

**Choice Based Credit System
SCHEME
*B.Tech, Computer Science & Engineering***



**Department of Computer Science & Engineering
UIET**

Sant Baba Bhag Singh University

2018

INDEX

S.No.	Subject Code	Subject Name	Semester	Page No.
1		Course Scheme and Summary	All	1-15
2	*PHY105-18	Engineering Physics	1	17-18
3	MAT103-18	Engineering Mathematics-I	1	19-20
4	MAT104-18	Engineering Mathematics-II	1	21-22
5	*EE101-18	Basic Electrical Engineering	1	23-24
6	*CSE101-18	Fundamentals of Computer Technology	1	25-26
7	*PHY107-18	Engineering Physics Laboratory	1	27
8	*EE103-18	Basic Electrical Engineering Laboratory	1	28
9	*CSE103-18	Fundamentals of Computer Technology Laboratory	1	29-30
10	*ME107-18	Engineering Workshop	1	31-32
11	*CHM105-18	Engineering Chemistry	2	34-35
12	*ECE101-18	Basic Electronics & Communication Engineering	2	36-37
13	*ENG121-18	Communication Skills-I	2	38-39
14	*ME103-18	Engineering Drawing	2	40-41
15	*CHM107-18	Engineering Chemistry Laboratory	2	42
16	*ECE103-18	Basic Electronics & Communication Engineering Laboratory	2	43
17	*ENG123-18	Communication Skills-I (Practical)	2	44
18	CSE201-18	Introduction to Data Structures	3	45-46
19	CSE203-18	Object Oriented Programming Systems	3	46-47
20	MAT205-18	Engineering Mathematics-III	3	48-49
21	ECE207-18	Digital Electronics	3	50-51
22	ENG205-18	Professional Communication Skills	3	52-53
23	CSE205-18	IT Workshop	3	54-55
24	CSE207-18	Introduction to Data Structures Lab	3	56-57
25	CSE209-18	Object Oriented Programming Systems	3	58-59

		Lab		
26	ECE211-18	Digital Electronics Lab	3	60
27	CSE211-18	IT Workshop(Sci Lab/MATLAB)	3	61
28	CSE202-18	Discrete Structures	4	63-64
29	CSE204-18	Computer Organization & Design	4	65-66
30	CSE206-18	Operating Systems	4	67-68
31	CSE208-18	Database Design & Management	4	69-70
32	EVS101-18	Environmental Sciences	4	71-72
33	ECE212-18	Microprocessor	4	73-74
34	CSE210-18	Operating Systems Lab	4	75-76
35	CSE212-18	Database Design & Management Lab	4	77-78
36	ECE214-18	Microprocessor Lab	4	79-80
37	CSE301-18	Principles of Software Engineering & Design	5	82-83
38	CSE303-18	Design & Analysis of Algorithms	5	84-85
39	CSE305-18	Theory of Automata & Computation	5	86-87
40	SSC303-18	Human Values and Professional Ethics	5	88-89
41	PLS303-18	Constitution of India	5	90-91
42	CSE307-18	Principles of Software Engineering & Design Lab	5	92
43	CSE309-18	Design & Analysis of Algorithms Lab	5	93
44	CSE313-18	Mobile Application Development	5	94-95
45	CSE315-18	Programming in Java	5	96
46	CSE317-18	Computer Graphics & Visualization	5	97-98
47	CSE302-18	Compiler Construction	6	100-101
48	CSE304-18	Data Communication & Networks	6	102-103
49	CSE306-18	Compiler Construction Lab	6	104-105
50	CSE308-18	Data Communication & Networks Lab	6	106
51	CSE312-18	Simulation & Modeling	6	107-109
52	CSE314-18	Computer Vision	6	110-111

53	CSE316-18	Internet web Programming	6	112-114
54	CSE318-18	Machine Learning	6	115
55	CSE320-18	Distributed Systems	6	116-117
56	CSE322-18	Wireless Communications	6	118-119
57	MGT401-18	Organization Behaviour	7	121
58	CSE403-18	Cryptography & Security	7	122-123
59	CSE405-18	Multimedia & Animation	7	124-125
60	ECE405-18	Information Theory and Coding	7	126-127
61	CSE407-18	Graph Theory	7	128-129
62	CSE409-18	Design & Management of Big Data	7	130-131
63	CSE411-18	Cloud Computing	7	132
64	CSE404-18	Fundamentals of Digital Signal Processing	8	134-135
65	CSE406-18	Computational Intelligence	8	136-137
66	CSE408-18	Ad-hoc Wireless Network	8	138-139
Open Electives			140-172	
67	CSE371-18	Basics of Database Design	5	141-142
68	CSE373-18	Fuzzy Logic	5	143-144
69	ME371-18	Total Quality Management	5	145-146
70	ME373-18	Production Planning & Control	5	147-148
71	EE371-18	Electrical Energy Conservation and Auditing	5	149-150
72	EE373-18	Element of power System	5	151-152
73	ECE371-18	Signal Systems	5	153-154
74	ECE373-18	Micro Controller & Applications	5	155-156
75	CE371-18	Renewable Energy Resources	5	157-158
76	CE373-18	Architecture and Town Planning	5	159-160
77	CSE372-18	Communication Networks	6	161-162
78	CSE374-18	Computer Organization	6	163-164
79	ME372-18	Industrial Training Management	6	165-166

80	ME374-18	Lean Manufacturing	6	167-168
81	EE372-18	Industrial Electrical System	6	169-170
82	EE374-18	Fundamentals of Electrical Machines	6	171-172
83	ECE372-18	Analog & Digital Communications	6	173-174
84	ECE374-18	Analog Circuits	6	175-176
85	CE372-18	Construction of Metro System	6	177
86	CE374-18	Traffic Engineering	6	178-179
87	CSE471-18	Concepts of Operating System	7	180-181
88	CSE473-18	Data Warehouse & Data Mining	7	182-183
89	ME471-18	Material Management	7	184-185
90	ME473-18	Mechatronics	7	186-187
91	EE471-18	Wind and Solar Energy System	7	188-189
92	EE473-18	Instrumentation Engineering	7	190-191
93	ECE471-18	Biomedical Electronics	7	192-193
94	ECE473-18	Principles of VLSI Design	7	194
95	CE471-18	Rural Technology and Community Development	7	195
96	CE473-18	Waste Water Engineering	7	196
97	CSE472-18	Image Analysis	8	197
98	CSE474-18	Concepts of Cloud Computing	8	198
99	ME472-18	Production Operation Management	8	199-200
100	ME474-18	Industrial Safety	8	201-202
101	EE472-18	Electrical Materials	8	203-204
102	EE474-18	Electrical & Hybrid Vehicles	8	205-206
103	ECE472-18	Embedded System	8	207-208
104	ECE474-18	Advanced Optical Comm. System	8	209-210
105	CE472-18	Tall Building	8	211
106	CE474-18	Remote Sensing and Geographical Information System	8	212-213
107	CSE476-18	Big Data	8	215-216

108	CSE478-18	Network Security	8	217-218
109	ME476-18	Supply Chain Management	8	221-222
110	ME478-18	Power Plant Engineering	8	218-219
111	EE476-18	Electrical Measurement	8	220-221
112	EE478-18	Energy Auditing & Management	8	222-223
113	ECE476-18	Digital System Design	8	224-225
114	ECE478-18	Broadband Comm.	8	226-227
115	CE476-18	Infrastructure and real estate management	8	228-229
116	CE478-18	Site investigation	8	230



Course Scheme, B.Tech Computer Science & Engineering

General Course Structure

Course Code and Definition

Course Code	Definition
BS	Basic Science
ES	Engineering Science
HS	Humanities Science
PC	Professional Core
PE	Professional Elective
OE	Open Elective
MC	Mandatory Course
SI	Summer Industry Internship
PROJ	Project



SEMESTER I / II

Scheme for B. Tech. 1st Year (Common to all disciplines) (Physics Group)

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	*PHY105-19	Engineering Physics	3:0:0	3:0:0	3	3
2	BS	MAT103-19/ MAT104-18	Engineering Mathematics-I/ Engineering Mathematics-II	4:1:0	4:1:0	5	5
3	ES	*EE101-18	Basic Electrical Engineering	2:0:0	2:0:0	2	2
4	ES	*CSE101-18	Fundamentals of Computer Technology	3:0:0	3:0:0	3	3

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	*PHY107-18	Engineering Physics Laboratory	0:0:2	0:0:1	2	1
2	ES	*EE103-18	Basic Electrical Engineering Laboratory	0:0:2	0:0:1	2	1
3	ES	*CSE103-18	Fundamentals of Computer Technology Laboratory	0:0:4	0:0:2	4	2
4	ES	*ME107-18	Engineering Workshop	0:0:6	0:0:3	6	3
5	MC	*PT101/PT103 /PT105-18	Physical Training-I (NSO/NCC/NSS)	0:0:2	NC	2	NC

- In the 2nd Semester the scheme for Physics and Chemistry group will interchange
- In the 2nd Semester Engineering Mathematics-I will be replaced by Engineering Mathematics-II
- Training after the 2nd Semester will be focused on Engineering Computer Graphics Laboratory work
- *Indicates that the subject will be offered in both the Semesters

Total Contact Hours = 29
Total Credits Hours = 20

SEMESTER I / II

Scheme for B. Tech. 1st Year (Common to all disciplines) (Chemistry Group)

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	*CHM105-19	Engineering Chemistry	3:0:0	3:0:0	3	3
2	BS	MAT103-19/ MAT104-18	Engineering Mathematics-I/ Engineering Mathematics-II	4:1:0	4:1:0	5	5
3	ES	*ECE101-18	Basic Electronics & Communication Engineering	2:0:0	2:0:0	2	2
4	HS	*ENG121-18	Communication Skills-I	2:0:0	2:0:0	2	2
5	ES	*ME103-18	Engineering Drawing	1:0:6	1:0:3	7	4

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	*CHM107-18	Engineering Chemistry Laboratory	0:0:2	0:0:1	2	1
2	ES	*ECE103-18	Basic Electronics & Communication Engineering Laboratory	0:0:2	0:0:1	2	1
3	HS	*ENG123-18	Communication Skills-I (Practical)	0:0:2	0:0:1	2	1
4	MC	*PT102/PT104/ PT106-18	Physical Training-II(NSO/NCC/NSS)	0:0:2	NC	2	NC

- In the 2nd Semester the scheme for Physics and Chemistry group will interchange
- In the 2nd Semester Engineering Mathematics-I will be replaced by Engineering Mathematics-II
- *Indicates that the subject will be offered in both the Semester.

Total Contact Hours = 27
Total Credits Hours = 19

SEMESTER III

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE201-18	Introduction to Data Structures	4:0:0	4:0:0	4	4
2	PC	CSE203-18	Object Oriented Programming Systems	4:0:0	4:0:0	4	4
3	BS	MAT205-18	Engineering Mathematics-III	4:1:0	4:1:0	5	5
4	ES	ECE207-18	Digital Electronics	3:0:0	3:0:0	3	3
5	HS	ENG205-18	Professional Communication Skills	3:0:0	3:0:0	3	3
6	PC	CSE205-18	IT Workshop	1:0:0	1:0:0	1	1

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE207-18	Introduction to Data Structures Lab	0:0:2	0:0:1	2	1
2	PC	CSE209-18	Object Oriented Programming Systems Lab	0:0:2	0:0:1	2	1
3	ES	ECE211-18	Digital Electronics Lab	0:0:2	0:0:1	2	1
4	PC	CSE211-18	IT Workshop(Sci Lab/MATLAB)	0:0:4	0:0:2	4	2
5	MC	PT201/PT203/ PT205-18	Physical Training-III(NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours = 32

Total Credits Hours = 25

SEMESTER IV

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE202-18	Discrete Structures	4:0:0	4:0:0	4	4
2	PC	CSE204-18	Computer Organization & Design	3:0:0	3:0:0	3	3
3	PC	CSE206-18	Operating Systems	3:0:0	3:0:0	3	3
4	PC	CSE208-18	Database Design & Management-I	3:0:0	3:0:0	3	3
5	MC	EVS101-18	Environmental Sciences	3:0:0	NC	3	NC
6	ES	ECE212-18	Microprocessor	4:0:0	4:0:0	4	4
7	MC		Educational Tour	NC			

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE210-18	Operating Systems Lab	0:0:2	0:0:1	2	1
2	PC	CSE212-18	Database Design & Management-I Lab	0:0:2	0:0:1	2	1
3	ES	ECE214-18	Microprocessor Lab	0:0:2	0:0:1	2	1
4	MC	PT202/PT204 / PT206-18	Physical Training-IV (NSO/NCC/NSS)	0:0:2	NC	2	NC

❖ **4 Weeks Industrial Training**

Total Contact Hours = 28

Total Credits Hours = 20

SEMESTER V

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE301-18	Principles of Software Engineering & Design	3:0:0	3:0:0	3	3
2	PC	CSE303-18	Design & Analysis of Algorithms	3:1:0	3:1:0	4	4
3	PE		Professional Elective-I	3:0:0	3:0:0	3	3
4	PC	CSE305-18	Theory of Automata & Computation	3:1:0	3:1:0	4	4
5	HS	SSC303-18	Human Values and Professional Ethics	3:0:0	3:0:0	3	3
6	MC	PLS303-18	Constitution of India	3:0:0	NC	3	NC

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE307-18	Principles of Software Engineering & Design Lab	0:0:2	0:0:1	2	1
2	PC	CSE309-18	Design & Analysis of Algorithms Lab	0:0:4	0:0:2	4	2
3	SI	CSE311-18	*Industrial Training (undertaken after 4 th semester)	Four Weeks			3

III. Professional Elective-I

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE313-18	Mobile Application Development	3:0:0	3:0:0	3	3
2	PE	CSE315-18	Programming in Java	3:0:0	3:0:0	3	3
3	PE	CSE317-18	Computer Graphics & Visualization	3:0:0	3:0:0	3	3

*The students will undertake Training in Industry of course relevance for 4 weeks after the completion of 4th semester. The evaluation of the student will be done in 5th semester on the basis of report writing and presentation for the training done in Industry.

Total Contact Hours = 25

Total Credits Hours = 22

SEMESTER VI

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE302-18	Compiler Construction	3:0:0	3:0:0	3	3
2	PC	CSE304-18	Data Communication & Networks	3:0:0	3:0:0	3	3
3	PE		Professional Elective-II	3:0:0	3:0:0	3	3
4	PE		Professional Elective-III	3:0:0	3:0:0	3	3
5	OE		Open Elective-II	3:0:0	3:0:0	3	3

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE306-18	Compiler Construction Lab	0:0:4	0:0:2	4	2
2	PC	CSE308-18	Data Communication & Networks Lab	0:0:4	0:0:2	4	2
3	PROJ	CSE310-18	Minor Project	0:0:4	0:0:2	4	2

III. Professional Elective-II

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE312-18	Simulation & Modeling	3:0:0	3:0:0	3	3
2	PE	CSE314-18	Computer Vision	3:0:0	3:0:0	3	3
3	PE	CSE316-18	Internet web Programming	3:0:0	3:0:0	3	3

IV. Professional Elective-III

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE318-18	Machine Learning	3:0:0	3:0:0	3	3
2	PE	CSE320-18	Distributed Systems	3:0:0	3:0:0	3	3
3	PE	CSE322-18	Wireless Communications	3:0:0	3:0:0	3	3

❖ 4 Weeks Industrial Training

Total Contact Hours = 27

Total Credits Hours = 21

SEMESTER VII

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE		Professional Elective-IV	3:0:0	3:0:0	3	3
2	PE		Professional Elective-V	3:0:0	3:0:0	3	3
3	OE		Open Elective-III	3:0:0	3:0:0	3	3
4	HS	MGT401-18	Organization Behaviour	4:0:0	4:0:0	4	4

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PROJ	CSE401-18	Industrial Training cum Project Work	0:0:10	0:0:5	10	5

III. Professional Elective-IV

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE403-18	Cryptography & Security	3:0:0	3:0:0	3	3
2	PE	CSE405-18	Multimedia & Animation	3:0:0	3:0:0	3	3
3	PE	ECE405-18	Information Theory and Coding	3:0:0	3:0:0	3	3

IV. Professional Elective-V

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE407-18	Graph Theory	3:0:0	3:0:0	3	3
2	PE	CSE409-18	Design & Management of Big Data	3:0:0	3:0:0	3	3
3	PE	CSE411-18	Cloud Computing	3:0:0	3:0:0	3	3

*The problem of the project, formulated during 6th Semester is to be extended and executed in project work by the same group of students. The design/construction/fabrication/computer modeling/experimentation etc. is to be carried out. The results and analysis followed by discussion regarding suitability /non suitability of the project or any positive gain in the project made with conclusions and recommendations for future extension of the project must be covered

Total Contact Hours = 23
Total Credits Hours = 18

SEMESTER VIII

I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE		Professional Elective-VI	3:0:0	3:0:0	3	3
2	OE		Open Elective-IV	3:0:0	3:0:0	3	3
3	OE		Open Elective-V	3:0:0	3:0:0	3	3

II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PROJ	CSE402-18	Major Project	0:0:10	0:0:5	10	5

III. Professional Elective-VI

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE404-18	Digital Signal Processing	3:0:0	3:0:0	3	3
2	PE	CSE406-18	Computational Intelligence	3:0:0	3:0:0	3	3
3	PE	CSE408-18	Computational Biology	3:0:0	3:0:0	3	3

Total Contact Hours = 19

Total Credits Hours = 14

Open Elective-I

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE371-18	Basics of Database Design	3:0:0	3:0:0	3	3
2	OE	CSE373-18	Fuzzy Logic	3:0:0	3:0:0	3	3
3	OE	ME371-18	Total Quality Management	3:0:0	3:0:0	3	3
4	OE	ME373-18	Production Planning & Control	3:0:0	3:0:0	3	3
5	OE	EE371-18	Electrical Energy Conservation and Auditing	3:0:0	3:0:0	3	3
6	OE	EE373-18	Element of power System	3:0:0	3:0:0	3	3
7	OE	ECE371-18	Signal Systems	3:0:0	3:0:0	3	3
8	OE	ECE373-18	Micro Controller & Applications	3:0:0	3:0:0	3	3
9	OE	CE371-18	Renewable Energy Resources	3:0:0	3:0:0	3	3
10	OE	CE373-18	Architecture and Town Planning	3:0:0	3:0:0	3	3

Open Elective-II

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE372-18	Communication Networks	3:0:0	3:0:0	3	3
2	OE	CSE374-18	Computer Organization	3:0:0	3:0:0	3	3
3	OE	ME372-18	Industrial Training Management	3:0:0	3:0:0	3	3
4	OE	ME374-18	Lean Manufacturing	3:0:0	3:0:0	3	3
5	OE	EE372-18	Industrial Electrical System	3:0:0	3:0:0	3	3
6	OE	EE374-18	Fundamentals of Electrical Machines	3:0:0	3:0:0	3	3
7	OE	ECE372-18	Analog & Digital Communications	3:0:0	3:0:0	3	3
8	OE	ECE374-18	Analog Circuits	3:0:0	3:0:0	3	3
9	OE	CE372-18	Construction of Metro System	3:0:0	3:0:0	3	3
10	OE	CE374-18	Traffic Engineering	3:0:0	3:0:0	3	3

Open Elective-III

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE471-18	Concepts of Operating System	3:0:0	3:0:0	3	3
2	OE	CSE473-18	Data Warehouse & Data Mining	3:0:0	3:0:0	3	3
3	OE	ME471-18	Material Management	3:0:0	3:0:0	3	3
4	OE	ME473-18	Mechatronics	3:0:0	3:0:0	3	3
5	OE	EE471-18	Wind and Solar energy System	3:0:0	3:0:0	3	3
6	OE	EE473-18	Instrumentation Engineering	3:0:0	3:0:0	3	3
7	OE	ECE471-18	Biomedical Electronic	3:0:0	3:0:0	3	3
8	OE	ECE471-18	VLSI Design	3:0:0	3:0:0	3	3
9	OE	CE471-18	Rural Technology and Community Development	3:0:0	3:0:0	3	3
10	OE	CE473-18	Waste Water Engineering	3:0:0	3:0:0	3	3

Open Elective-IV

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE472-18	Image Analysis	3:0:0	3:0:0	3	3
2	OE	CSE474-18	Concepts of Cloud Computing	3:0:0	3:0:0	3	3
3	OE	ME472-18	Production Operation Management	3:0:0	3:0:0	3	3
4	OE	ME474-18	Industrial Safety	3:0:0	3:0:0	3	3
5	OE	EE472-18	Electrical Materials	3:0:0	3:0:0	3	3
6	OE	EE474-18	Electrical & Hybrid Vehicles	3:0:0	3:0:0	3	3
7	OE	ECE472-18	Embedded System	3:0:0	3:0:0	3	3
8	OE	ECE474-18	Advanced Optical Comm. System	3:0:0	3:0:0	3	3
9	OE	CE472-18	Tall Building	3:0:0	3:0:0	3	3
10	OE	CE474-18	Remote Sensing and Geographical Information System	3:0:0	3:0:0	3	3

Open Elective-V

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	OE	CSE476-18	Big Data	3:0:0	3:0:0	3	3
2	OE	CSE478-18	Network Security	3:0:0	3:0:0	3	3
3	OE	ME476-18	Supply Chain Management	3:0:0	3:0:0	3	3
4	OE	ME478-18	Power Plant Engineering	3:0:0	3:0:0	3	3
5	OE	EE476-18	Electrical Measurement	3:0:0	3:0:0	3	3
6	OE	EE478-18	Energy Auditing & Management	3:0:0	3:0:0	3	3
7	OE	ECE476-18	Digital System Design	3:0:0	3:0:0	3	3
8	OE	ECE478-18	Broadband Comm.	3:0:0	3:0:0	3	3
9	OE	CE476-18	Infrastructure and real estate management	3:0:0	3:0:0	3	3
10	OE	CE478-18	Site investigation	3:0:0	3:0:0	3	3

COURSE SCHEME SUMMARY

Sem	L	T	P	Contact hrs/week	Credits	HS	BS	ES	PC	PE	OE	Project/Training/ Seminar	MC
1	12	1	16	29	20	-	9	11	-	-	-	-	-
2	12	1	14	27	19	3	9	7	-	-	-	-	-
3	19	1	12	32	25	3	5	4	13	-	-	-	-
4	20	0	8	28	20	-	-	5	15	-	-	-	3
5	18	2	6	26	23	3	-	-	14	3	-	3	3
6	15	0	12	27	21	-	-	-	10	6	3	2	-
7	13	0	10	23	18	4	-	-	-	6	3	5	-
8	9	0	10	19	14	-	-	-	-	3	6	5	-
Total	118	5	88	211	160	13	23	27	52	18	12	15	6



DETAIL COURSES UNDER B.TECH (CSE)

Course	Credit			Total
	Lecture	Tutorial	Practical	
	(#Subject * Credit)	(#Tutorial * Credit)	(#Practical * Credit)	
I. PC (12 Papers)	$4 * 4 = 16$ $7 * 3 = 21$ $1 * 1 = 1$	$1 * 1 = 1$	$5 * 1 = 5$ $4 * 2 = 8$	52
II. PE (6 Papers)	$6 * 3 = 18$	-	-	18
III. ES (6 Papers)	$4 * 1 = 4$ $2 * 3 = 6$ $2 * 2 = 4$ $1 * 1 = 1$	$1 * 2 = 2$ $4 * 1 = 4$ $2 * 3 = 6$	-	27
IV. BS (5 Papers)	$2 * 3 = 6$ $3 * 4 = 12$	$3 * 1 = 3$	$2 * 1 = 2$	23
V. HS (4 Papers)	$1 * 2 = 2$ $2 * 3 = 6$ $1 * 4 = 4$	-	$1 * 1 = 1$	13
VI. OE (4 Papers)	$4 * 3 = 12$	-	-	12
VII. Training/ Project	-	-	$2 * 1 = 2$ $2 * 5 = 10$ $1 * 3 = 3$	15
Total				160

MC- 6 units

SCHEME FOR CHOICE BASED CREDIT SYSTEM

Sem	PC (12)	BS (5)	ES (7)	HS (4)	PE (6)	OE (4)	Project/Tr aining/Sem inar (4)	MC (2)
I		Engineering Physics	Basic Electrical Engineering					
		Engineering Mathematics -I	Fundamentals of Computer Technology					
			Engineering Workshop					
II		Engineering Chemistry	Basic Electronics & Communicatio n Engineering	Communicatio n Skills				
		Engineering Mathematics -II	Engineering Drawing					
III	C1	Engineering Mathematics -III	Digital Electronics	Professional Communicatio n Skills				
	C2							
	C3							
IV	C4		Microprocessor					Environmental Science
	C5							Educational Tour
	C6							
	C7							
V	C8			Human Values and Professional Ethics	PE-I		Industrial Training	Constitution of India

	C9							
	C10							
VI	C11				PE-II	OE-II	Minor Project	
	C12				PE-III			
VII				Organization Behaviour	PE-IV	OE-III	Industrial Training cum Project	
					PE-V			
VIII					PE-VI	OE-IV		
						OE-V	Major Project	



The logo of Sant Baba Bhag Singh University is a circular emblem. The outer ring contains the text "SANT BABA BHAG SINGH" at the top and "UNIVERSITY" at the bottom. Inside the ring is a central emblem featuring a book and a torch, flanked by two figures. Below the circle is a banner with the motto "KHALA HETI JALANHAN OPUNDAI".

