Type Conversion and Casting, Compiling and running of simple Java program.
Classes and Objects: Concepts of classes and objects, Declaring objects, Assigning Object Reference Variables, Methods, Constructors, Access Control, Garbage Collection, Usage of static with data and methods, usage of final with data, **Reading Inputs and writing output:** Introduction to I//O streams, Scanning, formatting and writing**Methods and constructors:**Polymorphism through Overloading methods and constructors, parameter passing - call by value, recursion, Nested classes. **Inheritance:** Inheritance Basics, member access rules, Usage of super key word, forms of inheritance, Polymorphism through Method Overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, The Object class. **Packages and Interfaces:** Packages, Class path, importing packages, differences between classes and interfaces, Implementing & Applying interface.**Exception Handling:** Exception handling fundamentals.

Text Books:

1. Herbert Scheldt, "The Complete Reference Java", 7th edition TMH.
2. **Timothy A. Budd, "An Introduction to Object-Oriented Programming", 3/e, Pearson, 2008.**

Reference Books:

1. Deitel & Deitel, "'Java – How to program", 6th edition, PHI, 2007
2. Cay.S. Horstmann and Gary Cornell "Core Java 2, Vol 1, Fundamentals", Seventh Edition, Pearson Education.

DISCRETE MATHEMATICS

Course	Discrete Mathematics		
Course Code	18SC1203	L-T-P-S	2-1-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.	PO4/PS02	2
CO2	Understand the basics of discrete probability and number theory and be able to apply the methods from these subjects in problem solving.	PO4/PS02	2
CO3	Be able to use effectively algebraic techniques to analyse basic discrete structures and algorithms.	PO4/PS02	2
CO4	Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples	PO4/PS02	2

Syllabus

Sets and Sequences: Data Models. Finite Sets, power Set, Cardinality of finite sets, Cartesian product, Properties of Sets, Vector Implementations of Sets, Cardinality of Sets, Matrices

Propositional logic: Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradiction, normal forms (conjunctive and disjunctive), modus ponens and modus Tollens, validity, predicate logic, universal and existential quantification. Notion of proof: proof by implication, converse, inverse, contra positive, negation, and contradiction, direct proof, proof by using truth table, proof by counter example.

Counting: The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Generalized, Permutations and Combinations, Generating Permutations and Combinations, Binomial Coefficients and Identities.

Advanced Counting Techniques: Applications of Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion–Exclusion, applications of Inclusion–Exclusion, Relations: Relations and Their Properties, n-ray Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings, Lattices.

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Colouring.

Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

Text Books

1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications" Seventh Edition Mc GrawHill Publications, ISBN 978-0-07-338309-5
2. SEYMOUR LIPSCHUTZ, MARC LARS LIPSON, Schaum's Outline of Theory and Problems of DISCRETE MATHEMATICS, Revised Third Edition.

Reference Books

1. Kenneth H. Rosen, ―Discrete Mathematics and its Applications‖, Special Indian Edition, 7th Edition, Tata McGraw-Hill Publisher, New Delhi.
2. C. L. Liu, Elements of Discrete Mathematics, second edition 1985, McGraw-Hill Book
3. Company. Reprinted 2000.
4. J .L. Mott, A. Kandel, T. P .Baker, Discrete Mathematics for Computer Scientists and
5. Mathematicians, second edition 1986, Prentice Hall of India.
6. W. K. Grassmann and J. P. Trembnlay, Logic and Discrete Mathematics, A Computer Science

DIGITAL SYSTEM DESIGN

Course	Digital System Design		
Course Code	18 EC1001	L-T-P-S	3-0-2-0
Pre-Requisites	Nil	Credits	4

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Describe the concepts of number systems with codes and logic gates usage in digital circuit design and identify the logical expressions in different forms and their minimization techniques for logical circuit optimization	PO 4	1
CO2	Design of Combinational logic circuits and verification through hardware description language	PO 4	2
CO3	Substantiation of Sequential logic circuits and verification through hardware description language	PO 4	2
CO4	Implementation of digital circuits using PAL, PLA, FPGA and CPLD	PO 4	2

Syllabus

Logic Simplification and Combinational Logic Design: Number Systems, Review of Boolean algebra and De Morgan's Theorem, SOP &POS forms, Karnaugh maps, Binary codes, Code Conversion, Integrated Circuit Logic Gates.

Combinational Logic Functions: Adder and Subtractor, Decoders, Encoders, Multiplexers, De-multiplexers, Magnitude Comparators, Parity Generators and Checkers, BCD to seven segment decoder, Verilog HDL design for Combinational Logic Functions.

Sequential Logic Functions: NAND/NOR Latches Gated Latches, Edge- Triggered Flip-flops. Registers and Counters: Shift register, Universal Shift Register, Design of Synchronous and Asynchronous Counters, Modulus counters. Mealy and Moore machines, State diagrams and Tables, FSM, Introduction to ASM charts. Verilog HDL design for Sequential Logic Functions.

Programmable Logic Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL), Logic implementation using Programmable Devices. Complex Programmable Logic Devices, Field Programmable Gate Arrays, Applications of CPLDs and FPGAs.

Text Books:
1. Stephen Brown and Zvonko Vrane "Fundamentals of Digital Logic with Verilog Design" Second Edition, McGraw-Hill.
2. M. Morris Mano, "Digital Logic and Computer Design", Pearson

Reference Books:
1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009
2. J. Bhasker, "Verilog HDL Synthesis, A Practical Primer", Star Galaxy Publishing.
3. Fundamentals of Digital Circuits, Dr. A. Anand Kumar, PHI

SIGNAL MODELLING AND ANALYSIS

Course	Signal Modelling and Analysis		
Course Code	18EM3106	**L-T-P-S**	**2-0-2-0**
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand basic concepts related to signals	PO2,PSO1	2
CO2	Ability to model signals	PO2,PSO1	3
CO3	Ability to convert continuous time domain signals to frequency domain signals through use of Fourier and Laplace Transformations	PO2,PSO1	3
CO4	Ability to convert discrete time domain signals to frequency domain signals through use of Z Transformations.	PO2,PSO1	3

Syllabus

Introduction: Meaning of a signals, Classification of signals (Basic Continuous & Discrete Time signals Basic elementary signals), representation of signals, Characteristics of signals, Generation of the signals, Assertion of the digital signals, Signal operations, Convolution of Signals .Introduction to Systems: Classification of Continuous & Discrete Time systems, Linear Time Invariant (LTI) system, System Inputs: Impulse, step, convolution, System Responses: impulse response, Step Response**Signal Modelling:** Introduction to modelling, the need for modelling signals. Modelling through transformations, types of transformations

Signal Analysis Fourier Transformations: Converting Continuous time domain signals to frequency domain: Importance, reason and purpose. Fourier analysis of Continuous Time Signals: Fourier transformation of standard signals, Fourier transform of periodic signals, properties of Fourier transforms Inverse FT. **Converting continuous to discrete and vice versa:** Introduction, Sampling Theorem - Graphical and analytical proof for band limited signals. Reconstruction of signal from its samples, effect of under sampling, Quantization: Converting discrete to digital signals: Importance and purpose.**Laplace Transforms (LT) for process continuous time domain signals:** Introduction to LT, LT of standard signals, Concept of ROC for LT, Properties of L. T's, Relation between L. T's, and F.T., Inverse LT, Differential Equations for LTI Systems, Partial fraction expansion method. **Z-Transform for processing discrete time domain signals**: Introduction to ZT, Concept of Z- Transform and its ROC, Inverse Z-Transform, properties and Applications of Z-Transforms. **Introduction to signal processing**: Meaning, methods, operations, Discrete Fourier Transformation (DFT), Fast Fourier Transformation (FFT)

Text Books
1. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
2. Discrete Time Signal Processing by A. V. Oppenheim and Shafer

References
1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems – K R Rajeswari

PROFESSIONAL CORE

COMPUTER ORGANIZATION & ARCHITECTURE

Course	Computer Organization and Architecture		
Course Code	18EM1201	**L-T-P-S**	**3-0-2-0**
Pre-Requisites	**nil**	**Credits**	**4**

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	The students should be able to acquire knowledge related to functioning of different components that are contained within a basic computer system.	PO3,5/PSO1	1
CO2	Should be able analyse, design and develop different components that are contained within a computer system	PO3,5,/PSO1	2
CO3	Should be able to develop micro control code for implementing a pattern of low level instructions	PO3,5/PSO1	4
CO4	Must be able design and develop Arithmetic and Logic Unit for a given basic instruction set to be supported by a computer system	PO3,5/PSO1	1
Co5	Examine the functional verification of the digital circuits on Logisim	PO3,5/PSO1	1

Syllabus

Introduction to computer system and its modules: Arithmetic and Logical operation and hardware implementation of Arithmetic and Logic Unit, Introduction to memory Unit, control unit and Instruction Set. Working with an ALU, Concepts of Machine level programming, Assembly level programming and High-level Programming.

Register transfer & micro-operations: Register Transfer Language, Register Transfer, Bus & memory Transfers, Arithmetic Micro-operations, Logic Micro Operations, Shift Micro-operation, and Arithmetic Logic Shift Unit.

Basic computer organisation and design: instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction Cycle, Memory-Reference Instruction, Input-Output instructions and interrupt, Design of Basic Computer, Design of accumulator Logic

Micro programmed control: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

Central processing unit: General registers Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced instruction Set Computer (RISC).

Computer arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations.

Memory organization: Memory Hierarchy, Main Memory, Associative Memory, Cache Memory, Virtual Memory.

Input-output organization: Peripheral Devices, input-Output interface, Asynchronous Data Transfer, Modes of Transfer, Priority interrupt, Direct Memory Access (DMA), input –output Processor.

Text Books:

1. William Stallings, Computer Organization and Architecture: Designing for Performance, 8/e, Pearson Education India. 2010.
2. Morris M. Minicomputer Systems Arichitecture",3rd Edition.

Reference Books:

1. V. Rajaraman and T. Radha Krishnan, "Digital logic and Computer Organization", 2009, 2nd edition/PHI.
2. Brian Holds worth, Cline Woods, Digital Logic Design- 4th Edition, Elsevier.

PROCESSORS & CONTROLLERS

Course	Processors and Controllers		
Course Code	18EM2101	L-T-P-S	3-0-2-0
Pre-Requisites	18EM1201	Credits	4

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	Be able to describe architecture of 8086 Processor	PO1,PSO1	2
CO2	Be able to interface various devices to 8086 processor and program the same using assembly Language	PO2,PSO1	4
CO3	Be able to describe architecture of 8051 Controller	PO2,PSO1	2
CO4	Be able to interface various devices to 8051 controller and program the same using assembly Language	PO2,PSO1	4

Syllabus

8086 Microprocessor: Introduction to Microprocessor, Intel Microprocessor families,8086 Microprocessor architecture, Register Organization, Pin Description, Physical Memory Organization, Modes of operation. Addressing within 8086, 8086 interrupts
8086 Assembly Programming: Introduction to 8086 Assembly Language, 8086 Instruction set, Assembler directives, simple Programs, Procedures and Macros.
8051 Microcontroller: Microcontroller families, 8051 Architecture, Signal Description, register organization, Internal RAM, Special Function Registers, Interrupt control flow, Timer/Counter Operation, Addressing mode, 8051
8051 Assembly Programming: Instruction set, Simple Programs involving Arithmetic and Logical Instructions, programming Timers / Counters, and Interrupts. **Interfacing with 8051 and Programming:** Stepper Motor, DC Motor, Seven segment display, DAC & ADC

Text books

1. D. V. Hall "Microprocessor and Interfacing", 2nd Edition Tata McGraw Hill Publishing Company, 2006.
2. Mazidi & Mc Kinley "The 8051 Micro controller and Embedded systems: using assembles and C, 2nd edition, 2007.

Reference books

1. A.K. Ray & K. M Bhurchandi, "Advanced Microprocessors & peripherals", Tata McHill
2. Subrata Ghoshal, "8051 Microcontroller", Pearson

OPERATING SYSTEMS

Course	Operating Systems		
Course Code	18CS2102	L-T-P-S	3-0-2-0
Pre-Requisites		Credits	4

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understanding the basic algorithms for subsystem components	PO 4/PSO 1	2
CO2	Understand memory and process virtualization	PO 4/PSO 1	2
CO3	Design and solve synchronization problems, and multi-threading libraries	PO 4/PSO 1	3
CO4	Understand persistence concepts	PO 5/PSO 1	2
CO5	Develop application programs using different platforms and languages	PO 4/PSO 1	**5**

Syllabus

Basics: Operating System Functionalities, Types of Operating Systems, Computer Architecture support to Operating Systems **Processor Management:** Processes, Process API code, Direct Execution, CPU Scheduling, Multi-level Feedback, Lottery Scheduling code, Multiprocessor Scheduling, **Concurrency:** Concurrency and Threads code, Thread API, Common concurrency problems, Locks, Locked Data Structures, Condition Variables, Mutex, Semaphores, Monitors, **Deadlock**: Prevention, Detection and Avoidance**Memory Management:** Address Spaces, Memory API, Address Translation, Segmentation, Free Space Management, Introduction to Paging, Translation Look Aside Buffer, Swapping, Demand Paging, Thrashing, Page replacement algorithms.**Device and Information management:** I/O Devices, Hard Disk Drives, Redundant Disk Arrays (RAID), Files and Directories, File System Implementation, Distributed systems, Data Integrity and Protection, CPU Virtualization Basics.

Text Books:
1. Silberschatz, A., Galvin, P.B. and Gagne, G., 2014. Operating system concepts essentials. John Wiley & Sons, Inc.
2. Tanenbaum, A.S., 2009. Modern operating system. Pearson Education, Inc.

Reference Books:
1. The Design of The Unix Operating System by Maurice J. Bach, PHI Publishing, (2013).
2. Vahalia, U., 2008. UNIX internals: the new frontiers. Pearson Education India.
3. Stallings, W. and Manna, M.M., 2015. Operating systems: internals and design principles. Pearson.
4. Professional Bodies: (ACM, IEEE and similar)ACM

DATABASE MANAGEMENT SYSTEMS

Course	Database Management Systems		
Course Code	18CS2205	**L-T-P-S**	**2-1-2-0**
Pre-Requisites		**Credits**	**4**

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Illustrate the functional components of DBMS, importance of data modelling in design of a database.	PO1, PSO5/ PSO2	2
CO2	Build queries using SQL and concepts of PL/SQL	PO1,PO5/PSO2	3
CO3	Apply normalization techniques and indexing to construct and access decent database.	PO5/PSO2	3
CO4	Identify the importance of transaction processing, concurrency control and recovery techniques	PO1/PSO2	3
CO5	Develop a good database and define SQL queries for data analysis	PO3/PSO2	3

Syllabus

Database Fundamentals: DBMS Characteristics & Advantages, Database Environment, Database Users, Database Architecture, Data Independence, Languages, Tools and Interface in DBMS, DBMS types. **Data Modelling:** ER Model, Notation used in ER Diagram, Constraint, Types, Relationships in ER Model and other considerations in designing ER diagram. Enhanced ER data Model, EER Diagram, Relational Model: concepts, constraints, schemas, ER to Relational Model.**SQL & Relational Algebra:** Data Definition and other languages in SQL, Creating tables and Data types, Constraints, DML statements, Functions and writing SQL statements using nested sub queries, complex queries, joining relations, views, compound statements, user defined functions, user defined procedures, cursors, Triggers, Relational Algebra :Operators in relational algebra, **Database Design:** Guidelines for good database design, Normalization- Normal Forms, First, Second, Third Normal Forms, BCNF, Multi value and join dependencies, 4th and 5th normal forms. File and storage structures: File storage, Index structures, Indexing and hashing, query processing and optimization. **Transaction Management**: Transaction processing issues, Transaction states, problems during multiple transactions processing, ACID properties, system log and concurrency control techniques: Lock based techniques, and Timestamp based techniques, Multi-version-based Techniques. **Recovery Techniques:** Recovery concepts, shadow paging, ARIES.

Text Books:
1. Ramez Elmasri and shamkant B Navathe, "Database Systems: Models, Languages, Design and Application Programming, 6e", Pearson Education, 2013.
2. CONNOLLY, Database Systems: A Practical Approach to Design, Implementation and Management, 6th edition, Pearson Education.

Reference Books:

1. A.Silberschatz Henry F Korth,S.Sudarsan, "Database System Concepts", Sixth Edition, Tata McGrawhHill (2011)
2. Raghu RamaKrishnan, Johannes Gehrke, "Database Management Systems", 3rd edition, Tata McGraw Hill, 2014.
3. Ivan Bayross, "SQL, PL/SQL: The Programming Language of Oracle", 2nd edition, BPB Publications.
4. C. J. Date, A. Kannan and S. Swamynathan, An Introduction to Database Systems, Pearson Education, Eighth Edition, 2009

SOFTWARE ENGINEERING

Course	Software Engineering		
Course Code	18CS2103	L-T-P-S	2-1-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand the software development life cycle and associated process models.	PO1,PSO2	2
CO2	Illustrate Requirement modelling and design issues that are used in software development	PO2,PSO2	3
CO3	Examine dynamic modelling issues which are used in software development	PO1,PSO2	4
CO4	Categorize various testing and CMMI techniques	PO1,PSO2	4

Syllabus

Software and Software Engineering: Nature of software, software application domains, unique nature of web applications, software engineering, software process, software engineering practice, software myths. **Process Models**: Generic process model, prescriptive process models, specialized process models, unified process, personal and team process models, product and process. **Agile development**: Agility, agile process, extreme programming. **Understanding Requirements**: Identify stakeholders, recognizing multiple viewpoints, eliciting requirements, building requirement model, negotiating requirements, validating requirements. **RequirementModelling:** Analysis, Rules of Thumb, domain analysis, requirement modelling approaches, scenario based modeling, Data modeling concepts, Flow oriented modeling, creating behavioural model, patterns for requirement modeling **Designing:** Design concepts, Design process, design model, Design issues, **Software testing**: A strategic approach to software testing, strategic issues, test strategies for conventional software, Black-Box and White-Box testing, validation testing, system testing,
Software Process Improvement: SPI, The SPI process, The CMM.

Text Books:

1. Roger Pressman ,"Software Engineering – A Practitioner's Approach 7th Edition, Graw Hill,(2014).
2. Ian Sommerville, 'Software Engineering', Tenth Edition, Pearson Education,(2015).
3. Jim Arlow, ILA Neustadt, "UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design", 2nd Edition, Pearson, (2005).

Reference Books:
1. Craig Larman, "Applying UML and Patterns: An introduction to OOAD and design and interface deployment", Pearson, (2005).
2. Stephen R. Schach, "Software Engineering", Tata McGraw-Hill Publishing Company

EMBEDDED SYSTEMS

Course	Embedded systems		
Course Code	18EM2203	L-T-P-S	3-0-2-0
Pre-Requisites	Nil	Credits	4

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Must acquire basic knowledge about embedded systems, hardware devices used and the general discussion about at mega Controller.	PO3,5/ PSO1	4
CO2	Must be able to use IDE and Free RTOS to develop firmware using embedded C	PO3,5/PSO1	3
CO3	Must be able to develop small applications for reading input from the sensors and writing output to the actuators	PO3,5/ PSO1	5
CO4	Understand the purpose and basic functioning of RTOS and be able to implement sample applications through use of RTOS functions	PO3,5/PSO1	4
Co5	Able to develop a prototype for a real time embedded application using project-based labs.	PO3,5/PSO1	6

Syllabus

Moving forward from Processors & Controllers to Embedded systems: Moving on from 8051 & assembly language to Atmegaand Programming using C

Introduction to Embedded Systems: Definition, Comparison with Loaded Systems, Challenges of Embedded systems, Application of Embedded Systems. Reading through an Embedded Board, terminology, symbols and notations considering Arduino board.

Hardware fundamentals: Power, coupling and decoupling, Open collector out puts, Tristate outputs, Signal loading related issues, Memories types and selection, Processor types and selection.

General discussion on Atmega 328 Architecture, On chip devices: Timers, Counters, watchdog timer, Pulse width Modulation, Interrupts, Overview on device interfacing with Atmega 328: LCD, Key Pad Stepper motor, A/D Converters,

Introduction to Embedded programming: Languages that can be used to develop firmware. Differences between C and Embedded C especially related to address mapping, Relevance to Header files included into the embedded C programs in relation to Arduino board. IDE and RTOS: Introduction to IDE and FreeRtos, Downloading and installing Arduino IDE and FreeRTOS, setting environment for development of applications using Arduino board. Sample program

Basic Interfacing: Interfacing through ports and PINS, Implementing Memory based, and I/O based, and BUS based Addressing, Basic Interfacing: Interrupt based I/O, Interrupt latency. Measuring time through timers: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, developing sample application using timers.

Using counters: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, sample application. Pulse with modulation – the primary concepts, use of pulse width modulators for speed control of stepper Motors: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, sample application, Use of pulse width modulators for speed control of DC motors: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, sample application (E4)

Writing on to LCD at function Level: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, developing sample application to write on to LCD). Reading from Matrix Keyboards: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, sample application. (E6)

Reading analog inputs (Temperature) through A/D converters: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, sample application.

Reading analog inputs (Flow) through A/D converters: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, sample application.

Reading analog inputs (Humidity) through A/D converters: Block diagrams, Layout, principal of operation, interfacing with a Micro controller, sample application.

Firmware   Architectures: Round Robin, Round Robin with Interrupts, Function Queue Scheduling, RTOS architectures, Sample Applications using Embedded Software Architecture

Introduction to RTOS: Task and Task Data, re-entry, semaphores and shared data problem. Scheduling tasks under RTOS: Principles, Sample application, related tasks and scheduling, Introduction to soft and hard real time requirements. Introducing Inter Task communication: Message ques, Pipe and Mail Boxes, Implementation of Inter task communication (E13) using message Queues

Effecting Inter task communication through Mail Boxes: Sample application, related tasks, Effecting Inter task communication through Mail Boxes: Sample application, related tasks. Implementing timing under RTOS: Basic concepts, Sample application and Implementation, Implementing Event handling under RTOS: Basic concepts, Sample application, Sample application that implements event handling under RTOS. Managing memory and power: Using memory through RTOS, power management using RTOS, Managing power under RTOS

Text books:

1. David E Simon, "An embedded Software Premier", Pearson Education, Edition 2007
2. Frank Vahid and Tony Givargis, "Embedded software Division", John Wiley and Sons, 2002 Edition
3. Arduino Technical Documentation

Reference books:

1. .Raj Kamal, "Embedded Systems - Architecture, programming and design", er and Embedded Systems-Mazidi and Mazidi, 2 Edition

ANALOG ELECTRONIC CIRCUITS

Course	Analog Electronic circuits		
Course Code	18EM3104	L-T-P-S	3-0-4-0
Pre-Requisites	Nil	Credits	5

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Acquiring the fundamental and theoretical knowledge related to Analog electronic devices: Diodes, Regulators, Transistors, Op amplifiers and Filters	PO1,PSO1	2
CO2	Acquiring the fundamental and theoretical knowledge related to Analog electronic devices: Op amplifiers, Filters, Oscillators	PO2,PSO1	2
CO3	Must be able to trace out the use of Electronic devices in sensing circuits	PO2,PSO1	3
CO4	Must be able to trace out the use of these Electronic devices in actuating circuits	PO2,PSO1	4
CO5	Must conduct the lab experiments with all covered components	PO1,PSO1	6

Syllabus

Introduction to Analog Electronic devices and circuits: The meaning and content of analog electronic devices, the role of diodes and transistors in developing those circuits

Diodes: Concepts of diode as a switching element, Diode property's variation based on temperature, Diode as Limiter, designing of: Clipper, half wave & full wave rectifier, Clamper, Voltage multiplier, Capacitor filters,

Concepts of Regulators: Series and shunt voltage regulator, Zener diode, Design of Zener diode regulator, Concept of junction capacitance, Varactor diode, LED.