First Semester

Course Code	PHY105-19
Course Title	Applied Physics
Type of course	Theory
L T P	3 0 0
Credits	3
Course prerequisite	
Course Objective (CO)	To provide high quality, comprehensive educational and training opportunities those are compatible to changing needs of the students. Engineering Physics is a field that provides broad training in physics and basic training in engineering and design. Our engineering physics program aims to educate students to become professionals with in-depth knowledge and skills in engineering to understand physical systems; to research, design, and solve problems; and to provide the foundation for graduate study and lifelong learning.

SYLLABUS

UNIT-I

Electromagnetics: Physical significance of Gradient, Divergence & Curl, Differential approach to Gauss Law, Ampere's law and Faraday's law, Stoke's theorem, Gauss divergence theorem, Equation of continuity, Maxwell's Equations, Dielectric polarization, displacement Current.

Physics of Materials: Basic ideas of Dia, Para, Ferro & Ferri, Ferrites, Domain theory, Magnetic Anisotropy, Magnetostriction, B-H curve, Hard and Soft magnetic materials, Superconductivity, Superconductors as ideal diamagnetic materials, Meissner Effect, Type I & Type II superconductors, London Equations, Introduction to BCS theory.

UNIT-II

Special Theory of Relativity: Concept of Ether, Michelson Morley experiment, Einstein's postulates, Lorentz transformation equations, length, time and simultaneity in relativity, Addition of velocity, Variation of mass with velocity, Energy momentum relations.

UNIT-III

Lasers: Introduction, Spontaneous & Stimulated emissions, Einstein's Coefficients, Population Inversion, Pumping Mechanisms, Components of a laser System, Lasing action, properties of laser, Ruby, He-Ne, CO₂ and semiconductor Lasers, Characteristics of different types of lasers, Applications of lasers, Holography.

Fibre Optics: Introduction, Acceptance Angle, Numerical Aperture, Normalized Frequency, Modes of propagation, Losses in Optical Fibre, Applications of Optical Fibres.

UNIT-IV

Physics of crystallography: Unit cell, Basis, Space lattice, Crystal Systems, Miller Indices of Planes & Directions in cubic system, Continuous & Characteristic X-Rays, X-Ray Diffraction & Bragg's law in Crystals.

Nanophysics: Nanoscale, Nanoparticles(1D 2D 3D), Nanomaterials and their properties, Synthesis Methods- Ball milling and sol- gel techniques, Carbon nanotubes (Synthesis and properties), Applications of nanomaterials.

Recommended books:-

S. No	Name	Author(S)	Publisher
1	Physics for Scientists & Engineers (Vol. I &II),	Serway& Jewett, 6thEdition	Cengage Learning.
2	Engineering Physics,	Malik; HK, Singh; AK,	Tata McGraw Hill
3	Materials Science &Engg.,	Raghvan V.	Prentice Hall of India
4	Concepts of Modern Physics	Beiser; A., Mahajan; S., Choudhary; SR	Tata McGraw Hill
5	Solid State Physics	Dan Wei,	Cengage Learning
6	Introduction to Solids	Azaroff LV	Tata Mc Graw Hill
7	Introduction to Electrodynamics	Griffiths; DJ,	Prentice Hall
8	Lasers & Optical engineering	Dass; P,	Narosa Publishers
9	Optical Fibre system, Technology, Design & Applications	Kao; CK	McGraw Hill.

Course Code	MAT103-19
Course Title	Engineering Mathematics-I
Type of course	BS
L T P	4 4 0
Credits	6
Course prerequisite	+2 with non- medical
Course Objective (CO)	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students : (1) To understand the theory knowledge as well as practical knowledge of different formulas.(2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.

UNIT-I

Matrices: Basic concepts of matrices, Gauss Jordan Method, Rank of Matrices, reduction to normal form, Inverse of Matrices, Consistency and solution of linear algebraic system of equations, Orthogonal, Eigen values and Eigen vectors, Cayley Hamilton Theorem, Diagonalization of Matrix.

UNIT-II

Partial Derivatives: Function of two or more variables; Partial differentiation; Homogeneous functions and Euler's theorem ; Composite functions ; Total Derivative ; Derivative of an implicit function, Change of variable, jacobian, Applications of Partial Differentiation: Tangent and normal to a surface; Taylor's and Maclaurin's series for a function of two variables; Maxima and Minima of function of several variables; Lagrange's method of undetermined multipliers.

UNIT-III

Multiple Integrals : Double and triple integral and their evaluation.

Vector Calculus: Scalar and vector fields, differentiation of vectors, velocity and acceleration. Vector differential operators: Del, Gradient, Divergence and Curl, Directional Derivatives and Work Done by Force, Line, surface and volume integrals

UNIT-IV

Application of Vector Calculus: Solenoidal and irrotational vectors. Gauss Divergence Theorem, Green's Theorem in plane, Stoke's Theorem (without proof) and their applications.

Recommended books:-

S. No	Name	Author(S)	Publisher
1	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publishers
2	Fourier Series and Boundary Values Problems	Churchill	McGraw Hill.
3	Complex Variables & Applications	Churchill	McGraw Hill.
4	Engineering Mathematics	Bali & Iyengar	Laxmi Publication.
5	Advanced Engineering Mathematics	Wylie and Barren	McGraw Hill, 6th edition, 1995
6	Advanced Engineering Mathematics	Kreyszig, John Wiley	



Course Code	MAT104-18
Course Title	Engineering Mathematics-II
Type of course	BS
L T P	4 1 0
Credits	5
Course prerequisite	
Course Objective (CO)	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students : (1) To understand the theory knowledge as well as practical knowledge of different formulas.(2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.

SYLLABUS

UNIT-I

Probability Distributions and Sampling Distributions: Random variables, Probability Distribution: Binomial, Poisson and Normal distributions. Fundamentals of Sampling, Large samples, Small samples; Sampling distribution of the means, t-Distribution, F-Distribution, Chi-square Distribution.

UNIT-II

Ordinary Differential Equations of first order and Linear Ordinary Differential Equations of second & higher order:Exact Differential equations, Equations reducible to exact form by integrating factors; Equations of the first order and higher degree. Clairaut's equation.Leibniz's linear and Bernoulli's equation Solution of linear Ordinary Differential Equations of second and higher order; methods of finding complementary functions and particular integrals. Method of variation of parameters, Cauchy's homogenous and Legendre's linear equation.

UNIT-III

Complex Numbers and elementary functions of complex variable: De-Moivre's theorem and its applications. Real and Imaginary parts of exponential, logarithmic, circular, inverse circular, hyperbolic, functions of complex variables. Summation of trigonometric series.(C+iS method)

UNIT-IV

Measures of Central tendency and Dispersion: Measures of central tendency: Arithmetic Mean, Geometric Mean, Harmonic Mean, Quartiles, Deciles, Percentiles. Median, Mode, Skewness, Kurtosis. Measures of dispersion: Range, Interquartile range, Variance and Standard Deviation.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Higher Engineering Mathematics	Grewal, B.S.	Khanna Publishers, Delhi.
2	Advanced Engineering Mathematics	Jain, R.K and Iyengar, S.R.K.	Narosa Publishing Company
3	Statistical Methods	S P Gupta	Sultan Chand & sons Publisher



Course Code	EE101-18
Course Title	Basics Of Electrical Engineering
Type Of Course	ES
L T P	2 0 0
Credits	2
Course Prerequisites	Physics & Mathematics
Course objectives	To familiarize with AC, DC circuits & their fundamentals, Magnetic circuits & Transformer, Electrical Machines and Measuring Instruments

SYLLABUS

UNIT-I

DC Circuits

Circuits : Identifying the Elements and the Connected Terminology, Ohm's Law- Statement , Illustration and limitation, Kirchhoff's Laws –Statement and Illustration ,Method of solving a Circuits by Kirchhoff's Laws, Computation of Resistance at Constant temperature, Temperature Dependence of resistance, Computation of Resistance at different temperatures, Units – Work, Power and Energy (Electrical, Thermal and Mechanical).

UNIT-II

AC Fundamentals

Generation of Alternating Emf, Concept of 3-phase EMF Generation, Root Mean Square or Effective Value, Average value of AC, Phasor Representation of Alternating quantities, Representation of Alternating Quantities in Rectangular and Polar forms, Introduction of Resistors, Inductors and Capacitors, R-L Series Circuits, R-C Series Circuits, R-L-C Series Circuits, Admittance and its components, Resonance in Series and Parallel, Analysis of simple 3 phase system, star-delta connections and conversion.

UNIT-III

Magnetic Circuits

Comparison between Magnetic and Electric circuits, Electromagnetic Induction, Magnetic Effects of Electric Current, Current carrying conductor in Magnetic field, Law of Electromagnetic Induction, Self Inductance, Mutual Inductance ,Coupling Coefficient between two magnetically coupled Circuits.

UNIT-IV

Electrical Machines Transformer: principle, construction, working, efficiency& applications. D.C. Generator: principle, construction, working & applications. D.C. Motor: principle, construction, working & applications. Three Phase Induction Motor: principle, construction, working & applications.

Measuring Instruments

Classification of Instruments, Basic Principles of indicating instruments, Moving Iron Instruments – Attraction and Repulsion Type, Moving Coil Instruments – Permanent Magnet - Dynamometer Type, Multimeters.

Recommended Books			
Sr.No.	Name	Author	Publisher
1	Basic Electrical, Electronics and Computer Engg.	R muthusubramanian,S Salivahanan,K A Muraleedharan	Tata McgrawHill
2	A Textbook of Electrical Tech	B.L Theraja.& A.K Theraja	S Chand
3	Fundamentals of Electrical Engg	Vincent Deltoro	Prentice Hall.
4	A Course in electrical and electronic Measurements & Instrumentation	A.K Sawhney	Dhanpat Rai & co.
5	Basic Electrical Engineering	H.M Rai and S.Marwaha	Satya Prakashan, Delhi



Course Code	CSE101-18
Course Title	Fundamentals of Computer Technology
Type of Course	ES
L T P	3 0 0
Credits	3
Course Prerequisites	Basics of computer and any high level language
Course Objectives (CO)	To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++.

SYLLABUS

UNIT-I

Introduction to Computers: Define a Computer System, Block diagram of a Computer System and its working, associated peripherals, memories, RAM, ROM, secondary storage devices, Computer Software and Hardware.

Working Knowledge of Computer System and Office automation: Introduction to the operating system, its functions and types, working knowledge of GUI based operating system, introduction to word processors and its features, creating, editing, printing and saving documents, spell check, mail merge, creating power point presentations, creating spreadsheets and simple graphs

Problem Solving & Program Planning: Need for problem solving and planning a program; program design tools – algorithms, flow charts, and pseudo code; illustrative examples.

UNIT-II

Overview of C++ Language: Introduction to C++ language, structure of a C++ program, concepts of compiling and linking, IDE and its features; Basic terminology - Character set, tokens, identifiers, keywords, fundamental data types, literal and symbolic constants, declaring variables, initializing variables, type modifiers.

Operators and expressions: Operators in C++, precedence and associativity of operators, expressions and their evaluation, type conversions.

Beginning with C++ program: Input/output using extraction (>>) and insertion (<<) operators, writing simple C++ programs, comments in C++, stages of program execution.

UNIT-III

Control Structures and Functions: Decision making statements: if, nested if, if – else. Else if ladder, switch, Loops and iteration: while loop, for loop, do – while loop, nesting of loops, break statement, continue statement, goto statement, Advantages of using functions, structure of a function, declaring and defining functions, return statement, formal and actual arguments, const argument, default arguments,

Arrays and Strings: Declaration of arrays, initialization of array, accessing elements of array, I/O of arrays, passing arrays as arguments to a function, multidimensional arrays. String as array

of characters, initializing string variables, I / O of strings, string manipulation functions (strlen, strcat, strcpy, strcmp), passing strings to a function. Use of arrays and strings through illustrative programming examples.

Classes and Objects: Concept of classes, Declaration of classes, Defining access specifier, Public, Private, Protected derivations, defining member functions in a class, use of scope resolution operator outside the class definition. Defining objects. Friend function.

UNIT-IV

CAD/CAM: Introduction to the basics of CAD and CAM, Study 2-D sketching entities like lines, rectangle, parallelogram polygon, circle etc., under SKETCH ENTITY MENU.

Evolution of Internet and its applications and services.

RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1.	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
2.	Object-Oriented Programming with C++	Lafore R	Waite Group
3.	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley
4.	Fundamentals of Computers	R. S. Salaria	Salaria Publishing House

Course Code	PHY107-18
Course Title	Engineering Physics Laboratory
Type of course	BS
L T P	0 0 2
Credits	1
Course prerequisite	Nil

SYLLABUS

1. To study the magnetic field of a circular coil carrying current.
2. To find out polarizability of a dielectric substance.
3. To study the laser beam characteristics like; divergence using diffraction grating aperture.
4. To study laser interference using Michelson's Interferometer.
5. Study of diffraction using laser beam and thus to determine the grating element.
6. To determine numerical aperture of an optical fibre.
7. To determine attenuation & propagation losses in optical fibres.
8. To find out the frequency of AC mains using electric-vibrator.
9. To find the refractive index of a material using spectrometer.
10. To find the refractive index of a liquid.
11. To study B-H curve using CRO.

Course Code	EE103-18
Course Title	Basics Of Electrical Engineering Lab
Type Of Course	ES
L T P	0 0 2
Credits	1
Course Pre-requisites	Basics of Electrical Engineering
Course objectives	To familiarize with various AC, DC circuits, Transformer, Electrical Machine and Measuring Instruments

SYLLABUS

- 1) To find voltage, current relationship and power factor of a given R-L circuit.
- 2) To perform open- circuit and short circuit test on a transformer and determine the following:
 - (a) The transformation ratio (b) the transformer efficiency.
- 3) To find out the line voltage, phase voltage relationship, line current and phase current relationship in case of star and delta connected 3- phase balanced load.
- 4) To connect 3 identical single phase transformers for three phase power transformations through following connections (a) star-delta (b) star-star(c) delta-star (d) delta-delta and to find phase and line voltage ratio.
- 5) To connect, start and reverse the direction of rotation of a 3- phase induction motor.
- 6) To perform the Block Rotor test of 3-phase induction motor test.
- 7) To study various measuring instruments(Moving Iron Instruments – Attraction Type, Moving Iron Instruments – Repulsion Type, Moving Coil Instruments – Permanent Magnet Type, Moving Coil Instruments – Dynamometer Type).
- 8) To study the speed control of characteristic of D.C. Motor.
- 9) To verify the rating of compact fluorescent lamp (CFL).
- 10) To verify Ohm's Law and its limitations.
- 11) To verify Kirchhoff's Laws.
- 12) To measure the resistance and inductance of a coil by ammeter-voltmeter method.
- 13) To measure power and power factor in a single- phase AC circuit.
- 14) To verify series and parallel resonance in AC circuits.

Recommended Books		
Name	Author	Publisher
Basic Electrical, Electronics and Computer Engg.	R muthusubramanian,S Salivahanan,K A Muraleedharan	Tata McgrawHill
A Textbook of Electrical Tech	B.L Theraja.& A.K Theraja	S Chand

Course Code	CSE103-18
Course Title	Fundamental of Computer Technology Lab
Type of Course	ES
L T P	0 0 4
Credits	2
Course Prerequisites	Basics of computer and knowledge of any high level language
Course Objectives (CO)	To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++.

SYLLABUS

Familiarization with the Computer System:

- 1) To explain the part of the computer system such as system unit, input devices, output devices connected to the computer.
- 2) To explore the outside view of the system unit that includes the panels on front and ports at the rear
- 3) To explore the inside view of the system unit that includes the motherboard, processor, expansion slots, various add-on cards, storage devices, power supply, fans.
- 4) To understand the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.
- 5) To introduce the graphical user interface (desktop) of Windows operating System to explain the various elements of the desktop such as taskbar, icons (My Computer, Recycle Bin, etc.), short cuts, notification area.
- 6) To configure the desktop that includes selecting the wallpaper, selecting the screen saver with or without password protection, selecting the screen resolution and color quality.

Explore Office automation

- 1) Creating, Formatting documents with Word, explore the various toolbar options, Mail Merge, Spell Check, Word –Art.
- 2) Creating PowerPoint presentations with Power Point, Explore various views of PPT, Charts, Graphs, animation, multimedia.
- 3) Creating Sheets in Excel using formulas, chart and graphs.

Programming using C++

- 1) Implement programs using various operators in C++
- 2) Implement various Branch statements: if, if-else, nested if, switch
- 3) Implement various loop statements: for, while, do-while
- 4) Implement other control statements: go-to, exit function, continue

- 5) Implement various programs using arrays and string
- 6) Implement various programs classes and objects

Computer Aided Tools and Internet

- 1) Exercise with CAD/CAM
- 2) Internet surfing and E-mail

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1.	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
2.	Object-Oriented Programming with C++	Lafore R	Waite Group
3.	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley.
4.	Fundamentals of Computers	R. S. Salaria	Salaria Publishing House



Course Code	ME107-18
Course Title	Engineering Workshop
Programme	ES
L T P	0 0 6
Credits	3
Course Prerequisites	+2 Physics and Mathematics
Course Objectives (CO)	To become aware of different manufacturing process in industry.

SYLLABUS

1. Carpentry and Pattern making: Various types of timber and practice boards, defects in timber, seasoning of wood, tools, wood operations and joints, exercises involving use of important carpentry tools to practice various operations and making joint.
2. Foundry Shop: Introduction to moulding material, mould, melting furnaces, foundry tools and equipment's used in foundry shops; firing of a cupola furnace, exercises involving preparation of small sand moulding and casting.
3. Forging practice: introduction to forging tools; equipment's and operations forge ability of metals; exercises on simple smithy; forging exercises.
4. Machine shop: Machines ; introduction to lathe and shaper machine and its operation performed on it.
5. Welding shop: introduction to different welding methods; welding equipment's; electrodes; welding joints; welding defects; exercises involving use of gas/electric arc welding.
6. Electrical and electronics shop: introduction to electrical wiring; preparation of PCBs involving soldering applied to electrical and electronic applications; exercises preparation of PCBs involving soldering applied to electrical and electronic applications.
7. Sheet metal shop: shop development of surfaces of various objects; sheet metal forming and joining operation, joints, soldering and brazing; exercises involving use of sheet metal forming operations for small joints.
8. Fitting shop: introduction of fitting practice and tool used in fitting shop; exercise involving

marking cutting fitting practice (right angles) male female mating parts practice.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1.	Workshop Technology	HS Bawa	McGraw-Hill Publishing Company Limited
2.	Workshop Technology I,II,III	S K Hajra, Choudhary and A K Choudhary	Media Promoters and Pu blishers Pvt. Ltd., Bombay
3.	Manual on Workshop Practice	K Venkata Reddy	MacMillan India Ltd. New Delhi
4.	Basic Workshop Practice Manual	T Jeyapoovan	VikasPublishing House (P) Ltd., New Delhi



The logo of Sri Lanka Bhagwan Singh University is a circular emblem. It features a central shield with a book and a lamp, flanked by two figures. The shield is surrounded by a wreath. The outer ring of the emblem contains the text 'SRI LANKA BHAGWAN SINGH UNIVERSITY' in blue capital letters. Below the emblem is a blue ribbon with white text in Sinhala: 'සරියාලා සිත්ත මාලානුමාන ආරාමය' (Sariyala Sittamalanumaana Aramaya).

Second Semester

Course Code	CHM105-19
Course Title	Engineering Chemistry
Type of course	BS
L T P	3 0 0
Credits	3
Course prerequisite	NA
Course Objective (CO)	The objectives of the engineering chemistry are to relate the students with basic concepts of chemistry. Some new topics have been introduced to the syllabus for the development of the right attitudes by the engineering students to cope with new technology

SYLLABUS

UNIT-I

Water and its Treatment: Boiler feed water: Specification, Scales and sludge formation; Priming & foaming; Different methods of the water purifications and softening; Water for domestic use; Specifications; Disinfection of water.

Corrosion and its Prevention: Introduction; Different types of corrosion ;Wet and Dry corrosion; Mechanisms of wet & Dry corrosion; Concentration cell corrosion and differential aeration corrosion; Soil and microbial corrosions; waterline, stress corrosions; Prevention measure against corrosion.

UNIT-II

Spectroscopy and its Applications: An introduction

1). UV/Visible Spectroscopy: Selection rules; Line widths and intensities Chromophores &auxochromes; Principle and instrumentation; Electronic Transitions lines; Franck Condon principle; Applications of UV/Visible spectroscopy.

2).I.R. spectroscopy: Fundamental modes of vibrations and types; Factors affecting vibration frequency; Applications of I.R. spectroscopy.

3). NMR Spectroscopy: Principle & instrumentation; Chemical shift; Spin-Spin Splitting; applications of N.M.R. spectroscopy.

Photochemistry: Introduction; Photophysical & photochemical processes; Light sources in photochemistry; Beer Lambert Law; Laws of Photochemistry; Quantum yield (primary and overall); Primary and secondary photochemical reactions; Jablonski diagram; Semiconductor photochemistry, Photovoltaic cells Introduction to optical sensors.

UNIT-III

Green Chemistry and its Applications: Introductory overview Definition and concepts of Green chemistry; Twelve principles of Green Chemistry with emphasis on the use of alternative feedstock (bio fuels); Design of the safer chemicals; Microwave and ultrasonic radiation in Green synthesis minimizing energy consumption.

Polymers and Reinforced Composites: Introduction; Functionality; Types of polymerization; Specific features of polymers; Tactility of polymers; Average molecular weights and size; polymers; Introduction: polymer reinforced composite; Effect of molecular weight on the properties of polymers; Biodegradable polymers.

UNIT-IV

Nano-chemistry: Introduction; Materials self-assembly; Molecular vs. materials self assembly; Self-assembling materials; Two dimensional assemblies; Mesoscale self assembly; Coercing colloids; Nanocrystals; Super molecular structures Nanoscale materials; Future perspectives.

Petrochemicals: Introduction; First, second & third generation petrochemicals; Primary Raw Materials for Petrochemicals, Natural gas: Natural gas treatment processes; Natural gas liquids; Properties of natural gas; Crude oil: Composition of crude oil-Hydrocarbon compounds; Non-hydrocarbon compounds; Metallic Compounds, Crude oil classification Physical separation processes; Conversion processes; Renewable and non renewable source of energy.

RECOMMENDED BOOKS

S. No	Name	Author(S)	Publisher
1.	Engineering chemistry	J.C. Curiacose and J.Raja Ram	Tata Mcgraw-Hill Co. New Delhi.
2.	Chemical applications of infrared spectroscopy	CNR. Rao.	Academic Pres, New York.
3.	Ultra violet and visible spectroscopy chemical applications	CNR, Rao	Plenum press

Course Code	ECE101-18
Course Title	Basic Electronics & Communication Engineering
Type of Course	ES
L T P	2 0 0
Credits	2
Course Prerequisite	Knowledge of Physics
Course Objectives (CO)	To introduce basic postulates of Electronics, Boolean algebra and basic gates, and Boolean expressions, To outline the formal procedures for the analysis and design of electronics and digital circuits. Introduction to basic fundamentals of communication engineering.

SYLLABUS

UNIT-I

Semiconductor Diodes& Applications: Introduction, Semiconductor materials, Extrinsic materials: n type and p type, Semiconductor diodes, Biasing of diodes, Breakdown mechanisms, Ideal diode, Transition and diffusion capacitance, Reverse recovery time, Diode testing, Zener diode, Light emitting diodes (LEDs).Load line analysis, Half wave rectifications, full wave rectification, Clippers, Clampers, Zener diode as a voltage regulator, Voltage multiplier.

UNIT-II

Digital Electronics Fundamentals: Digital and Analog Quantities, Binary digits, Logic levels, Basic logic operations, Overview of basic logic functions, Number system: Decimal numbers, Binary numbers & its arithmetic operations, octal & Hexadecimal numbers, number system conversions, Logic gates: The inverter, The AND gate, The OR gate, The NAND gate, The NOR gate, The Exclusive OR and Exclusive NOR gates.

UNIT-III

Basic Signals & Systems: Introduction, Signals and classification of signals, Basic continuous time signals, Basic discrete time signals, System and classification of systems, Transducers.

UNIT-IV

Communication Systems: Introduction, Elements of a communication system, Classification of communication systems, Modulation and coding, Need of modulation, Multiplexing, Analog and Digital communication, Advantages of digital communication over analog communication, Microwave communication, Satellite communication, Optical communication, Cellular Mobile communication:1G, 2G, 3G, GSM. (Basic introduction to all communication systems).

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Electronics Devices & Circuits	Robert Boylested and Louise Nashelsky	Prentice Hall of India
2	Fundamental of Analog Circuits	Thomos L. Floyd and David buchla	Prentice Hall
3	Electronic Devices and Circuits	J.B Gupta	S K Kataria& Sons
4	Wireless Communications	T. L. Singal	Tata McGraw-Hill



Course Code	ENG121-18
Course Title	Communication Skills-I
Type of Course	HS
L T P	2 0 0
Credits	2
Coursepre-requisite	NA
Course Objectives	The objective of this course is to : 1.Assist the students to acquire proficiency, both in spoken and written language 2. To develop comprehension, improve writing skills, and enhance skills in spoken English.

SYLLABUS

UNIT-I

Basics of Communication Skills:

Communication, Process of Communication, Types of Communication-Verbal and Non verbal communication, Channels of Communication- Upward, Downward, Horizontal, Barriers to Communication, Role of Communication in society.

UNIT-II

Listening Skills:

Listening Process, Hearing and Listening, Types of Listening, Effective Listening, Barriers of Effective Listening, Note Taking

Reading Skills:

Purpose of reading, Process of reading, reading skills Models and strategies, scanning, skimming, SQ3R, Approaches of Reading, Comprehension passages for practice.

UNIT-III

Writing Skills:

Purpose of writing, Effective writing, Types of writing, Business Correspondence, Precise writing, Memo writing, minutes of meeting.

UNIT-IV

Speaking Skills:

Speech process, Skills of effective speaking, Role of audience, Feedback Skill, Oral Presentation.

RECOMMENDED BOOKS			
Sr No	Author(s)	Title	Publisher
1.	Bhupender Kour	Effectual Communication Skills	S.K. Kataria and Sons
2.	R. Datta Roy and K.K. Dheer	Communications Skills	Vishal Publishing Company
3	The Essence of Effective Communication	Ludlow and Panthon	Prentice Hall of India
4	Essentials of Business Communication	Pal and Rorualling	S. Chand and Sons. New Delhi



Course Code	ME103-18
Course Title	Engineering Drawing
Type of Course	ES
L T P	1 0 6
Credits	4
Course Prerequisites	Basic Mathematics
Course Objectives (CO)	Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.

SYLLABUS

UNIT-I

Introduction: Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning. Basic Definition of geometrical objects: Points, lines, planes and solids.

Scales: Representative Fraction, Types of Scale, Plain and Diagonal Scale, Scale of chords

Projection: Introduction, Principle of Projection, Method of projection, Planes of projection, Four quadrant, First and Third angle projection, Reference line, symbols for methods of projection, Orthographic projection

UNIT-II

Projection of Point: Introduction, Projection of Point situated in first, second, third & fourth quadrant.

Projection of lines: Introduction , Line parallel to One or both the planes, Line contained by

one or both the planes, Line perpendicular to one of the planes, Line inclined to one plane and parallel to other . Line inclined to both the planes, True length.

Projection of Planes: Introduction, Types of planes, Difference between plane and lamina, Projection of planes, Projection of planes perpendicular to both the reference planes, Perpendicular to one plane and parallel to other plane, Perpendicular to one plane and inclined to the other plane, Inclined to both planes.

UNIT-III

Projection of solids: Introduction, Type of solid, Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

Section of Solids: Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

Development of Surfaces: Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

UNIT-IV

Isometric Projection: Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

Orthographic Projection: Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Intersection of Surfaces/Solids: Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

Recommended Books

S.No.	Name	Author(s)	Publisher
1.	Engineering Graphics	Narayana K L and Kanaiah P	Tata McGraw Hill Publishing Company Limited, New Delhi
2.	Engineering Graphics and Drafting	P S Gill	Katria and Sons, Delhi.
3.	Elementary Engineering Drawing-Plane and solid Geometry	ND Bhat	Chartotar Publishing House, Anand
4.	A Text Book of Engg Drawing	R. K. Dhawan	S. Chand and Co. Ltd
5.	Engineering Graphics	K.L. Narayana and P.Kannaiah	Scitech Publications (India)



Course Code	CHM107-18
Course Title	Applied Chemistry Laboratory
Type of course	BS
L T P	0 0 2
Credits	1

SYLLABUS

1 Analysis of Effluents

- Determination of hardness of water by EDTA method.
- Determination of C.O.D and B.O.D in water.
- Determination of Residual Chlorine.

2. Analysis of Fuels and Lubricants

- Determination of Moisture, Volatile and ash content by proximate analysis.
- Determination of acid value of oil
- Determination of the viscosity.

3. Instrumental Analysis

- Determination of surface –tension of given liquid
- Determination of the concentration of a solution conductometrically.
- Determination of the strength of a solution pH meterically.

4.Chromatography

- Determination of R_f value of amino acid by TLC and identification of the amino acid present.
- Separation of metallic ions by paper chromatography.
- Separation of Ions by using complexing agents

5. Synthesis & Green Chemistry experiments

- Preparation of a polymer phenol/urea formaldehyde resin or •Preparation of aspirin. •Base catalyzed aldol condensation by Green Methodology •Acetylation of primary amines using ecofriendly method.

Recommended books:-

S. No	Name	Author(S)	Publisher
1.	Engineering chemistry	J.C. Curiacose and J.Raja Ram,	Tata Mcgraw-Hill Co.New Delhi.
2.	Chemical applications of infrared spectroscopy	CNR.Rao.	Acad.Pres, New York.

Course Code	ECE103-18
Course Title	Basic Electronics & Communication Engineering Lab
Type of Course	ES
L T P	0 0 2
Credits	1
Course Prerequisites	Basic knowledge of Electronics components

SYLLABUS

List of Experiments

1. Identification of Basic components of Electronics.
2. Introduction to Multimeter.
3. Introduction to working of CRO & Function Generator.
4. Component Testing: Resistance, Capacitor and Inductance.
5. Component Testing: Diode, BJTs.
6. LED testing.
7. Calculate and verify the Resistance and capacitance in series and parallel combination.
8. Verification of Basic Logic gates (AND, OR, NOT).
9. Verification of Universal Logic gates (NAND, NOR).
10. Basics practice on soldering and general purpose PCB component installation.

Course Code	ENG123-18
Course Title	Communication Skills-1 (Practical)
Type of Course	HS
L T P	0 0 2
Credits	1
Coursepre-requisite	NA
Course Objectives	The objective of this course is to provide the students sufficient practice for speaking and writing English efficiently.

SYLLABUS

UNIT-I

Speaking and Discussion Skills:

Oral Presentation, Planning and organizing content for presentation, Use of audio /Visual Aids, Making Slides for presentation , Group Discussion ,Debate, Extempore speaking, Interview Skills, Mock interview, Mock Dialogues (Pair Speaking), Cue Card Speaking, Meeting/ Conferences.

UNIT-II

Listening Skills:

Listening to any recorded material and asking oral/written questions for listening comprehension.

Reading Skills:

Active Reading of passages for Reading comprehensions, paraphrase, Summary writing.

UNIT-III

Writing Skills:

Guidelines of effective writing, Paragraph Writing, Email Writing.

UNIT-IV

Grammar and Vocabulary:

Parts of Speech, Tenses, GRE words (List of 50 Words).

The logo of Sant Baba Bhag Singh University is a circular emblem. The outer ring contains the text "SANT BABA BHAG SINGH" at the top and "UNIVERSITY" at the bottom. Inside the ring is a central design featuring a book and a torch, flanked by two figures. Below the emblem is a banner with the motto "TRUTH ALONE TRIUMPHS" in English and its Gurmukhi equivalent.

Third Semester

Course Code	CSE201-18
Course Title	Introduction to Data Structures
Type of Course	PC
L T P	4 0 0
Credits	4
Course Prerequisites	Basic knowledge of C language and C++ language
Course Objectives (CO)	This course work provides the thorough understanding of the Linear and Non- Linear Data Structures in solving problems and to give the idea of the efficiency of various algorithms.

SYLLABUS

UNIT-I

Introduction: Concept of data type, Brief description of various data structures, data structures versus data types, operations on data structures, algorithm complexity, Asymptotic Notations.

Arrays: Linear and multi-dimensional arrays and their representation, operations on arrays, sparse matrices and their storage.

Linked List: Linear linked list, operations on linear linked list, doubly linked list, operations on doubly linked list, and Variations of Linked Lists applications of linked lists.

UNIT-II

Stacks: Sequential and linked representations, operations on stacks, application of stacks such as parenthesis checker, evaluation of postfix expressions, conversion from infix to postfix representation, implementing recursive functions.

Queues: Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, linked representation of a queue and operations on it, dequeue, priority queue, applications of queues.

UNIT-III

Trees: Basic terminology, sequential and linked representations of trees, traversing a binary tree, BST, inserting a node, deleting a node, brief introduction to threaded binary trees, AVL trees and m-way tree, B-trees.

Heaps: Representing a heap in memory, operations on heaps, application of heap in implementing priority queue and heap sort algorithm.

Graphs: Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth-first search and depth-first search), and applications of graphs.

UNIT-IV

Hashing & Hash Tables: Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing. **Searching & Sorting:** Searching an element using linear search and binary search techniques, Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, shell sort and radix sort, complexities of searching & sorting

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Data Structures	Seymour Lipschutz	Tata McGraw Hill
2	Data Structures, Algorithms and Applications in C++	Sartaj Sahni	Tata McGraw Hill
3	Data Structures using C and C++	Tenenbaum, Augenstein, &Langsam	Prentice Hall of India
4	Data Structures & Algorithms Using C++	R. S. Salaria	Khanna Book Publishing Co. (P) Ltd.



Course Code	CSE203-18
Course Title	Object Oriented Programming Systems
Type of Course	PC
L T P	4 0 0
Credits	4
Course Prerequisites	Basic knowledge of Programming Language
Course Objectives (CO)	To understand the basic concepts of object oriented programming languages and to learn the techniques of software development in C++.

SYLLABUS

UNIT-I

Object-Oriented Programming Concepts: Introduction, procedural programming paradigm and object-oriented programming paradigm, comparison, concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationships among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, Messaging.

Standard Input/Output: Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators.

UNIT-II

Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers, and static members, use of *const* keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

Constructors and Destructors: Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initialize lists.

UNIT-III

Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.

Virtual Functions & Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors.

UNIT-IV

Exception Handling: Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions.

Templates and Generic Programming: Template concepts, Function templates, class templates, illustrative examples.

Files: File streams, hierarchy of file stream classes, error handling during file operations,

reading/writing of files, accessing records randomly, updating files.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Object Oriented Programming in C++	Robert Lafore	SAMS
2	Object Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
3	Mastering Object-Oriented Programming with C++	R. S. Salaria	Salaria Publishing House
4	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley
5	The Complete Reference to C++ Language	Herbert Schildt	McGraw Hill-Osborne.
6	C++ Primer	Lippman F. B	Addison Wesley
7	Object Oriented using C++	Farrell	Cengage Learning



Course Code	MAT205-18
Course Title	Engineering Mathematics-III
Type of Course	BS
L T P	4 1 0
Credits	5
Course Prerequisites	Applied Mathematics I and II
Course Objectives (CO)	This course is an introduction to a broad range of mathematical techniques for solving problems that arise in Science and Engineering. The goal is to provide a basic understanding of the derivation, analysis and use of these techniques along with a detailed understanding of Transforms in engineering applications.

SYLLABUS

UNIT-I

Fourier Series: Periodic functions, Euler's formula. Even and odd functions, Point of Discontinuous Function, Change of interval half range expansions, Fourier series of different wave forms.

Fourier Transforms: Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Sine and Cosine Integral Theorem (statement only), Fourier Cosine & Sine Transforms. Fourier, Fourier Cosine & Sine Transforms of elementary functions. Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation. Examples, Fourier Transform of Derivatives. Examples. Convolution Theorem (statement only), Inverse of Fourier Transform, Examples.

UNIT-II

Laplace Transforms: Laplace transforms of various standard functions, properties of Laplace transforms, inverse Laplace transforms, transform of derivatives and integrals, Laplace transform of unit step function, impulse function, periodic functions, applications to solution of ordinary linear differential equations with constant coefficients, and simultaneous differential equations.

UNIT-III

Partial Differential Equations: Formation of partial differential equations, Linear partial differential equations, homogeneous partial differential equations with constant coefficients Applications: Wave equation and Heat conduction equation in one dimension. Two dimensional Laplace equation, solution by the method of separation of variables. Laplacian in polar coordinates.

UNIT-IV

Functions of Complex Variable: Limits, continuity, derivative of complex functions, analytic function, Cauchy-Riemann equation, conjugate functions, harmonic functions; Conformal Mapping: Mapping of a complex function, conformal mapping, standard transforms, mapping of standard elementary transformations, complex potential, applications to fluid flow problems; Complex Integration : Line integrals in the complex plane, Cauchy's theorem, Cauchy's integral

formula and derivatives of analytic function. Taylor's and Laurent's expansions, singular points, poles, residue, complex integration using the method of residues, evaluation of real integrals by contour integration

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Higher Engineering Mathematics (Third Edition) Vol-II	Dr. K.R. Kachot.	Mahajan Pub. House, Ahmedabad.
2	Advanced Engineering Mathematics (Fifth Edition)	Erwin Kreyszig.	John Wiley
3	Higher Engineering Mathematics	Dr. B.S. Grewal.	Khanna, New Delhi.
4	Elementary Differential Equations	W.E.Boyce and R.Diprima	John Wiley
5	Fourier Series& Boundary Value Problems	R.V. Churchill & J.W. Brown	McGraw-Hill.



Course Code	ECE207-18
Course Title	Digital Electronics
Type of Course	ES
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of computer and its components.
Course Objectives (CO)	This subject gives the basic knowledge to analyse architectures and computational designs and synthesize new and better architectures.

SYLLABUS

UNIT-I

Introduction: Number system (Binary, Octal, Decimal and Hexadecimal), Signed and unsigned numbers, Binary operations: Addition, Subtraction, Multiplication and Division. Subtractions using 1's and 2's complement. Weighted & Non-weighted codes, ASCII Code, BCD Code and Gray code.

Switching Algebra: Theorems of Boolean algebra. Minimization of logic functions. Logic gates. Sum of products and product of sums. Canonical form. Minimization using K-Map and Q-M Method.

UNIT-II

Design of Combinational Circuits: Introduction, Adders, Subtractors, Multiplexers, Demultiplexers, Decoders, Encoders, Parity generators and checkers, Magnitude comparators, Code converters. Implementation of combinational circuit using MUX.

Sequential Circuits: Basic Concepts, Flip Flops: S-R, J-K, D, Master Slave J-K (Truth Tables, Circuits, and Excitation Tables), and Conversion of Flip Flops. Triggered and Clocked Flip Flops. Registers and its types. Shift Register (types, circuit diagram, timing waveforms). Counter (types, counter design with state equation, state diagrams and timing waveforms).

UNIT-III

D/A and A/D Converters: Introduction. DAC (Principle, Types and Specifications). ADC (Principle, Types and Specifications).

UNIT-IV

Memory Elements: Introduction, ROM, PROM, SRAM, DRAM and Flash Memories.

Logic Families: TTL, ECL, I^2L , NMOS, CMOS, And Comparison of Logic Families.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Digital Design	Mano, Morris	Prentice Hall of India
2	Digital Principle and Applications	Malvino	Tata McGraw Hill
3	Modern Digital Electronics	R. P. Jain	TMH

Course Code	ENG205-18
Course Title	Professional Communication Skills
Type of Course	HS
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of English grammar and sentence making.
Course Objectives (CO)	The course is career oriented which aims to develop and improve the English language and proficiency of students in order to gain confidence in public and professional life and strengthen the abilities and skills pertinent to success.

SYLLABUS

UNIT-I

Language Skills: Parts of Speech, Vocabulary, Phrase, Clause, Sentence and its types, Punctuation.

UNIT-II

Business Correspondence: Meaning of Business correspondence – Importance of Business Correspondence, Essential qualities of a business letters, types of business letters – cover letter, thank you letters, message through email and Fax. Acceptance letters, rejection letters, and withdrawal letters.

UNIT- III

Principles of communication: LSRW in communication. What is meant by LSRW Skills – Why it is important – How it is useful – How to develop the skills? Non verbal communication: Body language-Kinesics, Proxemics, Para linguistic, Chronemics Signs and symbols, Territory/Zone Oral: Speaking words, articulation and pronunciation.

UNIT- IV

Enhancing self esteem and Personality development: Self theory and the Johari window: Characteristics of fully functioning individuals, manifestations of low and high self esteem, techniques for enhancing self esteem, nurturance techniques.

Comprehension Skills: Collection of Short Stories: Khushwant Singh's *The Mark of Vishnu*

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Communication Skills	Loveleen Kaur	Satya Prakashan
2	A course in Communication Skills and English Grammatr	Tanu Gupta, Titiksha Mittal	Ajay Publications Yamuna Nagar
3	Business Communication	Varinder Kumar, Bodh Raj	Kalyani Publishers

Course Code	CSE205-18
Course Title	IT Workshop
Type of Course	PC
L T P	1 0 0
Credits	1
Course Prerequisites	Nil
Course Objectives (CO)	1. Become familiar with additional MATLAB functions and looping/conditional statements 2. Learn how to create and use MATLAB m files. 3. Learn how to write and use MATLAB functions. At the end of the workshop student will be able to use the MATLAB help facility, do simple (but large) calculations and print out graphs.

SYLLABUS

UNIT-I

Introduction to Matlab: Matlab as {best} calculator, Standard Matlab windows, Operations with variables- Naming, Checking existence, Clearing, Operations. Familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files

Arrays: Columns and rows: creation and indexing, Size & length, Multiplication, division, Power, Operations.

Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.

UNIT-II

Data and data flow in Matlab: Data types- Data types, Constants and Variables, Character constants, operators, Assignment statements. Matrix, string, cell and structure, Creating, accessing elements and manipulating of data of different types. File Input-Output Functions.

UNIT-III

Function minimization and parameters search- Polynomial fit- 1D and 2D fits, Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials. Data windowing, Error bounds. Arbitrary function fit- Error function, fixing parameters, Goodness of fit- 2 criteria, Error in parameters.

UNIT-IV

Graphics- 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart. Pre-defined dialogs, Handle graphics, Graphics objects, Properties of objects, Modifying properties of graphics objects.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	MATLAB and its Applications in Engineering	Bansal , Goel and Sharma.	Pearson Education
2	MATLAB-An Introduction with Applications	Amos Gilat	Wiley India



Course Code	CSE207-18
Course Title	Introduction to Data Structures Lab
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of C++ Programming Language
Course Objectives (CO)	Allows the students to understand the implementation of data structures.

SYLLABUS

1: Sequential Arrays

- 1.1: Insert a new element at end as well as at a given position
- 1.2: Delete an element from a given whose value is given or whose position is given
- 1.3: To find the location of a given element
- 1.4: To display the elements of the linear array

2: Linear Linked Lists

- 2.1: Insert a new element
- 2.2: Delete an existing element
- 2.3: Search an element
- 2.4: Display all the elements

3: Stacks and Queues

- 3.1: Program to demonstrate the use of stack.
- 3.2: Program to demonstration the implementation of various operations on a linear queue represented using a linear array.
- 3.3: Program to demonstration the implementation of various operations on a circular queue represented using a linear array.
- 3.4: Program to demonstration the implementation of various operations on a queue represented using a linear linked list (linked queue).

4: Sorting and Searching

- 4.1: Program to sort an array of integers in ascending order using bubble sort.
- 4.2: Program to sort an array of integers in ascending order using selection sort.

4.3: Program to sort an array of integers in ascending order using insertion sort.