Transistors: Concepts of amplifier: Q Point, load line analysis, Biasing of BJT, Self-Bias-CE, High and low frequency –small signal models of Transistors, Expression of voltage gain, current gain, input & output impedance, Designing CE amplifier, FET fundamentals, current-voltage characteristics, Biasing of JFET, Biasing of MOSFET, FET small signal model, Functional Specification and characteristics of RC coupled amplifier, Concept of Feedback, Feedback amplifier configurations.

Op-amps: Ideal OPAMP, Concept of differential amplifier, CMRR, Open & closed loop circuits, importance of feedback loop (Positive& negative), inverting & non-inverting amplifiers, Voltage follower, Adder, Functional specification of Integrator, Differentiator, Comparator, Schmitt Trigger, Instrumentation Amplifier.

Functional Characteristics of Filter Circuits: Design and Analysis of Low pass, High pass, Bandpass, Band reject filters

Computational Characteristics ofOscillators: Barkhausen criterion, Colpitt, Hartley's, RC Phase shift, Wien Bridge, & Crystal oscillators.

Text Books

1. Muhammad H. Rashid, "Microelectronic Circuit Analysis and Design", Oxford Press.
2. Sedra & Smith, "Micro-Electronic Circuits theory and applications" 2nd edition, Cengage Learning.

Reference Books

1. Jacob Millman & Christos C. Halkias, "Integrated Electronics", Tata -McGraw Hill, 2nd Edition, (2010).
2. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", PHI. 9th Edition.

WEB APPLICATION DEVELOPMENT

Course	Web Application development		
Course Code	18EM2202	L-T-P-S	3-0-2-0
Pre-Requisites	18CS2009	Credits	4

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Able to create Static Web pages using basic HTML &apply CSS	PO2,5/ PSO2	6
CO2	Able to apply JavaScript features for form validations and event handling	PO2,5/ PSO2	3
CO3	Able to create databases using MYSQL and apply JDBC concepts to connect to a database.	PO2,5/ PSO2	6
CO4	Able to create dynamic web pages using servlets & JSP	PO2,5/PSO2	6
CO5	Must be able to design WEB site considering the user interface, navigation and interaction with database using project-based LABS	PO2,5/PSO2	6

 Syllabus

Introduction to Web, Technologies for Web Development, Introduction to HTML5: Headings, Linking, Images, Lists, Tables, Frames, Forms and Input types. **Cascading Style Sheets (CSS3):** Introduction, Inline Styles, Embedded Style Sheets, Linking External Style Sheets, positioning Elements. **JavaScript**: Introduction to Scripting Languages, JavaScript-Control Statements- (if, if-else, switch, while, do-while, for), Document Object Model –objects and collections, Event Handling. **Database Access with JDBC (Oracle/MYSQL)**: Introduction to JDBC architecture, Connection Object, working with statements, Creating and executing SQL statements, working with Result Set. **Servlets & Java Server Pages:** Servlet Basics: Handling the Client Request, Generating the Server Response, Overview of JSP Technology, JSP Scripting Elements, Implicit Objects, Accessing MYSQL/Oracle Database with JDBC. Developing Sample Web Applications using HTML5, CSS3, JavaScript, Servlets/JSP & MYSQL.

Text books:
1. Deitel & Deitel & Nieto, "Internet & World Wide Web – How to Program", PEA, Fifth Edition.2010.
2. Falkner & Jones," Servlets and Java Server Pages: The J2EE Technology Web Tier", 1/e, Addison-Wesley Professional, 2008..

Reference Books:
1. Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.
2. Anders Moller, Michael Schwartzbach, "An Introduction to XML and Web Technologies", 1st Edition, Pearson Education, 2006.
3. Ivan BayRoss, "Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl", BPB Publication, 3rd Edition, 2005.
4. Uttam K Roy, "Web Technologies", OXFORD University Press, 2012.

FUNDAMENTALS OF COMMUNICATION SYSTEMS

Course	Fundamentals of Communication Systems		
Course Code	18EM3205	L-T-P-S	3-0-2-0
Pre-Requisites	Nil	Credits	4

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Ability describe different concepts related to building communication systems	PO2/PSO1	2
CO2	Should be able to extend an existing port structure supported on a Micro Controller	PO2/PSO1	4
CO3	Should be able to draw the block disarms connecting processors, memory and peripherals and explain the working of the same	PO2/PSO1	3
CO4	Should be able to extent the basic communication concepts through inclusion of transfer rates, addressing, error detection and correction, timing etc.	PO2/PSO1	4

Syllabus

Terminology: Bus, port, address, bus structure, reading and writing protocols, timing diagrams, Basic Protocol concepts: Master, Slave, Actor, Data direction, addresses, time multiplexing, control methods: Strobe and Han shake, I/O addressing: port and I/O addressing, , Memory mapped I/o, standard I/O, ISA Bus protocol, Basic Memory Protocol, Complex Memory Protocol, Interrupt driven I/O: poling, fixed address, interrupt address vector, Types of Interrupts, external and Internal Interrupts, Vectored interrupt using an Interrupt table, Direct Memory Access: DMA I/O, ISA Bus Protocol, Arbitration: Priority Arbiter. Daisy-Chain Arbitration, Network oriented Arbitration protocols; Multi-Level Bus Architectures, Advanced Communication Principles: Parallel Communication, Serial Communication, Wireless Communication, Layering, Error Detection and Correction, Serial protocols: I2C, CAN, Fire wire, USB, parallel Protocols: PCI Bus, ARM Bus, Wireless Protocols: IrDA, Bluetooth, IEEE 802.11

Text book
1. Embedded systems design: A unified hardware / Software Introduction, Frank Vahid / Tony Givargis, John Wiley and Sons Inc.

COMPUTER NETWORKS AND SECURITY

Course	Computer Networks and security		
Course Code	18EM2204	**L-T-P-S**	**3-0-2-0**
Pre-Requisites	Nil	**Credits**	**4**

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Must be aware of the fundamental concepts related to networking and securing networks through cryptography	PO1,PSO2	2
CO2	Must have knowledge about various cryptographic algorithms used for securing the network-based communication	PO 2/PSO2	4
CO3	Must have the knowledge about various functions implemented as a part of physical and network layers, the protocols used and the way the communication is secured in these layers	PO 2/PSO2	4
CO4	Must have the knowledge about various functions implemented as a part of Transport and Application layers, the protocols used and the way the communication is secured in these layers	PO 2/PSO2	4
Co5	Develop network-based application using Python	PO 5/PSO2	3

Syllabus

Introduction to networking: Machine identification, interconnecting the machines and standards used for effecting communication, **Communication standards:** OSI, TCP/IP and other networks models, **Types of Networks:** Novell Networks, Arpanet, Internet, Network Topologies: WAN, LAN, MAN. **Network Interfaces:** Ethernet. X.25

Physical Layer: Transmission media: copper, twisted pair wireless, switching and encoding, asynchronous communications; Narrow band, broad band ISDN and ATM.

Network Layer: Virtual circuit and Datagram Subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing. Dynamic routing, Broadcast routing. Rotary for mobility, Congestion, Control Algorithms, General Principles – of Congestion prevention policies. Internetworking: The Network layer in the internet and in the ATM Networks.

Transport Layer: Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.

Application Layer: – Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

Introduction to security: Introduction to Network Security: Attacks, services, Security. A model of Inter network Security, Steganography, One-time PADS. Basic and ESOTERIC Cryptographic Protocols: Key Exchange, Authentication, Formal Analysis of Authentication and key Exchange Protocols, Multiple & Public Key Cryptography, Secret Splitting & Sharing Secure elections, Secure multiparty, Communication, Digital Cash.

Crypto Graphic Concepts: Key Management: Key lengths, Generating Keys, Transferring, Verification, Updating, Storing, Backup, Compromised, Lifetime of, Destroying Keys, Public key Management, Introduction to Crypto Graphic Algorithms: RC2, GOST, CAST, BLOW FISH, SAFEER, RC5, NEWDES, CRAB.

Digital Signatures: Concepts: Digital Signature, DSA, DSA variants, Gost, Introduction digital signature algorithms: Discrete Algorithm, One – Schnorr – Shamir digital Signatures, Esign, and Cellular Automata.

Overview on implementing security within different Layers: physical layer, Network Layer, Transport layer, **Application Layer**

Text Books

1. Andrew S Tanenbaum, 4th Edition. PearsonEducation/PHI
2. Data Communications and Networking – Behrouz A. Forouzan. Third EditionTMH.

References

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay,Thomson
3. Applied Cryptography, 7/e, Bruce SCHNEIDER John Wiley & SonsInc.
4. Cryptography and Network Security, William Stallings,PHI.
5. Introduction to cryptography with coding Theory, 7/e, Wade Trappe, C. Washington,PEA.
6. Cryptography and Information Security, V.K. Pachghare,PHI.
7. Cryptography and Network Security, Forouzan, TMH,2007.
8. Modern Cryptography, Wenbo Mao, PEA

ARTIFICIAL INTELLIGENCE

Course	Artificial Intelligence		
Course Code	18CS2206	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand the problem, well defined problems and their solutions, Uninformed and Informed search.	PO1, 2/PSO2	2
CO2	Game playing with adversarial search. Constraint satisfaction problems	PO2, PO7, PSO2	3
CO3	Building Knowledge and reasoning: - propositional logics, first order logic, forward and backward reasoning, resolution.	PO4, PO6, PO7, PSO2	4
CO4	Analysing uncertainty using Bayes theorem, Hidden Markov model and Kalman filters.	PO1, PO3, PO4, PO6, PO7, PSO2	4
CO5	Solving AI problems.	PO5, PSO2	5

Syllabus

Introduction to AI: Intelligent Agents, solving problems by searching, problem-solving agents, well defined problems and solutions with examples. **Applications of AI:** ANN, Fuzzy Systems, NLP. Introduction to Expert systems. Uninformed search strategies: BFS, DFS, Iterative deepening, bidirectional search. Heuristic Search Techniques: Greedy BFS, A*, memory bounded, heuristic functions.**Local &Adversarial search**: Optimization problems, hill climbing search, simulated annealing, local beam search, genetic algorithms. Online search agents and unknown environments. Optimal decisions in games, alpha-beta pruning, cutting of search, forward pruning, stochastic games, partially observable games. Constraint satisfaction problems: -Inference in CSPs, back tracking search foe CSPs, Local search for CSPs.**Knowledge and reasoning:**knowledge-based agents, Logic, propositional logics and horn clauses, first order logic, Inference in first order logic, Propositional versus first order inference, unification and lifting, forward & backward chaining, resolution.**Handling Uncertainty**: Quantifying uncertainty, basic probability notation, Bayes theorem, Probabilistic reasoning, representation of conditional distributions, probabilistic reasoning overtime, hidden Markov model, and Kalman filters.

Text Books
1. Russel and Norvig, 'Artificial Intelligence', third edition, Pearson Education, PHI, (2015)
2. Elaine Rich & Kevin Knight, 'Artificial Intelligence', 3nd Edition, Tata McGraw Hill Edition, Reprint(2008)

Reference Books
1. Patrick Henry Winston, 'Artificial Intelligence', Pearson Education (2003)
2. G. Luger, W. A. Stubblefield, "Artificial Intelligence", Third Edition, Addison-Wesley,(2007)
3. William F. Clocks in, Christopher S. Mellish-Programming in Prolog-Springer (2003)

PROFESSIONAL ELECTIVES

EMBEDDED SYSTEMS STREAM

SENSOR AND ACTUATORS

Course	Sensor and actuators		
Course Code	18EM5101	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	To make the students understand the operating principles, signal conditioning, and A/D conversion	PO7,12, PSO1	2
CO2	The students must be able to trace of the Analog signal flow from the sensors till the time the data is received at the controller side.	PO7,12, PSO1	2
CO3	The students must be able to trace of the Analog signal flow from controller till the time the actual control is exercised	PO7,12, PSO1	2
CO4	The students must be able to trace of the Digital signal flow from the digital sensors till the time the data is received at the controller side.	PO7,12, PSO1	2

 Syllabus:

Introduction to Sensors and Actuators: Role of sensors and actuators, sensors and Actuators in Automobile Systems, Sensors and Actuators in feedback control system, portance of estimation in sensing, Innovative Sensor technologies, Application scenarios, Analog and digital transducers and Actuators
Components inter connections and signal conditioning: Component interconnection. Signal modification conditioning, Importance of Impedance Matching in Component Interconnection, Impendence matching methods
Analog Sensors: Principle of operation. Transduction concept, signal amplification, timing, scaling, range calibration, interfacing considering Temperature sensors, Humidity sensors, LDR, stepper motor, Level sensor, pressure, Piezo Vibration sensor, and Flow sensor, potentiometers, differential transformers, tachometers, piezoelectric devices, gyros, Keyboards

Analog Actuators: Principle of operation. Transduction concept, signal amplification, timing, scaling, range calibration, interfacing considering Stepper Motors, PieZo Actuator, Solenoid Valve, relay systems, Ultrasonic Motor Actuator

Digital Sensors: Principle of operation. Transduction concept, signal amplification, timing, scaling, range calibration, interfacing considering Temperature sensors, Humidity sensors, LDR, Level sensor, pressure, and Flow sensor

Digital Actuators: Principle of operation. Transduction concept, signal amplification, timing, scaling, range calibration, interfacing considering DC, servo Motors, PieZo Actuator, Solenoid Valve, relay systems, Ultrasonic Motor Actuator

Text Book

1. Sensors and actuators, Engineering System for instrumentation, 2nd Edition, Clarence W d Selva, CRC Press
2. Data Sheets downloaded from different WEB sites

ADVANCED MICROPROCESSORS AND CONTROLLERS

Course	Advanced Microprocessors and controllers		
Course Code	18EM5102	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO 1	To understand basic concepts and features related to Microprocessors and controllers in relation to ARM7 and LPC2148	PO2, PSO1	1
CO 2	Ability to develop firmware using C and IAR – Integrated Development tool	PO2, PSO1	4
CO 3	Ability to develop application using C that include GPIO, GSM, Smart Card	PO2, PSO1	1
CO 4	Ability to develop application using C and RTOS considering, interrupt processing, Application Scheduling and Inter task communication	PO2, PSO1	1

Syllabus

Introduction to advanced features built into Advanced Micro processors and controllers**:** Review of the Features supported in Basic Micro Controllers (8051 + Atmega) and Advanced processors and micro controllers, a brief review of the features supported in advanced micro processors and controllers

Introduction to ARM Technologies: Variants of ARM processors and controllers, Advanced ARM processors and controllers

ARM Processor (ARM7): Features, Components, Connectivity, Acorn RISC Machine – Architecture inheritance – 3 and 5 stage pipeline ARM organizations – Advanced Microcontroller bus architecture- Little Endian Big-Endian architecture

ARM Controller (LPC2148): Features, Pin configuration, On Chip Devices: GPIO, Serial communication, A/D Converters: single and Multiple Channels, Interrupts,

Basic Interfacing, GPIO and interfacing devices to the GPIO, Fast GPIO

ARM programming through C using IDE-IAR: Overview on KEIL/IAR, installing KEIL/IAR, Drill down using C: Variable declaration, includes, Conditional and Looping instructions, Computational instructions, loops,

Interfacing with LPC2148: Developing application for effecting communication between PC and LPC2148, Interfacing RFID, GSM, Smart card and developing small applications.

Text Books:

1. ARM System on Chip Architecture – Steve Furber – 2nd ed., 2000, Addison Wesley Professional
2. Volume 1: LPC214x User Manual, UM10139, http://www.semiconductors.philips.com
3. John H. Davies, "MSP430 Microcontroller Basics", Newnes (Elsevier Science), 2nd Edition, 2008.

HARDWARE SOFTWARE CO-DESIGN

Course	Hardware Software Co-Design		
Course Code	18EM5103	**L-T-P-S**	**3-0-0-0**
Pre-Requisites	**Nil**	**Credits**	**3**

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Awareness of the students with the processes used for designing the Embedded Systems using HW-SW co design approach	PO6,PO5,PSO1	2
CO2	Ability of the students to develop prototypes of the Embedded Systems using HW-SW co design	PO6,PO5,PSO1	3
CO3	Ability of the students to verify the correctness of the HW-SW Co design	PO6,PO5,PSO1	4
CO4	Ability of the students for designing HW-SW specification for a given Application	PO6,PO5,PSO1	4

Syllabus

Basic concepts relating to design of embedded systems: Design process, Design technology, Compilation, Analysis, Synthesis, testing, Verification, Life Cycle models: V Models, In Line Models, HW-SW Co models

Design Principles: Number of tasks, size of the task, short Interrupt routines, Task Priority, Task Encapsulation, Task Structure, creating and destroying tasks, Time Slicing

Co- Design Issues: Co- Design Models, different application specific architecture, Languages, A Generic Co-design Methodology. Co- Synthesis Algorithms: Hardware software synthesis algorithms, hardware – software partitioning distributed system algorithms, co-synthesis algorithms.

Design Specification: Languages for describing specification, Design, Co-design, the co-design computational models, concurrent processing and coordination, interfacing components, System – level specification, specification for system level synthesis, Heterogeneous specifications, multi-language co-simulation, Cosyma and **Lycos** systems frameworks for designing.

Design verification: implementation verification, verification tools, and interface verification

Prototyping and Emulation: Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping.

Designing real life Application: Home Automation, Line following robot

Text Books

1. Hardware / software co- design Principles and Practice – Jorgen Staunstrup, Wayne Wolf – 2009, Springer.

2. Hardware / software co- design Principles and Practice, 2002, kluwer academic publishers

NETWORKING EMBEDDED SYSTEMS

Course	Networking Embedded systems		
Course Code	18EM5210	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Should be aware of the concepts related to networking through RS485, I2C, CAN, USB and Ethernet	PO1/PSO1	2
CO2	Ability to develop application that run on RS485 and USB networks	PO1/ PSO1	2
CO3	Ability to develop application that run on *I2C* and CAN networks	PO2/ PSO1	3
CO4	Ability to develop application that run on Ethernet	PO2/ PSO1	3

Syllabus

Introduction to networking: Peer to peer connectivity, Any to Any connectivity, Rs232C review. A small review on essential of communication

Networking through RS485: RS485 Standards, balanced Differential Lines, Termination resistors, Topologies, cable length and data rate, Maximum number of devices in a RS485 network, Grounding and Common wires, Connections, Half-duplex- RS485, RS485 converters, Full-duplex-RS485

Networking through USB: Introduction, Speed identification on the bus, USB states, USB bus communication – Packets, Data flow types, Enumeration, descriptors, interfacing PIC 18 with USB, Developing Sample networking of embedded systems using USB

Networking through I^{2}C: Meaning, the I^{2}C Bus, Acknowledgments and negative Acknowledgements, addressing, I^{2}C Firmware, Developing Sample networking of embedded systems using I^{2}C

Networking through CAN: Introduction, Frames, bit stuffing, error detection, types of errors, Nominal bit timing, Interfacing PIC controller with CAN, Development of Sample Networking of embedded systems using PIC Micro Controllers

Networking through Ethernet: Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure. Developing small application

Text Books
1. **Embedded Systems Networking: Applications, Case Studies and Technologies,Robert Oshana,Academic Press, 01-Sep-2017 - Technology & Engineering**
2. **Embedded and Networking Systems: Design, Software, and Implementation, Gul N. Khan, Krzysztof Iniewski,CRC Press, 12-Jul-2017**

3. Jan Axelson 'Embedded Ethernet and Internet Complete', Penram publications

Reference Books
1. Frank Vahid, Givargis 'Embedded Systems Design: A Unified Hardware/Software
2. Introduction', Wiley Publications
3. Jan Axelson, 'Parallel POrt Complete', Penram publications
4. Dogan Ibrahim, 'Advanced PIC microcontroller projects in C', Elsevier 2008
5. Jan Axelson 'Embedded Ethernet and Internet Complete', Penram publications

CLOUD COMPUTING

Course	Cloud Computing		
Course Code	18EM5211	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Ability to explain various concepts, architectures and deployment models relating to the cloud computing technologies	PO1/PSO1	2
CO2	Ability to develop sample applications using SaaS deployment Model	PO1/ PSO1	2
CO3	Ability to develop sample applications using PaaS deployment Model	PO2/ PSO1	3
CO4	Ability to develop sample applications using IaaS deployment Model	PO2/ PSO1	3

Syllabus

Introduction to Cloud Computing: meaning of Cloud Computing, variations of cloud computing from other models, Essential Characteristics, Cloud computing Architectures, Technological Influences. Cloud Computing Architecture, the three-deploymentmodel's IaaS, PaaS, SaaS, and Types of clouds (Public, Private and Hybrid)

CLOUD INFRASTRUCTURE: Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

Service Models (XaaS): Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS); Deployment Models: Public cloud, Private cloud, Hybrid cloud, Communitycloud.Establishing and using a private cloud: Network topology, HW-SE specification, installing open stack, configuring open stack availing services through open stacks, establishing virtual networks

Infrastructure as a Service (IaaS): Introduction to IaaS, IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, and Virtual Machine (VM). **Resource Virtualization:** Server, Storage, Network, Virtual Machine (resource) provisioning and manageability, **Storage as a service, Examples** Applications: Amazon EC2, Google Drive, one drive, drop box. Developing applications Using IaaS.

Platform as a Service (PaaS): Introduction to PaaS: What is PaaS, Service Oriented Architecture (SOA), Cloud Platform and Management, Computation, Storage, Examples, Google App Engine, Microsoft Azure, SalesForce.com's Force.com platforms. Developing applications using PaaS.

Software as a Service (SaaS): Introduction to SaaS, Web services, Web 2.0, Web OS, and Case Study on SaaS. Provisioning, scheduling and requesting VM that is identified with desired software packages. Development of Application software using the system software installed on the Virtual Machine. Developing Applications that use SaaS.

Reference books:

1. Kris Jamsa, Cloud Computing, Jones & Bartlett,2012
2. Russell Dean Vines and Ronald L. Krutz ,Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley India Pvt Ltd, 2010
3. Barrie Sosinsky, Cloud Computing Bible, Wiley India,2011
4. Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
5. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
6. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly, 2009.

DATA SCIENCE AND BIG DATA ANALYTICS

Course	Data Science and Big Data Analytics		
Course Code	18EM5212	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Corse outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Ability to find and transmit data emanated from different embedded and IOT devices	PO5,PSO2	2
CO2	Ability to use HADOOP and MAP reduce tools in the process of undertaking Analytics	PO5,PSO2	4
CO3	Ability to develop data Modelling, Structuring and Analytics using "R" Language	PO5,PSO2	4
Co4	Ability to conduct various kinds of analytics on the big data especially using text	PO5,PSO2	4

Syllabus

Big Data Overview – Sources of data through embedded systems: Video, audio, spectral, transactional, WEB Data, Different kinds of data Structures - Analyst Perspective on Data Repositories - State of the Practice in Analytics - Current Analytical Architecture - Drivers of Big Data - Emerging Big Data Ecosystem and a New Approach to Analytics.