4.4: Program to demonstrate the use of linear search to search a given element in an array.

4.5: Program to demonstrate the use of binary search to search a given element in a sorted array in ascending order.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Practical Data Structures Using C :: Beginner's Easy	Harry H. Chaudhary	Createspace LLC USA
2	Object Oriented Programming with C++	Balagurusamy	Tata McGraw-Hill Education
3	Data Structures through C++	Yashavant P. Kanetkar	BPB Publications



Course Code	CSE209-18
Course Title	Object Oriented Programming Systems Lab
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Fundamentals of C language and Knowledge of computer
Course Objectives (CO)	This course work is to help the students to give the practical implementation of the C++ programs

List of Practical

1: Classes and Objects

- 1.1: Write a program that uses a class where the member functions are defined inside a class
- 1.2: Write a program that uses a class where the member functions are defined outside a class.
- 1.3: Write a program to demonstrate the use of static data members.
- 1.4: Write a program to demonstrate the use of const data members.

2: Constructors and Destructors

- 2.1: Write a program to demonstrate the use of zero argument and parameterized constructors.
- 2.2: Write a program to demonstrate the use of dynamic constructor.
- 2.3: Write a program to demonstrate the use of explicit constructor.

3: Operator Overloading

- 3.1: Write a program to demonstrate the overloading of increment and decrement operators.
- 3.2: Write a program to demonstrate the overloading of binary arithmetic operators.
- 3.3: Write a program to demonstrate the overloading of memory management operators.

4: Typecasting

- 4.1: Write a program to demonstrate the typecasting of basic type to class type.
- 4.2: Write a program to demonstrate the typecasting of class type to basic type.
- 4.3: Write a program to demonstrate the typecasting of class type to class type.

5: Inheritance

- 5.1: Write a program to demonstrate the multilevel inheritance.
- 5.2: Write a program to demonstrate the multiple inheritances.
- 5.3: Write a program to demonstrate the virtual derivation of a class.

6: Polymorphism

- 6.1: Write a program to demonstrate the runtime polymorphism.

7: Exception Handling

- 7.1: Write a program to demonstrate the exception handling.

8: File Handling

- 8.1: Write a program to demonstrate the reading and writing of mixed type of data.
- 8.2: Write a program to demonstrate the reading and writing of objects.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Object Oriented Programming in C++	Lafore R.	Waite Group
2	Object Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
3	Mastering Object-Oriented Programming with C++	R. S. Salaria	Salaria Publishing House



Course Code	ECE211-18
Course Title	Digital Electronics Lab
Type of Course	ES
L T P	0 0 2
Credits	1
Course Prerequisites	Basic knowledge of Electric circuits, Logic design
Course Objectives (CO)	This course work is to help the students to give the practical implementation of the various digital electronics circuits.

SYLLABUS

1. To study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR).
2. To design and verify the operation of Half Adder and Full Adder.
3. To design and verify the operation of Half Subtractor and Full Subtractor.
4. Design a 4-bit binary to gray and gray to binary code convertor.
5. Design a 4-bit magnitude comparator using logic gates.
6. Truth table verification of Multiplexer (MUX).
7. Truth table verification of De-Multiplexer (DE-MUX).
8. Implementation and Verification of Encoder and Decoder using Logic Gates.
9. Truth table verification of flip-flops: RS, JK, D & T FLIP FLOPS.
10. Shift registers: study of SISO, SIPO, PISO, PIPO shift registers.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Lab Manual for Digital Electronics: A Practical Approach	Vance Venable , Michael Wiesner	Prentice Hall
2	Digital Electronics	Green	Pearson Education India
3	Lab Experiments--Digital Electronics, a Practical Approach	Vance Venable , Michael Wiesner	Prentice Hall

Course Code	CSE211-18
Course Title	IT Workshop Lab
Type of Course	PC
L T P	0 0 4
Credits	2
Course Prerequisites	
Course Objectives (CO)	1. Become familiar with additional MATLAB functions and looping/conditional statements 2. Learn how to create and use MATLAB m files. 3. Learn how to write and use MATLAB functions. At the end of the workshop student will be able to use the MATLAB help facility, do simple (but large) calculations and print out graphs.

SYLLABUS

List of Practical

1. Practicing MATLAB environment with simple exercises to familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.
2. Data types, Constants and Variables, Character constants, operators, Assignment statements.
3. Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.
4. Input-Output functions, Reading and Storing Data.
5. Vectors and Matrices, commands to operate on vectors and matrices, matrix Manipulations.
6. Arithmetic operations on Matrices, Relational operations on Matrices, Logical operations on Matrices.
7. Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials.
8. Graphics: 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	MATLAB and its Applications in Engineering	Bansal , Goel and Sharma.	Pearson Education
2	MATLAB-An Introduction with Applications	Amos Gilat	Wiley India

The logo of Sant Baba Bhag Singh University is a circular emblem. The outer ring contains the text "SANT BABA BHAG SINGH UNIVERSITY" in blue capital letters. Inside this ring is a green wreath. At the center of the wreath is a blue shield featuring a white cross and a white book. Below the circular emblem is a blue ribbon banner with white text in Gurmukhi script.

Fourth Semester

Course Code	CSE202-18
Course Title	Discrete Structures
Type of Course	PC
L T P	4 0 0
Credits	4
Course Prerequisites	Basic Mathematics
Course Objectives (CO)	Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students: (1) To understand the theory knowledge as well as practical knowledge of different formulas. (2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.

SYLLABUS

UNIT-I

Graph theory: Graph- Directed and undirected, Eulerian chains and cycles, Hamiltonian chains and cycles, Trees, Chromatic number Connectivity, Graph coloring, Plane and connected graphs, Isomorphism and Homomorphism. Applications.

UNIT-II

Sets and functions: Introduction, Combination of Sets, ordered pairs, proofs of general identities of sets, relations, operations on relations, properties of relations and functions, Hashing Functions, equivalence relations, compatibility relations, and partial order relations.

Monoids and groups: Groups Semigroups and monoids Cyclic semigroups and submonoids, Subgroups and Cosets, Congruence relations on semigroups, Morphisms. Normal subgroups, Structure of cyclic groups.

UNIT-III

Boolean algebra: Boolean algebra, direct product, morphisms Boolean, sub-algebra Boolean Rings Application of Boolean algebra (Logic Implications, Logic Gates, Karnaughmap).

UNIT-IV

Probability: Sample spaces, events and probability functions, Examples using counting methods, sampling with and without replacement, Algebra of events, Conditional probability, partitions of sample space theorem of total probability. Bayes theorem, independence, Random variables, Probability mass functions. Discrete distributions, Bernoulli binomial, Poisson, geometric

Expectation mean and variance independence for discrete random variables.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Discrete Mathematics	Schaum series by Lipschutz	McGraw Hill
2	Applied Discrete Structures for Computer Science	Alan Doerr and Kenneth Levarseur.	Science Research Associates
3	Discrete Mathematics	N Ch SN Iyengar, VM Chandrasekaran.	Vikas Publishing
4	Discrete Mathematics and Graph Theory	Sartha	Cengage Learning
5	Discrete Mathematics and its Applications.	Kenneth H Rosen	McGraw Hill



Course Code	CSE204-18
Course Title	Computer Organization & Design
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of computer and its components.
Course Objectives (CO)	This subject gives the basic knowledge to analyse architectures and computational designs and synthesize new and better architectures.

SYLLABUS

UNIT-I

Introduction: Introduction to computer system and its sub-modules, Number System and Representation of information.

Register Transfer and Micro operations: Register transfer language & operations, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit. Design of a complete basic computer and it's working.

UNIT-II

Basic Computer Organisation and Design: Instruction codes, Computer registers, Computer Instructions, Timing and control, Instruction Cycle, Memory reference instructions, Input/Output and Interrupt, Design of basic Computer, Design of Accumulator Logic.

Design of Control Unit: Control memory, Hardwired control CPU design, Micro-programmed control CPU design and their comparative study.

UNIT-III

Central Processing Unit: General Register Organisation, Stack Organisation, Instruction formats, Addressing Modes, Data transfer and manipulations, Program control, RISC and CISC architecture.

Input-Output Organisation: Peripheral devices, I/O Interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA, I/O processor, serial communication.

Memory Organisation: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

UNIT-IV

Pipelining: Introduction to pipelining and pipeline hazards, design issues of pipeline architecture.

Introduction to Parallel Processing: Inter-process or communication & synchronization. Cache in multiprocessor systems and related problems, Cache coherence protocols.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Advanced Computer Architecture	Kai Hawang	Tata McGraw Hill

2	Computer Organization and Design	P.PalChoudhary	PHI
3	Computer System Architecture	M.Moris Mano	Pearson
4	Computer Organization and Architecture	William Stallings	Pearson



Course Code	CSE206-18
Course Title	Operating Systems
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Overview of Computer Architecture
Course Objectives (CO)	This course provides the knowledge about the role of an operating system, issues in the management of resources like processor, memory and input-output, design of an operating system.

SYLLABUS

UNIT-I

Introduction: Operating Systems functions, Types of operating systems, Multiprogramming systems, Batch systems, Time-sharing systems, Operating system operations, Special purpose operating systems, distributed systems, Different computing environments.

UNIT-II

Operating System Organization: Processor and user modes, user operating system interface, Kernels, System calls and its types, System programs, Operating system structures, Virtual machines.

Process Management: Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multi-threading models, Non-pre-emptive and pre-emptive scheduling algorithms, Concurrent processes, Critical section, Semaphores, methods for inter-process communication, Deadlocks.

UNIT-III

Memory Management: Physical and virtual address space, Memory allocation strategies, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.

File and I/O Management: Directory structure, File operations, Files system mounting, File allocation methods, Device management, Disk scheduling algorithms.

UNIT-IV

OS and Security: Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access control lists and OS support, internet and general network security, Policy mechanism, Program, network and system threats, Authentication.

Case Study : UNIX and LINUX operating systems

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Operating Systems Concepts	A Silberschatz, P.B. Galvin, G. Gagne	John Wiley Publications
2	Operating Systems: A Modern	G. Nutt	Pearson Education

	Perspective		
3	Modern Operating Systems	A.S. Tanenbaum	Pearson Education
4	Operating Systems, Internals & Design Principles	W. Stallings	Prentice Hall of India



Course Code	CSE208-18
Course Title	Database Design & Management
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Elementary knowledge about computers including some experience using Windows. Basic knowledge about programming in some common programming language.
Course Objectives (CO)	This subject assesses new developments in database technology. It Interpret and explain the impact of emerging database standards and Evaluate the contribution of database theory to practical implementations of database management systems

SYLLABUS

UNIT-I

Introduction to Databases and Transactions: database system, purpose of database system, File based system, view of data, database architecture,

Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

Database Design ER-Diagram: Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas.

UNIT-II

Relational database Model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization.

Relational Algebra and Calculus: Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

UNIT-III

Constraints, Views and SQL: Database Languages, Constraints and its types, Integrity constraints, Views: Introduction to views, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations.

UNIT-IV

Transaction management and Concurrency control: Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management

Database Security and Authorization: Introduction to Database Security Issues, Discretionary Access Control Based on Granting/Revoking of Privileges, Introduction to Statistical Database Security.

Advance Topic: OLAP, data mining, data warehouse, Timestamp database, multimedia database, geographical database, spatial database

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Fundamentals of Database Systems, Third Edition	Elmasri/Navathe	Addison Wesley
2	Database Concepts	Korth and Silberschatz Abraham,	McGraw Hall
3	An introduction to Database Systems	C.J.Date.	Addison Wesley
4	An introduction to Database Systems	Bipin C. Desai.	West Publishing
5	SQL,PL/SQL ,The programming language of oracle	Ivan Bayross	BPB Publication



Course Code	EVS101-18
Course Title	Environmental Science
Type of course	MC
L T P	3 0 0
Credits	NC
Course prerequisite	Nil
Course Objective (CO)	To make students aware about environment and need of maintaining it with best possible knowledge.

SYLLABUS

UNIT-I

Introduction to Environment and Ecosystem: Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness, Concept of Ecosystem, Structure, interrelationship, producers, Consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity.

UNIT-II

Environmental Pollution & Natural Resources: Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster Management: Floods, earthquake, cyclone and landslides, Natural Resources and associated problems, use and over exploitation, case studies of forest mresources and water resources.

UNIT-III

Social Issues and the Environment :From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation.Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation

UNIT-IV

Human Population and the Environment & Field Work: Population growth, variation among nations. Population explosion –Family Welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies
Visit to a local area to document environemntal assetsriver/forest/grassland/hill/mountain;Visit to a local polluted site-Urban/Rural/Industrial/Agricultural;Study of common plants, insects, birds;Study of simple ecosystems-pond, river, hill slopes, etc.

RECOMMENDED BOOKS:

S. No	Name	Author(S)	Publisher
1	A Textbook for Environmental Studies	Erach Bharucha	Orient BlackSwan
2	Environmental Biology,	Agarwal, K.C. 2001	Nidi Publ. Ltd. Bikaner.
3	Environmental Science,	Miller T.G. Jr.	Wadsworth



Course Code	ECE212-18
Course Title	Microprocessor
Type of Course	ES
L T P	4 0 0
Credits	4
Course Prerequisites	Digital Electronics
Course Objectives (CO)	To introduce the students with the basics of microprocessor and its needs, develop the capability to write assembly language programs and understand how the hardware and software components of microprocessor work together to develop microprocessor based system.

SYLLABUS

UNIT-I

8085 Microprocessor: Introduction to Microprocessor, Difference between Microprocessor and CPU, Evolution & history of microprocessors, application areas of microprocessors, 8085 architecture, pin diagram, demultiplexing of address and data bus, addressing modes, 8085 instruction set, programming of 8085, stack and subroutines, interrupts of 8085.

UNIT-II

8086 Microprocessor: 8086 internal architecture, 8086 pin configuration and timing, memory segmentation, minimum and maximum mode configuration, interrupts, instruction set of 8086, programming of 8086

UNIT-III

Microprocessor system peripheral and interface : Introduction to interfacing, memory mapped I/O and I/O mapped I/O, block diagram and modes of operation of interfacing devices like 8255,8254,8259,USART .

UNIT-IV

Microprocessor applications: Interfacing of single and multiple digitseven-segment LED output display. Interfacing of DAC & ADC. Applications like Temperature measurement and control, water level indicator, measurement and display of motor speed and traffic light control system.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S. Gaonkar	Penram International
2	Advanced Microprocessors & Interfacing	Badri Ram	Tata MC Graw Hill

3	Microprocessor Principles and Applications	Charles M. Gilmore	Tata MC Graw Hill
4	Microprocessors and Interfacing programming and Hardware	Douglas V. Hall	Tata MC Graw Hill



Course Code	CSE210-18
Course Title	Operating System Lab
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of Operating System, DOS Commands
Course Objectives (CO)	To provide the understanding of the operating system operation and inter-process communication.

SYLLABUS

List of Practicals

1. Simulation of the CPU scheduling algorithms:
 - a) Round Robin
 - b) SJF
 - c) FCFS
 - d) Priority
2. Simulation of continuous memory management allocation techniques :
 - a) First Fit
 - b) Best Fit
 - c) Worst Fit
3. Simulation of page Replacement Algorithms:
 - a) FIFO
 - b) LRU
 - c) OPT
4. Simulation of file allocation Strategies:
 - a) Sequential
 - b) Indexed
 - c) Linked
5. Simulation of file organization techniques:
 - a) Single Level Directory
 - b) Two Level
- 7: Unix Commands
8. Reading from a file, Writing into a file , File Creation

RECOMMENDED BOOKS

Sr. no.	Name	Author(S)	Publisher
1	Practical Linux Programming: Device Drivers, Embedded Systems	Ashfaq A. Khan	Firewall Media
2	A Practical Guide to Linux Commands, Editors, and Shell Programming	Mark G. Sobell	Pearson Education
3	A Practical Guide to UNIX System V Release 4	M. G. Sobell	Benjamin/Cummings

			Publishing Company
4	100 Shell Programs in Unix	Sarika Jain	Pinnacle Technology



Course Code	CSE212-18
Course Title	Database Design and Management Lab
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of Program Development Constructs
Course Objectives (CO)	This practical course work allows the students to efficiently design a working software model.

SYLLABUS

List of Practicals

1: Introduction To DBMS And Its Applications

1.1: Introduction to DBMS and its applications.

2: Study Of SQL Statements

2.1: Data types, creating tables, retrieval of rows using select statement, conditional retrieval of rows, alter and drop statements.

2.2: working with null values, matching a pattern from a table, ordering the result of a query, aggregate functions, grouping the result of a query, update and delete statements.

3: Operators

3.1: arithmetic operators- add, subtract, multiply, divide

3.2: rename field

3.3: logical operations-and, or, not

4: Other Operations

4.1: aggregate function- average, minimum, maximum, sum, count, count(*)

4.2: numeric functions- absolute, power, sqrt, round

4.3: string functions: lower, upper, initcap, length, ltrim, rtrim, substring, lpad, rpad

5: T-SQL: Transact Structured Query Language

5.1: Implement grants and revoke commands, commit and rollback commands.

5.2: program to write a pl/sql block which inserts a record in the table and applies rollback and commit in it.

6: Joins And Sequences

6.1: program to illustrate use of join.

6.2: program to illustrate use of sequence.

7: View And Indexes

7.1: create a view.

7.2: create an index.

8: Introduction To PL/SQL

8.1: introduction to PL/SQL, basic code structure, difference b/w SQL and PL/SQL

8.2: study PL/SQL control structure

- Conditional control-if and case statements
- Iterative control-loop and exit statements
- Sequential control-goto and null statements

8.3: programs

- Program to find greatest of two numbers
- Program to find greatest of three numbers
- Program to perform addition, subtraction, multiplication, division according to user's choice
- Program to print first n natural numbers.
- Program to print first n natural numbers using for loop.
- Program to print table of a number entered by user
- Program to show the use of goto statement.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	DBMS – Complete Practical Approach	Sharad Maheshwari, Ruchin Jain	Firewall Media
2	Database Systems: A Practical Approach To Design, Implementation And Management	Connolly	Pearson Education India
3	Fundamentals of Database Systems	Ramez Elmasri	Pearson Education India

Course Code	ECE214-18
Course Title	Microprocessor Lab
Type of Course	ES
L T P	0 0 2
Credits	1
Course Prerequisites	Familiar with Binary Code and mnemonic code in microprocessor
Course Objectives (CO)	Introduce to the students to assembly language and functioning of microprocessors

SYLLABUS

List of Practical

1. Introduction to 8085 kit.
2. Addition of two 8 bit numbers, sum 8 bit.
3. Subtraction of two 8 bit numbers.
4. Find 1's complement of 8 bit number.
5. Find 2's complement of 8 bit number.
6. Shift an 8 bit no. by one bit.
7. Find Largest of two 8 bit numbers.
8. Find Largest among an array of ten numbers (8 bit).
9. Sum of series of 8 bit numbers.
10. Introduction to 8086 kit.
11. Addition of two 16 bit numbers, sum 16 bit.
12. Subtraction of two 16 bit numbers.
13. Find 1's complement of 16 bit number.
14. Find 2's complement of 16 bit number.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	8085 Microprocessor	Ramesh Gaonkar	PHI Publications
2	Microprocessors and Interfacing: Programming and Hardware	Douglas V. Hall	Tata McGraw Hill Edition, 1986

3	Microprocessors: Principles and Applications	Charles M.Gilmore	McGraw Hill
4	The 8086 Microprocessor Programming and Interfacing	Ayala Kenneth	Cengage Learning
5	Microprocessor, Architecture, Programming, & Applications with the 8085	Ramesh Gaonkar	Penram Intl. Publishing (India) Pvt.





Fifth Semester

Course Code	CSE301-18
Course Title	Principles of Software Engineering and Design
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Overview of Structure and Software Analysis and Design
Course Objectives (CO)	This Course Work provides the thorough understanding of the software engineering concepts and it also gives the ideas of handling the projects in the organizations and in institutes

SYLLABUS

UNIT-I

Introduction: Software Engineering definition, history, evolution of software, software components, applications, software myths, software crisis.

Software Development Life-cycle: Requirements analysis, software design, coding, testing, maintenance

Software Process Models: Waterfall model, prototyping, interactive enhancement, spiral model. Role of Management in software development. Role of metrics and measurement.

UNIT-II

Software Requirement Specification: Problem analysis, requirement specification, validation, metrics, monitoring and control, SRS

System Design: Problem partitioning, abstraction, top-down and bottom-up design, Structured approach. Functional versus object-oriented approach, design specification and verification metrics, monitoring and control, UML.

UNIT-III

Coding: Top-down and bottom-up, structured programming, information hiding, programming style, and internal documentation. Verification, Metrics, monitoring and control.

Testing: Levels of testing functional testing, structural testing, test plane, test cases specification, and reliability assessment.

UNIT-IV

Software Project Management: Cost estimation, Project scheduling, Staffing, Software configuration management, Quality assurance, SIX SIGMA, Project Monitoring, Risk management, reverse engineering

CASE Tools

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Engineering: A Practitioners Approach	Roger Pressman	McGraw Hill
2	Software Engineering	Sommerville	Adison Wesley
3	Managing software process	Watts Humphrey	Pearson education
4	Software Engineering – An Engineering Approach	James F. Peters and WitoldPedrycz	Wiley



Course Code	CSE303-18
Course Title	Design & Analysis of Algorithms
Type of Course	PC
L T P	3 1 0
Credits	3
Course Prerequisites	Data Structures, C, C++ Programming language
Course Objectives (CO)	This course provides the ability to understanding the computational problem. To be able to devise fast and practical algorithms for real-life problems using the algorithm design techniques and principles learned in this course.

SYLLABUS

UNIT-I

Introduction: Introduction to algorithm. Review of elementary data structures, Time and space complexity of an algorithm. Performance Analysis. Different orders of growth. Asymptotic notations. Polynomial and Exponential running time of an algorithm. Recurrence relations, Concept of hashing. MAXMIN algorithms.

Algorithm Design Techniques: Divide-and-conquer, Sorting, Median Finding, Greedy approach, Randomization, and Dynamic Programming, Branch and Bound, Backtracking. Knapsack problems and algorithms illustrating the use of these techniques.

UNIT-II

Sorting and Searching: Binary search in an ordered array. Sorting algorithms such as Merge sort, Quick sort, Heap sort, Radix Sort, and Bubble sort with analysis of their running times. Lower bound on sorting. Median and order statistics.

Graph: Graph traversal algorithms: breadth-first search (BFS) and depth-first search (DFS). Applications of BFS and DFS. Topological sort. Shortest path algorithms in graph: Dijkstra and Bellman-Ford. Minimum spanning trees, Travelling salesman problem, Kruskal's algorithm, Prim's algorithm, single source shortest paths, Relaxation, Floyd-Warshall algorithm, Johnsons algorithm.

UNIT-III

NP-Completeness: Definition of class NP. NP-hard and NP-complete problems. SAT, 3SAT is NP-complete. Proving a problem to be NP-complete using polynomial-time reductions. Examples of NP-complete problems. Approximation algorithms for various NP-complete problems.