Overview on data capturing through Embedded Systems and IOT devices, transmission of the same through different stages, and storage of the same in Clouds.

Introduction to Big Data Analytics: Big Data Overview, State of the Practice of Analytics, Big Data Analytics in Industry Verticals. Data analytics lifecycle Discovery - Data Preparation - Model Planning – Model Building - Communicate Results - Operationalize Case Study.

Initial Analysis of the Data using R :Introduction to R: Graphical User Interface, data import and Export: Attributes and data types, Descriptive statistics, **Exploratory Data Analysis:** visualization before Analysis, dirty data, visualizing a single variable, examine multiple variables, data exploration Vs Presentation, **Statistical methods for evaluation:**Hypothesis testing, difference of means, Ranking tests, Sampling, ANOVA, Introduction to HADOOP and Map reduce and the uses of the same for effecting the data analytics.

Analytics for Text Analysis: Text Analysis steps, collecting raw text, representing text, TFIDF (Term frequency and document frequency), categorizing documents by topics, determine sentiments, gaining insights. Example Application

Text Books:

1. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data by EMC Education Services 2014

2. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big Data Analytics", EMC Education Series, John Wiley, ISBN: 978-1-118-87613-8, 2015.
3. Peter Bühlmann, Petros Drineas, Michael Kane, Mark van der Laan, "Handbook of Big Data", CRC Press, 2016.

Reference Books:

1. MapReduce Design Patterns, Author: Donald Miner, Publisher: O'Reilly (2012), ISBN-13:- 9789350239810
2. Agile data science: building data analytics applications with Hadoop-Russell Journey-O'Reilly Media-2013
3. An Introduction to Applied Multivariate Analysis with R -Brian Everett, Torstein Hothorn-Springer-2011
4. Statistical Modeling and Analysis for Database Marketing: Effective Techniques for Mining Big Data-Bruce Ratner-Chapman and Hall/CRC-2003

WEB TECHNOLOGIES STREAM

WEB PROGRAMMING WITH PYTHON

Course	Web Programming with Python		
Course Code	18EM5104	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Acquire fundamental knowledge related to Python Conditional Statements and Strings	PO5,PSO2	3
CO2	Acquire fundamental knowledge related to Lists, Tuples and Dictionaries	PO5,PSO2	3
CO3	Should be able to develop application using OOPS Concepts	PO5,PSO2	3
CO4	Should be able to develop applications using Database Connectivity	PO5,PSO2	3

Syllabus

Introduction to python, the concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages;Conditions, Boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while), String manipulations: subscript operator, indexing, slicing a string;

Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments.Recursive functions.

Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modelling; persistent storage of objects inheritance, Polymorphism, operator overloading abstract classes; exception handling.

Python database application programmer's interface (DB- API), connection and cursor objects, Type objects and constructors, python database adapters. Creating simple web clients, introduction to CGI, CGI module, building CGI applications, python web application frameworks.

Text Books

1. Core Python Programming by Wesley J. Chun, 2nd Edition , Pearson Education
2. An Introduction to Python by Guido Van Russom, Fred L.Drake, Network Theory Limited.

References

1. Beginning Python: From Novice to Professional by Magnus Lie Hetland, Second Edition Apress
2. Programming in Python 3 by Mark Summerfield, Pearson Education

WEB SERVICES

Course	WEB services		
Course Code	18EM5105	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Acquire fundamental knowledge related to developing application using the WEB services related Technologies.	PO5,PSO2	2
CO2	Acquire fundamental knowledge related to various technologies used for implementing WEB services that include SOAP, WSDL and UDDI	PO5,PSO2	2
CO3	Should be able to develop small WEB services-oriented applications through use of XML language	PO5,PSO2	3
CO4	Should be able to develop applications using third part services which are launched on different servers	PO5,PSO2	3

Syllabus:

Introduction to Web Services, Web Service Architecture, XML Messaging, and Service Description: WSDL, Service Discovery: UDDI, Service Transport, Using WEB service technologies together. Standards related to WEB service.
XML-RPC Essentials: XML-RPC Overview, the need for XML-RPC, XML-RPC Technical Overview, Developing using XML-RPC, beyond simple XML-RPC Calls.
SOAP Essentials: SOAP 101, The SOAP Message, SOAP Encoding, SOAP via HTTP, SOAP and the W3C, SOAP Implementations, Using Apache SOAP: Installing Apache SOAP, developing a simple SOAP message, Deploying SOAP Services, Programming using Apache SOAP: Working with Arrays, working with JavaBeans, Working with Literal XML Documents, Handling SOAP Faults, Maintaining Session State.
WSDL: The WSDL Specification, Basic WSDL Example: Hello Service, wsdl, Invoking WSDL, Basic WSDL Invocation methods (Part-1) Xmethods, Basic WSDL Invocation methods (Part-2) Xmethods, Generating WSDL Files, XML Schema Data Typing.
UDDI Essentials: Introduction to UDDI, UDDI Technical Overview, UDDI Data Model, Searching UDDI, Publishing to UDDI, UDDI Implementations, Web Resources, UDDI Inquiry API: The UDDI Inquiry API, Find Qualifiers, Finding and Retrieving UDDI Data, Publishing UDDI Data, UDDI4J Quick Reference API.
Developing Sample Applications using WEB services: Income Tax Calculation, Purchase order processing, Invoicing and Billing
Text Books:

1. Web Services Essentials By Ethan Cerami, Orielly, 2002.

Reference Books:
1. JavaWebServices David A. Chappell & Jewell, Oreilly, 2009.

2. Web Services Concepts, Architectures and applications by Gustavo Alonso., Springer, 2009.

WEB SECURITY

Course	WEB Security		
Course Code	**18EM5106**	**L-T-P-S**	**3-0-0-0**
Pre-Requisites	**Nil**	**Credits**	**3**

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To Acquire basic knowledge about the WEB sites and Cryptography	PO5,PSO2	2
CO2	To acquire basic knowledge about attacking and counter attacking of WEB servers	PO5,PSO2	2
CO3	To acquire basic knowledge about attacking and counter attacking of Browsers	PO5,PSO2	3
CO4	Should be able to implement counter attacking mechanisms within un-secures WEB application considering different attacking systems	PO5,PSO2	3

Syllabus

Introduction to WEB: WEB components: Browsers: Browser Layout, functionalities, Cookies, Style Sheets, Servers: WEB server, Email Server, FTP server, WEB application server, WEB services server, Business server, Enterprise server, Network, WEB Network layout**,** Cookies**,**

Introduction to security: Meaning, cryptography: Symmetric and Asymmetric keys, key pairs, encoding and decoding, digital signature, digital certificate, Security Attacks, Security services, Security Mechanisms, difference between WEB security and other types of Security: Network Security, Data Security, Information security, cyber Security.

Vulnerabilities for Attacking WEB applications: Threats, OWASP Principles

Attacking and counter attacking Browsers: Attacking Browsers: Introducing Browsers, Browser Functionalities, Phishing, spamming, is spoofing. Develop applications for simulating phishing, spoofing. Counter attacking browsers: Add-ons, Plugins, same-origin policy, Finger Printing, CSP, DKIM, SPF.

Attacking and Counter Attacking WEB servers: Attacking WEB Servers: CSRF (Cross site request forgery), XSS (Cross site Scripting), Command Injection, Broken Authentication, Worms, malware, Virus, develop and Implement an application for profiling. Counter Attacking WEB servers: Privacy preserving: Spyware, backdoor, Protecting Un-authorized Access, Fire walling, Tracking and profiling, Anonymity checking, user identity Management, develop an application that implements an identification management system

Text Books:

1. Web Application Security: A Beginner's Guide, Bryan Sullivan, Vincent Liu, and McGraw Hill.
2. Web Security & Commerce, 2nd Edition, Simson Garfinkel, O'REILLY.

3. Improving Web Application Security: Threats and Countermeasures, 1st Edition, Forewords by Mark Curphey, Joel Scambray, Erik Olson and Michael Howard, Microsoft Corporation.
4. Security Technologies for the world wide web, 2nd Edition, Rolf Oppliger, Artech House Publishers

Reference Books:

1. Web Application Security, A Beginner's Guide Paperback – Bryan Sullivan (Author), Vincent Liu
2. Web Security and Commerce (Nutshell Handbooks) 1st Edition, by Simson Garfinkel, Gene Spafford
3. Preventing Web Attacks with Apache 1st Edition, by Ryan C. Barnett
4. Testing Web Security: Assessing the Security of Web Sites and Applications 1st Edition, by Steven Spline
5. Preventing Web Attacks with Apache 1st Edition, by Ryan C. Barnett

WEB SEMANTICS

Course	WEB Semantics		
Course Code	18EM5213	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Must Acquire theoretical knowledge related to WEB semantics, ontology learning and languages that can be used for the development of WEB semantics	PO5, PSO2	2
CO2	Must be knowledgeable using tools to develop web semantics for various real-life applications	PO5,PSO2	2
CO3	Able to understand ontology Management & learning for semantic web	PO5,PSO2	2
CO4	Must develop a real-life application that require use of WEB semantics	PO5,PSO2	6

Syllabus

Introduction: Introduction to WEB semantics − Meaning and Reason. The Concept of Ontology, The langue of Ontology, **Ontological**Categories, Knowledge Representation Ontologies, Top Level Ontologies, Linguistic Ontologies, Domain Ontologies, Semantic Web: Need, Foundation, Layers, Architecture.

Languages for Semantic Web and Ontologies: Web Documents in XML, RDF − Schema, Web Resource Description using RDF, RDF Properties, Topic Maps and RDF, RDF Overview, RDF Syntax Structure, RDF Semantics, RDF Pragmatics, Brief review of Traditional Ontology Languages: LOOM, OKBC,, OCML, F-logic Ontology, Brief review of Mark-up Languages: SHOE, OIL, DAML, OIL, OWL

Ontology Learning for Semantic Web: Taxonomy for Ontology Learning, − Layered Approach, Phases of Ontology Learning, Importing and Processing Ontologies and Documents, Ontology Learning Algorithms, Evaluation.

Ontology Management and Tools: Need for ontology management, development process, target ontology, ontology mapping, skills management system, ontological class, constraints, issues. Evolution, Development of Tools and Tool Suites, Ontology Merge Tools, Ontology based Annotation Tools. Use of porterage tool for the development of Ontology.

Applications: Developing ontology for the applications such as Insurance system, banking system and a Retail Trading System which are developed using various types of sources that of type structured, unstructured and semi-structured data (HTML. XML, RDBMS)

Text Books:

1. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez "Ontological Engineering: with examples from the areas of Knowledge Management, eCommerce and the Semantic Web" Springer, 2004.
2. Grigoris Antoniou, Frank van Harmelen, "A Semantic Web Primer (Cooperative Information Systems)", The MIT Press, 2004.

Reference Books:

1. Alexander Maedche, "Ontology Learning for the Semantic Web", Springer; 1 edition, 2002.
2. John Davies, Dieter Fensel, Frank Van Harmelen, "Towards the Semantic Web: Ontology – Driven Knowledge Management", John Wiley & Sons Ltd., 2003.

3. John Davies (Editor), Rudi Studer (Co-Editor), Paul Warren (Co-Editor) "Semantic Web Technologies: Trends and Research in Ontology-based Systems"Wiley Publications, Jul 2006
4. Dieter Fensel (Editor), Wolfgang Wahlster, Henry Lieberman, James Hendler, "Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential", The MIT Press, 2002.
5. Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, "The Semantic Web: A Guide to theFuture of XML, Web Services, and Knowledge Management", Wiley, 2003

INTERNET OF THINGS (IOT) STREAM

FUNDAMENTALS OF INTER NET OF THINGS

Course	Fundamentals of IoT			
Course Code	18EM5107	L-T-P-S	2-0-2-0	
Pre-Requisites	Nil	Credits	3	

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO 1	Understand functional blocks and functioning of IOT devices	PO7,PSO1	2
CO 2	Understand Communication models and protocols that are used for development of the IOT based Systems	PO7,PSO1	2
CO 3	Understand different networking topologies used for the development of IOT based Networks	PO7,PSO1	2
CO 4	Understand various IOT design Components	PO7,PSO1	4

Syllabus

Introduction to IOT: Definition, Characteristics, things in IOT, Challenges of IOT based Systems, IOT Device: Building Blocks, Raspberry Pi as an IOT device, Raspberry PI components, porting LINUX on Raspberry PI, Raspberry PI frequently used commands, Raspberry PI interfaces: Serial, SPI and I2C, Other IOT devices

IOT Communication model and Protocols: Link Layer: 802.3 Ethernet, 802.11 WiFi, 802.16 WiMax, 802.15.4 LR-WPAN, 2G/3G/4G Mobile Communication, Network/Internet Layer: IPv4, IPv6, IPv6 Low power, Transport Layer: TCP, UDP, Application Layer: HTTP, CaAP, WebSocket, MQTT, XMPP, DDS, AMQP

IOT Design Components: Function Blocks, Communication Models, Communication API

IOT Enabling Technologies:Wireless sensor networks, Cloud Computing, Big data Analytics, Embedded Systems, Communication protocols

IOT Topologies and deployment models: IOT Deployment components (Devices, resources, controller service, database, web services (stateless/Stateful, Unidirectional / Bi Directional, Request-response/Full duplex, TCP Connections, Header Overhead,Scalability)**,** Analysis Components, Applications, Communication Topologies**:** Level-1, Level-2, Level-3, Level-4, Level-5, Level-6

Text Book

1. Arshdeep Bahga and Vijay Madisetti,, Internet of Things - A Hands-on Approach, Universities Press, 2015, ISBN: 9788173719547 .

Reference Books

1. Wolfram Donat "Learn Raspberry Pi programming in python", Apress (2014), ISBN – 9781430264255
2. Matt Richardson & Shawn Wallace, Getting Started with Raspberry Pi, O'Reilly (SPD), 2014, ISBN: 9789350239759.
3. **"Learning Python"**, Fifth Edition by Mark Lutz, Published by O'Reilly Media, ISBN: 978-1-449-35573-9.

IOT APPLICATION DEVELOPMENT

Course	IOT Application development		
Course Code	18EM5108	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Ability describe the Raspberry PI board architecture and components	PO1,PO5, PSO1	2
CO2	Ability to design IOT based Applications	PO1,PO5, PSO1	3
CO3	Ability to develop IOT applications using Python	PO2,PO5, PSO1	3
CO4	Ability setup environment required for developing applications using Python and Raspberry PI board	PO5,PSO1, PSO1	3

 Syllabus

Introduction to IOT Applications: Home Automation: Cities: Environment: Energy: Retail: Logistics: Agriculture: Industry: Health and Lifestyle:

Introduction to Raspberry Board: Architecture and Hardware specifications

Preparing Raspberry Board for application development: Installing OS on raspberry Pi**,** setting up the board to work with Python as the programming language, Retrieving the board's assigned IP address, connecting to the board's operating system, Installing and upgrading the necessary libraries to interact with the board, installing pip and additional libraries, Invoking the Python interpreter

Programming using Python: Installing Python, Python Data Types & Data Structures, Numbers Strings Lists, Tuples, Dictionaries, Type Conversion, Control Flow: if, for, while, range, break/continue, pass. Functions, Modules, Packages, File Handling, Date/Time Operations, Classes, Python Packages of Internet Of Things-JSON, XML, HTTPLib & URLLib, SMTPLib.

Designing IOT based Systems: Requirement specification, Process specification, domain model specification, information model specification, Services Speciation, level specification, functional view specification, operational view specification, device and component integration, application development.

Development of IOT based Smart Lighting Systems: Deployment design, developing mode and state services, developing sterilizers, developing views for rest services, Developing URL patterns for rest services, Developing Main application, developing controller and integrated schematic for IOT home lighting system

Text Book

1. ArshdeepBahga and Vijay Madisetti,, Internet of Things - A Hands-on Approach, Universities Press, 2015, ISBN: 9788173719547 .

Reference Books

2. Wolfram Donat "Learn Raspberry Pi programming in python", Apress (2014), ISBN – 9781430264255
3. Matt Richardson & Shawn Wallace, Getting Started with Raspberry Pi, O'Reilly (SPD), 2014, ISBN: 9789350239759.
4. **"Learning Python"**, Fifth Edition by Mark Lutz, Published by O'Reilly Media, ISBN: 978-1-449-35573-9.

WIRELESS AND MOBILE COMMUNICATION

Course	Wireless and Mobile Communication		
Course Code	18EM5109	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To make the students aware of fundamental concepts related to Wireless communication	PO7,PO12, PSO1	2
CO2	To make the students aware of fundamental concepts related to Mobile communication	PO7,PO12, PSO1	2
CO3	Ability develop small wireless application for communicating between different embedded systems	PO7,PO12, PSO1	3
CO4	Ability develop small mobile application for communicating between different embedded systems	PO7,PO12, PSO1	3

Syllabus
Introduction to wireless communication: Meaning of wireless communication, Wireless communication standards: OSI standards, layers, protocols and functions, Wireless communication protocols: Wi-Fi, Gigbee, Bluetooth, WiMAX.
Wireless networks: peer to peer, Wireless LAN, Adhoc wireless network,
Wireless gateways: wireless to cellular and Vice versa, wireless to router and wireless to optic fiber, PSTN to wireless and vice versa.
Application development: Introduction to Wi-Fi related API included in python, developing Wi-Fi applications using python API.
Introduction to mobile communication: Meaning of mobile communication. Mobile communication standards: OSI standards, layers, protocols and functions.
Mobile communication protocols: Introduction to GSM, TDMA, FDMA AND CDMA, Random access data oriented networks, Short messaging service in GSM, Mobile application protocols.
Mobile networks: peer to peer, Mobile LAN, Mobile Network gateways: wireless to Cellular and wired to mobile, wireless and vice versa. Mobility in Internet Applications, Cellular IP, IPv6 and Mobility Management.
Mobile **Application development:** Introduction to Mobile communication related API within python, developing Mobile applications using python API.
Text Books:
1. Wireless Communications Principles and Practice second Edition by Theodore S. RappaPOrt, Pearson Education, Inc, publishing as prentice Hall, 2002.
2. Pahlavan, Kaveh and Prashanth Krishnamurthy. Principles of wireless network: a unified **approach. Prentice Hall, 2001.**

Reference Book:

1. Gast, Mathew S. 802.11 Wireless Networks: the definitive guide. 2nd ed. O'Reilly Media, 2005.
2. Aftab Ahmad, Wireless and Mobile Data Networks Wiley, 2005.

WIRELESS SENSOR NETWORKS

Course	Wireless sensor networks		
Course Code	18EM5214	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Cloud Computing

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Must be aware of various theoretical concepts related wireless sensors and networking of the sensors	PO1,PSO1	2
CO2	Must be able to develop sample applications using CDAC motes	PO1,PSO1	2
CO3	Must be able to develop applications that help the clusters communicating with remote servers	PO1,PSO1	3
CO4	Must be able to develop applications that help the sensors in a cluster to authenticate with remote servers	PO5,PSO1	3

Syllabus

Introduction to wireless sensor networks: As a sub-net of a IOT network, Wireless Sensors, Wireless protocols, Challenges for Wireless Sensor Networks, Application of sensor networks, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture,

Wireless Sensor Network Presentation: Overall Architectural diagram, Layers in the WSN networks, Node Layer, Controller Layer, Communication layer, Service Layer: Gateway Layer, remote data storage and retrieval layer, Communication standard used

Wireless sensor node presentation: Block diagram, Node Networking Topology, Hardware components, Sensor node hardware overview, Controller, Memory, Communication device, Sensors and actuators, Power supply of sensor nodes.

Programming sensor nodes: Introduction to CDAC motes, Programming Challenges, Software Platforms, State-Centric programming. Development of sample Applications

Networking Sensors: Physical layer, Trans receiver design considerations, Data Link layer: MAC Layer: Classification of MAC protocols, Low duty cycle protocol and wakeup concept, Address and Name management: Develop an Applications that implements authorization and authentication through a remote server

Assignment of MAC address, Routing Protocols: Data centric routing, Energy Efficient routing, geographic routing. **Develop application for establishing communication between motes and the controller using different routing protocols**

Connecting Sensors: Topology, Clustering, and Localization: meaning, Properties, introducingpossible approaches and hopping methods, Introduction to topology control, Time Synchronization, Positioning the sensors, sensor node tasking and control. **Developing an application for sensing through clusters**

Text Books

1. W. Dargie, C. poellabauer,"Fundamentals of Wireless sensor networks-Theory and Practice", John Wiley & Sons Publication2010
2. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
3. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007

Reference Books

1. K. Sohraby, D.Minoli and T. Znati, "Wireless Sensor Network Technology- Protocols and Applications", John Wiley & Sons,2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

CLOUD COMPUTING AND DATA ANALYTICS FOR IOT

Course	Cloud Computing and data Analytics for IOT		
Course Code	18EM5215	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Under the process involved in sensing and moving data across the network to be stored in the clouds and extract the same for conducting the analytics	PO7,PSO1	2
CO2	Understand the fundamentals related to cloud computing especially relating to data storage into cloud and retrieval of the same from the clouds.	PO7,PSO1	2
CO3	Ability to develop application for storing the sensed data on to the clouds	PO7,PSO1	3
CO4	Ability to conduct Analytics using the data stored in the clouds	PO7,PSO1	3

Introduction to data emanation from ES and IOT devices: Devices, Data flow, data Storage

Overview of Computing Paradigm: Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. Evolution of cloud computing: Business driver for adopting cloudcomputing.Introduction to Cloud Computing: Cloud Computing (NIST Model): Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers; Properties, Characteristics & Disadvantages: Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing; Role of Open Standards.

Computing Architecture: Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, Role of Networks in Cloud computing, Protocols used, Role of Web services; Service Models (XaaS): Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS); Deployment Models: Public cloud, Private cloud, Hybrid cloud, Communitycloud.

Embellishing and using a private cloud: Network topology, HW-SE specification, Installing open stack, configuring open stack availing services through open stacks, establishing virtual networks

Infrastructure as a Service (IaaS): Introduction to IaaS, IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, and Virtual Machine (VM). **Resource Virtualization:** Server, Storage, Network, Virtual Machine (resource) provisioning and manageability, **Storage as a service, Examples** Applications: Amazon EC2, Google Drive, One drive, drop box. Developing applications that use IaaS.

Introduction to big data and Analytics:– Sources of data through embedded systems: Video, audio, spectral, transactional, WEB Data, Different kinds of data Structures - Current Analytical Architecture - Drivers of Big Data. Big Data Overview, State of the Practice of Analytics, Big Data Analytics in Industry Verticals. Data analytics lifecycle Discovery - Data Preparation - Model Planning – Model Building - Communicate Results - Operationalize Case Study

Overview on data capturing through IOT devices, transmission of the same through different stages, and storage of the same in Clouds.

Initial Analysis of the Data using R:Introduction to R: Graphical User Interface, data import and Export: Attributes and data types, Descriptive statistics,

Exploratory Data Analysis: visualization before Analysis, dirty data, visualizing a single variable, examine multiple variables, data exploration Vs Presentation,

Statistical methods for evaluation: Hypothesis testing, difference of means, Ranking tests, Sampling, ANOVA, Introduction to HADOOP and Map reduce and the uses of the same for effecting the data analytics.

Text Books:

1. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data by EMC Education Services 2014
2. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big Data Analytics", EMC Education Series, John Wiley, ISBN: 978-1-118-87613-8, 2015.
3. Peter Bühlmann, Petros Drineas, Michael Kane, Mark van der Laan, "Handbook of Big Data", CRC Press, 2016.

Reference Books:
1. Kris Jamsa, Cloud Computing, Jones & Bartlett,2012
2. Russell Dean Vines and Ronald L. Krutz ,Cloud Security: A Comprehensive Guide To Secure Cloud Computing, Wiley India Pvt Ltd, 2010
3. Barrie Sosinsky, Cloud Computing Bible, Wiley India,2011
4. Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
5. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
6. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly, 2009.
7. MapReduce Design Patterns, Author: Donald Miner, Publisher: O'Reilly (2012), ISBN-13:- 9789350239810

SOFT COMPUTING

Course	Soft Computing		
Course Code	18EM5110	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand the extensions from intelligent systems to soft computing through knowledge representation.	PO1,PSO1	2
CO2	Understand and apply fuzzy concepts, fuzzification, defuzzification and Fuzzy Inference Systems	PO2,PSO1	3
CO3	Analyse the working of various types of Neural Networks and applications	PO1,PO2,PSO1	4
CO4	Apply the biological and nature inspired evolutionary algorithms	PO2,PSO1	3
CO5	Develop and implement neuro, fuzzy and genetic concepts learnt using open source tools	PO5, PSO1	3

Syllabus

Introduction to Intelligent systems and soft computing: Intelligence systems, Knowledge -based systems, knowledge representation and processing, soft computing.
Fuzzy Logic and Control System: Crisp Vs Fuzzy Sets Operations, Fuzzification methods, Defuzzification Methods, Extension Principle and Fuzzy Relations, Fuzzy Inference Systems
Fundamentals of Artificial neural networks: Fundamentals of connectionist modeling Major classes of neural networks: The multi-layer perceptron, radial basis function networks, Kohonen's self-organizing network, The Hopfield network, industrial and commercial application of ANN.
Evolutionary computing: Overview of Evolutionary Computing, Genetic algorithms and optimization, Genetic Algorithm operators and algorithm, Particle Swarm Optimization, Hybrid Systems-Neuro, Fuzzy, Genetic.
Text Books:
1. Fakhreddine O. Karry, Clarence De Silva, "Soft Computing and Intelligent systems Design Theory, Tools and Applications", Pearson, (2009).

Reference Books:

1. J.S.R.Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education, (2015).
2. S N. Sivanandam, S. N. Deepa, "Principles of Soft Computing", Second Edition, Wiley India (2011).
3. LaureneFausett, "Fundamentals of Neural Networks", Pearson, (2004).
4. Timothy J Ross "Fuzzy Logic with Engineering Applications", 3rd Edition, Wiley, (2010).
5. Bart Kosko, "Neural Networks and Fuzzy Systems", PHI, (2004).
6. Randy l. Haupt, "Practical Genetic Algorithms", Wiley Interscience (2004).

NATURAL LANGUAGE PROCESSING

Course	Natural Language processing		
Course Code	18EM5111	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand approaches to syntax and semantics in NLP.	PO1, PO2,PSO2	2
CO2	Apply the statistical estimation and statistical alignment models	PO2, PO7, PSO2	3
CO3	Analyse grammar formalism and context free grammars	PO4, PO6, PO7, PSO2	4
CO4	Apply Rule based Techniques, Statistical Machine translation (SMT), word alignment, phrase-based translation	PO1,PO3, PO4, PO6, PO7, PSO2	4
C05	Implementing NLP algorithms using python	PO5, PSO2	6

Syllabus

Introduction: overview, Statistical machine translation, Language models and their role in speech processing, The problem of ambiguity, NLP tasks in syntax, semantics, and pragmatics. Words: Structure, Semantics,

Parts of Speech and Sentences: Basic ideas in compositional semantics, Classical Parsing (Bottom up, top down,

Dynamic Programming: CYK parser). Sentences: Parsing using Probabilistic Context Free Grammars and EM based approaches for learning PCFG parameters.

N-gram Language Models and Information Theory: The role of language models. Simple N-gram models, Entropy, relative entropy, cross entropy, Statistical estimation and smoothing for language models.

Statistical Machine Translation (MT) Alignment Models: Statistical Alignment Models and Expectation Maximization (EM) EM and its use in statistical MT alignment models, EM algorithm.

Speech processing: Part of Speech Tagging and Sequence Labelling, Lexical syntax. Hidden Markov Models (Forward and Viterbi algorithms and EM training). N-gram models.

Syntactic-parsing: Grammar formalisms, treebanks. Efficient parsing for context-free grammars (CFGs), Statistical parsing, probabilistic CFGs (PCFGs, Top-down and bottom-up parsing, empty constituents, left recursion.

Modern Statistical Parsers Search methods in parsing: Agenda-based chart, A*, "best-first" parsing, Dependency parsing, Discriminative parsing.

Semantic Analysis: Lexical semantics and word-sense disambiguation. Discourse: Reference resolution and phenomena, syntactic and semantic constraints on Reference, pronoun resolution algorithm, text coherence, discourse structure. Labelling and parsing of semantics. Syllabus:

Information Extraction (IE): Named entity recognition and relation extraction, sequence labelling, Information sources, rule-based methods, evaluation (recall, precision.

Machine Translation (MT): Basic issues in MT. Rule based Techniques, Statistical Machine translation (SMT), word alignment, phrase-based translation, and synchronous grammars,

Additional topics:Advanced Language Modelling (including LDA), other applications like summarization.

Text books

1. Daniel Jurafsky and James H. Martin "An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Second Edition.
2. Bird, S., Klein, E., Loper, E. (2009). Natural Language Processing with Python. SebastoPOl, CA: O'Reilly Media.

Reference Books:

1. James A.. Natural language Understanding 2e, Pearson Education, 1994
2. Bharati A., Sangal R., Chaitanya V.. Natural language processing: a Paninian perspective, PHI, 2000
3. Siddiqui T., Tiwary U. S. Natural language processing and Information retrieval, OUP, 2008.
4. Manning, Christopher D.; HinrichSchuetze; Foundations of Statistical Natural Language Processing Cambridge, MIT Press, 1999.
5. Kiraz, George Anton; Computational Nonlinear Morphology: With Emphasis on Semitic Languages Cambridge University Press, 2001, 171 pages

MACHINE LEARNING

Course	Machine Learning		
Course Code	18EM5112	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Apply Machine Learning Techniques using Decision Trees to solve Real World Problems	PO 3/PSO2	2
CO2	Build Bayesian models for solving Classification and Prediction problems	PO 4/PSO2	2
CO3	Apply Neural Network and Genetic Algorithm techniques to solve Classification, Prediction problems	PO 3/PSO2	2
CO4	Demonstrates Learning First Order Rules, Analytical Learning and Explanation-Based Learning	PO 2/PSO2	3
CO5	Lab experiments to Implement Machine Learning Techniques using python Language	PO 4/PSO2	6

Syllabus

Introduction and Decision Trees: Introduction to Learning problems. **Designing a Learning System:** Choosing Training Experience, Choosing target Function, Choosing a Representation for the Target function, choosing a Function Approximation Algorithm, the final Design.

Perspectives and Issues in Machine Learning: Issues in Machine Learning. **Decision Tree Learning:** Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning. **The Basic Decision Tree Learning Algorithm:** Which attribute is the Best classifier, an illustrative example, Hypothesis Space Search in Decision Tree Learning?

Inductive Bias in Decision Tree Learning: Restriction Biases and preference Biases, why prefer short Hypotheses. **Issues in Decision Tree Learning:** Avoiding Over fitting the Data, Incorporating Continuous-valued Attributes, Alternative Measures for Selecting Attributes, Handling Training Examples with Missing Attribute Values, Handling Attributes with Differing Costs.

Bayesian Learning: Introduction, Bayes Theorem. **Bayes Theorem and Concept Learning**: Brute-Force Bayes Concept Learning, MAP Hypothesis and Consistent Learners. Maximum Likelihood and Least-squared Error Hypotheses, Maximum Likelihood Hypothesis for predicting probabilities:Gradient Search to Maximize Likelihood in a Neural Net. Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naive Bayes Classifier, and An Example: Learning to classify Text.

Bayesian Belief Networks: Conditional Independence, Representation, Inference, Learning Bayesian Belied Networks, Gradient Ascent Training of a Bayesian Networks, Learning the structure of Bayesian Networks. **The EM Algorithm**: Estimate Means of K Gaussians, General Statement of EM Algorithm, Derivation of the K Means Algorithm.

Artificial Neural Networks: Introduction, Neural Network Representations, Appropriate Problems for Neural Network Learning, Perceptron, and Multi-Layer Networks and BACK PROPAGATION Algorithm, Remarks on the BACK PROPAGATION Algorithm, Advanced Topics in Artificial Neural Networks.

Genetic Algorithms: Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Learning Sets of Rules: Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First-Order Rules, Learning Sets of First-order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

Introduction to Analytical Learning: Inductive and Analytical Learning Problems, and Learning with Perfect Domain Theories: PROLOG-EBG, Remarks on Explanation Based Learning, Explanation Based Learning of

Text Books:

1. Tom M.Mitchell ,"Machine Learning", McGraw Hill,1997
2. Stephen Marsland, "Machine Learning an Algorithmic Perspective", CRC Press,(2009).
3. Chun, J Wesley, *Core Python Programming, 2*nd *Edition*, Pearson, 2007 Reprint 2010.
4. Programming Python by Mark Lutz, O'Reilly.

Reference Books:
1. EthemAlpadin, "Introduction to Machine Learning", The MIT Press, (2010)

DEEP LEARNING

Course	Deep Learning		
Course Code	18EM5216	**L-T-P-S**	2-0-2-0
Pre-Requisites	Nil	**Credits**	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Understand the fundamentals of linear algebra, probability and information theory and numerical computation	PO1, PSO1	2
CO2	understand the core aspects of machine learning, deep feedforward networks and regularization for deep learning	PO2, PSO5	2
CO3	Analysing the concept of optimization for training deep models, Convolutional networks and finally recursive and recurrent networks	PO4, PSO2	4
CO4	Developing a system with a practical methodology of deep networks, some practical applications of deep networks in domains like computer vision, speech recognition, NLP etc...	PO3,4/PSO2,3	6
CO5	Build &Evaluate common practical applications	PO3,4/PSO2, PO3	6

Syllabus

Introduction: Deep learning, moving from machine learning to Deep Learning
Mathematical foundations: linear algebra, probability and information theory, Numerical computation.
Deep learning Foundations: deep feedforward networks, regularization for deep learning, optimization for training deep models, convolutional networks,
Sequential Modelling: recurrent and recursive nets, practical methodology for deep networks, applications of deep learning, Expert Systems
Textbooks:

1. Ian Goodfellow, YoshuaBengio, Aaron Courville. Deep Learning
2. Tensor Flow for Deep Learning – 2018, BY REZA ZADEH , BHARATH RAMSUNDAR
3. Agile data science: building data analytics applications with Hadoop-Russell Journey-O'Reilly Media-2013
4. An Introduction to Applied Multivariate Analysis with R -Brian Everett, Torstein Hothorn-Springer-2011
5. Statistical Modeling and Analysis for Database Marketing: Effective Techniques for Mining Big Data-Bruce Ratner-Chapman and Hall/CRC-2003

FUNDAMENTALS OF CYBER SECURITY

Course	Fundamentals of Cyber security		
Course Code	18EM5311	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

course outcomes with student outcomes:

C.O. No.	Course outcome	PO/PSO	BTL
CO1	Understand the need for cyber security and analyze the risk involved	PO4,PSO2	2
CO2	Analyze various types of security threats and electronic payment systems	PO4,PSO2	4
CO3	Analyze the security issues involved in developing secure information systems	PO4,PSO2	4
CO4	Analyze the security policies standards and cyber laws	PO4,PSO2	4

Syllabus

Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce Electronic Payment System, e- Cash, Credit/Debit Cards. Digital Signature, public Key Cryptography.

Developing Secure Information Systems, Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV and intrusion Detection Systems, Backup Security Measures.

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

Text Books :
1. Charles P. Pfleeger, Shari LawerancePfleeger, "Analysing Computer Security ", Pearson Education India.
2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India. 3.Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla ,"Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill.
5.Chander, Harish "Cyber Laws and its Protection" ,PHI.

MOBILE AND WIRELESS SECURITY

Course	Mobile and wireless security		
Course Code	18EM5312	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

course outcomes

C.O. No.	Course Outcomes (CO)	PO/PSO	BTL
CO1	Analyze the Security and Privacy aspects of Mobile and Wireless Networks	PO4,PSO2	4
CO2	Understand the mobile system architectures and related security issues	PO4,PSO2	2
CO3	Analyze the security issues in wireless networks	PO4,PSO2	4
CO4	Analyze RFID security and privacy issues	PO4,PSO2	4

Syllabus.

Security and Privacy for Mobile and Wireless Networks: Introduction- State of the Art- Areas for Future Research- General Recommendation for Research. Pervasive Systems: Enhancing Trust Negotiation with Privacy Support: Trust Negotiation- Weakness of Trust Negotiation- Extending Trust Negotiation to Support Privacy

Mobile system architectures, Overview of mobile cellular systems, GSM and UMTS Security & Attacks, Vulnerabilities in Cellular Services, Cellular Jamming Attacks & Mitigation, Security in Cellular VoIP Services, Mobile application security.

Overview of Wireless security, Scanning and Enumerating 802.11 Networks, Attacking 802.11 Networks, Attacking WPA protected 802.11 Networks, Bluetooth Scanning and Reconnaissance, Bluetooth Eavesdropping, Attacking and Exploiting Bluetooth, Zigbee Security, Zigbee Attacks

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management in Adhoc Wireless Networks, Secure Routing in Adhoc Wireless Networks

RFID Security and privacy, RFID chips Techniques and Protocols, RFID anti-counterfeiting, Man-in-the-middle attacks on RFID systems, Digital Signature Transponder, Combining Physics and Cryptography to Enhance Privacy in RFID Systems, Scalability Issues in Large-Scale Applications, An Efficient and Secure RFID Security Method with Ownership Transfer, Policy-based Dynamic Privacy Protection Framework leveraging Globally Mobile RFIDs, User-Centric Security for RFID based Distributed Systems, Optimizing RFID protocols for Low Information Leakage, RFID: an anti-counterfeiting tool.

Text Books
1. Kia Makki, Peter Reiher, "Mobile and Wireless Network Security and Privacy ", Springer, ISBN 978-0-387-71057-0, 2007.
2. C. Siva Ram Murthy, B.S. Manoj, "Adhoc Wireless Networks Architectures and Protocols", Prentice Hall, x ISBN 9788131706885, 2007.
3. NoureddineBoudriga, "Security of Mobile Communications", ISBN 9780849379413, 2010.
4. 4. Kitsos, Paris; Zhang, Yan , "RFID Security Techniques, Protocols and System-On-Chip Design ", ISBN 978-0-387-76481-8, 2008.
5. 5. Johny Cache, Joshua Wright and Vincent Liu," Hacking Wireless Exposed: Wireless Security Secrets & Solutions ", second edition, McGraw Hill, ISBN: 978-0-07-166662-6, 2010.

COMPUTER FORENSICS

Course	Computer forensics		
Course Code	18EM5314	**L-T-P-S**	3-0-0-0
Pre-Requisites	Nil	**Credits**	3

course outcomes

C.O. No.	Course Outcome (CO)	PO/PSO	BTL
CO1	Understand the principles and methodologies of digital forensics	PO4, PSO2	1
CO2	Analyze the techniques involved in data acquisitions and duplication	PO4, PSO2	4
CO3	Analyze the vulnerabilities in routers	PO4, PSO2	4
CO4	Understand the basics of forensics acquisition	PO4, PSO2	1

Syllabus

History of Forensics – Computer Forensic Flaws and Risks – Rules of Computer Forensics – Legal issues – Digital Forensic Principles – Digital Environments – Digital Forensic Methodologies. Live forensics and investigation –digital evidence – seizure methodology factors **limiting the whole sale seizure of hardware**- Demystifying computer/ cyber crime – explosion of networking – explosion of wireless networks – interpersonal communication.

Recovering deleted files and deleted partitions – deleted file recovery tools – deleted partitioned recovery tools – data acquisition and duplication – data acquisition tools – hardware tools – backing up and duplicating data.

An overview of Routers – Hacking Routers – Investigating Routers – Investigating Wireless Attacks – Basics of wireless – Wireless Penetration Testing – Direct Connections to Wireless Access Point – Wireless Connect to a Wireless Access Point.

Forensics Acquisition – Processing Local mail archives – Processing server level archives – **classification of steganography** – categories of steganography in Forensics – Types of password cracking.

TEXT BOOKS

1. Anthony Reyes, Jack Wiles, "Cybercrime and Digital Forenscis", Syngress Publishers, Elsevier 2007.
2. John Sammons, "The Basics of Digital Forensics", Elsevier 2012
3. Linda Volonins, Reynalds Anzaldua, "Computer Forensics for dummies", Wiley Publishing 2008.

SECUIRTY IN INTERET OF THINGS

Course	Security in internet of things		
Course Code	18EM5313	L-T-P-S	2-0-2-0
Pre-Requisites	Nil	Credits	3

course outcomes

C.O. No.	Course outcome	PO/PSO	BTL
CO1	Understand the security requirements of IOT	PO4,PSO2	2
CO2	Understand the cryptographic fundamentals for IOT	PO4,PSO2	2
CO3	Understand the privacy and trust models for IOT	PO4,PSO2	2
CO4	Analyse various Cloud IOT Security controls	PO4,PSO2	4

Syllabus

INTRODUCTION: SECURING THE INTERNET OF THINGS: Security Requirements in IoT Architecture - Security in Enabling Technologies - Security Concerns in IoT Applications. Security Architecture in the Internet of Things - Security Requirements in IoT - Insufficient Authentication/Authorization - Insecure Access Control - Threats to Access Control, Privacy, and Availability - Attacks Specific to IoT. Vulnerabilities – Secrecy and Secret-Key Capacity - Authentication/Authorization for Smart Devices - Transport Encryption – Attack & Fault trees

CRYPTOGRAPHIC FUNDAMENTALS FOR IOT Cryptographic primitives and its role in IoT – Encryption and Decryption – Hashes – Digital Signatures – Random number generation – Cipher suites – key management fundamentals – cryptographic controls built into IoT messaging and communication protocols – IoT Node Authentication

IDENTITY & ACCESS MANAGEMENT SOLUTIONS FOR IOT Identity lifecycle – authentication credentials – IoT IAM infrastructure – Authorization with Publish / Subscribe schemes – access control PRIVACY PRESERVATION AND TRUST MODELS FOR IOT Concerns in data dissemination – Lightweight and robust schemes for Privacy protection – Trust and Trust models for IoT – self-organizingThings - Preventing unauthorized access.

CLOUD SECURITY FOR IOT Cloud services and IoT – offerings related to IoT from cloud service providers – Cloud IoT security controls – An enterpriseIoT cloud security architecture – New directions in cloud enabled IoT computing

Text Book
1. Practical Internet of Things Security (Kindle Edition) by Brian Russell, Drew Van Duren
2. Securing the Internet of Things Elsevier

References

1. Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations

INTRUSION DETECTION SYSTEMS

Course	Intrusion detection system		
Course Code	18EM5317	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

course outcomes

C.O. No.	Course outcome(CO)	PO/PSO	BTL
CO1	Understand the characteristics of intrusion detection systems	PO4,PSO2	2
CO2	Analyse limitations of existing IDS tools through case studies	PO4,PSO2	4
CO3	Analyse various attacks on computers and estimate the severity	PO4,PSO2	4
CO4	Analyse the techniques for visualizing the network data	PO4,PSO2	4

Syllabus

Overview of intrusions, system intrusion process, dangers of system intrusions, history and state of the art of intrusion detection systems (IDSs): anomaly detection, misuse detection, types of IDS: Network-Based IDS. Host-Based IDS, Hybrid IDS, Intrusion Prevention Systems (IPS): Network-Based IPS, Host-Based IPS,

Intrusion Detection Tools, the limitations and open problems of intrusion detection systems, advanced persistent threats, case studies of intrusion detection systems against real-world threats and malware.

Statistical and machine approaches to detection of attacks on computers - Techniques for studying the Internet and estimating the number and severity of attacks, network based attacks, host based attacks.

Statistical pattern recognition for detection and classification of attacks, and techniques for visualizing network data, etc.

Text books:
1. Roberto Di Pietro**,** Luigi V. Mancini**,** Intrusion Detection System, Springer ,2008

Reference books:
1. Anderson, Ross (2001). Security Engineering: A Guide to Building Dependable Distributed Systems. New York: John Wiley & Sons. pp. 387–388. ISBN 978-0-471-38922-4.
2. Anderson, James P., "Computer Security Threat Monitoring and Surveillance," Washing, PA, James P. Anderson Co., 1980.

ETHICAL HACKING AND WEB SECURITY

Course code   :18EM5318   L – T – P-S:**2**-0-2-0
Pre Requisite :NIL   Credits : 3
Mapping of course outcomes with student outcomes:

C.O. No.	Course outcome	PO/PSO	BTL
CO1	Analyse the security features of various operating systems	PO4,PSO2	4
CO2	Analyse the vulnerabilities in network devices	PO4,PSO2	4
CO3	Analyse various wireless hacking mechanisms	PO4,PSO2	4
CO4	Analyse the techniques for session hijacking ,email hacking and web application hacking	PO4,PSO2	4

Syllabus

Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Case study: Network Security Monitoring.
 Securing permission: Securing file and folder permission, Using the encrypting file system, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000 and windows XP. Unix: The Quest for Root, Remote Access vs Local access, Remote access, Local access, After hacking root.
Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialling, Brute-Force Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media.
 Wireless Hacking: Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks, Firewalls: Firewalls landscape, Firewall Identification-Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of Dos Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS.
Remote Control Insecurities, Discovering Remote Control Software, Connection, Weakness. VNC, Microsoft Terminal Server and Citrix ICA, Advanced Techniques Session Hijacking, Back Doors, Trojans, Cryptography, Subverting the systems Environment, Social Engineering, Web Hacking, Web server hacking web application hacking, Hacking the internet Use, Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking.

Text Books:
1. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Tata Mc Graw Hill Publishers, 2010.
2. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall of India, 2010.
Reference Books:
1. Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 5th Edition, Tata Mc Graw Hill Publishers, 2010.
2. Rafay Baloch, "A Beginners Guide to Ethical Hacking".
3. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, "Gray Hat Hacking The Ethical Hackers Handbook", 3rd Edition, McGraw-Hill Osborne Media paperback(January 27, 2011)

Laboratory programs

1. Wireshark: Experiment to monitor live network capturing packets and analyzing over the live network.
2. LOIC: DoS attack using LOIC.
3. FTK: Bit level forensic analysis of evidential image and reporting the same.
4. Darkcomet : Develop a malware using Remote Access Tool Darkcomet to take a remote access over network. 4.
5. HTTrack: Website mirroring using Httrack and hosting on a local network.
6. XSS: Inject a client side script to a web application.
7. Emailtrackerpro: Email analysis involving header check, tracing the route. Also perform a check on a spam mail and non-spam mail.