UNIT-IV

Pattern Matching Algorithms: Knuth-Morris-Pratt algorithm. Algorithms in Computational

Geometry: Convex hulls. Fast Fourier Transform (FFT) and its applications. Integer and polynomial arithmetic. Matrix multiplication: Strassen's algorithm.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Design and Analysis of Algorithms	Sartaj Sahni	Silicon PR.
2	Let Us C	Yashwant Kanitkar	BPB Publications
3	Object Oriented Programming Using C++	E.Balagurusamy	Tata McGraw Hill Education



Course Code	CSE305-18
Course Title	Finite Languages and Automata Theory
Type of Course	PC
L T P	3 1 0
Credits	4
Course Prerequisites	Basic knowledge of Discrete mathematics and System programming
Course Objectives (CO)	This course provides the basic knowledge of concepts in automata theory and theory of computation. Allows the students to design grammars and recognizers for different formal languages.

SYLLABUS

UNIT-I

Basic Theory of Automata: Sets, Relation, Functions, Alphabet, String, Languages Finite Automata: Formal Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ -moves, Equivalence of NFA and DFA, Minimization of finite automata, Two-way finite automata, Moore and Mealy machines, Applications of finite automata b) Regular Expression: Definition, Algebraic Laws, Conversion of R.E to F.A, F.A to R.E , Applications, Regular grammar for F.A.

UNIT-II

Regular Sets and Context Free Grammars: Properties of regular sets, Context-Free Grammars – Derivation trees, Chomsky Normal Forms and Greibach Normal Forms, Ambiguous and unambiguous grammars.

Pushdown Automata and Parsing Algorithms: Pushdown Automata and Context-Free Languages; Top-down parsing and Bottom-up parsing, Properties of CFL, Applications of Pumping Lemma, Closure properties of CFL and decision algorithms, Chomsky hierarchy.

UNIT-III

Turing Machines: Turing machines (TM) – computable languages and functions –Turing Machine constructions – Storage in finite control.

Variations of TMs: Variations of TMs – Recursive and Recursive enumerable languages, Recursive Function, Partial and Total Recursive Function, Primitive Recursive Function.

UNIT-IV

Introduction to Computational Complexity: Time and Space complexity of TMs –Complexity classes – Introduction to NP-Hardness and NP-Completeness, PCP Problem, Concept of decidability & undecidability. Unit 7: Cellular Automata:- DNA computing, Membrane computing.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft and Jeffrey D. Ullman	Narosa Publishers

2	Theory of Computer Sc. (Automata, Languages & Computation)	K.L..P. Mishra & N. Chandershekar	PHI
3	Introduction to the Theory of Computations	Michael Sipser	Brooks/Cole, Thomson Learning,
4	Introduction to Languages and the Theory of Computation	John C. Martin	Tata McGraw-Hill



Code	SSC303-18
Course Title	Human Values and Professional Ethics
Type of Course	HS
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objectives (CO)	1. To help the students to discriminate between valuable and superficial in the life. 2. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. 3. This Course will encourage the students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. This course is an effort to fulfill our responsibility to provide our students significant input about understanding

SYLLABUS

UNIT-I

Course Introduction- Need, Basic Guidelines, Content and Process for Value Education : Understanding the need, basic guidelines, content and process for Value Education, Understanding Happiness and Prosperity correctly.

Understanding Harmony in the Human Being : Understanding the harmony with self and the Body: Sanyam and Swasthya.

UNIT-II

Harmony in Human Relationship: Understanding harmony in the Family- the basic unit of human interaction, visualizing a universal harmonious order in society

Understanding Harmony in the Nature and Existence: Understanding the harmony in the Nature, Holistic perception of harmony at all levels of existence

UNIT-III

Understanding of Harmony on Professional Ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.

UNIT-IV

Strategy for transition from the present state to Universal Human Order: At the level of

individual, at the level of society.

Case studies: Typical Holistic Technologies, Management models and production systems

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	A Foundation Course in Value Education	R R Gaur, R Sangal, G P Bagaria	Excel Books Publishers
2	Energy & Equity	Ivan Illich	The Trinity Press, Worcester, and HarperCollins, USA
3	Human Values and Professional Ethics	Rishabh Anand	Satya Prakashan, New Delhi
4	Jeevan Vidya ek Parichay.	A Nagraj	Divya Path Sansthan, Amarkantak



Course Code	PLS303-18
Course Title	Constitution of India
Type of Course	MC
L T P	3 0 0
Credits	NC
Course Prerequisites	Nil
Course Objectives (CO)	1. To enable the student to study and understand the basics of Indian Constitutions 2. To aware the learners about the duties of Citizens. 3. To acquaint the learners with political vocabulary. 4. To aware them about roots of Indian constitution and its relevance in present scenario. 5. To acquaint the learners with various posts and procedure for election.

SYLLABUS

UNIT-I

Constitution of India: - Basic features of the Indian Constitution: Sovereign, Socialist, Secular and Democratic Republic, Preamble of the Constitution of India: Text and features of Indian Federation and its importance, Nature of Indian Federalism and Centre-State Relations

UNIT-II

Fundamental Duties: Fundamental Duties included in the Constitution, Importance of Fundamental Duties, Directive Principles of the State Policy: Nature and Classification of Directive Principles, Criticism & Importance of Directive Principles, Parliament: Characteristics, Powers & Actual role of Parliament, Decline in the position of Parliament.

UNIT-III

President: Method & Stages of President Election, Powers and Position of the President, Prime Minister: Appointment of the Prime Minister, Powers, Changing role of Prime Minister, Supreme Court: Its Composition, Powers and Functions of Supreme Court, Position and Independence of judiciary.

UNIT-IV

Governor: Appointment, Powers and position of the Governor, Chief Minister: Powers and Position of the State Council Minister & Chief Minister, High Court: Its Composition, Powers and Functions of Supreme Court

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	M.V. Pylee	Constitutional Government in India	Asia Publishing House.
2	D.D. Basu	An Introduction to the Constitution of India	Sterling publishers, New Delhi.

3	M.P. Jain	Political Theory	Guild Publication, Delhi
4	S.P.Verma	Modern Political Theory	General Publishing House, New Delhi.



Course Code	CSE307-18
Course Title	Principles of Software Engineering & Design Lab
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Knowledge of Program Development Constructs
Course Objectives (CO)	This practical course work allows the students to efficiently design a working software model.

SYLLABUS

1: Use Case Models

- 1.1: To develop a problem statement.
- 1.2: Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
- 1.3: Identify Use Cases and develop the Use Case model.

2: UML Diagrams

- 2.1: Identify the business activities and develop an UML Activity diagram.
- 2.2: Identify the conceptual classes and develop a domain model with UML Class diagram.
- 2.3: Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
- 2.4: Draw the State Chart diagram.
- 2.5: Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.

3: Implementations of Layers

- 3.1: Implement the Technical services layer.
- 3.2: Implement the Domain objects layer.
- 3.3: Implement the User Interface layer.
- 3.4: Draw Component and Deployment diagrams.

4: Mini- Projects Using UML

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design	Jim Arlow, Ila Neustadt	Pearson Education
2	Practical Object-Oriented Design With Uml	Priestley	Tata McGraw-Hill Education
3	Object-Oriented Software Engineering: Practical Software Development Using UML and Java	Lethbridge	Tata McGraw-Hill Education

Course Code	CSE309-18
Course Title	Design and Analysis of Algorithms Lab
Type of Course	PC
L T P	0 0 4
Credits	2
Course Prerequisites	Knowledge of C++ Programming Language Concepts
Course Objectives (CO)	Makes the students proficient in implementing algorithms using the algorithm design techniques.

SYLLABUS

1. Array

- 1.1: WAP. Two code and analyze to compute greatest common divisor of two numbers.
- 1.2: WAP two code and analyze to find the mid element in an array.
- 1.3: WAP. To code to analyze to find maximum and minimum element (without MAXMIN algorithm) in array.
- 1.4: WAP. To code and analyze to find the largest element in an array.
- 1.5: WAP. To code to analyze to enter elements in an array.

2. Searching

- 2.1: WAP. To find maximum and minimum element choosing MAXMIN algorithm.
- 2.2: WAP to code and analyze to find an element using binary search and find its time complexity.

3. Sorting

- 3.1: WAP. To code and analyze to short an array of integer using HEAP Sort.
- 3.2: WAP. To code and analyze to short an array of integer using Merge Sort.

4: Pattern Matching

- 4.1: WAP. To code and array analyze to find all occurrence of pattern in a given string.

5: Shortest Path Algorithm

- 5.1: WAP. To code and analyze to find minimum path using Kruskal's Algorithm.

6: Dynamic Programming

- 6.1: WAP. To code and analyze to find the distance between two characters strings using Dynamic programming.

7: Divide and Conquer

- 7.1: WAP to code and analyze to find an element using linear search by applying divide and conquer technique and find its time complexit

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	The Algorithm Design Manual	Steven S Skiena	Springer Science & Business Media
2	Object Oriented Programming with C++	Balagurusamy	Tata McGraw-Hill Education
3	Object Oriented Programming Using C++	Jaspreet Singh, Mrs. Pinki Parampreet Kaur	Technical Publications

Course Code	CSE313-18
Course Title	Mobile Application Development
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Students are expected to have basic knowledge of JAVA, HTML, Javascript and CSS
Course Objectives (CO)	Students will learn the basics of the programming language, designing mobile interfaces, using libraries to build applications, user input and other aspects.

SYLLABUS

UNIT-I

Introduction To Mobile Devices

Mobile devices vs. desktop devices, ARM and intel architectures, Power Management, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store, Development environments ,Xcode, Eclipse, VS2012, PhoneGAP, Native vs. web applications

Mobile Applications

Introduction to mobile computing, mobile applications , Embedded systems, Market and business drivers for mobile applications , Publishing and delivery of mobile applications , Requirements gathering and validation for mobile applications

UNIT-II

Mobile OS Architectures

Comparing and Contrasting architectures of all three – Android, iOS and Windows , Underlying OS (Darwin vs. Linux vs. Win 8) , Kernel structure and native level programming , Runtime (Objective-C vs. Dalvik vs. WinRT), Approaches to power management , Security

Basic Design

Introduction , Basics of embedded systems design , Embedded OS Design constraints for mobile applications, both hardware and software related , Architecting mobile applications , user interfaces for mobile applications , touch events and gestures , Achieving quality constraints , performance, usability, security, availability and modifiability.

UNIT-III

Advanced Design

Designing applications with multimedia and web access capabilities, Integration with GPS and social media networking applications, Accessing applications hosted in a cloud computing environment, Design patterns for mobile applications.

Technology I - Android

Introduction , Establishing the development environment , Android architecture , Activities and

views , Interacting with UI , Persisting data using SQLite , Packaging and deployment , Interaction with server side applications , Using Google Maps, GPS and Wifi, Integration with social media applications.

UNIT-IV

Technology II - iOS

Introduction to Objective C ,iOS features , UI implementation , Touch frameworks , Data persistence using Core Data and SQLite , Location aware applications using Core Location and Map Kit , Integrating calendar and address book with social media application , Using Wifi iPhone marketplace.

Mobile Device Security

Mobile malware, Device protections, iOS “Jailbreaking”, Android “rooting” and Windows’ “defenestration”.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Professional Mobile Application Development	Jeff McWherter and Scott Gowell	Wrox
2	Android in Practice	Charlie Collins, Michael Galpin and Matthias Kappler	DreamTech
3	Beginning iOS 6 Development: Exploring the iOS SDK	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson	Apress

Course Code	CSE315-18		
Course Title	Programming in Java		
Type of Course	PE		
L T P	3 0 0		
Credits	3		
Course Prerequisites	Knowledge of OOPs		
Course Objectives (CO)	1. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 2. Be aware of the important topics and principles of software development. 3. Be able to use the Java SDK environment to create, debug and run simple Java programs. 4. Understand the principles of inheritance, packages and interfaces		
SYLLABUS			
UNIT-I Object oriented programming concepts, objects, classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism, Objects and classes in Java, defining classes, methods, access specifiers, static members, constructors, finalize method			
UNIT-II Arrays, Strings, Packages, Java-Doc comments, Inheritance, class hierarchy, polymorphism, dynamic binding, final keyword, abstract classes			
UNIT-III The Object class, Reflection, interfaces, object cloning, inner classes, proxies, I/O Streams, Graphics programming, Frame, Components, working with 2D shapes.			
UNIT-IV Basics of event handling, event handlers, adapter classes, actions, mouse events – AWT event hierarchy, introduction to Swing, Model-View-Controller design pattern – buttons, layout management, Swing Components, exception handling, exception hierarchy, throwing and catching exceptions.			
RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Core Java: Volume I – Fundamentals	Cay S. Horstmann and Gary Cornell.	Sun Microsystems Press
2	The JAVA programming language	K. Arnold and J. Gosling	Pearson Education

Course Code	CSE317-18
Course Title	Computer Graphics and Visualization
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer graphics (basics), linear algebra, programming
Course Objectives (CO)	The main objective of this course is to give the student a comprehensive understanding of computer graphics and visualisation and their applications. In particular participants will have the ability to understand the process of generating virtual images from virtual scenes, typically identified as a pipeline of generate, compute and store/display.

SYLLABUS

UNIT-I

Introduction - History of computer graphics, applications, graphics pipeline, physical and synthetic images, synthetic camera, modeling, animation, rendering, relation to computer vision and image processing, review of basic mathematical objects (points, vectors, matrix methods)

Introduction to OpenGL - OpenGL architecture, primitives and attributes, simple modeling and rendering of two- and three-dimensional geometric objects, indexed and RGB color models, frame buffer, double buffering, GLUT, interaction, events and callbacks, picking.

UNIT-II

Geometric transformations- Homogeneous coordinates, affine transformations (translation, rotation, scaling, shear), concatenation, matrix stacks and use of modelview matrix in OpenGL for these operations.

Viewing - Classical three dimensional viewing, computer viewing, specifying views, parallel and perspective projective transformations; Visibility- z-Buffer, BSP trees, Open-GL culling, hidden-surface algorithms.

UNIT-III

Shading - Light sources, illumination model, Gouraud and Phong shading for polygons. Rasterization- Line segment and polygon clipping, 3D clipping, scan conversion, polygonal fill, Bresenham's algorithm.

UNIT-IV

Discrete Techniques- Texture mapping, compositing, textures in OpenGL; Ray Tracing- Recursive ray tracer, ray-sphere intersection.

Representation and Visualization- Bezier curves and surfaces, B-splines, visualization, interpolation, marching squares algorithm.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Interactive Computer Graphics. A Top-Down Approach Using	Edward Angel	Pearson Education

	OpenGL		
2	Computer Graphics with OpenGL	Donald Hearn and Pauline Baker	Prentice Hall
3	Computer Graphics using OpenGL	F. S. Hill Jr. and S. M. Kelley	Prentice Hall
4	Computer Graphics (first edition)	Peter Shirley and Steve Marschner	A. K. Peters



The logo of Sant Baba Bhag Singh University is a circular emblem. The outer ring contains the text "SANT BABA BHAG SINGH" at the top and "UNIVERSITY" at the bottom. Inside the ring is a central shield-like shape with a green wreath and a blue and white design. Below the emblem is a blue ribbon with white text in Gurmukhi script.

Sixth Semester

Course Code	CSE302-18
Course Title	Compiler Construction
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Basic understanding of Programming Languages, Data structures and machine architecture
Course Objectives (CO)	This course provides the student with the techniques used in design and construction of a working compiler. The course emphasizes connections between compilers and formal languages, data structures, and computer architecture.

SYLLABUS

UNIT-I

Introduction to Compilers: The role of language translation in the programming process; Comparison of interpreters and compilers, language translation phases, machine-dependent and machine-independent aspects of translation, language translation as a software engineering activity

Lexical Analysis: Application of regular expressions in lexical scanners, hand coded scanner vs. automatically generated scanners, formal definition of tokens, and implementation of finite state automata.

UNIT-II

Syntax Analysis: Revision of formal definition of grammars, Ambiguity, BNF and EBNF; bottom-up vs. top-down parsing, tabular vs. recursive-descent parsers.

Syntax-Directed Translation: Syntax-directed definitions, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down and Bottom-up evaluation of inherited attributes, Analysis of syntax-directed definitions

Type Checking: Data type as set of values with set of operations, Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators, Polymorphic functions, An algorithm for unification

UNIT-III

Run-Time Environments: Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques, Storage allocation in Fortran

Parsers Implementation: automatic generation of tabular parsers, symbol table management, the use of tools in support of the translation process.

UNIT-IV

Intermediate code Representation: Intermediate and object code, intermediate representations, implementation of code generators.

Code generation, code optimization: code generation by treewalking; context sensitive translation, register use. Machine-independent optimization; data-flow analysis; loop optimizations; machine-dependent optimization, Error Detection and Recovery, Error Repair, Compiler Implementation.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Compilers Principles, Techniques, & Tools	A.V.Aho, R.Sethi&J.D.Ullman	Pearson Education
2	Engineering a Compiler	Keith Cooper and Linda Torczon,	Morgan-Kaufman Publishers
3	Crafting a compiler	C. Fischer and R. LeBlanc	Benjamin Cummings
4	Modern Compiler Implementation in Java	Andrew W. Appel	Cambridge University Press
5	Compiler Construction Principles and Practice	Kenneth C. Louden	Kenneth C. Louden



Course Code	CSE304-18
Course Title	Data Communication & Networks
Type of Course	PC
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer, Digital Circuits and Network Arrangement.
Course Objectives (CO)	To be familiar with various computer network architectures and to identify the infrastructure components, design infrastructure including devices, topologies and protocols.

SYLLABUS

UNIT-I

Introduction to Computer Networks: Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

UNIT-II

Physical Layer: Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media : Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons.

Data Link Layer: Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.

Medium Access Sub-Layer: Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

UNIT-III

Network Layer: Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

Transport Layer: Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison.

UNIT-IV

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security.

Session & Presentation Layer

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Communication Networks: Fundamentals and Concepts and Key Architectures	Leon Garrcia and IndraWidjaja	TMH
2	Computer Networks.	A.S. Tanenbaum	PHI
3	Introduction to Data Communication and Networks	Forouzan, Coombs and Fagan	TMH
4	Data and Communication	William Stallings	PHI



Course Code	CSE306-18
Course Title	Compiler Construction Lab
Type of Course	PC
L T P	0 0 4
Credits	2
Course Prerequisites	C/C++ , Operating System
Course Objectives (CO)	Students will design and implement language processors in C/C++ by using tools to automate parts of the implementation process. This will provide deeper insights into the more advanced semantics aspects of programming languages, code generation, machine independent optimizations, dynamic memory allocation, and object orientation.

SYLLABUS

List of Practicals

1. Implementation of Symbol Table
2. Develop A Lexical Analyzer To Recognize A Few Patterns In C. (Ex. Identifiers, Constants, Comments, Operators Etc.)
3. Implementation Of Lexical Analyzer Using Lex Tool
4. Generate YACC Specification For A Few Syntactic Categories.
5. A) Program To Recognize A Valid Arithmetic Expression That Uses operator +, −, * And /.
B) Program To Recognize A Valid Variable Which Starts With A Letter followed By Any Number Of Letters Or Digits.
C) Implementation Of Calculator Using LEX And YACC
6. Convert The BNF Rules Into Yacc Form And Write Code To Generate Abstract Syntax Tree.
7. Implement Type Checking
8. Implement Control Flow Analysis And Data Flow Analysis
9. Implement Any One Storage Allocation Strategies (Heap, Stack, Static)
10. Construction Of DAG
11. Implement The Back End Of The Compiler Which Takes The Three Address Code And Produces The 8086 Assembly Language Instructions That Can Be Assembled And Run Using A 8086 Assembler. The Target Assembly Instructions Can Be Simple Move, Add, Sub, Jump. Also Simple Addressing Modes Are Used.
12. Implementation Of Simple Code Optimization Techniques (Constant Folding., Etc.)

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Compilers Principles, Techniques, & Tools	A.V.Aho, R.Sethi&J.D.Ullman	Pearson Education
2	Engineering a Compiler	Keith Cooper and Linda Torczon,	Morgan-Kaufman Publishers
3	Crafting a compiler	C. Fischer and R. LeBlanc	Benjamin Cummings
4	Modern Compiler Implementation in Java	Andrew W. Appel	Cambridge University Press
5	Compiler Construction Principles and Practice	Kenneth C. Louden	Kenneth C. Louden



Course Code	CSE308-18
Course Title	Data Communication & Networks Lab
Type of Course	PC
L T P	0 0 4
Credits	2
Course Prerequisites	Basic Knowledge of infrastructure components, design infrastructure including devices, topologies and protocols.
Course Objectives (CO)	To make students proficient in understanding Network components, Topologies and implementing Network protocols.

SYLLABUS

List of Practicals

1: Specification, Familiarization of Networking Components & devices.

1.1: Specification of laptop & computers.

1.2: Familiarization of Networking Components & devices: LAN adapter, Hub, Switches, Routers.

2: Familiarization with transmission media & tools, Preparing cables.

2.1: Coaxial cable, UTP Cable, Coaxial cable, UTP Cable.

2.2: Preparing straight cable & cross cable.

3: Study of topology, Study of TCP/IP Protocol.

3.1: Study of LAN topology & their creation using N/W devices, cables & computers.

3.2: Configuration of TCP/IP protocol in windows & LINUX.

4: Addressing, File & Printer sharing.

4.1: Implementation of file & printer sharing.

4.2: Designing & implementing class A, B,C network.

5: Subnet planning, FTP Server, TCP/UDP

5.1: Subnet planning & implementation.

5.2: Installation of FTP server & client.

5.3: Study of TCP/UDP performance.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	A+ Guide to PC Hardware Maintenance and Repair, Volume 1	Michael W. Graves	Cengage Learning
2	Practical TCP/IP and Ethernet Networking	Deon Reynders, Edwin Wright	Newnes
3	Data Communication and Networking: A Practical Approach	Massoud Moussavi	Cengage Learning
4	A Practical Guide to Advanced Networking	Jeffrey S. Beasley, Piyasat Nilkaew	Pearson

Course Code	CSE312-18
Course Title	Simulation & Modelling
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Programming skills in one or more of the programming languages
Course Objectives (CO)	Introduce computer simulation technologies and techniques, provides the foundations for the student to understand computer simulation needs, and to implement and test a variety of simulation and data analysis libraries and programs.

SYLLABUS

UNIT-I

Introduction- When simulation is appropriate and when not, advantages and disadvantages of simulation, application areas in communication, computer and software design, systems and systems environment, components of a system, discrete and continuous systems, model of a system, types of models, discrete-event simulation, steps in a simulation study. Simulation Examples- Simulation of queueing systems, on-demand and inventory systems, simulation for reliability analysis etc

General Principles- Concepts in discrete event simulation: event scheduling/time advance algorithms, world views. List Processing: properties and operations, data structures and dynamic allocation, techniques;

Simulation Software- Integrated environments. Examples and review of some existing software popular and useful in the industry, e.g., Arena, AutoMod, Extend, Flexsim, Micro Saint, ProModel, Quest, SIMUL8, WITNESS etc. Simulation using languages and environments like C++/Java/GPSS/SSF etc. Experimentation and Statistical-Analysis Tools: common features and relevant current products.