SKILLING COURSES

SKILLING FOR ENGINEERS - 1 (CODING)

Course	Coding Skill 1		
Course Code	18SC1106	L-T-P-S	0-0-0-6
Pre-Requisites	Nil	Credits	1.5

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Apply the concepts of basic programming to solve the basic problems, pattern based problems	PO2,PO3,PO5,PSO2	3
CO2	Build solutions for problems on Numbers and array based problems , functions, recursion	PO2,PO3,PO5,PSO2	3
CO3	Solve problems solutions for character/string based problems and pointers	PO2,PO3,PO5,PSO2	3
CO4	Build solutions to programs on Data structures concepts.	PO2,PO3,PO5,PSO2	6

Syllabus

Basic problems, Pattern based problems, Number based problems, Array based problems (one dimensional and two dimensional), character and string based problems, functions and recursion (class and objects for java), pointer based problems, function pointers and array pointers (For C Users), linked lists, queues, stack problems. Tool used for II Year problems solving contest URL: http://hackerrank.com/y16csecs

Tools for References:

1. http://hackerrank.com
2. http://codechef.com
3. http://spoj.com
4. http://hackerearth.com

SKLLING FOR ENGINEERS - 2 (CODING)

Course	Coding Skill 2		
Course Code	18SC1207	L-T-P-S	0-0-0-8
Pre-Requisites	Nil	Credits	1.5

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Apply the concepts of basic programming to solve the basic problems, pattern based problems	PO2,PO3,PO5,PSO2	3
CO2	Build solutions for problems on Numbers and array based problems , functions, recursion	PO2,PO3,PO5,PSO2	3
CO3	Solve problems solutions for character/string based problems and pointers	PO2,PO3,PO5,PSO2	3
CO4	Build solutions to programs on Data structures concepts.	PO2,PO3,PO5,PSO2	3

Syllabus

Basic problems, Pattern based problems, Number based problems, Array based problems (one dimensional and two dimensional), character and string based problems, functions and recursion (class and objects for java), pointer based problems, function pointers and array pointers (For C Users), linked lists, queues, stack problems. Tool used for II Year problems solving contest URL: http://hackerrank.com/y16csecs

Tools for References:

1. http://hackerrank.com
2. http://codechef.com
3. http://spoj.com
4. http://hackerearth.com

SKLLING FOR ENGINEERS - 3 (JAVA)

Course	Skilling for Engineers3 –(JAVA)		
Course Code	18TS201	L-T-P-S	0-0-0-8
Pre-Requisites	Nil	Credits	2

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Design and Develop applications using inheritance ,polymorphism	PO2,PO3,PO5,PSO2	6
CO2	Develop applications using abstract classes and packages	PO2,PO3,PO5,PSO2	6
CO3	Develop applications using interfaces and exceptions	PO2,PO3,PO5,PSO2	6
CO4	Develop applications using collections	PO2,PO3,PO5,PSO2	6

Syllabus

Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.Packages- Defining a Package, CLASSPATH, Access protection, importing packages.Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.Stream based I/O(java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, auto boxing,

Exception handling - Fundamentals of exception handling, Exception types, Termination or presumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable ,Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

List of Experiments

1. Install IDE (NetBeans)
2. Develop an application that creates objects of the same Class with properties set with different values

3. Develop an Application that implements inheritance with different objects instantiated for different purposes
4. Develop an application for reading data from keyboard and displaying the same on to the Monitor
5. Develop an application for reading data from files and writing data on to files
6. Develop an application that implements static polymorphism through method over ridding
7. Develop an application that implements dynamic polymorphism through method overloading
8. Develop an application that raises different exceptions and handles the same
9. Develop an application that implements variable function arguments
10. Develop an application that runs different tasks concurrently using Multi-thread programming
11. Develop an Application that uses string manipulations extensively
12. Develop an application that uses constructor overloading
13. Develop an application that uses array of objects and returns objects from the functions
14. Develop an Application that uses packages of classes
15. Develop an application that uses both Classes and Interfaces
16. Develop an application that uses formatter class
17. Develop an application that uses Scanner class
18. Develop an application that Byte streams
19. Develop an Application that uses Character Streams
20. Develop an application that tokenizes a document for finding the keywords

Text books:

1. Herbert Scheldt, "The Complete Reference Java", 7th edition TMH.
2. Deitel&Deitel, "'Java – How to program", 10th edition, Pearson,2012

Reference Books:

1. Jim Keogh, "The Complete Reference J2EE", TMH, 2006.
2. Cay. S. Horstmann and Gary Cornell "Core Java 2, Vol 1, Fundamentals", Seventh Edition, Pearson Education.

SKILLING FOR ENGINEERS - 4 (PYTHON PROGRAMMING)

Course	Skilling for engineers-4(Python Programming)		
Course Code	18TS202	L-T-P-S	0-0-0-8
Pre-Requisites	Nil	Credits	2

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Design and Develop applications using python control statements and arrays and strings	PO2,PO3,PO5,PSO1	6
CO2	Develop applications using python functions, lists dictionaries	PO2,PO3,PO5,PSO1	6
CO3	Develop applications using pythons oops concepts	PO2,PO3,PO5,PSO1	6
CO4	Develop applications using database connectivity with python	PO2,PO3,PO5,PSO1	6

Syllabus

Introduction to Raspberry Pi, Booting Up RPi- Operating System and Linux Commands, Working with RPi using Python and Sensing Data using Python , Introduction, Python vs. Other Languages, Applications of Python , **Understanding Python,** Interpreted Languages,Variables, Keywords, Operators and Operands ,Data Types in Python, Importing Libraries, Flow Control, Conditional Statement, Loops,**Sensors Interfacing-** Temperature and Humidity Sensor (DHT11), Motion Sensor (PIR), Obstacle detection using Ultrasonic sensor, etc. Communicating using RPi- GSM interfacing, Accessing on-board Wi-Fi ,Connecting Database with RPi, IoT , Applications based on Pi ,LAMP Web-server, GPIO Control over Web Browser, Communicating data using on-board module, Home automation using Pi

List of Experiments

1. Develop a system that interfaces a temperature sensor to Raspberry Pie and develop a firmware that reads temperature and writes on to an LCD
2. Develop a system that interfaces a Humidity sensor to Raspberry Pie and develop a firmware that reads Humidity and writes on to an LCD
3. Develop a system that interfaces a Flow sensor to Raspberry Pie and develop a firmware that reads Flow and writes on to an LCD
4. Develop a system that interfaces a pressure sensor to Raspberry Pie and develop a firmware that reads pressure and writes on to an LCD
5. Develop a system that reads data from the keyboard connected to Raspberry Pie and develop firmware that reads the input and writes on to an LCD
6. Develop a system that interfaces a DC motor to Raspberry Pie and develop a firmware that changes the speeds of DC Motor
7. Develop a system that interfaces a Servo motor to Raspberry Pie and develop a firmware that changes the speeds of servo Motor
8. Develop a system that interfaces a Stepper motor to Raspberry Pie and develop a firmware that changes the speeds of DC Motor

9. Develop a system that control the ON/OFF of Fan with the help of a commands initiated from a PC/Keyboard

10. Develop a system that changes the pattern of LED lighting as per the command inputted through a Keyboard

11. Develop a system that senses temperatures through two sensors and store the same in file connecting sensors ID, Location ID, Time Stamp and the sensed temperature

12. Develop a system that reads the data from a Head cluster noting down the time for transmission and receiving of the same at controller level and store the same in a PC as file.

13. Develop a system that reads images from camera connected to the raspberry pie board and store the same in a PC as distinct files

14. Develop a system that reads the two temperatures and invoke buzzer if the difference of temperatures > 2.

15. Develop a systems that controls ON/OFF of a pump when a sensed temperature is greater than a reference temperatures which is read from a Keyboard

16. Develop a system that trigger a Buzzer when a water taken is either empty or overfull

17. Develop a System that senses the level of CO2 at a particular area and if CO2 is more than certain level shut of a chimney

18. Develop a system that displays messages in matrix form indicating the weather conditions

19. Develop a system that reads a number board and display the car number on 7 segmented display system

20. Develop a system that shows a path way that a vehicle must take its route.

Text Books:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage

SKILLING FOR ENGINEERS - 5 (EMBEDDED C)

Course	Skilling for Engineers-5(Embedded C)		
Course Code	18TS301	L-T-P-S	0-0-0-8
Pre-Requisites	Nil	Credits	2

Course outcomes

CO No	Course Outcomes (CO)	PO	BTL
CO1	Develop applications using 8051 microcontroller and interfacing LED ,Buzzers	PO2,PO3,PO5,PSO1	6
CO2	Develop applications using 8051 microcontroller and interfacing LCD ,DC motor	PO2,PO3,PO5,PSO1	6
CO3	Develop applications using 8051 microcontroller and interfacing Timers and event counters	PO2,PO3,PO5,PSO1	6
CO4	Develop applications using 8051 microcontroller and interfacing sensors and serial communication with keyboard.	PO2,PO3,PO5,PSO1	6

Syllabus

Embedded System Introduction ,difference between C and Embedded c, 8051 introduction ,SBIT, SFRS in 8051, pin diagram ,keil software LED interfacing, delay generation using for loops ,Switch interfacing, Buzzer interfacing, Relay interfacing, LCD interfacing ,DC motor interfacing. Uses of Timers, timers and counters, TMOD ,TCON registers ,time delay calculation, timer programming counter programming, delay generation using different modes and different timers, Serial communication introduction, SCON and SBUF registers ,use of timers in serial communication ,baud rate calculation ,hardware components used in serial communication, data transfer from MC to PC and from PC to MC. Interrupts introduction, types of interrupts, IP register, programming with interrupt serial interrupt, ADC interface to 8051(0804,0808)

List of Experiments

1. Write an Embedded c program to interface a single LED to 8051
2. Write an Embedded c program to interface a multiple LED to 8051
3. Write an Embedded c program to blink the LED
4. Write an Embedded c program to interface a switch to 8051 and blink the LED
5. Write an Embedded c program to design a 2-way traffic signal using delay
6. Write an Embedded c program to connect multiple LED'S using SFR
7. Write an Embedded c program to interface an 16x2 LCD to the 8051
8. Write an Embedded c program to interface an DC motor to 8051 and run it in clock-wise
9. Write an Embedded c program to interface the key pad and the output on the LCD
10. Write an Embedded c program to ON and OFF an AC load using relay
11. Write an Embedded c program to bink an LED for every 30ms using timers
12. Write an Embedded c program to calculate the 10ms delay using timer 1 and mode 1 and blink the LED

13. Write an Embedded c program to calculate   20us delay using timer 0 mode 2 and blink the LED
14. Write an Embedded c program to count the number of events using the counters
15. Write an Embedded c program to transfer the data from 8051 to PC using serial communication
16. Write an Embedded c program to receive the data from PC to 8051 using serial communication and display the received data in the LCD
17. Write an Embedded c program to receive the data from PC to 8051 using serial communication and display the received data in the LCD by using the interrupt method
18. Write an Embedded c program to interface a temp sensor to 8051 by using the ADC 0808
19. Write an Embedded C program to interface a temperature Sensor and a Buzzer and invoke the Buzzer when the sensed temperature > inputted temperature from the keyboard
20. Write an Embedded C program that controls a stepper motor based on the input keyed through the key board.

Skilling for Engineers - 6 (IOT PROGRAMMING)

Course	Skilling for Engineers-6(IOT programming)		
Course Code	18TS303	**L-T-P-S**	**0-0-0-8**
Pre-Requisites	Nil	**Credits**	**2**

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Develop applications using python for home automation	PO2,PO3,PO5,PSO1	6
CO2	Develop REST services for smart applications	PO2,PO3,PO5,PSO1	6
CO3	Develop applications using python for intrusion detection	PO2,PO3,PO5,PSO1	6
CO4	Develop applications using python for smart parking	PO2,PO3,PO5,PSO1	6

Syllabus

IOT Definition ,IoT Applications ,IoT Architecture, Sensors, Cloud Computing, Arduino / Raspberry Pi , Introduction Of Thing Speak , Creating Channel ,Field and API key , Raspberry PI/ Arduino , Architecture and Hardware specifications, Flashing the loading the SD card with the OS, Booting the OS, Introduction to various Sensors, Interfacing Sensors with Arduino/Rpi , Integrating Sensors & Reading Values , Uploading Sensor Data over cloud , Data Analytics.

List of Experiments

1. Develop a topology diagram of IOT network for implementing smart Lighting systems
2. Develop a hardware based IOT system for home automation
3. Develop a Django model for implementing Mode and State REST services in Python language to implement a smart lighting system
4. Develop serializes and View sets for Django model for providing the REST services using Python
5. Develop URL patterns for rest services for home automation application using Python
6. Develop Django model for home automation application using Python
7. Develop a Python code for implementing a controller for Home automation systems using Python
8. Develop a topology diagram of IOT network for implementing Home Intrusion system
9. Develop a hardware based IOT system for home Intrusion system
10. Develop Django model for implementing room and Door rest services using Python
11. Develop serializes for room and door rest services using Python
12. Develop Viewpoints for rest services for home automation using python program
13. Develop URL patterns for rest services for home intrusion application using Python
14. Develop Django model for home intrusion application using Python
15. Develop a Python code for implementing a controller for Home Intrusion systems using Python
16. Develop a topology diagram of IOT network for implementing smart parking
17. Develop a hardware based IOT system for smart parking

18. Develop Django model for implementing rest services using Python
19. Develop serializes rest services using Python for smart parking
20. Develop Viewpoints for rest services for smart parking using python program
21. Develop URL patterns for rest services for smart parking application using Python
22. Develop Django model for smart parking application using Python
23. Develop a Python code for implementing a controller for smart parking system using Python

References

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann
2. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally
3. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers
4. Internet of Things (A Hands-on-Approach) , Vijay Madisetti , ArshdeepBahga
5. 6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
6. Building the internet of things with ipv6 and mipv6, The Evolving World of M2M Communications, Daniel Minoli John Wiley & Sons

OPEN ELECTIVES

LINUX PROGRAMMING

Course	Linux Programming		
Course Code	18EM40B1	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Must have full understanding of Linux Commands and Bourn shell programming	PO7	2
CO2	Ability to develop Bourn shell programs interfaced with LINUX utilities	PO8	2
CO3	Ability to develop Bourn shell programs interfaced with SED and AWK user interface systems and File management systems	PO5	2
CO4	Ability to develop Bourn shell programs that implements inter process communication and process management	PO5	2

Syllabus

Introduction: Introduction to LINUX operating system, Command language and scripting Languages

Working with Bourne Shell (bash): Structure of a shell script, running shell script, Shell as a programming language, shell Meta characters, Control structures, arithmetic in shell, functions, debugging shell scripts developing sample programs using Bourne shells

Linux Utilities- and interfacing with Bourn Shell programs: File handling utilities, file permissions, Process utilities, Disk utilities, Text processing utilities, Backup utilities, Invoking Utilities through Bourne Shell and development of sample Applications

Implementing Pattern processing and filtering through bourn shell programming: Pattern processing through **SED Scripts:** operation, addresses, commands, applications, filters through **AWK Scripting:** Execution, field and records, scripts, operation, patterns, actions functions using system commands in AWK. **Sample applications using Bourn shell programming interfaced with AWK and SED**

Files and interfacing with Bourne shell: Introduction to files and file permissions, File processing through shell programming and development of sample applications

Process Management through LINUX Programming: Linux commands related process Management: Kill, raise, alarm, pause, abort, sleep functions. Process management through Bourn shell and development of sample applications

Text Books:

1. UNIX and Shell Programming, B. A. Forouzan and R.F Gilberg, Cengage learning
2. Unix Concept and Applications, 4thedn. SumitabhadasTMH
3. Beginning Linux programming 4thedn. N. Matthew, R stones Wrox Wiley India edn.

Reference Books:

1. Linux system Programming , Robot Love, O. Reilly, SPD
2. Unix Network Programming , W.R. Stevens , PHI

3. Unix Internals , U Vahalia , Pearson Education
4. Unix and shell Programming, S. G. KochanandP.Word 3rdedn. Pearson Edn.

WEB TECHNOLOGIES

Course	Web Technologies		
Course Code	18EM40B3	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Able to create Static Web pages using basic HTML &apply CSS	PO7	3
CO2	Able to apply JavaScript features for form validations and event handling	PO7	3
CO3	Able to create databases using MYSQL and apply JDBC concepts to connect to a database.	PO7	3
CO4	Able to create dynamic web pages using servlets & JSP	PO7	1
CO5	Must be able to design WEB site considering the user interface, navigation and interaction with database using project based LABS	PO11	3

 Syllabus

Introduction to Web, Technologies for Web Development, Introduction to HTML5: Headings, Linking, Images, Lists, Tables, Frames, Forms and Input types.
Cascading Style Sheets (CSS3): Introduction, Inline Styles, Embedded Style Sheets, Linking External Style Sheets, positioning Elements. **JavaScript**: Introduction to Scripting Languages, Javascript- Control Statements-(if, if-else, switch, while, do-while, for), Document Object Model –objects and collections, Event Handling.
Database Access with JDBC (Oracle/MYSQL): Introduction to JDBC architecture, Connection Object, working with statements, Creating and executing SQL statements, working with Result Set.
Servlets & Java Server Pages: Servlet Basics: Handling the Client Request, Generating the Server Response, Overview of JSP Technology, JSP Scripting Elements, Implicit Objects, Accessing MYSQL/Oracle Database with JDBC. Developing Sample Web Applications using HTML5, CSS3, JavaScript, Servlets/JSP & MYSQL.
Text books:
1. Deitel&Deitel& Nieto, "Internet & World Wide Web – How to Program", PEA, Fifth Edition.2010.
2. Falkner & Jones," Servlets and Java Server Pages: The J2EE Technology Web Tier", 1/e, Addison-Wesley Professional, 2008..
Reference Books:
1. Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.
2. Anders Moller, Michael Schwartzbach, "An Introduction to XML and Web Technologies", 1st Edition, Pearson Education, 2006.
3. Ivan BayRoss, "Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl", BPB Publication, 3rd Edition, 2005.
4. Uttam K Roy, "Web Technologies", OXFORD University Press, 2012.
5. "Advanced Java 2 Platform -HOW TO PROGRAM" by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall.

E-COMMERCE

Course	E - Commerce		
Course Code	18EM40B2	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO	BTL
CO1	Should gain fundamental knowledge related to development of E-commerce sites / portals	PO7	1
CO2	Should be able to design, develop and Host small e-commerce sites /portals	PO8	2
CO3	Should be able to implement security enforcement mechanisms within e-commerce sites /portals	PO5	1
CO4	Should be able to implement different payment mechanisms within e-commerce sites / portals	PO5	2

 Syllabus:

Introduction to E-Commerce: E-Commerce Vs Regula commerce, Elements of E-Commerce (Shopping Cart, Check-in, check-out, product display, payment mechanisms, security issues. WEB site Vs portal, Dynamic WEB site, Ecommerce Typical Infrastructure layouts
E-Commerce Business models: B2B, B2C, C2C
Ecommerce infrastructure and technologies: Clients, Network, servers, peer to peer communication, E-commerce Technologies: Client side processing, server side processing, communication between the clients and the servers
E-Commerce payment systems: Models, service providers, process and API
Securing E-commerce sites: Concepts, methods and mechanisms for securing e-commerce sites
E-commerce applications: Supply chain, sales and logistics
Text Book:
 1. Kenneth C. Laudon, Carol G. Traver , E-Commerce, (Pearson Education) 10th Edition
Reference Books:

 1. Daniel Minoli, EmmaMinoli, 'Web Commerce Technology Handbook',(TMG)
 2. Elias M. Awad' Electronic Commerce'(PHI)

DISASTER MANAGEMENT

Course	Disaster Management		
Course Code	18CE40A5	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes

CO No	Course Outcomes (CO)	PO	BTL
CO1	To understand the disaster caused due to Earthquakes, Floods, droughts	PO7	1
CO2	To make the students to understand the way the predict the occurrence of the disasters	PO8	2
CO3	To make the students understand various methods through which disasters can be managed	PO5	1

Syllabus

Introduction: Introduction and Concept of disasters and hazards related to Earthquakes, Tsunami, Volcanic eruption, Cyclones, Floods, Drought, Landslides, Forest fires, Avalanches and Pest infestation. Prediction and perception of hazards and adjustments to hazardous activities; Rates of natural cycles and residence time. Landslide: causes, prevention and correction. Landslide hazard mitigation.

Earthquakes: intensity and magnitude of earthquakes; geographic distribution of earthquake zones; precursors to the earthquakes, seismic waves, travel-time and location of epicenter, nature of destruction; ground subsidence; protection from earthquake hazards; do's and don'ts during earthquake; Tsunamis causes and consequences.

Floods: Causes, nature and frequency of flooding: nature and extent of flood hazard; urban floods, environmental effects of flooding; flood mitigation methods. Tropical cyclone formation and consequences, Coastal erosion, sea level changes and its impact on coastal areas.

Drought: Nature and effect on plant and animal systems. Study of pattern and mitigation of forest fires, Geological and environmental investigations for the construction of dams, bridges, highways and tunnels, Impact of major geotechnical projects on the environment.

Disaster Management: Capability- Vulnerability- risk- preparedness and mitigation- Disaster management cycle; Disaster Risk Reduction and Resilience, Disaster Management Act and policy. Disaster Management case studies.

Text books:

1. Environmental Hazards by Smith, K., Routledge, London,1992.
2. Geological Hazards by Bell, F.G., Routledge, London,1999.

Reference books:

1. Principles of Engineering Geology by Krynine, D.S. and Judd, W.R., CBS, New Delhi, 1998.
2. Natural Hazards by Bryant, E., Cambridge University Press. London, 1985.
3. Landslide Disaster – Assessment and Monitoring Nagarajan, R., Anmol Publications, New Delhi, 2001.
4. Environmental risks and hazards by Cutter, Susan L., Prentice Hall of India, New Delhi.1999.
5. Bill Mc Juire, Ian Mason and C. Killburn (2002) Natural hazards and Environmental change, Oxford University Press, New York.
6. Gupta, Harsh K. (2003) Disaster Management, Universities Press (India) Pvt. Ltd
7. Coppoa, Damon P. (2006) Introduction to International Disaster Management, Butterworth - Heinemann
8. Jha, Madan Kumar (2010) Natural and Anthropogenic Disasters: Vulnerability, Preparedness and Mitigation, Springer.

EMOTIONAL INTELLIGENCE

Course	Emotional Intelligence		
Course Code	18GN40C2	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To make the students understand emotional intelligence and the way to manage it for professional success.	PO7	2

Syllabus

Emotional Intelligence: The Concept, dimensions of emotions; Theories of Multiple intelligences; portance of emotions; emotions and the brain; The Role of Emotions in Organizations; Self-Awareness and Self-Control; Empathy; Social Expertness; Personal Influence.

Emotional Intelligence and Personality: relationship between EQ and IQ; human mind; consequences of low and high EQ; EQ development; Emotional Skills; emotional factors: Emotional Competency, Emotional Maturity, and Emotional Sensitivity.

Levels of EI: Models of Emotional Intelligence; emotional intelligence competencies; emotional intelligence and leadership behavior; emotional intelligence and stress management; art of influencing people.

The Role of Emotional Intelligence in Professional Success: Emotional Intelligence and the Complexity of Work; Emotional Intelligence and High IQ Professions; Emotional Intelligence and Leadership; manage emotional upsets; Emotional 'Winner'.

EQ in the Indian Perspective: EQ and Managerial Effectiveness; the soft art of being a tough leader.

Textbook

1. Dalip Singh - Emotional Intelligence at Work: A Professional Guide – Response Books – 2006.

Reference Books:

1. Daniel Goleman, Emotional Intelligence, Bantam Books, 2006.
2. Moshe Zeidner, Gerald Matthews, and Richard D. Roberts, What We Know About Emotional Intelligence – How It Affects Learning, Work, Relationships, and Our Mental Health, The MIT Press, 2009.
3. James Bradford Terrell and Marcia Hughes, A Coach's Guide to Emotional Intelligence: Strategies for Developing Successful Leaders, Wiley, 2008.
4. Dr. Jeanne Segal, the Language of Emotional Intelligence, McGraw-Hill, 2008.

ENVIRONMENTAL POLLUTION CONTROL METHODS

Course	Environmental pollution control methods		
Course Code	18CE40A2	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes

CO No	Course Outcomes (CO)	PO	BTL
CO1	Understand the concepts of Air pollution	PO7	1
CO2	Understand the concepts of water pollution	PO7	1
CO3	Understand the concepts of Solid waste	PO7	2
CO4	Understand various concepts and methods that can control different types of Air pollution	PO7	2

Syllabus

Air PO/pollution: Sources, Types, and effects and Fate of air pollutants. Meteorological factors and their impacts on pollutants dispersal, Sampling and measurement of air polllutants, Air quality standards, Air pollution control methods for particulates and gaseous pollutants. Emission Control equipment's for particulate and gaseous matter.

Water pollution: Sources, Types and Effects of Water pollutants. Measurement of pollution loads: DO, BOD, COD, TOC - Water quality and Effluent discharge standards. Role of Microorganisms in wastewater treatment. Bacterial population dynamics, growth kinetics, Pre-treatment, primary treatment, secondary and tertiary treatment of wastewater, Low cost treatment unit processes.

Solid waste: Sources and types of Solid wastes – **Disposal methods:** Land filling - Composting - Incineration – Pyrolysis. Reclamation of polluted and degraded soil by Bioremediation, Phyto-remediation, Human acoustics, Sound and its general features, Noise and its measurement - Noise pollution hazards -Control methods.

Text Books:

1. Environmental pollution Control Engineering by C.S.Rao (2006), New Age International (P) Limited Publishers, New Delhi.
2. Environmental Engineering by Howard S. Peavy, Donald R. Rowe and George Tchobanoglous (1985), Mc Graw-Hill International Editions, New York.

Reference Books:

1. Sewage Disposal and Air pollution engineering by S.K. Garg, Khanna publishers, New Delhi, 2010
2. Waste water engineering by M.N Rao and A.K Dutta, Oxford & IBH Publishing Co. Ltd, 2000.
3. Air pollution by M.N Rao and H.V.N Rao, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2000.
4. Environmental Engineering by Davis Cornvel, McGraw Hill Book Co., New York, 2000.
5. Waste Water Engineering by Met Calf &Eddy, McGraw Hill Book Co., New York, 2006.

IMAGE PROCESSING

Course	Image processing		
Course Code	18EC40A9	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Must be aware of basic concepts digital image processing	PO7	1
CO2	Must be aware of Image transformations, image enhancements in different domains	PO7	1
CO3	Must be aware of Image restoration and image segmentation	PO7	2
CO4	Must be aware of Image Comprehension and Representation	PO7	2

Syllabus

Introduction: Origin of Digital Image Processing, Fields that uses Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System**.**

Digital image fundamentals: Elements of Visual perception, Image sampling and Quantization, Basic relationships between Pixels, Linear and Non-linear operations.

Digital image transforms: Image Transforms – The Discrete Fourier Transform, The FFT, Walsh, Hadamard, Discrete Cosine Transform, The Haar Transform, And The Slant Transform,

Image enhancement in spatial domain: Some basic Grey level transformations, histogram processing, enhancement using Arithmetic/Logic operations, Smoothing Spatial Filters, Sharpening Spatial Filters.

Image enhancement in frequency domain: Introduction to Fourier Transform and the Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters.

Image restoration: Noise models, Restoration in the presence of Noise, only Spatial Filtering, Periodic Noise reduction by Frequency Domain Filtering, Linear, position-Invariant Degradations, Inverse Filtering, Wiener Filtering, Least mean square Filtering.

Image compression: Fundamentals – Image Compression models – Error Free Compression, Lossy Compression.

Image segmentation: Detection of discontinuities, Thresholding, Edge based Segmentation and Region based Segmentation.

Image representations and description: Representation schemes, Boundary Descriptors, Regional Descriptors

Text books:

1. Rafael C Gonzalez, Richard E Woods," Digital Image Processing", Second Edition, Pearson Education Asia, 2002. (Chapter 1, 3, 4, 5, 6, 7, 8, 9)
2. Jorg Arndt, " DSP Algorithms for Programmers"(Chapter 3)
3. Gonzalez. R & Woods B.E.," Digital Image Processing", Addison Wesley Longman Pearson Education, 2000.

Reference books

1. MilanSonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson learning, Second Edition, 2001.
2. William J Prati, "Digital Image Processing", John Wiley & sons

3. Tinku Acharya, Ajoy K Ray, "Image Processing Principles and Applications Principles and Applications", Wiley- Inter science.

IPR AND PATENT LAW

course	IPR and patent laws		
Course Code	18BT401A	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To make the students understand the Issues related to IPR	PO7	1
CO2	To make the students understand the functioning of GATT and WTO	PO7	1
CO3	To make the students understand the regulations related to IPR	PO7	2
CO4	To make the students understand the kind of documentation that must be done in relation to patent filing	PO7	2

Syllabus

Intellectual Property Rights, Patents and intellectual property rights (IPR): Definition, History of intellectual property; Types of intellectual property rights, copy rights, trade marks, geographical indication, Industrial design rights, and patents. Sources of patent information, patent application procedures.

Principles, Scope and Functions of GATT & WTO GATT- Historical perspective, objectives and fundamental principles, impact on developing countries. WTO-Objectives, scope, functions, structure, status, membership and withdrawal, dispute settlement, impact on globalization, India-tasks and challenges.

Regulatory Affairs: Indian contest-requirements and guidelines of GMP, understanding of Drugs and cosmetic act 1940 and rules 1945 with reference schedule M,U & Y. Related quality systems-objectives and guidelines of USFDA,WHO & ICH; Introduction to ISO series.

Documentation and Protocols Documentation: Types related to pharmaceuticals industry, protocols, harmonizing formulation development for global fillings, NDA, ANDA, CTD, Dealing with post approval changes-SUPAC, handling and maintenance including electronic documentation.

Case Studies on Patents: Basumati rice, turmeric, Neem, and related medicinal plants and byproducts)

Textbooks:

1. S. H. Willig, Good manufacturing practices for Pharmaceuticals, Informa Healthcare (Oct 2000).

Reference books:

1. Industrial Property Rights: Vol. III-4, Kogan Pate, Kogan Pate, **Kogan Page (May 1998)**.

MECHATRONICS

Course	Mechatronics		
Course Code	18ME40B5	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To be aware of Sensors, transducers and signal conditioning system	PO7	1
CO2	To be aware of Data representation, and actuation systems	PO7	1
CO3	To be aware of system models, system response, and digital logic	PO7	2
CO4	To be aware of the Closed loop control systems	PO7	2

Syllabus

Introduction to mechatronics: Introduction, Elements of Mechatronic system, Applications.
Sensors and transducers: Introduction, Classification of Sensors, selection of sensors. Classification of transducers - strain gauges, displacement transducers, capacitive and inductive transducers, LVDT, oscillation transducer, piezoelectric, potentiometric, velocity transducers, temperature transducers, optical transducers.
Signal conditioning: Introduction, data acquisition –Quantizing theory, Analog to Digital conversion, Digital to Analog conversion.
Data presentation systems: Data presentation elements, Data acquisition systems, systems measurement, Testing and calibration.
Actuation systems: Pneumatic and hydraulic actuation systems, Stepper and Servo Motors
System models: Modeling of one and two degrees of freedom Mechanical, Electrical, fluid and thermal systems. Block diagram representations for these systems.
System response: Introduction, Transfer function, Time response and Frequency response analysis mechanical systems and electrical systems.
Closed loop controllers: Continuous and discrete processes, control modes, Two-step, proportional, Derivative, integral, PID controllers.
Digital logic: Logic gates, Boolean algebra, Karnaugh maps**.**
PLC: Introduction, basic structure, I/P ,O/P processing, programming, ladder diagrams, Timers, Internal relays and counters ,data handling, Analogue Input and Output, selection of a PLC**.**
Design: Mechatronics system Design, possible design solutions.
Text books:

1. W.Bolton,"Mechatronics", Electronic Control Systems in Mechanical and Electrical Engineering" , 3rd Edition, Pearson education,2007.
2. David G. Alciatore, Michael B. HI stand," Introduction to mechatronics and measurement systems", 2nd Edition, McGraw-Hill Professional, 2002.

Reference books:
1. A.K.Sawhney, "A course in Electrical and Electronic Measurement and Instrumentation"- Dhanpat Rai & Sons - 1991.
2. NitaigourPremchandMahalik, "Mechatronics", Tata McGraw-Hill, 2003.
3. *HMT Limited, "Mechatronics", McGraw-Hill Education (India) Pvt. Ltd, 2000.*
4. T.G. Beckwith &N.L.Buck, "Mechanical Measurements", 3rd Edition, Addison-Wesley Pub. Co., 1969.

NANO MATERIALS AND TECHNOLOGY

Course	Nano Materials and technologies		
Course Code	18PH40B7	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To know basic concepts related to Nano materials	PO7	1
CO2	The know the processes involved in synthesizing Nano Particles and Nano films	PO7	1
CO3	To be able to understand characteristics special Nano materials	PO7	2

Syllabus

Introduction: Evolution of science and technology, Introduction to Nanotechnology, Nanotechnology-Definition, Difference between Nanoscience and Nanotechnology, Feynman predictions on Nanotechnology, Moore's law, Bottom up and top down approaches, challenges in Nanotechnology .

Nano materials: History of materials, Nanomaterials-Definition, Classification of Nanostructured materials, causes of interest in nanomaterials, some present and future applications of nanomaterials, Bio-Medical Applications-Drugs, Drug Delivery, Photodynamic therapy, Molecular motors, Neuro-Electronic Interfaces, Protein Engineering, Nano luminescent tags.

Synthesis and processing of nanoparticles, thin films: Nanoparticles: Processes for producing ultrafine powders-mechanical milling, wet chemical synthesis, gas condensation process, chemical vapor condensation, laser ablation. Thin Films: Synthesis techniques- Physical Vapor Deposition: Evaporation, Molecular beam epitaxy, sputtering. Comparison of evaporation and sputtering.

Special nanomaterials, characterization and tools: Carbon nanotubes, nano composites, carbon fullerenes-An overview over preparation, properties, applications. Electron Microscopy Techniques: Scanning Electron Microscopy, Transmission Electron Microscopy, Scanning Tunneling Microscopy, Atomic Force Microscopy, Scanning Probe Microscopy– X ray Diffraction. MEMS: – Introduction, types of MEMS:- Mechanical, Thermal, Magnetic MEMS; Fabrication of MEMS.

Text books

1. Nano structures & Nano materials by Guozhongcao, Imperial college press.
2. Micro manufacturing and Nano Technology by N. P. Mahalik.

Reference books

1. Nano Technology by Mark Ratner &Danier Ratner, Prentice Hall
2. Nano materials by A S Edelstein& R C Cammarata, Institute of physics publishing, Bristol and Philadelphia.

OPERATIONS RESEARCH

Course	Operations research		
Course Code	18ME40B6	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To be aware of fundamental concepts related to operation research	PO7	1
CO2	Must be aware of the techniques used in the field of operations research that include Linear programming, transportations	PO7	1
CO3	Must be aware of the techniques used in the field of operations research that include Game theory, inventory control	PO7	2
CO4	Must be aware of the techniques used in the field of operations research that include Dynamic programming and inventory control	PO7	2

Syllabus

Introduction to Operation Research: Introduction, Modelling in Operations Research, Phases of OR study, Scope and application of OR.

Linear Programming and its Applications: Linear Programming Problem – Graphical solution of LP Problem. Simplex method, Big M method, two phase method, multiple solution, infeasible solution, unbounded solution, degeneracy, Dual Simplex method.

Transportation: Introduction – Methods of basic feasible solution, Optimality test, Degeneracy in transportation problem, unbalanced transportation Problem, Assignment Problems: Hungarian method for assignment problem, Traveling salesman problem.

Theory of Games: Introduction, to solve the rectangular two person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, solution of a two person zero sum 2Xn game, Graphical method for 2Xn and nX2 games.

Inventory Control: Introduction – EOQ with uniform rate of demand, Economic lot size with finite rate of replenishment, Quantity discounts, Deterministic model with Shortages, ABC analysis of inventory.

Dynamic Programming: Introduction, Bellman's principle of optimality, application to shortest route problem, linear programming, tabular method. Queuing Theory: Introduction, single channel, poison arrival, exponential service time with finite population and infinite population, Simulation: Introduction, Monte-Carlo Simulation, and Application to Inventory Control. Project Management by

PERT/CPM: Introduction, simple network techniques, construction rules of drawing, Fulkerson's rule, Critical path method (CPM)- floats, critical path, project duration, PERT: Introduction, different Time estimates, expected time, variance, expected project duration and probability of completion. Crashing: Introduction, crashing of network, problem

Text Books

1. Operations Research - Hamdy Taha
2. Operations Research – Hiller &Liberman.

Reference Books

1. Quantitative Techniques – A.P. Natarajan
2. Operations Research – S.D. Sarma

PHOTOGRAPHY

Course	Photography		
Course Code	18BM40C1	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To be able to take static pictures in high resolution	PO7	1
CO2	To be able to take pictures while in motion	PO7	2

Syllabus

History of Photography, Cameras, Film Speed – Shutter Speed – Aperture – Figuring Focus – Depth Definitions, Camera: Types, Structure & Features. Specialized of Field – Exposure Types of Lenses – Normal lens, Wide angle, Telephoto, Fish eye & Close up lenses, Macro and Zoom Lens, Focal Length - Angle of View.

Photographic equipment and types of photography, Digital and film photography, Digital images and their characteristics, Pixels and resolutions, Digital Camera and their types, Storage and memory issues of digital images, Scanners and their applications.

Basic Lightings: Outdoor Lightings, Indoor portrait Lighting - Flashbulbs – Electronic Flash units – Flash Techniques, B/W & Colour Filters – Filter Factor Composing Effective Photographs: Picture Purpose, Centre of Interest , Rule of Third, Backgrounds, Angles, Framing, Varying Format, Focus for Effect – Good Timing – Colour Consideration – Imagination, Photography under Special Conditions.

Different types of photography, Introduction to Digital Photography & Its Fundamentals. Digital Image Sensor, Resolution, Storage Medium, File Formats – Digital Printing Technology.

References:

1. Tom Grimm, The Basic book of Photography, New York, Plume, 1979
2. George Haines, learning photography, Hamlyn Publishing Group, London 1992
3. Michael Langford , Basic photography , focus press London 1986
4. JhonHedgeco, New Book of photography , Dorling Kindersley book Lonon1994
5. Leslie D Stroebel, and Richard D Zakia, Basic photography materials and process-
6. John Hedgecoe, The Photography's Handbook,-1992
7. Chris George, Mastering Digital Flash Photography-2008.

REMOTE SENSING AND GIS

Course	Remote Sensing and GIS		
Course Code	18CE40A4	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To be aware of the meaning concepts related to remote sensing	PO7	1
CO2	To be aware of GIS models, Types of data that can be captured through GIS	PO7	1
CO3	To be aware of the way different types of data are captured through GIS system	PO7	2
CO4	To be aware of the way the LAND is recognized for positioning GIS systems and capturing data	PO7	2

Syllabus

Remote sensing: basic definition and process, Passive and active remote sensing, Electromagnetic Spectrum, Resolution, Characteristics of Various sensors and satellites, Fundamentals of Image Processing. Map as a model, spatial elements and terminology, Map scale, Spatial referencing system, Computers in map production, General software's in map production.

Types of data products: Image interpretation strategy, Levels of interpretation keys; Topography, Types of Drainage Pattern and Texture, Erosion, Basic elements of image interpretation, Overview on visual image interpretation equipment, brief history of GIS, GIS architecture, Components of a GIS, GIS workflow,

Theoretical models of GIS: Functional elements, Fundamental operations, Theoretical framework, GIS categories, Levels/scales of measurement.

The data stream, Data input methods: Keyboard entry, manual digitizing, Scanning and automatic digitizing. Stages of GIS data modelling: Raster and Vector data representation, spatial data models, Data editing, Detecting and correcting errors, Data reduction and generalization Edge matching and Rubber sheeting, components of data quality, Sources of error in GIS.

Land use /Land cover studies: slope mapping, preparation of structures map, Ground water prospects mapping, Watershed management and Action plan, Water quality modeling, Salt Water intrusion models, pipeline alignment studies, Solid and hazardous waste disposal site selection, Landslides mapping, urban planning and Management, GPS applications.

Text books:

1. Remote Sensing and Image Interpretation- 5th Edition by Lillesand, Kiefer and Chipman, Published byJohn Wiley and Sons, Inc, New York, 2007**2.**
2. Text book of remote sensing and GIS – 3rd Editions by M. Anji Reddy, BS Publications, Hyderabad, 2010.

Reference Books:

1. Geo informatics for Environmental management" by M. Anji Reddy, B.S Publications, Hyderabad

2. Remote Sensing and GIS- by B. Bhatia Published by Oxford University Press, 2009

RENEWABLE ENERGY SOURCES

Course	Renewable Energy Resources		
Course Code	18EE40B3	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To be able to understand the fundamental concepts related Renewable energy	PO7	1

Syllabus

Extra-terrestrial solar radiation, terrestrial solar radiation, solar thermal conversion, flat plate and concentrated solar thermal collectors, solar ponds, solar heating/cooling technique, solar distillation, photovoltaic energy conversion, solar cells – 4 models.

Planetary and local winds, vertical axis and horizontal axis wind mills, principles of wind power, maximum power, actual power, wind turbine operation, yaw control, pitch control and stall control mechanisms, derivation of power coefficient.

Ocean temperature differences, principles of OTEC plant operations, wave energy, devices for energy extraction, tides, simple single pool tidal system.

Origin and types, Bio fuels, classification, direct combustion for heat and electricity generator, anaerobic digestion for biogas, biogas digester, power generation.

Biomass energy conversion technologies, Biogas generation, classification of biogas plants, Micro hydroelectric systems, and different types of turbines.

Text books

1. Godfrey Boyle "Renewable Energy", Oxford Publications, Second edition.
2. G. D. Rai, "Non-Conventional Energy Sources", Khanna Publishers, First edition.

Reference books

1. Roger H.Charlier, Charles W. "Ocean Energy- Tide and Tidal power"ISBN: Library of Congress Control Number: 2008929624_c Springer-Verlag Brerlin Heidelberg 2009.
2. John Twidell& Toney Weir: E & F.N. SPOn, "Renewable Energy Sources", Taylor & Francis New York, 2nd edition.
3. John F.Walker&N. Jenkins, "Wind Energy Technology", John Willey and Sons Chichester, U.K – 1997

ROBOTICS

Course	Robotics		
Course Code	18ME40B4	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To be aware of effectors, sensory devices	PO7	1
CO2	To be aware of different types of sensors that are used within robotic systems	PO7	1
CO3	To be aware of the concepts related to transformations and kinematics	PO7	2
CO4	To be able to understand the way different robotic application are built	PO7	2

Syllabus

Introduction to Robotics: Major components of a Robot, Robotic like devices, Classification of Robots – Classification by coordinate system and by control method, Specifications of Robots, Fixed versus flexible automation, economic analysis.

Robot end effectors: Introduction, End effectors, interfacing, types of End effectors, grippers and tools, considerations in the selection and design of remote cantered devices.

Robotic sensory devices: Objective, Non-Optical position sensors – potentiometers, Synchro, inductosyn, optical position sensors – opto interrupters, Optical encoders (absolute & incremental).

Proximity sensors: Contact type, non-contact type – reflected light scanning laser sensors.

Touch & slip sensors: Touch sensors – proximity Rod & Photodetector sensors, Slip sensors – Forced oscillation slip sensor, interrupted type slip sensors, force and torque sensors.

Transformations and kinematics: Objectives, homogeneous coordinates, basic transformation operations, forward solution – Denavit Hardenberg procedure, Simple problems involving planar manipulators, inverse or backward solution – problems involved techniques. Introduction to Trajectory Planning, the manipulator jacobian.

Robot applications: Industrial Applications – Material Transfer, material handling, Loading and unloading, processing, spot and continuous arc welding, spray painting, grinding, Assembly and Inspection and Non-Industrial Applications.

Robot languages: Introduction, AL, AML, VAL, RAIL

Text books

1. Robotic engineering by Richard D. Klafter, Prentice Hall India
2. Industrial robotics by MikellP. Groover, Mcgraw Hill Publications

Reference books

1. Robotics – K.S. Fu, Gonzalez & Lee, Mcgraw Hill Publications
2. Robotics For Engineers by YoramKkoren, Mcgraw Hill Publications
3. Introduction to Robot Technology, - P.Coiffet and M.Chairenze / Kogam Page Ltd. 1983 London.

SELF DEVELOPMENT

Course	Self-Development			
Course Code	18GN40C1	L-T-P-S	3-0-0-0	
Pre-Requisites	Nil	Credits	3	

Course outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	To be aware Yoga and be able to practice yoga	PO7	1
CO2	To be aware of the way mediation can be done	PO7	2

Syllabus

Orientation, Discussion on Values: Understanding Values, Behaviour and Attitudes, Application of Values and Universal Values,
Philosophy of Yoga: God, Self and Ultimate goal of yoga, Brief Introduction to various types of yoga and Integration of values in Yoga,
Study of major Religions: Identify commonality, condition of its origin or intention vs. current state,
Art of Meditation: Observation, Introspection, Contemplation, Meditation and Concentration, Schools of Meditation,
Systematic Practice of Meditation: Theories of life Need for Meditation, Natural Path, Integration
Personal Responsibility:Stress Management, Tips for Self-Management, Choices we make, Excellence.

Text book

1. Self-development modules from Healthfulness Institute (www.heartfulness.org)

Reference book

1. Complete works of Swami Vivekananda
2. Jonathan –Livingston - Seagull
3. The Monk Who Sold His Ferrari Robin S. Sharma
4. You can win by shiv khera
5. Many lives Many Masters
6. The road less travelled – Scott Peck
7. As a man thinketh
1. Journey of the Soul
2. The Bhagavad-Gita
3. King James version of the Holy Bible
4. Holy-Quran

SOLID AND HAZARD MANAGEMENT

Course	Solid and Hazardous waste Management		
Course Code	18CE40A3	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Syllabus

Solid wastes: Sources, Types, reasons for increase in generation, composition and properties of solid waste, Collection and on-site handling, Separation and processing. Solid waste disposal methods, Land filling, methods of land filling, Design of Landfills, gas production, Leachate and its control.

Conversion and recovery: Incineration, Pyrolysis, Composting methods, merits and demerits, Energy recovery, Bio machination, use of refuse derived fuels (RDF).