UNIT-II

Statistical Models in Simulation- Terms and concepts. Statistical Models. Review of discrete and continuous distributions. Review of Poisson (stationary and non-stationary) processes. Empirical Distributions; Elementary Queueing Theory- Basic Structure of Queueing Models. Input Source (Calling Population). Queue, Queue Discipline, Service Mechanisms. Notations and relationships between L, W, Lq, and Wq. Little's Formula. Role of Exponential Distribution and Properties. Birth and Death Processes. M/M/s queues. Finite queue variation in M/M/s/K models with different s values. Finite Calling Population cases. Queueing Models involving Non-Exponential Distributions: M/G/1, M/D/s, M/Ek/s (involving Erlang distribution), Models without a Poisson Input, Models involving hyperexponential distributions, Priority Discipline Queueing Models: Preemptive and Non- Preemptive with results, properties and server number variations, Queueing Networks:Equivalence Property. Infinite Queues in Series and Product

Form Solutions. Jackson Networks,

Application of Queueing Models- Review of Characteristics (calling population system capacity, arrival processes, behavior and disciplines, service times and mechanisms etc) and notations, Application of Long-Run Measures of Performance: Time average in system, average time spent per customer, Little's Formula and server utilization, costs. Steady State behaviour of Infinite (M/G/1, M/M/c/infinity, M/M/c/N/infinity) and finite (M/M/c/K/K) Calling Population Models, Use of Network of Queues.

UNIT-III

Random Number Generation- Properties. Generation of Pseudo-Random Numbers, Techniques for Generation of Pseudo-Random Numbers: Linear Congruential, Combined Linear Congruential, Random Number Streams. Tests for Random Numbers: Frequency Tests and Tests for Autocorrelation. Random Variate Generation- Inverse Transform Techniques for Exponential, Uniform, Weibull, Triangular and for Empirical Continuous Distributions. Acceptance-Rejection Techniques for Poisson (Stationary and NonStationary) Distribution and Gamma Distribution. Special Properties like the Direct Transformation for the Normal and Lognormal Distributions, Convolution Method and others.

Input Modeling- Data collection, Identifying the Distribution with Data: Histograms, Selection of the Appropriate Family of Distributions, Quantile-Quantile Plots. 100 Parameter Estimation: Sample Mean and Sample Variance and various biased and unbiased Estimators. Goodness of Fit Tests applied to Simulation inputs: Chi-Square and Chi-Square with Equal Probabilities, Kolmogorov-Smirnov Tests, pValues and Best Fits. Verification and Validation of Simulation Models- Verification and Validation of Simulation Models. Calibration and Validation: Face Validity, Validation of Assumptions, Input-Output Transformation Validation.

UNIT-IV

Output Analysis of a Single Model- Output analysis and types of simulation. Stochastic Nature of the Output Data. Measures of Performance and Estimation: Point Estimation and Confidence-Interval Estimation. Output Analysis for Terminating Simulations and Estimation of Probabilities. Output Analysis of Steady State Simulations: Initialization Bias, Error Estimation, Replications, Sample Size and Batch Means for Interval Estimation.

Comparison and Evaluation of Alternative System Designs- Comparison of Two System Designs. Sampling with Equal and Unequal Variances. Common Random Numbers. Confidence Intervals with Specified Precision. Comparison of Several System Designs: Bonferroni Approaches to Multiple Comparisons and to Screening and to Selection of the Best. MetamodelingL Sample Linear Regression, Testing for Significance, Multiple Linear Regression. Random Number Assignment for Regression. Optimization via Simulation: Robust

Heuristics.

Simulation of Computer Systems- Simulation Tools: Process Orientation and Event Orientation. Model Input: Modulated Poisson Process and Virtual-Memory Referencing. High-Level Simulation. CPU and Memory Simulations. Simulation of Computer Networks- Traffic Modeling, Media Access Control: TokenPassing Protocols and Ethernet, Data Link Layer, TCP, Model Construction.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Discrete-Event System and Simulation	Jerry Banks, John S. Carson II, Barry L. Nelson and David M. Nicol	Prentice Hall of India, New Delhi
2	Simulation modeling and analysis	Averill M. Law	Tata McGraw Hill India
3	Applied Modeling and Simulation	David Cloud, Larry Rainey	Tata McGraw Hill, india
4	Modeling and simulation: theory and practice	Walter J. Karplus, George A. Bekey, Boris Yakob Kogan	Springer,

Course Code	CSE314-18
Course Title	Computer Vision
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer Graphics
Course Objectives (CO)	To familiarize the student with specific, well known computer vision methods, algorithms and results. To understand the roles of image transformations and their invariances in pattern recognition and classification.

SYLLABUS

UNIT-I

Digital Image Formation and low-level processing: Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

Depth estimation and Multi-camera views: Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.

UNIT-II

Feature Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.

Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.

UNIT-III

Motion Analysis: Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

Shape from X: Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.

Perceptual organisation and cognition: Vision as model-building and graphics in the brain, Learning to see.

Lessons from neurological trauma and visual deficits, Visual agnosias and illusions, and what they may imply about how vision works.

UNIT-IV

Model estimation: Machine learning and statistical methods in vision. Applications of machine learning in computer vision. Discriminative and generative methods. Content based image retrieval.

Miscellaneous Applications: CBIR, CBVR, Activity Recognition, computational photography, Biometrics, stitching and document processing; Modern trends - super-resolution; GPU, Augmented Reality; cognitive models, fusion and SR&CS.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Computer Vision: Algorithms and Applications	Richard Szeliski	Springer
2	Computer Vision: A Modern Approach	D. A. Forsyth, J. Ponce	Prentice Hall
3	Introductory Techniques for 3D Computer Vision	Trucco and Verri	Prentice Hall
4	Computer vision	Shapiro, L. & Stockman, G	Prentice Hall
5	Three dimensional Computer Vision: A geometric approach	Olivier Faugeras	Olivier Faugeras

Course Code	CSE316-18
Course Title	Internet Web Programming
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Program Development and Programming Language Constructs
Course Objectives (CO)	This course introduces advanced programming skills for website design. Dynamic content development will be explored through state of the art programming languages for the creation of interactive web sites. Students will create web pages that utilize the most current advances in web development.

SYLLABUS

UNIT-I

Internet and WWW: Introduction to internet and its applications, Email, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address World Wide Web (WWW) : World Wide Web and its evolution, uniform resource locator (URL), browsers - internet explorer, netscape navigator, opera, firefox, chrome, mozilla. Search engine, web saver - apache, IIS, proxy server, HTTP protocol.

HTML and Graphics: HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Frame Tags, Executable content tags.

Image maps: Client-side Imagemaps, Server-side Imagemaps, Using Server-side and Client-side Imagemaps together, alternative text for Imagemaps,

Tables: Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, spanning multiple rows or columns, Elements that can be placed in a table, Table Sections and column properties, Tables as a design tool

UNIT-II

Frames : Introduction to Frames, Applications, Frames document, The <FRAMESET> tag, Nesting <FRAMESET> tag, Placing content in frames with the <FRAME> tag, Targeting named frames, Creating floating frames, Using Hidden frames,

Forms : Creating Forms, The <FORM> tag, Named Input fields, The <INPUT> tag, Multiple lines text windows, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons,

Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event handlers, Passing form data

Style Sheets: What are style sheets? Why are style sheets valuable? Different approaches to style sheets, Using Multiple approaches, Linking to style information in separate file, Setting up style information, Using the <LINK> tag, embedded style information, Using <STYLE> tag, Inline style information.

UNIT-III

Java Script: Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? (Conditional operator), (Comma operator), delete, new, this, void.

Statements: Break, comment, continue, delete, do ... while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with,

Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, regExp

Document and its associated objects: document, Link, Area, Anchor, Image, Applet, Layer
Events and Event Handlers: General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload

UNIT-IV

XML: Introduction to XML, Anatomy of an XML, document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL

PHP: Why PHP and MySQL?, Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors / problems.

Advanced PHP and MySQL: PHP/MySQL Functions, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, Type and Type Conversions, E-Mail.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	HTML 5 in simple steps	Kogent Learning Solutions Inc.	Dreamtech press
2	HTML :Beginner's guide	Wendy Willard	Mc Graw Hill
4	HTML,XHTML, and CSS Bible, 5ed.	Steven M. Schafer	Wiley India

5	Beginning HTML,XHTML, CSS and JavaScript	John Duckett	Wiley India
6	Beginning CSS: Cascading Style Sheets for web design	Ian Pouncey, Richard York	Wiley India
7	HTML 5 in simple steps	Kogent Learning Solutions Inc.	Dreamtech press



Course Code	CSE318-18
Course Title	Machine Learning
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Discrete mathematics
Course Objectives (CO)	To understand learning models and learning algorithms

SYLLABUS

UNIT I

Introduction- Basic concepts, machine learning problems, types of learning, designing a learning system, Goals and applications of machine learning

Learning Theory- Bias/variance tradeoff. Union and Chernoff/Hoeffding bounds. VC dimension, Worst case (online) learning, learning algorithms.

UNIT II

Supervised learning- Supervised learning setup, LMS, Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines, Model selection and feature selection.

Unsupervised learning- Clustering. K-means, EM, Mixture of Gaussians, Factor analysis, PCA (Principal components analysis), ICA (Independent components analysis).

UNIT III

Reinforcement learning and control- MDPs, Bellman equations, Value iteration and policy iteration, Linear quadratic regulation (LQR), LQG, Q-learning. Value function approximation, Policy search, Reinforce, POM.

UNIT IV

Decision Tree Learning

Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute: entropy and information gain, Searching for simple trees and computational complexity, Occam's razor, Overfitting, noisy data, and pruning

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Pattern Recognition and Machine Learning	Bishop, C.	Berlin: Springer-Verlag.
2	Elements of Statistical Learning	Hastie, Tibshirani, and Friedman	Springer
3	Machine Learning	Tom Mitchell	Mc-Graw Hill

Course Code	CSE320-18
Course Title	Distributed System
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of object oriented programming, data structures, threads, operating system concepts.
Course Objectives (CO)	This Course work provides the complete understanding of distributed system and its various applications in the field of computer Science.

SYLLABUS

UNIT-I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Issues in Distributed Operating Systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, and termination detection.

UNIT-II

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

UNIT-III

Agreement Protocols: Introduction, System models, classification of Agreement Problem-Interactive consistency Problem, Applications of Agreement algorithms.

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control

UNIT-IV

Distributed Transactions: Introduction, Flat and nested distributed transactions, Atomic commit protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Distributed shared memory – Design and Implementation issues, consistency models, CORBA Case Study: CORBA RMI, CORBA services.

File System: File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA. Name services – SNS name service model.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Advanced Concepts in Operating Systems	Mukesh Singhal & Niranjan G Shivaratri	Tata McGraw Hill
2	Distributed System: Concepts and Design	Coulouris, Dollimore, Kindberg	Pearson Education
3	Distributed Operating Systems	Tanenbaum S.	Pearson Education
4	Distributed System: Concepts and Design	P K Sinha	PHI



Course Code	CSE322-18
Course Title	Wireless Communications
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objectives (CO)	To gain an understanding of the principles behind the design of wireless communication systems and technologies.

SYLLABUS

UNIT-I

Introduction: A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog & digital cellular systems. Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems.

GSM system : Architecture and features ; GSM Services ; Authentication ; Incoming & outgoing call flow ; Handover in GSM.

UNIT-II

Digital Communication through fading multipath channels: Fading types and their characteristics. Concept of diversity branches and signal paths- Combining methods- Selective diversity combining- pre-detection and post-detection combining- Switched combining- maximal ratio combining- Equal gain combining. Different type of channels: Control & Traffic channels.

BTS hardware: Introduction of BTS 3900 series ; Baseband unit (BBU); Radio Frequency unit (RFU) ; Description of Cards; Login to BTS 3900

UNIT-III

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access(FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, CDMA (code division multiple access), Space Division Multiple Access. WCDMA (wideband CDMA) features and architecture, handoff and its types.

UNIT-IV

Wireless Systems & Standards: GPRS/EDGE specification features and architecture, 3G systems: Application of 3G & UMTS & CDMA 2000 standards, specifications and architecture of UMTS , Forward CDMA Channel, Reverse CDMA Channel. BSC Hardware: Introduction to 6900 series ; GPRS & EDGE; Description of Cards ; Login to BSC 6900. Future trends: Blue Tooth technology, 4G mobile techniques, Wi-Fi Technology, LTE advance system, zigbee.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Wireless Communications	T.S.Rappaport,	Principles Edition, and Practice, 2 nd Pearson Education Asia, 2010.
2	Mobile Cellular Telecommunications	William C Y Lee	2nd Edition, MGH.

3	Mobile and Personal Communication systems and services	Raj Pandya	Prentice Hall of India.
4	Wireless and Digital Communications	Dr. Kamilo Feher	TMH



The logo of Samrat Ashoka Bhagwati University is a circular emblem. It features a central shield with a crown on top, flanked by two lions. The shield is surrounded by a green wreath. The outer ring of the emblem contains the text 'SAMRAT ASHOKA BHAGWATI UNIVERSITY' in blue capital letters. Below the emblem is a blue ribbon with white text in Hindi: 'एशिया के उत्तम शिक्षण संस्थान' (Uttam Shikshan Sansthan of Asia).

Seventh Semester

Course Code	MGT401-18
Course Title	Organization Behaviour
Type of Course	HS
L T P	4 0 0
Credits	4
Course Prerequisites	Nil
Course Objectives (CO)	The aim is to enable the student to know about the behavior of Individual in the organization.

SYLLABUS

UNIT-I

Organization Behavior: its Concepts, Features and Importance, Challenges and Opportunities for OB. Foundations of Individual Behavior. Learning, Concept, Theories and Principles of learning, Reinforcement. Perception, Concept, Perceptual Process, Factors in Interpersonal perception. Attitude, Concept, Components, Attitude formation, Values & Beliefs.

Unit II

Leadership, Concept, Theories and Leadership Styles in Management.

Transactional Analysis: Life positions, Levels of Self Awareness-Johari window Model, Ego States. Motivation: Nature, importance, process, Theories of Motivation, Application of Motivation Perception: Concept, Theories of Personality, Determinants of Personality

Unit-III

Group Dynamics: Concept and nature of group formation, Models of Group formation, Theories of group formation. Group decision making techniques. Difference between group and team, Types of Teams, Power and Politics: Concept, Bases of power, Tactics to gain Power, Techniques of politics. Stress Management: Meaning, Concept, Causes of Organization Stress, Stress Management.

Unit-IV

Organization Change: Concept, Change Agents, Resistance to change, Overcoming resistance to change, Organization Culture: Concept, functions of Organization Culture, Development and implications of Organization Culture, Creating and sustaining Organization Culture.

Organization Development: Concept, Interventions of Organization Development

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Organizational Behavior	Luthans,F	McGraw –Hill Inc.
2	Understanding Organizational Behaviour	Pareek, U	Oxford University Press, Delhi.

Course Code	CSE403-18
Course Title	Cryptography & Security
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic Knowledge of complexity theory, algorithms, game theory, machine learning
Course Objectives (CO)	This course work provides the thorough understanding of the network security and various cryptography techniques to obtain the security on network and a computer.

SYLLABUS

UNIT-I

Introduction: Attacks, Services and Mechanisms, Security attacks, security services, model for internetwork security. Conventional Encryption: Conventional Encryption Model, steganography, Classical Encryption Techniques: Substitution Techniques, Transposition Techniques.

UNIT-II

Modern Encryption Techniques: Simplified Data Encryption Standard, Block Cipher Principles.

The Data Encryption Standard, Strength of DES. Encryption Algorithms: Triple DES, International Data Encryption Algorithm, Blowfish.

UNIT-III

Confidentiality using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key distribution, Random Number Generation.

Public- Key Cryptography: Principles of Public- Key Cryptosystems, RSA algorithm, Key Management, Diffie-Hellman Key.

UNIT-IV

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of hash Functions and MACs, Digital Signatures, Authentication Protocols, SHA-1, RC-4, RC-5.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Cryptography and Network	William Stallings	Pearson Education

	Security: Principles and Practice		
2	Computer Networks	A.S. Tanenbaum	Pearson Education
3	Network Security	C. Kaufman, R. Perlman, M. Speciner	Pearson Education



Course Code	CSE405-18
Course Title	Multimedia & Animation
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer Graphics & Image Processing.
Course Objectives (CO)	The main objective of the subject is to impart the knowledge about Animation execution, workflow & post-production

SYLLABUS

UNIT-I

Fundamentals of Animation: Animation Drawings/Cels, Rough Drawings , Clean ups, Color reference drawings, Layout, Model Sheet, Key Drawing, Master Background, Concept Piece, Character drawing, Story Board.

Modeling Concepts: Introduction to Maya, Types of 3D Modeling, Advantages & Disadvantages, Difference between Polygon Modeling and NURBS modeling

Texturing - Assigning Materials To Models: UV texturing: Texturing of Characters and Props, Shading: Different Maya Shaders.

UNIT-II

Lighting& Shadows: Sources of light: Natural and artificial Lights, Types of lights in Maya, Types of Shadows in Maya.

Rigging& Skinning of a Model: Joints, Inverse Kinematics, Forward Kinematics. Types of Skinning.

Animation Types: Types of Animation. Stop motion vs. motion graphics.

UNIT-III

Rendering Process: Process, Types of Renderers.

Data Management: How to manage 3D Assets

Compositing: Basics of compositing, Chroma keying, Background colors, Even Lighting, Processing the video, Various Tools used.

UNIT-IV

Music & Dubbing: Process of adding music to the clip, Tools used for placing, editing the sound tracks.

Editing Clips: Process, Tools used for editing process.

Output& Formats: Types of Output formats, lossless and lossy compression techniques.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	3D Animation for the Raw Beginner Using Maya	Roger King	Chapman and Hall
2	Editing Digital Video - The Complete Creative and Technical Guide	Robert Goodman	McGraw-Hill
3	Maya Documentation	https://knowledge.autodesk.com	Autodesk



Course Code	ECE405-18
Course Title	Information Theory and Coding
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Digital Communication
Course Objectives (CO)	To get the knowledge of Coding Techniques& Error Detection and Correction Techniques in Communication Engineering.

SYLLABUS

UNIT-I

INTRODUCTION: Introduction to information theory & error control coding, Probability, random variables, Probability distribution and density functions, Information measure, Information Capacity Theorem and its implications, Entropy, Differential Entropy, Conditional Entropy, Relative Entropy, Information rate, Mutual Information, Channel Capacity. Introduction to SDH, WDM, DWDM, OTN and ASON Technologies. SOURCE CODING Shannon's Source Coding Theorem, Data Compaction, Prefix Coding, Kraft McMillan Inequality, Huffman Coding, Shannon-Fano Coding, Arithmetic Coding, Lempel-Ziv Algorithm, Rate Distortion Theory, and Mutual Information.

UNIT-II

CHANNEL CAPACITY & CODING Channel Models, Channel Coding Theorem, Markov Sources, Discrete Channel with discrete Noise, BSC, BEC, Capacity of a Gaussian Channel, channel capacity for MIMO system, Bandwidth-S/N Trade-off.

UNIT-III

LINEAR BLOCK CODES Introduction to Linear Block codes, Error detecting and correcting capabilities of a block code, Syndrome and Error detection, Minimum distance of block code, Hamming Weight and Hamming Distance, Linear Block Codes, Encoding and decoding of Linear Block-codes, Parity Check Matrix, Bounds for block codes, Hamming Codes, Syndrome Decoding. Introduction to Convolutional Codes, Encoding of convolution codes CYCLIC CODES Introduction to cyclic code, Generator and parity check matrices of cyclic codes, Method for generating Cyclic Codes, Matrix description of Cyclic codes.

UNIT-IV

TRANSMISSION: SDH systems: Emergence, Standards, Frame Structure, WDM Systems, DWDM Technologies, OTN Interface, ASON Technology, Transmission Products

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher

1	Information Theory, Coding & Cryptography	Ranjan Bose	TMH, Second Edition
2	Communication Systems	S. Haykin	Wiley-Publication
3	Elements of Information Theory	Thomas M. Cover, J. A. Thomas	Wiley-Interscience Publication
4	Error Correction Coding Mathematical Methods and Algorithms	Todd K. Moon	Wiley-India Edition.
5	Cryptography and Network Security	William Stallings	Mc Graw Hill.



Course Code	CSE407-18
Course Title	Graph Theory
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Discrete Structures, Data Structures, Data Analysis and Interpretation.
Course Objectives (CO)	In computer science, graph theory is used extensively. The intension of this course is to introduce the subject of graph theory to computer science students in a thorough way .While the course will cover all elementary concepts such as coloring, covering, hamiltonicity, planarity, connectivity and so on, it will also introduce the students to some advanced concepts.

SYLLABUS

UNIT-I

Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, euler graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem.

UNIT-II

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and Dijkstra Algorithms.

UNIT-III

Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets , connectivity and separability, network flows Planer graphs, combinatorial and geometric dual: Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings.

UNIT-IV

Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set subspaces, Matrix representation of graph – Basic concepts; Incidence matrix, Circuit matrix, Path matrix, Cut-set matrix and Adjacency matrix. Coloring, covering and partitioning of a

graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Graph theory with applications to Engineering and Computer Science	Deo, N	PHI
2	Introduction to Graph Theory	Gary Chartrand and Ping Zhang	TMH
3	Introduction to Graph Theory	Robin J. Wilson	Pearson Education
4	Graph theory and application	Bondy and Murthy	Elsevier Science Ltd/North-Holland
5	Schaum's Outline of Graph Theory	V. Balakrishnan	TMH
6	Graph Theory: Modeling, Applications and Algorithms	Geir Agnarsson	Pearson Education



Course Code	CSE409-18
Course Title	Design & Management of Big Data
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Design and Management of Data
Course Objectives (CO)	Study the requirements of non-traditional large-scale data applications

SYLLABUS

UNIT-I

DBMS Overview Introduction to big data, Handling and Processing Big Data, Methodological Challenges and Problems, Benefits and challenges of big data, Examples.

UNIT-II

Analysis of data at Rest- Hadoop analytics: Limitations of existing distributing systems, Hadoop Approach, Hadoop Architecture, Distributed file system: HDFS and GPFS, Internals of Hadoop MR engine, Need for High level language- JAQL and PIG.

UNIT-III

Introduction to Text Analytics: Using Regular expressions, Using AQL, Sentiment analysis

No SQL: JSON store, MongoDB, RDF, HBASE

UNIT-IV

Analytics: Clustering, Classification, Segmentation, Linear regression, ML Search: Indexing and Indexing Techniques, Create inverted index using JAQL, Lab using Data Explorer Bundling Hadoop job: Application, Use BI tooling to create application, Publish applications. Analysis of data in motion – Real time analytics

Introduction to streams computing, Challenges/limitations of conventional Systems, Solving a real time analytics problem using conventional system, Challenges to be solved - scalability, thread pooling, etc., Understanding the challenges in handling streaming data from the real world and how to address those using stream computing, Benefits of stream computing in Big Data world, Realtime Analytics Platform(RTAP).