Hazardous Waste: Definition, Sources, Classification, Hazardous wastes rules, and nuclear waste, biomedical wastes, Chemical wastes, disposal methods, Waste minimization, Treatment methods, Physio-chemical processes, Biological methods, Stabilization and Solidification, Thermal methods, Disposal methods Land disposal, Remedial technologies.

Text books

1. Solid waste Engineering by P. AarneVesilind , William Worrell & Debra Reinhart, Cengage Learning India Pvt. Ltd, New Delhi
2. Environmental POllution control Engineering by C. S. Rao; New age International Publishers, New Delhi.

Reference books

1. Venkatappa Rao. G and Sasidhar. R. S. (2009), Solid waste management and Engineered Landfills, Sai Master Geo environmental Services Pvt. Ltd, Hyderabad
2. World Health Organization, *Global Water Supply and Sanitation Assessment 2000* (Geneva2000).
3. Environment and POllution Laws: Universal, Universal Law Publishing Co. Pvt.Ltd, Ed 2011.
4. Solid and hazardous waste management by M. N. Rao and Razia Sultana, BS Publications, Hyderabad.

MANAGEMENT ELECTIVES

Course	Paradigms In Management Thought		
Course Code	18MB4051	**L-T-P-S**	**3-0-0-0**
Pre-Requisites	**Nil**	**Credits**	**3**

Course Outcomes: Upon successful completion of the course, a student will be able to:

S.No	Course Outcome(CO)	PO/PSO	BTL
CO1	Understand the basic management concepts along with an insight into levels of management.	PO9	2
CO2	Understand the key contributions of classical approach to Management	PO12	2
CO3	Understand and apply Quantitative methods to improve Management performance.	PO9	2
CO4	Understand the key contributions ofBehavioural and contemporary approaches to Management.	PO9,PO12	2

SYLLABUS:

Management Introduction - Early management thought - Management Concept – Nature - Management as art, science, profession - Scope and functions of Management - Levels of Management - Importance of management.

Classical Approach to Management: (a) Scientific Management- The advent of Scientific Management – Frederick W Taylor's contributions, - Contribution by Henry L Gantt - Contribution by Frank, Lillian Gilberth.

General Administrative Approach: Henry Fayol's contributions towards general management – Max Weber's Bureaucracy Approach.

Quantitative Approach: Important contributions – TQM – implications in today's management – Six sigma.

Behavioral Approach: Organizational Behaviour – Contributions of Elton Mayo's – .Hawthorne studies – contributions of Mary Parker Follett – Chester Bernard.

Contemporary Approach: Systems Theory – Contingency Theory – Chao's Theory -Peter F Drucker Contributions – C K Prahlad's Contribution – Porter's theory – Worker Management – Employee Engagement – People Capability Maturity Model.

Recommended Text Book(s):

1. Management by Stephen P Robbins, Mary Coulter, Neeharika Vohra – Pearson – 10th edition
Reference Books:

1. Management by Stoner, Freeman, Gilbert – PHI – 7th edition.
2. Management A Global & Entrepreneurial Perspective – Weihrich, Cannice, Koontz – Mc Graw Hill – 13th Edition.
3. The evolution of management thought by Daniel A Wren, Arther G Bedeian : john wiley& sons

INDIAN ECONOMY

Course	Indian Economy		
Course Code	18MB4052	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes: Upon successful completion of the course, a student will be able to:

S.No	Course Outcome(CO)	PO/PSO	BTL
CO1	Understand the structure of Indian Economy	PO7	2
CO2	Understand the structural problems encountered by India	PO7	2
CO3	Develop a perspective approaches to economicplanning and development in India	PO7	3
CO4	Understand the role of the Indian Economy in the global context	PO7,PO12	2

SYLLABUS:

Economy: Meaning, types, problems and functions – Features of Indian Economy: Circular flow of economic activity: two sector, three sector and four sector models. Sectoral distribution of the economy. Nature and features of Indian Economy; Sectoral contribution of National Income-Share of Public and Private Sectors in GDP.

Agricultural Sector of India: importance and general problems; Land Reforms, Agricultural marketing problems and remedies. Industrial Sector of India: Types, Importance and general problems: Small Scale Sector: Importance and general problems.

Tertiary Sector in India- Importance – Infrastructure Development – Transport – Roadways, Railways – Banking and Insurance –Communication – Science and Technology – Software. Personal Income distribution and causes of inequality - Unemployment causes and remedial measures; Poverty in India- Poverty Line – antipoverty programs. Human development: concept and measurement - Human Development Index.

Economic Planning in India: Role of Planning Commission - Over all Objectives and achievements of various Five Year Plans. 12th Five Year Plan; Economic Liberalisation: LPG strategy-General Agreement on Tariffs and Trade (GATT) - Objectives of GATT and Evolution of WTO – WTO and the Indian Economy, NABARD and World Bank.

Recommended Text Book(s):

1. G.Dutt and K.P.M.Sundaram: Indian Economy (2011), S.Chand&Co., New Delhi.
2. S.K.Mishra and V.K.Puri: Indian Economy, 30th ed., Himalaya Publishing House, New Delhi.
3. M.L.Jingan: Macro Economics, 6th ed., Konark Publishing House.

Reference Books:

1. P.K.Dhar, Indian Economy-Its growing dimension, Kalyani Publishers.
2. Alok Ghosh, Indian Economy, Its Nature and Problem, World Press.
3. A.N.Agarawal, Indian Economy- Problems of Development and Planning, New Age

MANAGING PERSONAL FINANCES

Course	Management Personal Finances		
Course Code	18MB4053	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes: Upon successful completion of the course, a student will be able to:

S.No	Course Outcome(CO)	PO/PSO	BTL
CO1	Understand the need for effective financial planning	PO12	2
CO2	Analyze the basic concepts of money management, tax planning, consumer credit, housing and other consumer decisions, insurance, investments, retirement planning etc.	PO12	4
CO3	Evaluate various financial tax saving schemes to save money to get tax benefits.	PO12	5
CO4	Design savings and investment plans.	PO12	3

Syllabus

Financial planning process: Introduction-Importance of Financial Planning- Process of financial planning -The planning environment-Determinants of personal income- Financial statements and plans-Concept of Time value of money - Preparing a personal balance sheet - Preparing the income and expense statement-Using personal financial statements - Ratio Analysis.

Managing Taxes: Introduction-Importance of tax planning-Basic concepts of income tax - Personal taxation - Income tax benefits on certain long term investments -Tax planning-Ethical consideration in tax planning.

Making decisions regarding houses and automobiles:- Meeting housing needs-The rental option - The home buying process - Financing the housing transaction - Housing finance institutions in India - Housing schemes in India- Automobile purchase planning.

Planning for Investments:- Types of investment vehicles-Factors considered in the choice of investments- Developing the investment strategy-Investing in Equities- Investment Process- Investing in Fixed Income Securities- Bond Market-Bond Investing Strategies-Types of Bonds-Bond Returns- Risks from Investing in Bonds

Insurance & Mutual Funds:-Insurance planning - Buying a life insurance - Life insurance products in India-Health Insurance-Need-Types and Sources of health care plans-Providers of Health care-Long term care insurance-Disability income insurance-Health Insurance in India; Mutual funds – Types of mutual fund products – Objectives of investing in Mutual funds.

Recommended Text Book(s):

1. Jack R Kapoor, "Personal Finance" Mc Graw Hill Publications, New Delhi, 2008.
2. KC Mishra and Steward Doss, "Basics of Personal Financial Planning" Cengage Learning, First Edition 2009.

Reference books:

1. Joehnk, Billingsley and Gitman "Planning Your Personal Finances" Cengage Learning India Private Limited, Delhi, 2012.
2. Mark Hirschey and John Nofsinger "Investments Analysis" and Behavior" Mc Graw Hill Publications, New Delhi, 2008.

BASICS OF MARKETING FOR ENGINEERS

Course	Basics of Marketing for Engineers		
Course Code	18MB4054	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes: Upon successful completion of the course, a student will be able to:

S.No	Course Outcome(CO)	PO/PSO	BTL
CO1	Understand the basic concepts of marketing management	PO12	2
CO2	Analyze the markets and consumers, the changing environmental factors with special focus on technology products	PO12	4
CO3	Understand the basics of marketing mix	PO12	2
CO4	Create an appropriate strategy for the marketing of high tech products and services	PO12	6

Syllabus:
Introduction and Nature of Marketing: Evolution of Marketing Concept - Core concepts of marketing - Scope and Importance of Marketing. -Difference between Selling and Marketing - Marketing Myopia - Consumer Marketing Vs. Industrial Marketing.
Understanding Consumer Behaviour: nature, scope and importance of consumer behavior – Factors influencing Consumer Behavior - Buying decision making process - Market Segmentation, Targeting and Positioning (STP).
Marketing mix - Product definition, levels of product, product classification, difference between goods and services, Product Life Cycle, New Product Development – Technology and Product Management - Concept of Pricing – Factors influencing the pricing policy – Pricing strategies - Pricing Considerations in High-Tech Markets.
Promotion mix - Marketing Communication Tools for High-Tech Markets - Channels of distribution - Supply Chain Management in High-Tech Markets - Technology Marketing, Green Marketing, Introduction to market study.
Text Books:
 1. Philip Kotler and Gary Armstrong- Principles of Marketing- 17/e, Pearson Education.
 2. Jakki J Mohr, Sanjit Sengupta and Stanley Slater, Marketing of High-Technology Products and Innovations, 3/e Pearson India
Reference Books:
1. V.S. Ramaswamy and S.Namakumari – Marketing Management, 4/e, Mc Millan Publications, New Delhi.
2. RajanSaxena, Marketing Management- 3/e, TMH, New Delhi.

ORGANIZATION MANAGEMENT

Course	organization management		
Course Code	18MB4055	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes: Upon successful completion of the course, a student will be able to:

S.No	Course Outcome(CO)	PO/PSO
CO1	Understand the theories and approaches of organizational management	PO9
CO2	Understand the basics of organization structure	PO9
CO3	Understand the methods for motivating in competitive business environment.	PO9
CO4	Understand the basic modes of maintaining good industrial relations	PO9

Syllabus:

Development of Management thought – Introduction, Various theories; Functional approach, scientific management approach, human relations approach, latest management thoughts, organisation theory-classical organisation, neo-classical organisation theory, modern organisation theory.

Organization Structure--Principles of organisation, organizational theories, departmentalism, authority, power, organizing, organizational effectiveness, structuring the organisation, organizational change, organisation charts; types of organisations—line , functional and line and staff relations, Organisational manuals.

Motivation, Morale and behavioral science—Motivation: Characteristics, importance, Kinds of motivation. Thoughts of motivational philosophy: Gouglass Mc Gregore—X and Y theory; Herzberg's theory. Human needs, Incentive as motivators, Managing dissatisfaction and frustration. Morale, Absenteeism, Behavioral science, Group dynamics, Group behavior. Leadership—Meaning, importance, styles, theories, leaders Vs managers.

Management concept—Management, Administration, Organisation, Difference and Relationship between Management, Administration and Organisation, Importance of Management, Characteristics of management, Managerial Skills, Managerial Objectives, Harmonization of Objectives, Hirechy of Objectives.

Industrial Relations, Trade Union And Collective Bargaining—Industrial relations, Industrial Psychology, Industrial disputes, Conflict management, Views about conflict, Labor Policy. Workers grievances, Suggestion system. Trade Unions. Collective Bargainning, Negotiations, Industrial Safety—working conditions, Accidents, Preventive measures, Safety training.

TEXT BOOKS

1. Stephen P. Robins, Organizational behavior, PHI / Pearson education, 11^t edition , 2008.
2. Koontz &Wehrich., Essentials of Management, 12th edition, Tata Mc Grawhill, 2007.

REFERENCES

1. Banga&Sarma , Industrial Engineering Management including Productionmanagement, 11th edition, 2010.
2. O.P. Khanna , Industrial engineering management, Khanna publications, 2006.

RESOURCE, SAFETY AND QUALITY MANAGEMENT

Course	Resource, Safety And Quality Management		
Course Code	18MB4056	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course outcome: The students will be able to

CO No:	Course out come(CO)	PO	BTL
1	Understand the basics systems of man power and materials management	5	2
2	Understand the basics systems of machinery management	5	2
3	Understand the basics systems of safety management	6	2
4	Understand the basics systems of quality management	5	2

Syllabus

Resource Management (Man Power, Materials & Machinery): Introduction; Resource smoothing; Resource Leveling, Establishing workers productivity; Objectives of material management;Functions of material management department; ABC classification of materials; Inventory of materials; Material procurement; Storage management;Classification of construction equipment; Earth moving equipment; Excavation equipment; Hauling equipment; Earth compaction equipment; Hoisting equipment; Concrete plant and equipment; Time and motion study; Selection of equipment – Task consideration, cost consideration; Factors affecting the selection; Factors affecting cost owning and operating the equipment; Equipment maintenance.

Safety and Quality Management:

Accident prevention program; Immediate attention in case of accident; Approaches to improve safety in construction; Safety benefits to employees, employees and customers; Prevention of fire in construction industries; Fault tree analysis; Safety information system; Safety budgeting;

Importance of quality; Elements of quality; Organization for quality control; Quality assurance techniques; Documentation; Quality control circles; Total quality management; ISO 9000 – 2008.

TEXT BOOKS:

1. Construction Engineering and Management by S.Seetharaman; Umesh Publications, NaiSarakl, Delhi.
2. Fundamentals of PERT/CPM and Project Management by S.K.Bhattacharjee; Khanna Publishers, NaiSarak; Delhi.

REFERENCE BOOKS:

1. Construction Management and Planning by B.Sengupta and H.Guha; Tata Mc.Graw-Hill Publishing Co. Ltd., New Delhi.
2. Construction Planning, Equipment and Methods by Peurifoy R.L; MC Graw-Hill International Book Company.

Course	Economics for Engineers		
Course Code	18MB4057	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

Course Outcomes: Upon successful completion of the course, a student will be able to:

S.No	Course Outcome(CO)	PO/PSO	BTL
CO1	Understand basic concepts of engineering economics	PO5, PO12	2
CO2	Apply the methods of value engineering	PO5,PO12	3
CO3	Apply the methods of cash flow	PO5,PO12	3
CO4	Analyze the methods of depreciation	PO5,PO12	4

Syllabus

Introduction to Engineering Economics: Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis, Elementary economic Analysis
Unit II: Value Engineering: Make or buy decision, Value engineering – Function, aims, value engineering procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor- Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods.

Unit III: Cash Flow: Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method, Examples in all the method

Unit IV: Replacement and Maintenance Analysis: Introduction-Types of maintenance –types of replacement Problem-Determination of economic life of an asset-Replacement of existing asset with a new asset.Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation-Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity method of depreciation, service output method of depreciation-Evaluation of public alternatives-introduction.

Text Books:

1. Dr. K K Patra, DhirajBhattacharjee, Engineering Economics and Costing, S. Chand & Company Ltd, New Delhi, 2013.
2. PanneerSelvam, R., *Engineering Economics*, Prentice Hall of India Ltd, New Delhi, 2001.

Reference Books:

1. Chan S.Park, *Contemporary Engineering Economics*, Prentice Hall of India, 2002. Donald.G. Newman, Jerome.P.Lavelle, *Engineering Economics and analysis*Engg. Press, Texas, 2002.
2. Degarmo, E.P., Sullivan, W.G and Canada, J.R, *Engineering Economy*, Macmillan, New York, 1984.
3. William G. Sullivan, Elin M Wicks, and James Luxhoj, Engineering Economy, 13th edition (Prentice-Hall)

Course	HINDI		
Course Code	18FC3056	L-T-P-S	3-0-0-0
Pre-Requisites	Nil	Credits	3

SYLLABUS:

Hindi Vakya ka Nirman :SaamanyaVyakaran, Sagna/ Sarvanam/ Vakya/ Kriya/ Vachya/ Ling/Vachan/ Karak/Ankh,Kaal/Kriyavisheshan/Visheshan/Bolchalki bhasha/ApatithGadya, Patyapustak se PaanchKahaniya– Mukthidhan/Goodhad Sai/Mai HaarGayi/BhookhHadthal/ Usne Kaha Tha, Hindi Bhasha kiUdhbhavaur Hindi kiboliyaan, Hindi Sahitya ka Itihas – Char Kaal.

REFERENCE BOOKS:

1. Adhunik Hindi VyakaranTatha Rachna
2. Hindi Text For Second Year, Janata Prachuranalu (Publ.)
3. Hindi Sahitya ka Itihas by Acharya Ramachandra Shukla

Gadya Sandesh, Hindi Textbook for B.A., Lorven Publications

AUTOMATA AND FORMAL LANGUAGES

Course	Automata and Formal Languages		
Course Code	18EM7001	L-T-P-S	3-1-0-0
Pre-Requisites	NIL	Credits	4

Course Outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	Knowledge and understanding of the concepts related to automata	PO5,PSO2	3
CO2	Ability of the students to resolve regular expressions through automata	PO5,PSO2	3
CO3	Ability of the students to resolve context free expressions through push down automata	PO5,PSO2	3
CO4	Knowledge and understanding of the Turing machines and the concept of decidability	PO5,PSO2	3

Syllabus
Automata – The Methods & Madness: Finite Automata, an Informal Picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata, Finite Automata with Epsilon Transitions.
Regular Expressions and Languages: Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions.
Properties of Regular Languages: Proving Languages not to be Regular, Closure Properties of Regular Languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.
Context-Free Grammars and Languages: Context-Free Grammars, Parse Trees, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.
Pushdown Automata: Definition of the Pushdown Automaton, The Language of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.
Properties of Context-Free Languages: Normal Forms for Context-Free Grammars, the Pumping Lemma for Context-Free Languages, Closure Properties of Context-Free Languages, Decision Properties of CFL's.
Turing Machines: Introduction to Turing Machines, Problems that Computer Cannot solves, The Turing Machines, Programming Techniques for Turing Machines, Extensions to the Basic Turing Machine, Restricted Turing Machines.
Undecidability: A Language that is not Recursively Enumerable, An Undecidable Problem that is RE, Undecidability problems about Turing Machines
Text Books:

1. John.E.Hopcroft, R.Motwani, & Jeffery. D Ullman, "Introduction to Automata Theory, Languages and Computations", Third Edition, Pearson Education,(2008).
2. Harry R. Lewis, Christos H Papadimitriou: "Elements of the theory of computation", 2nd Edition, PHI/Pearson Education, (1997).

Reference Books
1. Michel Sipser, "Theory of Computation", 1st Edition, Cengage Publications, (2008)
2. Elaine Rich, "Automata Computability and Complexity: Theory and Applications", 1st Edition, Pearson Publications,(2012)
3. Peter Linz, "An Introduction to Formal Languages and Automata", 3rd Edition, Narosa Publishers, (1998).

COMPILER DESIGN

Course	Compiler Design		
Course Code	18EM7002	L-T-P-S	3-1-0-0
Pre-Requisites	NIL	Credits	4

Course Outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	Knowledge and understanding of the basic concepts related to compilers	PO5,PSO2	3
CO2	Knowledge and understanding of the way lexical analysis is carried	PO5,PSO2	3
CO3	Knowledge and understanding of the way syntax analysis is carried	PO5,PSO2	3
CO4	Knowledge and understanding of way run-time management is done for creating the program image in memory for execution	PO5,PSO2	3

Syllabus

Introduction to Compilers: Translators-Compilation, Interpretation-Language processors, the Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools - Programming Language basics.

Lexical Analysis: Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analysers-LEX-Design of Lexical Analyzer for a sample Language.

Syntax Analysis: Need and Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language

Syntax directed translation & run time environment: syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions- Design of predictive translator - Type Systems-Specification of a simple type checker Equivalence of Type Expressions-Type Conversions.

Run-Time Environment: Source Language Issues-Storage Organization-Storage Allocation Parameter Passing-Symbol Tables-Dynamic Storage Allocation- CODE OPTIMIZATION AND CODE GENERATION Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis.

Text Book

1. Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers – Principles, Techniques and Tools", 2 nd Edition, Pearson Education, 2007.

References

1. Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence-based Approach", Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, "Advanced Compiler Design and Implementation, "Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004.

4. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008

DATA MINING

Course	Data Mining		
Course Code	18EM7003	L-T-P-S	3-1-0-0
Pre-Requisites	NIL	Credits	4

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Knowledge and understanding related to data pre-processing methods	PO5,PSO2	3
CO2	Ability to carry Pattern mining	PO5,PSO2	3
CO3	Ability to carry Classification mining	PO5,PSO2	3
CO4	Ability to carry Cluster Mining	PO5,PSO2	3

Syllabus

Data Mining Functionalities: Pattern mining, Data Pre-processing, Data Warehousing and On-Line Analytical Processing, Data Cube Technology,Mining Frequent Patterns, Associations and Correlations: Concepts andMethods, Advanced Frequent Pattern Mining, Classification: Basic Concepts, Advanced Methods, Cluster Analysis: Basic Concepts and Methods, Advanced Cluster Analysis, Outlier Analysis, Trends and Research Frontiers in Data Mining

Text Books

1. Jiawei Han and M Kamber, "Data Mining Concepts and techniques", Third Edition, Elsevier Publications, (2011).

Reference Books

1. Ian Written, Eibe frank, Mark. A. Hall, "Data Mining: Practical machine learning tools and techniques", 3rd edition, Elsevier,(2011).
2. Daniel T .Larose," Data mining methods and models" , Wiley , (2006).

DISTRIBUTED SYSTEMS

Course	Distributed Systems		
Course Code	18EM7004	L-T-P-S	3-1-0-0
Pre-Requisites	NIL	Credits	4

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Knowledge and understand of the concepts related to distributed systems	PO5,PSO2	3
CO2	Ability to develop and Implement inter-process communication	PO5,PSO2	3
CO3	Ability to develop and Implement remote process invocation	PO5,PSO2	3
CO4	Ability to develop and Implement naming services through DNS	PO5,PSO2	3

Syllabus

Characterization of Distributed Systems: Introduction, Examples, Resource Sharing and the Web-Challenges, System Models, Architectural, Fundamental, Inter-process Communication: Introduction, API for Internet protocols, External data representation and marshalling, Client-server communication, Group communication, distributed Objects, Remote Invocation: Introduction, Communication between distributed objects, Remote procedure calls, Events and notifications, Distributed File Systems: Introduction, File service architecture

Name Services-Introduction: Name Services and the Domain Name System, Directory Services, Time and Global States: Introduction, Clocks, events and process states: Synchronizing physical clocks-Logical time and logical clocks-Global states, Distributed debugging, Coordination and Agreement: Introduction, Distributed mutual exclusion, Elections, Multicast communication, Consensus and related problems.

Text book

1. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2005.

References

1. A.S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms",Second Edition, Prentice Hall, 2006.
2. M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.

OBJECT ORIENTED ANALYSIS AND DESIGN

Course	Object oriented Analysis and Design		
Course Code	18EM7005	L-T-P-S	3-1-0-0
Pre-Requisites	NIL	Credits	4

Course Outcomes

CO No	Course Outcomes (CO)	PO/PSO	BTL
CO1	Knowledge and understanding related to OOAD artefacts	PO5,PSO2	3
CO2	Ability to Carry requirements analysis using OOAD	PO5,PSO2	3
CO3	Ability to Design using OOAD	PO5,PSO2	3
CO4	Ability to carry development and Deployment using OOAD	PO5,PSO2	3

Syllabus

Introduction to OOAD: Unified Process, UML diagrams, Use Cases, Class Diagrams, Interaction Diagrams, State Diagrams, Activity Diagrams, Package, component and Deployment Diagrams.