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Understanding Big Data: Analytics for Enterprise Class	Chris Eaton, Paul Zikopoulos	McGraw-Hill

	Hadoop and Streaming Data		
2	Big Data Analytics: Turning Big Data into Big Money	Frank J. Ohlhorst	John Wiley & Sons
3	Ethics of Big Data	Kord Davis	O'Reilly Media
4	Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends	Michael Minelli, Michele Chambers, Ambiga Dhiraj	Wiley



Course Code	CSE411-18
Course Title	Cloud Computing
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Distributed System, Operating Systems and Networking
Course Objectives (CO)	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in the field of computer Science.

SYLLABUS

UNIT-I

Introduction: Shift from distributed computing to cloud computing; principles and characteristics of cloud computing- IaaS, PaaS, SaaS; service oriented computing and cloud environment. Cloud Computing Technology: Client systems, Networks, server systems and security from services perspectives; Accessing the cloud with platforms and applications; cloud storage.

UNIT-II

Working with Cloud: Infrastructure as a Service–conceptual model and working Platform as a Service – conceptual model and functionalities. Software as a Service: conceptual model and working. Trends in Service provisioning with clouds.

UNIT-III

Using Cloud Services: Cloud collaborative applications and services–case studies with calendars, schedulers and event management; cloud applications in project management. Case studies: Microsoft Azure, Google App Engine and Open source clouds- Open-Nebula and Eucalyptus.

UNIT-IV

Microsoft office 365 solution: IBM Cloud (Need Credit Card Details), Virtualization Technology, Creating VMs, Hypervisor. Storage Technology, types of Storage Devices, RAID Tech Practical Session for RAID (Hands on) File system, DAS, NAS & SAN Tech.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Cloud Computing – A Practical Approach	Anthony T.Velte, Toby J.Velte and Robert E	TMH
2	Cloud Computing – Web based Applications	Michael Miller	Pearson Publishing

The logo of Sant Baba Bhag Singh University is a circular emblem. The outer ring contains the text "SANT BABA BHAG SINGH UNIVERSITY" in blue capital letters. Inside this ring is a green wreath. At the center of the wreath is a blue shield with a white cross. Below the circular emblem is a blue ribbon banner with white text in Gurmukhi script.

Eighth Semester

Course Code	CSE404-18
Course Title	Fundamentals of Digital Signal Processing
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Analog Signal Processing
Course Objectives (CO)	To Study the basics, mathematical analysis and applications of DTFT, DFT, FFT, transforms and to study the design and implementation of Digital Filters.

SYLLABUS

UNIT I

Introduction to Digital Signal Processing: Block Diagram of Digital Signal Processing, Limitations of Analog Signal Processing, Advantages of Digital Signal Processing, Comparison of Analog and Digital Signal Processing, Classification of signals and systems, manipulation of discrete time signal, representation of signals. Basic elements of DSP such as convolution, correlation, and auto-correlation, Concept of stability, causality, linearity, Difference equation. DSP Processors: Architecture of ADSP and TMS series.

UNIT II

Z-transform: Introduction, definition, properties, Region Of Convergence and evaluation of inverse Z-transforms.

UNIT III

Discrete and Fast Fourier transform: Introduction, Discrete fourier transform(DFT) and its properties, Linear, Periodic and circular convolution, Linear Filtering methods based on DFT, Discrete time Fourier transform, Relation between DFT & DTFT, computing an inverse DFT by doing a direct DFT, Fast Fourier transform, FFT algorithm using Decimation in time & Decimation in frequency technique.

UNIT IV

Design of Digital Filter: Structure realization of discrete time system : Direct form, Cascade form and Parallel form, Finite Impulse Response (FIR) filters, magnitude and phase response of digital filters, frequency response of linear phase FIR filters, design techniques, design of Infinite Impulse Response (IIR) Filters, IIR filters design by impulse invariant, Matched z-transform & bilinear transformation method, Frequency transformation.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Digital Signal Processing: Principles, Algorithms and Applications	Proakis & Manolakis	Pearson Education
2	Digital Signal Processing	E C Ifeachor and B W Jervis	Pearson Education
3	Digital Signal Processing	A.V Oppenheim and R.W.Schafer	Pearson Education
4	Digital Signal Processing	Sanjit and Mitra	Tata McGraw-Hill
5	Digital Signal Processing	S Salivahanan, A Vallavraj, C Gnanapriya	Tata McGraw-Hill



Course Code	CSE406-18
Course Title	Computational Intelligence
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	NIL
Course Objectives (CO)	In this course we will study the techniques of computational intelligence, especially evolutionary computation and neural networks.

SYLLABUS

UNIT-I

Introduction to Computational Intelligence, Fundamental concepts, Introduction to Evolutionary Computing, Evolutionary computation terms, Canonical genetic algorithm, Evolutionary computation variations, Evolutionary programming and Evolution strategies, Implementation of Evolutionary Computing.

UNIT-II

Swarm Intelligence, Particle Swarm Optimization, Classification, Learning, and Adaptation, Supervised, Unsupervised, Reinforcement Learning, Data partitioning and Cross Validation, Error metrics: Mean squared error, receiver operating characteristic curves, Neural Networks and Evolutionary Computation: Explanation and Sensitivity Analysis, Neural Networks Implementation.

UNIT-III

Fuzzy sets, Fuzzy Logic, Fuzzy set operators, Fuzzy rule-based systems, Fuzzification, defuzzification, Fuzzy control, Evolving fuzzy rule systems, Neuro-fuzzy systems, Fuzzy-GA systems.

UNIT-IV

Probabilistic reasoning: Bayesian reasoning and Dempster-Shafer theory, Bayesian belief networks, Fuzzy belief networks Evolving belief networks, Artificial Immune Systems.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Computational Intelligence: An Introduction	A. P. Engelbrecht	John Wiley & Sons.
2	Introduction to Evolutionary Algorithms	X. Yu and M. Gen	Springer Verlag.
3	Computational Intelligence: Concepts to Implementations	Russell Eberhart and Yuhui Shi	Morgan Kaufmann Publishers
4	Soft Computing and Intelligent	Fakhreddine Karray	Addison Wesley Publishi

	Systems Design	and Clarence de Silva	ng,,ISBN 0321116178
5	-Computational Intelligence: an Introduction	Andries Engelbrecht	Wiley & Sons, Second Edition, (ISBN: 978-0-470-03561-0)
6	Computational Intelligence: Principles, Techniques, and Applications	Amit Konar	Springer, ISBN: 978-3-540-27335-6



Course Code	CSE408-18
Course Title	Ad-Hoc Wireless Networks
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer networks
Course Objectives (CO)	This subject provides the knowledge of Adhoc and sensor networks.

SYLLABUS

UNIT I

Introduction: A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog & digital cellular systems. Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems.

GSM system: Architecture and features; GSM Services ; Authentication ; Incoming & outgoing call flow ; Handover in GSM.

Ad-Hoc MAC

Introduction, Issues in Ad-Hoc Wireless Networks. MAC Protocols, Issues, Classifications of MAC protocols, Multi channel MAC& Power control MAC protocol.

UNIT II

Ad-Hoc Network Routing & TCP

Issue, Classifications of routing protocols, Hierarchical and Power aware. Multicast routing, Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc, Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

UNIT III

WSN -MAC

Introduction, Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols, self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

WSN Routing, Localization & QoS

Issues in WSN routing , OLSR, AODV. Localization, Indoor and Sensor Network Localization. QoS in WSN.

UNIT IV

Wireless Systems & Standards: GPRS/EDGE specification features and architecture, 3G systems: Application of 3G&UMTS & CDMA 2000 standards

Mesh Networks

Necessity for Mesh Networks, MAC enhancements, IEEE 802.11s Architecture, Opportunistic routing, Self configuration and Autoconfiguration, Capacity Models, Fairness, Heterogeneous Mesh Networks, Vehicular Mesh Networks

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Ad Hoc Wireless Networks – Architectures and Protocols	C.Siva Ram Murthy and B.Smanoj	Pearson Education.
2	Wireless Sensor Networks	Feng Zhao and Leonidas Guibas,	Morgan Kaufman Publishers.
3	Ad Hoc Mobile Wireless Networks	C.K.Toh	Pearson Education.
4	Wireless Mesh Networking	Thomas Krag and SebastinBuettrich	O'Reilly Publishers.



Open Electives



Course Code	CSE371-18
Course Title	Basics Of Database Design
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Elementary knowledge about computers including some experience using Windows. Basic knowledge about programming in some common programming language.
Course Objectives (CO)	This subject assesses new developments in database technology. It Interpret and explain the impact of emerging database standards and Evaluate the contribution of database theory to practical implementations of database management systems

SYLLABUS

UNIT-I

Introduction to Databases and Transactions: Basic concepts of database, Need of database system, File based system, view of data, database architecture,

Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

Database Design ER-Diagram: Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas.

UNIT-II

Relational database Model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization.

Relational Algebra and Calculus: Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

UNIT-III

Constraints, Views and SQL: Database Languages, Constraints and its types, Integrity constraints, Views: Introduction to views, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values.

UNIT-IV

Transaction management and Concurrency control: Transaction management: ACID

properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management

Database Security and Authorization: Introduction to Database Security Issues, Discretionary Access Control Based on Granting/Revoking of Privileges.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Fundamentals of Database Systems, Third Edition	Elmasri/Navathe	Addison Wesley
2	Database Concepts	Korth and Silberschatz Abraham,	McGraw Hall
3	An introduction to Database Systems	C.J.Date.	Addison Wesley
4	An introduction to Database Systems	Bipin C. Desai.	West Publishing
5	SQL,PL/SQL ,The programming language of oracle	Ivan Bayross	BPB Publication



Course Code	CSE373-18
Course Title	Fuzzy logic
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge about programming in some common programming language.
Course Objectives (CO)	To use Fuzzy logic in Design and Manufacture.

SYLLABUS

UNIT-I

Introduction, Classical Sets and Fuzzy Sets

Background, Uncertainty and Imprecision, Statistics and Random Processes, Uncertainty in Information, Fuzzy Sets and Membership, Chance versus Ambiguity. Classical Sets - Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Sets to Functions Fuzzy Sets - Fuzzy Set operations, Properties of Fuzzy Sets. Sets as Points in Hypercubes

UNIT-II

Classical Relations and Fuzzy Relations

Cartesian Product, Crisp Relations- Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition. Fuzzy Relations - Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition.

UNIT-III

Membership Functions

Features of the Membership Function, Standard Forms and Boundaries, Fuzzification, Membership Value Assignments – Intuition, Inference, Rank Ordering, Angular Fuzzy Sets, Neural Networks, Genetic Algorithms, Inductive Reasoning.

UNIT-IV

Fuzzy-to-Crisp Conversions, Fuzzy Arithmetic, Defuzzification Methods Extension Principle - Crisp Functions, Mapping and Relations, Functions of fuzzy Sets.

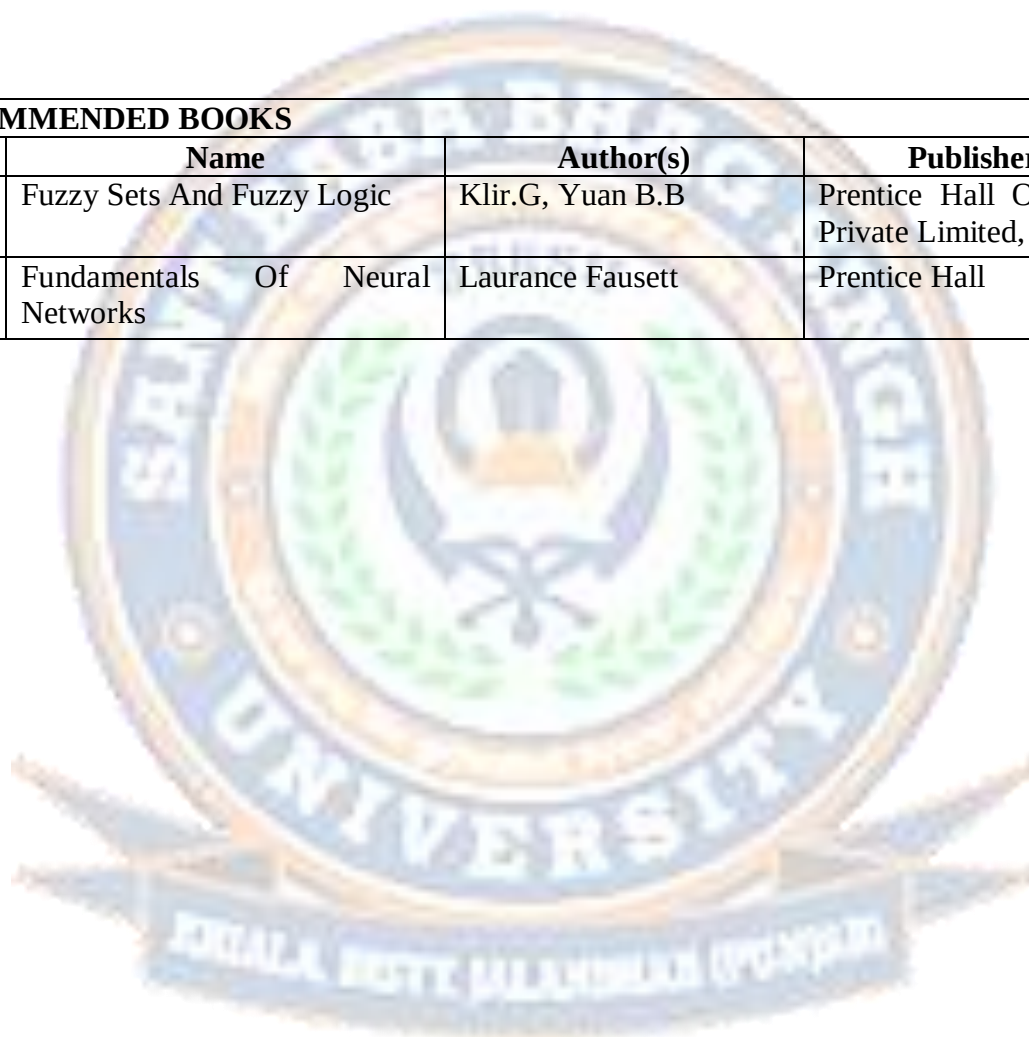
Fuzzy Rule- Based Systems

Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules, Graphical Techniques of Inference

Fuzzy Classification

Classification by Equivalence Relations - Crisp Relations, Fuzzy Relations. Cluster Analysis, Cluster Validity, c-Means Clustering - Hard c-Means (HCM), Fuzzy c-Means (FCM). Classification Metric, Hardening the Fuzzy c-Partition.

RECOMMENDED BOOKS			
S.No.	Name	Author(s)	Publisher
1	Fuzzy Sets And Fuzzy Logic	Klir.G, Yuan B.B	Prentice Hall Of India Private Limited, 1997
2	Fundamentals Of Neural Networks	Laurance Fausett	Prentice Hall



Course Code	ME371-18
Course Title	Total Quality Management
type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objectives (CO)	This subject provides students with the knowledge to understand the philosophy and core values of Total Quality Management (TQM), determining the voice of the customer and the impact of quality on economic performance and long-term business success of an organization; apply and evaluate best practices for the attainment of total quality.

SYLLABUS

UNIT-I

Quality and Total Quality Management: Excellence in manufacturing/service, factors of excellence, relevance of TQM.

Concept and definition of quality: Total quality control (TQC) and Total Quality Management (TQM), salient features of TQC and TQM. Total Quality Management Models, benefits of TQM.

Just-in-time (JIT): Definition: Elements, benefits, equipment layout for JIT system, Kanban system MRP (Material Requirement planning) vs JIT system, Waste elimination, workers involvement through JIT: JIT cause and effect chain, JIT implementation.

UNIT-II

Customer: Satisfaction, data collection and complaint, redressal mechanism.

Planning Process: Policy development and implementation; plan formulation and implementation.

Process Management: Factors affecting process management, Quality function development (QFD), and quality assurance system.

UNIT-III

Total Employees Involvement (TEI): Empowering employees: team building; quality circles; reward and Recognition; education and training, Suggestion schemes.

Problems solving: Defining problem, Problem identification and solving process, QC tools. Benchmarking: Definition, concept, process and types of benchmarking.

UNIT-IV

Quality Systems: Concept of quality system standards: relevance and origin of ISO 9000; Benefits; Elements of ISO 9001, ISO 9002, ISO 9003.

Advanced techniques of TQM: Design of experiments: failure mode effect analysis: Taguchi

methods.

RECOMMENDED BOOKS			
S.No.	Name	Author(s)	Publisher
1	Total Quality Management	Sunder Raju	Tata McGraw Hill.
2	TQM for engineers	M.Zairi	Aditya Books.
3	Total Quality Management Handbook	J.L. Hradeskym	McGraw Hill.
4	Total Quality Key terms and concepts	William L.Duncan	Amacom
5	Total Quality Management and Operational Excellence Text with Cases	John S. Oakland	Routledge



Course Code	ME373-18
Course Title	Production Planning & Control
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	The objective of this course is to Assist the students to acquire proficiency concept of planning and control of production.

Syllabus

UNIT-I

Production Planning & Control: Importance, Objectives, and Functions Types of Production Systems. Production Procedure: Production Cycle, Planning & Control in the Production Procedure. Production Organization: Organization Structure, Sections of Planning & Control Department. Product Selection, Process Selection, Plant Location, Plant Layout, Operations Capacity Planning.

UNIT-II

Production Order: Process Charts, Production Master Programmes, Operation & Route Sheets, Breakdown of the Production Order & preparation of various Cards. Production Planning: Operations Planning and Scheduling Systems, Aggregate Planning Process, Strategies for Aggregate Planning, Disaggregation of Aggregate Plans, Master Production Schedule (MPS), Material Requirement Planning (MRP), Rough Cut Capacity Planning.

UNIT-III

Production Control: Machine Loading; Infinite and Finite Loading, Gantt Load Chart, Visual Load Profiles; Detailed Scheduling: Gantt Scheduling Chart, Forward and Backward Scheduling, Forms Schedules, Inputs of Schedule, Drawing a Job Schedule, Factors influencing Scheduling, Procedure Scheduling, Reducing Scheduling Problems; Dispatching; Expediting; recording Progress; Input / Output Control.

UNIT-IV

Production Control for Mass Production: Design of Production Line, Assembly Line Balancing. Production Control for Batch production: Inventory Control for Single and Multiple Products, Line of Balance. Production control for Job Shop Production: Jumbled Flow in a Job Shop, Job

Sequencing for Machine Limited Scheduling Systems, Job Sequencing for Men and Machine Limited Scheduling Systems.

RECOMMENDED BOOKS			
Sr No	Author(s)	Title	Publisher
1.	Bhupender Kour	Effectual Communication Skills	S.K. Kataria and Sons
2.	R. Datta Roy and K.K. Dheer	Communications Skills	Vishal Publishing Company
3	The Essence of Effective Communication	Ludlow and Panthon	Prentice Hall of India
4	Essentials of Business Communication	Pal and Rorualling	S. Chand and Sons. New Delhi



Course Code	EE371-18
Course Title	Electrical Energy Conservation and Auditing
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To understand the current energy scenario and importance of energy conservation, the concepts of energy management, the methods of improving energy efficiency in different electrical systems and the concepts of different energy efficient devices.

SYLLABUS

UNIT- I

Energy Scenario Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

UNIT- II

Basics of Energy and its various forms. Electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

UNIT- III

Energy Management & Audit Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments. Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

UNIT- IV

Energy Efficiency in Electrical Systems -Electrical system: Electricity billing, electrical load

management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Guide books for National Certification Examination for Energy	Manager Energy Auditors Book-1	General Aspects
2	Utilization of Electrical Energy and Conservation	S. C. Tripathy,	McGraw Hill, 1991.
3	Success stories of Energy Conservation	BEE	BEE New Delhi

Course Code	EE373-18
Course Title	Elements of Power System
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To familiarize with concept of power system transmission and distribution.

SYLLABUS

UNIT-I

Power System Components: Single line Diagram of Power system, Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator Supply System Different kinds of supply system and their comparison, choice of transmission voltage

Transmission Lines: Configurations, types of conductors, resistance of line, skin effect, Kelvin's law. Proximity effect.

UNIT-II

Over Head Transmission Lines:-Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines, Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading

Overhead line Insulators: Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency

UNIT-III

Mechanical Design of transmission line: Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers Insulated cables: Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables

UNIT-IV

EHV AC and HVDC Transmission: Introduction to EHV AC and HVDC transmission and their comparison, use of bundle conductors, kinds of DC links, and incorporation of HVDC into AC system.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Electrical Power Systems.	WadhwaC. L.	New age international Ltd.
2	Power System Analysis and Design.	GuptaB. R.	S. Chand & Co
3	Electric Power	Uppal S. L.	Khanna Publishers



Course Code	ECE371-18
Course Title	Signals and Systems
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	NA
Course Objectives (CO)	Projects are non-recurring activities requiring a different set of skill for planning as compared to regular and operative activities. The course is aimed at developing the understanding of project activities and relevant skills.

SYLLABUS

UNIT- I

Introduction to Signals and Systems : Basic definitions, Classification of signals and systems. Signal operations and properties. Basic continuous time signals, signal sampling and quantization, discretization of continuous time signals, discrete time signals. Basic system properties, Representation of digital signals.

UNIT- II

Impulse response of CT and DT LTI Systems: characterization and convolution integral for CT-LTI system, signal responses to CT-LTI system, properties of convolution, LTI system response properties from impulse response. Impulse response characterization and convolution sum, Impulse response of DT-LTI system. System analysis from difference equation model .

UNIT- III

Representation of periodic functions: Fourier series, Frequency spectrum of aperiodic signals, Fourier Transform, Relation between Laplace Transform and Fourier Transform and its properties.

UNIT- IV

Z-Transform & its Properties: The z-Transform, Convergence of z-Transform, Basic z-Transform, Properties of z-Transform, Inverse z-Transform and Solving difference equation using z-Transform .

RECOMMENDED BOOKS			
S. No	Name	AUTHOR(S)	PUBLISHER
1	Signals and Systems	A.V. Oppenheim, A.S. Willsky and I.T. Young,	Prentice Hall
2	Introduction to Signals and Systems	Douglas K. Lindner	McGraw Hill International
3	Signals and Systems - Continuous and Discrete	R.F. Ziemer, W.H. Tranter and D.R. Fannin	Prentice Hall
4	Circuits and Systems: A Modern Approach	Papoulis	HRW
5	Signal Processing and Linear Systems	B.P. Lathi	Oxford University Press



Course Code	ECE373-18
Course Title	Microcontroller and Applications
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Microprocessor
Course Objectives (CO)	The course has been planned to know the architecture, instruction sets and various techniques for the interfacing of 8051 with different real world I/O devices to accomplish certain tasks.

SYLLABUS

UNIT- I

Introduction to 8051 Microcontrollers: Basic differences and similarities between Microprocessor and Microcontroller, Overview of 8051 family. : Intel 8051 history, Pin diagram of 8051, 8051-Architecture, Additional features in 8052.

UNIT-II

8051 Assembly Language Programming: Introduction to 8051 Assembly programming, Assembling and running an 8051 program, Data Types and directives, 8051 flag bits and PSW register. Register banks and stack.

UNIT-III

Instruction Set of 8051: Addressing modes and accessing memory using various addressing modes, Jump, Loop and Call instructions, Arithmetic instructions and programs, Logic instructions and programs, Single bit instructions and programming, Timer/counter programming in the 8051, Interrupt programming.