Design patterns: Designing objects with responsibilities, Creator, Information expert, Low Coupling, High Cohesion, Controller, Design Patterns, creational, factory method, structural, Bridge, Adapter, behavioural – Strategy – observer.

Case studies: The Next Gen POS system, Inception, Use case Modelling, Relating Use cases, include, extend and generalization, Elaboration, Domain Models, Finding conceptual classes and description classes, Associations, Attributes, Domain model refinement, Finding conceptual class Hierarchies, Aggregation and Composition.

Applying Design patterns: System sequence diagrams, Relationship between sequence diagrams and use cases Logical architecture and UML package diagram, Logical architecture refinement, UML class diagrams, UML interaction diagrams, Applying GoF design patterns.

Coding and testing: Mapping design to code, Testing: Issues in OO Testing, Class Testing, OO Integration Testing, GUI Testing, OO System Testing.

Text book

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.

References

1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.
2. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley, 1995.
3. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third edition, Addison Wesley, 2003.
4. Paul C. Jorgensen, "Software Testing:- A Craftsman''s Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2008.

DIGITAL IMAGE PROCESSING

Course	Digital Image processing		
Course Code	18EM7101	L-T-P-S	3-1-0-0
Pre-Requisites	Nil	Credits	4

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	Must be aware of basic concepts digital image processing	PO5,PSO2	3
CO2	Ability to develop Image transformations, image enhancements in different domains	PO5,PSO2	3
CO3	Ability to develop Image restoration and image segmentation	PO5,PSO2	3
CO4	Ability to develop Image Comprehension and Representation	PO5,PSO2	3

Syllabus

Introduction: Origin of Digital Image Processing, Fields that uses Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System.
Digital image fundamentals: Elements of Visual perception, Image sampling and Quantization, Basic relationships between Pixels, Linear and Non-linear operations.
Digital image transforms: Image Transforms – The Discrete Fourier Transform, The FFT, Walsh, Hadamard, Discrete Cosine Transform, The Haar Transform, And The Slant Transform,
Image enhancement in spatial domain: Some basic Grey level transformations, histogram processing, enhancement using Arithmetic/Logic operations, Smoothing Spatial Filters, Sharpening Spatial Filters.
Image enhancement in frequency domain: Introduction to Fourier Transform and the Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters.
Image restoration: Noise models, Restoration in the presence of Noise, only Spatial Filtering, Periodic Noise reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Inverse Filtering, Wiener Filtering, Least mean square Filtering.
Image compression: Fundamentals – Image Compression models – Error Free Compression, Lossy Compression.
Image segmentation: Detection of discontinuities, Thresholding, Edge based Segmentation and Region based Segmentation.
Image representations and description: Representation schemes, Boundary Descriptors, Regional Descriptors
Text books:

1. Rafael C Gonzalez, Richard E Woods," Digital Image Processing", Second Edition, Pearson Education Asia, 2002. (Chapter 1, 3, 4, 5, 6, 7, 8, 9)
2. Jorg Arndt, " DSP Algorithms for Programmers"(Chapter 3)
3. Gonzalez. R & Woods B.E.," Digital Image Processing", Addison Wesley Longman Pearson Education, 2000.

Reference books

1. MilanSonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson learning, Second Edition, 2001.
2. William J Prati, "Digital Image Processing", John Wiley & sons
3. Tinku Acharya, Ajoy K Ray, "Image Processing Principles and Applications Principles and Applications", Wiley- Inter science.

DIGITAL AUDIO PROCESSING

Course	Digital Audio Processing		
Course Code	18EM7102	L-T-P-S	3-1-0-0
Pre-Requisites	Nil	Credits	4

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	To make the students understand basic concepts involved in Audio processing	PO5,PSO2	3
CO2	To make the students understand the way the audio systems are interfaced through serial, parallel and standard bus systems	PO5,PSO2	3
CO3	To make the students develop equalisers and make the students understand the same through simulators	PO5,PSO2	3
CO4	To make the students develop dynamic control of ranges and make the students understand the same through simulators	PO5,PSO2	3

Syllabus

Introduction and Quantization: Digital Transmission Systems, Storage media, Audio components at home, Signal quantization, Dither, Spectrum shaping of quantization – noise shaping, Number representation.**Audio Conversions and Processing Systems: A** to D converters, D to A converters, Digital Signal Processors – Fixed point DSP, Floating point DSP, Digital audio interfaces, signal processor systems, Multiprocessor systems – Connection via serial links, Connection via parallel links, Connections via standard bus systems, scalable audio systems.**Equalizers and Room Simulation:** Recursive audio filters- Design, parametric filter structures and Quantization effects, Non recursive audio filters – Fast convolution, Fast convolution of Long sequences, Filter design by frequency sampling, Multi complementary filter bank, Ando's investigations, Gerzon algorithms, Subsequent Reverberation – Schroeder Algorithm, General feedback systems, Approximation of room impulse response.

Audio Dynamic Range Control & Sampling Rate Conversion: Static Curve, Dynamic behaviour, Implementation – Limiter, Compressor, Expander, Noise Gate, Combination System; Realization Aspects, Synchronous conversion, Asynchronous conversion, Interpolation methods – Polynomial Interpolation, Lagrange Interpolation, Spline Interpolation.

Compressing Audio files: Lossless data compression, Lossy data compression, Psychoacoustics – Critical bands and Absolute Threshold, Masking, ISO-MPEG1 audio coding, Dynamic bit allocation and coding.

Text books

1. Digital Audio Signal Processing by Udo Zolzer, Wiley Publications.

DATA VIDEO PROCESSING

Course	Digital Video Processing		
Course Code	18EM7103	L-T-P-S	3-1-0-0
Pre-Requisites	Nil	Credits	4

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	To make the students understand basic concepts involved in Video processing	PO5,PSO2	3
CO2	To make the students understand the way the Video is displayed through 2D motion	PO5,PSO2	3
CO3	To make the students understand the way the Video is displayed through 3D motion	PO5,PSO2	3
CO4	To make the students the way the noise existing in a Video can be filtered	PO5,PSO2	3

Syllabus

Representation of Digital Video: Basics of Video: Analog Video, Digital Video, Digital Video Processing, **Time Varying image formation models**: 3D motion models, Geometric image formation, Photometric image formation, Photometric effects of 3D motion, **Spatio temporal sampling**: Sampling for analog and digital sampling, Sampling on 3D Structures, Reconstruction from samples.

2D Motion and Estimation: Optical Flow Methods: 2D motion, 2D Motion Estimation, Methods using optical flow equation, **PEL Recursive Methods**: Displaced frame difference, Gradient based optimization, Steepest decent based algorithms, Wiener estimation based algorithms, **Bayesian Methods**: Optimization methods, Basics of MAP motion estimation, MAP motion estimation algorithms.

3D Motion Estimation and Segmentation: Methods using point correspondences: Modeling the projected displacement field, methods based on the orthographic model, methods based on the perspective model, case of 3D planar surfaces, **Motion Segmentation**: Direct methods, Optical flow segmentation, Simultaneous estimation and segmentation, **Stereo and motion tracking**: Motion and structure from stereo, Motion tracking – 2D and 3D.

Video Filtering:Motion Compensated Filtering: Spatio temporal Fourier Spectrum, Sub Nyquist spatio temporal sampling, filtering along motion trajectories, Applications: motion compensated noise filtering, motion compensated reconstruction filtering, **Noise Filtering**: Intraframe filtering, Motion adaptive filtering, Motion compensated filtering.
Video Compression and Digital Video Systems: The H.261 Standard, The MPEG-1 Standard, The MPEG-2 Standard, Software and Hardware Implementations, Video Conferencing, interactive video and multimedia, Digital Television, Low bitrate video and videophone.

Text books

1. Digital Video Processing by A M Tekalp, Prentice Hall.

DIGITAL SIGNAL PROCESSING

Course	Digital Signal Processing		
Course Code	18EM7104	L-T-P-S	3-1-0-0
Pre-Requisites	Nil	Credits	4

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	students understand the basic concepts related to digital signal processing	PO5,PSO2	3
CO2	students understand various issues related to programmable Analog and digital DSP devices	PO5,PSO2	3
CO3	students understand various issues related to programmable DSP processors	PO5,PSO2	3
CO4	students understand various issues related to Interfacing peripherals to programmable DSP devices	PO5,PSO2	3

Syllabus

Introduction To Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of erroring DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

Programmable DSP Devices: Basic features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices- ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP2100, ADSP-2181 high performance Processor. Introduction to Blackfin Processor – The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

Interfacing Memory And I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

Text Books

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach to Digital Signal Processing – K Padmanabhan, R. Vijayarajeswaran, Ananthi.S, New Age International, 2006/2009.
3. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon-Seng Gan, Sen M. Kuo, Wiley-IEEE Press, 2007.

References

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing – Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architecture & Features- Lapsley et al. 2000, S. Chand & Co. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI.
4. The Scientist and Engineering's Guide to Digital Signal Processing by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997.
5. Embedded Media Processing by David J. Katz and Rick Gentile of Analog Devices, Newnes, and ISBN 0750679123, 2005.

FPGA BASED DESIGN

Course	FPGA Based System Design		
Course Code	18EM7105	L-T-P-S	3-1-0-0
Pre-Requisites	Nil	Credits	4

Course Outcomes

CO NO	Course Outcomes(CO)	PO/PSO	BTL
1	Understand the basic concepts of Verilog programming	PO5,PSO2	3
2	Understand the Combinational & sequential logic circuits and analyse them through test benches using Verilog HDL	PO5,PSO2	3
3	Understand FPGA based embedded processors architectures	PO5,PSO2	3
4	Understand signal conditioning and serial communication protocols	PO5,PSO2	3

Syllabus

Introduction to Programmable Logic Devices: Various IC technologies, mask ROM, ROM, EPROM, EEPROM, Programmable Logic Devices – PLA, PAL and CPLD

Introduction to Verilog Programming Language: Front end design tools for FPGA and design flow, RT Level Design, Verilog HDL, Basic elements of Verilog HDL and Different modeling styles

Combinational circuit Description: Verilog HDL models of combinational circuits such as Adder, Multiplexer, De-multiplexer, Encoder, Decoder, Code converters, Comparators, Parity generators and implementation of Boolean functions, Test-benches

Sequential Circuit Design: Verilog Models of sequential circuits such as level and edge triggered D flip flop, T flip flop and J K flip flop, shift registers, counters, memories, ALU.

Field Programmable Gate Arrays: SRAM Programmable FPGAs - Introduction, Programming Technologies: such as anti-Fuse, SRAM Programmed FPGA. Device Architecture, Programmable Logic Block Architectures, Programmable Interconnects, and Programmable I/O blocks in FPGAs, Xilinx XC4000

Text Books:

1. Fundamentals of digital logic with Verilog design by Stephen Brown and ZvonkoVranesic, McGra Hill, 3 ed
2. Field Programmable Gate Array Technology by Stephen M. Trimberger, Springer International Edition.

Reference Books:

1. ZainalabedinNavabi, Verilog Digital System Design RT Level Synthesis, Testbench and Verification Second Edition McGraw-Hill Publications
2. Digital Design Using Field Programmable Gate Arrays by Pak K. Chan/Samiha Mourad, Pearson Low Price Edition.

FOUNDATIONS OF WEB TECHNOLOGY

Course	Foundations of WEB technologies		
Course Code	**18EM6001**	**L-T-P-S**	**3-1-0-0**
Pre-Requisites	**NIL**	**Credits**	**4**

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	The students shall understand the fundamental concepts related to development of WEB site	PO5,PSO2	3
CO2	Ability write HTML programs	PO5,PSO2	3
CO3	Ability of the students to write HTML programs using style sheets	PO5,PSO2	3
CO4	Ability of the students to write programs in Java Script especially for validating the data captured through HTML interfaces on the client side.	PO5,PSO2	3

Syllabus
Introduction to WEB: Understanding the internet and world wide web, History of WEB, protocols governing the WEB, WEB architecture, Major issues in WEB solution development, Introduction to WEB browsers and servers, Internet standards, TCP/IP protocol suite, IP Addresses, WEB applications, Planning to develop a WEB site, World wide web consortium (W3C), WEB 2.0, Personal, distributed and Client/Server Computing
Hypertext Text Markup language (HTML): HTML Basics, Elements, attributes, basic tags(Comments, Title, Paragraph, line breaks, text styles, heading, different types of text styles (Font, style, bold, underline, italicized, combining styles), Advanced Tags (Tables, cell spacing and padding, nested tables, forms, form elements, (Text, password, hidden, Label, Check Box, Radio button, selection list, text area, file load, buttons), Frames, Images, Meta Tag, Planning a WEB page, Model and Structure of a web site, Designing a WEB page, Hosting multi-media content (Audio and Video) Frames
Cascading style sheets: Introduction, adding CSS, Browser compatibility, CSS and Page Layout, Selectors, Grouping, Selectors, pseudo Classes and elements, Selectors (Attribute, Class, and ID)
Java Script: Introduction (Inserting Java script into HTML code, Keywords, browser incompatibility, Placement of Java Script code), Variables, literals, operators, control structures, conditional statements, Arrays, Functions, objects), Exceptional handling, Bulletin objects, events.
Text Book

1. Uttam K Roy, WEB Technologies, OXFORD Higher education, Seventh edition, 2012

References

1. P. J. Deitel and H. M Deitel, Internet & world wide web: How to program, Pearson publishers, Fourth Edition
2. NP Gopalan, and J Akilandeswari, WEB Technology- A developers Perspective, PHI publishers, second edition
3. Joy Sklar, WEB Design Principals, CENGAGE publishers, 5th Edition

INTERNET PROGRAMMING

Course	Internet programming		
Course Code	18EM6002	L-T-P-S	3-1-0-0
Pre-Requisites	NIL	Credits	4

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	To make the students to understand the basics relating to WEB server side development	PO5,PSO2	3
CO2	To make the students develop program accessing the database through server side components	PO5,PSO2	3
CO3	To make the students write programs to create servlets and run them under a WEB server	PO5,PSO2	3
CO4	To make the students write programs to create Java server pages to implement dynamic WEB sites	PO5,PSO2	3

Syllabus:

Database Access with JDBC: JDBC architecture, Connection Object, Working with statements, Creating and executing SQL statements, working with Result Set.
Server side development through servlets: Servlet Basics, Handling the Client Request, Generating the Server Response, Servlet Interface, GenericServlet, HttpServlet, Servlet Life Cycle ServletConfig, ServletContext, Servlet Communication.
Server side development through JSP: JSP Scripting Elements, Implicit Objects, Accessing MYSQL Database with JDBC.
Text Books

1. Deitel&Deitel& Nieto, "Internet & World Wide Web – How to Program", PEA, Fifth Edition.2010.
2. Falkner & Jones," Servlets and Java Server Pages: The J2EE Technology Web Tier", 1/e, Addison-Wesley Professional, 2008.

Reference Books

1. Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.
2. Anders Moller, Michael Schwartzbach, "An Introduction to XML and Web Technologies", 1st Edition, Pearson Education, 2006.

ENTERPRISE PROGRAMMING

Course	Enterprise programming		
Course Code	18EM6003	L-T-P-S	3-1-0-0
Pre-Requisites	NIL	Credits	4

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	Students to express and demonstrate theoretical knowledge related to enterprise architectures, development platforms, Application servers, EJB components	PO5,PSO2	3
CO2	Will be able to develop Enterprise session beans using NETBEANS and deploy the components using JBOSS	PO5,PSO2	3
CO3	Will be able to develop Enterprise entity beans using NETBEANS and deploy the components using JBOSS	PO5,PSO2	3
CO4	Will be able to develop Applications based on EJB QL, SQL server and deploy the components using JBOSS	PO5,PSO2	3

Syllabus

Introduction to Enterprise Systems: Meaning of an Enterprise, Difference between an enterprise and a business establishment, EE infrastructure support in JAVA.

Multi-Tier Architectures used for implementing IT for enterprises: Single tier systems, Client server and N. Tier Architectures, Features of JAVA EE: Clients, servers, containers, Servlets, JSP, JDBC, EJBS, XML support, WEB services, Transaction support, Security, JAVA EE Architectures: client with EJB, JSP Client with EJB, Applet client with JSP and Database, WEB services oriented implementation.

Introduction to application server: Meaning and purpose, Installing JBOSS, developing a sample EJB application and deploying under JBOSS and running the same: Introduction to component technologies, Role of Component technologies in implementing the Enterprise solutions, EJB Fundaments: EJB specification, Kinds of EJB.

EJB Session Beans: Purpose, Meaning and Purpose of Stateful and Stateless session beans, Using Stateful and Stateless session beans, Sample application that uses a session bean, developing a sample application using Session Beans.

EJB Entity Beans: Working of Entity beans with session's beans, Anatomy of Entity bean, Entity Bean class, Managing persistence and Entity Manager Interface. Developing a sample application using Entity Beans.

SQL and EJB SQL, JDBC: Introduction to SQL, SQL Objects, SQL Data types, Creating Tables, Selecting Data from Tables, Modifying Table Data, Constructing Joins. Introduction to EJB QL, Building EJB Queries, running EJB QL within Session beans and Entity beans and JDBC.

Text Books:

1. Kevin Mukhar and Chris Zelenak, "Beginning Java EE from Novice to professional, APRESS publications, 2009.

Reference Books:

1. Antonio Goncalves, "Beginning Java™ EE 6 Platform with GlassFish™ 3 Novice to Professional", Apress, 2009 Edition
2. Jan Graba, "An Introduction to Network Programming with Java", Springer, 2nd edition, 2006.
3. Mark D Hansen, "SOA Using Java web services", Pearson, 2007.
4. Dreamtech Software Team, "Java Server Programming J2EE: Black Book", Wiley, 2007.

WEB SECURITY

Course	WEB Security		
Course Code	**18EM6004**	**L-T-P-S**	**3-1-0-0**
Pre-Requisites	**NIL**	**Credits**	**4**

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	To Acquire basic knowledge about the WEB sites and Cryptography	PO5,PSO2	3
CO2	To acquire basic knowledge about attacking and counter attacking of WEB servers	PO5,PSO2	3
CO3	To acquire basic knowledge about attacking and counter attacking of Browsers	PO5,PSO2	3
CO4	Should be able to implement counter attacking mechanisms within un-secures WEB application considering different attacking systems	PO5,PSO2	3

Syllabus

Introduction to WEB: WEB components: Browsers: Browser Layout, functionalities, Cookies, Style Sheets, Servers: WEB server, Email Server, FTP server, WEB application server, WEB services server, Business server, Enterprise server, Network, WEB Network layout**,** Cookies**,**
Introduction to security: Meaning, cryptography: Symmetric and Asymmetric keys, key pairs, encoding and decoding, digital signature, digital certificate, Security Attacks, Security services, Security Mechanisms, difference between WEB security and other types of Security: Network Security, Data Security, Information security, cyber Security.
Vulnerabilities for Attacking WEB applications: Threats, OWASP Principles
Attacking and counter attacking Browsers: Attacking Browsers: Introducing Browsers, Browser Functionalities, Phishing, spamming, is spoofing. Develop applications for simulating phishing, spoofing. Counter attacking browsers: Add-ons, Plugins, same-origin policy, Finger Printing, CSP, DKIM, SPF.
Attacking and Counter Attacking WEB servers: Attacking WEB Servers: CSRF (Cross site request forgery), XSS (Cross site Scripting), Command Injection, Broken Authentication, Worms, malware, Virus, develop and Implement an application for profiling. Counter Attacking WEB servers: Privacy preserving: Spyware, backdoor, Protecting Un-authorized Access, Fire walling, Tracking and profiling, Anonymity checking, user identity Management, Develop an application that implements an identification management system
Text Books:

1. Web Application Security: A Beginner's Guide, Bryan Sullivan, Vincent Liu, and McGraw Hill.
2. **Web Security & Commerce, 2nd Edition, <u>Simson Garfinkel</u>, O'REILLY.**
3. Improving Web Application Security: Threats and Countermeasures, 1st Edition, Foreword by Mark Curphey, Joel Scambray, Erik Olson and Michael Howard, Microsoft Corporation.
4. Security Technologies for the world wide web, 2nd Edition, Rolf Oppliger, Artech House Publishers

Reference Books:

1. Web Application Security, A Beginner's Guide Paperback – Bryan Sullivan (Author), Vincent Liu
2. Web Security and Commerce (Nutshell Handbooks) 1st Edition, by Simson Garfinkel, Gene Spafford
3. Preventing Web Attacks with Apache 1st Edition, by Ryan C. Barnett
4. Testing Web Security: Assessing the Security of Web Sites and Applications 1st Edition, by Steven Spline
5. Preventing Web Attacks with Apache 1st Edition, by Ryan C. Barnett

AMAZON WEB SERVICES

Course	Amazon WEB services		
Course Code	18EM6005	L-T-P-S	3-1-0-0
Pre-Requisites	NIL	Credits	4

Course outcomes

CO No	Expected Course Outcomes (CO)	PO/PSO	BTL
CO1	Acquire fundamental knowledge related to developing application using the WEB services related Technologies.	PO5,PSO2	3
CO2	Acquire fundamental knowledge related to various technologies used for implementing WEB services that include SOAP, WSDL and UDDI	PO5,PSO2	3
CO3	Should be able to develop small WEB services oriented applications through use of XML language	PO5,PSO2	3
CO4	Should be able to develop applications using third part services which are launched on different servers	PO5,PSO2	3

Syllabus:

Introduction to Web Services, Web Service Architecture, XML Messaging, and Service Description: WSDL, Service Discovery: UDDI, Service Transport, Using WEB service technologies together. Standards related to WEB service.
XML-RPC Essentials: XML-RPC Overview, the need for XML-RPC, XML-RPC Technical Overview, Developing using XML-RPC, beyond simple XML-RPC Calls.
SOAP Essentials: SOAP 101, The SOAP Message, SOAP Encoding, SOAP via HTTP, SOAP and the W3C, SOAP Implementations, Using Apache SOAP: Installing Apache SOAP, Developing a simple SOAP message, Deploying SOAP Services, Programming using Apache SOAP: Working with Arrays, Working with JavaBeans, Working with Literal XML Documents, Handling SOAP Faults, Maintaining Session State.
WSDL: The WSDL Specification, Basic WSDL Example: HelloService, wsdl, Invoking WSDL, Basic WSDL Invocation methods(Part-1) Xmethods, Basic WSDL Invocation methods (Part-2) Xmethods, Generating WSDL Files, XML Schema Data Typing. **UDDI Essentials**: Introduction to UDDI, UDDI Technical Overview, UDDI Data Model, Searching UDDI, Publishing to UDDI, UDDI Implementations, Web Resources, UDDI Inquiry API: The UDDI Inquiry API, Find Qualifiers, Finding and Retrieving UDDI Data, Publishing UDDI Data, UDDI4J Quick Reference API.

Text Books:

1. Web Services Essentials By Ethan Cerami, Orielly, 2002.

Reference Books:

1. JavaWebServices   David A. Chappell & Jewell, Oreilly, 2009.

2. Web Services Concepts, Architectures and applications by Gustavo Alonso., Springer, 2009.
3. **Georgesammons**,Introduction to AWS (Amazon Web Services) Beginner's Guide Book: Learning the basics of AWS in an easy and fast wayPaperback – November 10, 2016

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