UNIT-IV

Serial Communication: 8051 connection to RS 232, 8051 serial communication programming. Hardware interfacing: I/O Port programming, Bit manipulation. Interfacing to a LED, LCD, Keyboard, ADC, DAC , Stepper Motors and sensors. Introduction to latest microcontroller: PIC microcontroller- Architecture, PIN Diagram.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	The 8051 Microocntroller and embedded Systems	Ali Mazidi	Pearson Education
2	The PIC Microcontroller and Embedded Systems	Ali Mazidi	Ali Mazidi
3	An Embedded Software Primer	David e Simon	Pearson Education



Course Code	ME371-18
Course Title	Renewable Energy Resources
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	NA
Course Objectives (CO)	The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro.

SYLLABUS

UNIT-I

Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar energy collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar energy storage and applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV

Geothermal energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Direct energy conversion: Need for DEC, Carnot cycle, limitations, principles of DEC

Recommended Books			
S.No.	Name	Author(s)	Publisher
1	Non-Conventional Energy Sources	G.D. Rai	Khanna Publishers
2	Renewable Energy Resources	Twidell&Wier	CRC Press(Taylor & Francis)
3	Renewable energy resources	Tiwari and Ghosal	Narosa.
4	Renewable Energy Technologies	K Mittal	Wheeler



Course Code	CE373-18
Course Title	Architecture & Town Planning
Type of Course	OE
L T P	30 0
Credits	3
Course Prerequisites	
Course Objectives (CO)	To enable the students to relate the architectural projects in context of planning in rural, urban and regional context.

SYLLABUS

UNIT-I

Elements of Design:

Line direction. Shape, size, texture, value and colour, balance, scale and proportion.

Principles of Design:

Repetition, gradation, harmony, contrast and unity, creation of 2 D and 3 D compositions.

UNIT-II

The Industrial Revolution:

The age of revivals, the emergence of engineer, new materials and techniques and the evolution of balloon frame and steel frame.

Origin of Modern Architecture:

Definition and concept of modern architecture, various pioneers of modern architecture.

UNIT-III

Town Planning:

Definition and meaning, age of planning, scope and motives of planning, brief history of town planning – its origin and growth, historically development of town planning in ancient valley civilizations. Indus Nile Tigris and Euphrates, Greek Roman, Medieval and Renaissance town planning

New Concepts:

Garden city movement, Linear city and concentric city concepts, Neighbourhood and Radburn, La-cite industrial, Radiant city to present day planning.

UNIT-IV

Planning Principles:

Types of town and their functions, types of town planning – Grid Iron, Radial, Spider webs, Irregular and Mixed, their advantages and disadvantages.

Planning Practice and Techniques:

Zoning – its definition, procedure and districts, height and bulk zoning, F. A. R., Master Plan – Meaning, preparation and realization, the scope of city planning – city rehabilitation and slum

clearance.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Urban Planning Problems	Cherry, Gordon	Board Hill, London
2	Urban and Regional Planning in India	Sundaram,K V	Vikas Publishing house(P) Ltd.,New Delhi
3	The Urban Pattern	Gallion A B,Eisner S,	Van Nostrandreinhold,New York



Course Code	CSE372-18
Course Title	Communication Networks
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer, Digital Circuits and Network Arrangement.
Course Objectives (CO)	To be familiar with various computer network architectures and to identify the infrastructure components, design infrastructure including devices, topologies and protocols.

SYLLABUS

UNIT-I

Introduction to Computer Networks: Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

UNIT-II

Physical Layer: Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media : Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons.

Data Link Layer: Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.

Medium Access Sub-Layer: Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

UNIT-III

Network Layer: Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

Transport Layer: Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery,

introduction to TCP/UDP protocols and their comparison.

UNIT-IV

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Network security.

Session & Presentation Layer

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Communication Networks: Fundamentals and Concepts and Key Architectures	Leon Garrcia and IndraWidjaja	TMH
2	Computer Networks.	A.S. Tanenbaum	PHI
3	Introduction to Data Communication and Networks	Forouzan, Coombs and Fagan	TMH
4	Data and Communication	William Stallings	PHI



Course Code	CSE374-18
Course Title	Computer Organization
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of computer and its components.
Course Objectives (CO)	This subject gives the basic knowledge to analyse architectures and computational designs and synthesize new and better architectures.

SYLLABUS

UNIT-I

Introduction: Introduction to Number System and Representation of information.

Register Transfer and Micro operations: Register transfer language & operations, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit. Design of a complete basic computer and it's working.

UNIT-II

Basic Computer Organisation and Design: Instruction codes, Computer registers, Computer Instructions, Timing and control, Instruction Cycle, Memory reference instructions, Input/Output and Interrupt, Design of basic Computer, Design of Accumulator Logic.

Design of Control Unit: Control memory, Hardwired control CPU design, Micro-programmed control CPU design and their comparative study.

UNIT-III

Central Processing Unit: General Register Organisation, Stack Organisation, Instruction formats, Addressing Modes, Data transfer and manipulations, Program control, RISC and CISC architecture.

Input-Output Organisation: Peripheral devices, I/O Interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA, I/O processor, serial communication.

Memory Organisation: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

UNIT-IV

Pipelining: Introduction to pipelining and pipeline hazards, design issues of pipeline architecture.

Introduction to Parallel Processing: Inter-process or communication & synchronization.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Advanced Computer Architecture	Kai Hawang	Tata McGraw Hill
2	Computer Organization and Design	P.Pal Choudhary	PHI
3	Computer System Architecture	M.Moris Mano	Pearson
4	Computer Organization and Architecture	William Stallings	Pearson



Course Code	ME374-18
Course Title	Lean Manufacturing
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	Implement lean manufacturing concepts in the factories.

Syllabus

UNIT- I

INTRODUCTION: The mass production system – Origin of lean production system – Necessity – Lean revolution in Toyota – Systems and systems thinking – Basic image of lean production – Customer focus – Muda (waste).

UNIT- II

STABILITY OF LEAN SYSTEM: Standards in the lean system – 5S system – Total Productive Maintenance – standardized work – Elements of standardized work – Charts to define standardized work – Man power reduction – Overall efficiency - standardized work and Kaizen – Common layouts.

UNIT- III

JUST IN TIME: Principles of JIT – JIT system – Kanban – Kanban rules – Expanded role of conveyance – Production leveling – Pull systems – Value stream mapping.

UNIT- IV

JIDOKA (AUTOMATION WITH A HUMAN TOUCH): Jidoka concept – Poka-Yoke (mistake proofing) systems – Inspection systems and zone control – Types and use of Poka-Yoke systems – Implementation of Jidoka.

WORKER INVOLVEMENT AND SYSTEMATIC PLANNING METHODOLOGY: Involvement – Activities to support involvement – Quality circle activity – Kaizen training - Suggestion Programmes – Hoshin Planning System (systematic planning methodology) – Phases of Hoshin Planning – Lean culture

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1.	How to implement lean manufacturing	Lonnie Wilson	Toyota Production
2.	Lean thinking: banish Waste and create wealth in your corporation	Daniel T. Jones and James P.Womack.	McGraw Hill
3	Statistics for six sigma	Warren Brussee	Made Easy



Course Code	EE372-18
Course Title	Industrial Electrical System
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD. Understand various components of industrial electrical systems. Analyze and select the proper size of various electrical system components.

SYLLABUS

UNIT-I

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

UNIT-II

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT-III

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premise, flood lighting.

UNIT-IV

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks. Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Electrical Power Systems.	Wadhwa C. L.	New age international Ltd.
2	Power System Analysis and Design.	Gupta B. R.	S. Chand & Co
3	Electric Power	Uppal S. L.	Khanna Publishers



Course Code	EE374-18
Course Title	Fundamentals of Electrical Machines
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To become familiar with single phase and three phase transformer, DC and AC machines, parallel operation of machines & to calculate the efficiency of machines.

SYLLABUS

UNIT-I

Introduction

Basic Principle, Types and constructional features of electrical machines, torque, and torque angle, basic electromagnetic laws, Induced EMF.

UNIT-II

Transformers

Basic principle, turns ratio, types and parts of a transformer, ideal transformer, transformer on no-load and on-load, phasor diagram, transformer reactance and equivalent circuit, losses, efficiency, all day efficiency, regulation, basic concept of three-phase transformer and auto transformer (excluding analysis).

UNIT-III

Direct Current (DC) Machines

Principle, Constructional features, Types of direct current (DC) machines, Electromotive force (EMF) and torque equations, circuit model, armature reaction, commutation, Types of armature winding (no detailed diagram), characteristics of dc motors, characteristics of dc generators, starting (three point and four point starters), speed control methods, efficiency and applications.

UNIT-IV

A.C MOTORS

Three-phase Induction Machines: Concept of rotating magnetic field in three phase, Construction and principle of operation. slip frequency, rotor currents, rotor Magneto motive force (MMF) and torque production, equivalent circuit; torque slip characteristics, power output, starting;

Single-phase Induction Motors: Principle of single phase induction motors, double field revolving theory, types of single phase induction motors.

Synchronous Machines: Construction and types, Electromotive force (EMF) equation, synchronous reactance.

Principle of Special Motors: Alternating current (AC) series motor, universal motor, reluctance motor, hysteresis motor, stepper motor, Brushless Motors, Switched reluctance motor and their

Applications.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Electrical Machines, VOL II	Thareja B.L	S.Chand
2	Bimbhra P.S.	Electrical Machinery,	Khanna Publishers
3	Electrical Machines	Nagrath I.J. and Kothari D.P	Tata McGraw Hill



Course Code	ECE372-18
Course Title	Analog and Digital Communication
Type of Course	OE
L T P	3-0-0
Credits	3
Course Prerequisites	Electronics Devices
Course Objectives (CO)	To study the fundamentals, mathematical analysis, generation, reception and considerations for various types of modulation techniques and impart practical knowledge of different communication systems.

SYLLABUS

UNIT- I

Review of Fundamental Concepts and Mathematical preliminaries: Elements of an electrical communication system; Characteristics of communication channel and their mathematical modeling; Signal models: deterministic and random; signal classification; Convolution Integral and response of LTI system; Fourier series representation, Parseval's theorem; Fourier transform; Hilbert transform.

UNIT- II

Analog communication systems: Concept of modulation and demodulation, Continuous wave (CW) modulation: amplitude modulation (AM) - double sideband (DSB); double sideband suppressed carrier (DSBSC); single sideband suppressed carrier (SSBSC) and vestigial sideband (VSB) modulation, angle modulation - phase modulation (PM) & frequency modulation (FM); narrow and wideband FM. Representation of narrowband noise; receiver model, signal to noise ratio (SNR), noise figure, noise temperature, noise in DSB-SC, SSB, AM & FM receivers, pre-emphasis and de-emphasis.

UNIT- III

Pulse Modulation: Sampling process, sampling theorem for band limited signals; pulse amplitude modulation (PAM); pulse width modulation (PWM); pulse position modulation (PPM) ; pulse code modulation (PCM); line coding; differential pulse code modulation; delta modulation and adaptive delta modulation, Basics of time division multiplexing, noise consideration in PAM and PCM systems..

UNIT- IV

Basic digital modulation schemes: Overview of geometric representation of signals, Gram-Schmidt Orthogonalization procedure; Basic digital modulations schemes: Phase shift keying (PSK), amplitude shift keying (ASK), frequency shift keying (FSK) and Quadrature amplitude modulation (QAM); coherent demodulation and detection; probability of error.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Communication Systems	Simon Haykin	Wiley India
2	Modern Digital and Analog Communication Systems	B P Lathi, Zhi Ding	Oxford University Press
3	Principles of Communication Systems	H. Taub, D. L. Schilling, G. Saha	Tata McGraw-Hill
4	Digital Communications	Bernard Sklar	Prentice Hall of India
5	Principles of Communication Systems	Taub and Schilling	Tata McGraw-Hill



Course Code	ECE374-18
Course Title	Analog Circuits
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Circuit models of CMOS, and BJT, Electronic circuit analysis
Course Objectives (CO)	The course has been planned to Introduce the principles of analog circuits and apply the techniques for the design of analog integrated circuit (Analog IC's).

SYLLABUS

UNIT- I

Low Frequency Transistor Amplifier : Equivalent circuit of BJT using h-parameter for CB, CE and CC & configuration, calculation of transistor parameter for CB, CE & CC using h-parameters, comparison of transistor amplifier configuration.

UNIT- II

Multistage and Large Signal Amplifiers: General cascaded system, RC coupled amplifier and its frequency response, merits and demerits, cascade amplifier, Darlington compound configuration, multistage frequency effect. Large Signal Amplifier Analysis and design of class A, B, AB, C amplifiers, push pull amplifiers, transformer less output stages, distortion calculations.

UNIT-III

Feedback Amplifier Feedback concept, characteristics of negative and positive feedback. Effect of negative and positive feedback on input impedance, output impedance, gain, and noise and frequency response..

UNIT-IV

Oscillators Classification of Oscillators, frequency and frequency stability of oscillatory circuits, Tuned based Oscillators, Hartley Oscillator, Colpitts Oscillators Clapp Oscillator, Crystal Oscillator, Phase Shift Oscillator, Wein Bridge Oscillator

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Analysis and Design of Analog Integrated Circuits	P.R. Gray and R.G. Meyer	John Wiley and Sons
2	Integrated Electronics	Millman & Halkias	Tata McGraw Hill.
3	Electronic Circuit: Discrete & Integrated	Schilling & Belone	Tata McGraw Hill.
4	OpAmps and Linear IC's	Gayakwad R.A	PHI



Course Code	CE372-18
Course Title	Construction of Metro System
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Transport & Railway Engineering
Course Objectives (CO)	Study of metro systems

SYLLABUS

UNIT- I

Overview of Metro System, Need for metro.

UNIT- II

Routing Studies, Basic Planning and Financials, Initial Surveys and investigations, Basics Of construction planning and management

UNIT-III

Construction Methods for elevated and underground stations, via duct spans & bridges , underground tunnels , Depots commercial and service buildings

UNIT-IV

Construction quality and safety systems , traffic integration , multi modal transfers and pedestrians facilities , environment and social safeguards
Track system – permanent way, facilities management

Course Code	CE374-18
Course Title	Traffic Engineering
Type of Course	0E
L T P	3 0 0
Credits	3
Course Prerequisites	Transportation Engineering-I,II
Course Objectives (CO)	The objective of the course is to give knowledge about the design of flexible and rigid pavements and basic knowledge of docks, harbor & tunnels.

SYLLABUS

UNIT-I

Introduction:

Types of pavement structure. Importance and functions of various components of pavement structures, design factors, Factors affecting pavement design, Design wheel load, equivalent single wheel load, repetition of loads climate variation.

UNIT-II

Design of Flexible Pavements:

Flexible pavement design methods: CBR method, group index method , IRC method of design of flexible pavement.

Design of Rigid Pavements:

General design considerations, Wheel load stresses, Westergard's stress equation for wheel load, evaluation of wheel load stress, temperature stresses, design of joints, design of dowel and tie bars, IRC method of design of rigid pavements, CRCP(Continuously Reinforced concrete pavements) FRC (Fibre reinforced concrete pavements), pre stressed concrete pavements

UNIT-III

Design of Bituminous Mixes:

Requirements of bituminous mixes, Marshall Method of Bituminous Mix Design

Harbor and Docks

Harbours and ports, water transportation, natural phenomenon: tides, wind & waves, classification, facilities at major port, protection facilities: wall type & special break waters, planning & layout of ports, classification of docks, docking facilities, repairing facilities-fixed form & movable form , approach facilities, loading and unloading facilities, guiding facilities-light house & signal, storing facilities.

UNIT-IV

Tunnels

General, basic definition, merits & demerits of tunnels & open cuts, selection of alignment of

tunnel, classification of tunnels, tunnel approaches.

Problems in Tunneling

Introduction to various stages in tunnel construction, methods of tunneling in soft soil & rock, tunnel lining necessity & material used, drainage in tunnels, health protection in tunnels.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Docks and harbor engineering	Bindra S.P	Dhanpat rai
2	Principles, practices and design highway engineering	Sharma S.K	S chand & company ltd 1995
3	Highway engineering	Khanna S.K & Justo CEG	Nem chand and brother roorkee



Course Code	CSE471-18
Course Title	Concepts of Operating Systems
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Overview of Computer Architecture
Course Objectives (CO)	This course provides the knowledge about the role of an operating system, issues in the management of resources like processor, memory and input-output, design of an operating system.

SYLLABUS

UNIT-I

Introduction: Operating Systems functions, Types of operating systems, Multiprogramming systems, Batch systems, Time-sharing systems, Operating system operations, Special purpose operating systems, distributed systems, Different computing environments.

UNIT-II

Operating System Organization: Processor and user modes, user operating system interface, Kernels, System calls and its types, System programs, Operating system structures, Virtual machines.

Process Management: Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multi-threading models, Non-pre-emptive and pre-emptive scheduling algorithms, Concurrent processes, Critical section, Semaphores, methods for inter-process communication, Deadlocks.

UNIT-III

Memory Management: Physical and virtual address space, Memory allocation strategies, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.

File and I/O Management: Directory structure, File operations, Files system mounting, File allocation methods, Device management, Disk scheduling algorithms.

UNIT-IV

OS and Security: Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access control lists and OS support, internet and general network security, Policy mechanism, Program, network and system threats, Authentication.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Operating Systems Concepts	A Silberschatz, P.B. Galvin, G. Gagne	John Wiley Publications
2	Operating Systems: A Modern Perspective	G. Nutt	Pearson Education
3	Modern Operating Systems	A.S. Tanenbaum	Pearson Education
4	Operating Systems, Internals & Design Principles	W. Stallings	Prentice Hall of India



Code	CSE473-18
Course Title	Data Warehousing And Data Mining
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Database Systems
Course Objectives (CO)	Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.

SYLLABUS

UNIT-I

Data Warehouse Fundamentals: Introduction to Data Warehouse, OLTP Systems; Differences between OLTP Systems and Data Warehouse; Characteristics of Data Warehouse; Functionality of Data Warehouse: Advantages and Applications of Data Warehouse;

Data Warehouse Architecture: Introductions, Components of Data warehouse Architecture: Technical Architectures; Data warehouse architectures 1: Data warehouse architecture 2: Data warehouse architecture 3: Tool selection: Federated Data Warehouse Architecture:

UNIT-II

Data Warehouse & OLAP: Introduction: What is OLAP?; Characteristics of OLAP, Steps in the OLAP Creation Process, Advantageous of OLAP: What is Multidimensional Data: OLAP Architectures; MOLAP, ROLAP, HOLAP: Data Warehouse and OLAP: Hypercube & Multicubes

Meta data Management in Data Warehouse: Introductions to Metadata: Categorizing Meta data: Meta data management in practice; Meta data requirements gathering, Meta data classification, Meta data collection strategies: Meta Data Management in Oracle and SAS: Tools for Meta data management

UNIT-III

Introduction to Data Mining: Introduction: Scope of Data Mining: What is Data Mining; How does Data Mining Works, Predictive Modeling: Data Mining and Data Warehousing: Architecture for Data Mining: Profitable Applications: Data Mining Tools: Data Preprocessing: Introduction, Data Preprocessing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Data Mining Techniques- An Overview: Introduction, Data Mining, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks.

Clustering: Introduction, Clustering, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering, Agglomerative clustering, Divisive clustering, clustering and segmentation software, evaluating clusters.

UNIT-IV

Web Mining: Introduction, Terminologies, Categories of Web Mining – Web Content Mining, Web Structure Mining, Web Usage Mining, Applications of Web Mining, and Agent based and Data base approaches, Web mining Software.

Applications of Data mining: Introduction, Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature construction, Medical applications (diabetic screening), Scientific Applications using Data Mining, Other Applications.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Data Warehousing And Data Mining	Varsha V. Bhosale	Wiley India
2	Data Warehousing: OLAP and Data Mining	Amos Gilat	Wiley India
3	Introduction to Data Mining	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	Pearson Education India
4	Data Mining	Pieter Adrians, Dolf zantinge	Pearson Education India
5	Database Management Systems	R. Ramakrishnan, J. Gehrke,	McGraw Hill

Course Code	ME471-18
Course Title	Material Management
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	To introduce to the students the various concepts of materials management

Syllabus

UNIT I

Introduction to materials management – Objectives – Functions – Operating Cycle – Value analysis – Make or buy decisions.

UNIT II

Management of purchase: Purchasing policies and procedures – Selection of sources of supply – Vendor development – Vendor evaluation and rating – Methods of purchasing – Imports – Buyer – Seller relationship – Negotiations.

UNIT III

Management of stores and logistics 12 Stores function – Location – Layout – Stock taking – Materials handling – Transportation – Insurance – Codification – Inventory pricing – stores management – safety – warehousing – Distribution linear programming – Traveling Salesman problems – Network analysis – Logistics Management.

UNIT IV

Materials plan for forecasting – Materials requirements planning – Quantity – Periodic – Deterministic models – Finite production. Inventory management 10 ABC analysis – Aggregate planning – Lot size under constraints – Just in Time (JIT) system.

RECOMMENDED BOOKS			
Sr No	Name	AUTHOR(S)	PUBLISHER
1.	Engineering Management	Dr. R. Kesavan, C.Elanchezian and T.SundarSelwyn.	Eswar Press
2.	Purchasing and Material Management,	Lamer Lee and Donald W. Dobler	Tata McGraw Hill, 200
3	Handbook of Materials Management	Gopalakrishnan.P	Prentice Hall of India.



Course Code	ME473-18
Course Title	Mechatronics
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	To understand the structure of microprocessors and their applications in mechanical devices, the principle of automatic control and real time motion control systems, with the help of electrical drives and actuators, use of micro-sensors and their applications in various fields .

Syllabus

UNIT-I

Introduction: Definition of Mechanical Systems, Philosophy and approach; Systems and Design: Mechatronic approach, Integrated Product Design, Modelling, Analysis and Simulation, Man-Machine Interface; Sensors and transducers: classification, Development in Transducer technology,

UNIT-II

Optoelectronics- Shaft encoders, CD Sensors, Vision System, Drives and Actuators: Hydraulic and Pneumatic drives, Electrical Actuators such as servo motor and Stepper motor, Drive circuits, open and closed loop control; Embedded Systems

UNIT-III

Hardware Structure, Software Design and Communication, Programmable Logic Devices, Automatic Control and Real Time Control Systems; Smart materials: Shape Memory Alloy, Piezoelectric and Magnetostrictive Actuators: Materials, Static and dynamic characteristics, illustrative examples for positioning, vibration isolation.

UNIT-IV

Micromechatronic systems: Micro sensors, Micro actuators; Micro-fabrication techniques LIGA Process: Lithography, etching, Micro-joining etc. Application examples; Case studies Examples of Mechatronic Systems from Robotics Manufacturing, Machine Diagnostics, Road vehicles and Medical Technology.

RECOMMENDED BOOKS			
Sr No	Author(s)	Title	Publisher
1	,Devdas Shetty & Richard A. Kolk	Mechatronics System Design	PWS Publishing Company
2	R.K.Rajput	A Textbook of Mechatronics	S. Chand & Company Private Limited



Course Code	EE471-18
Course Title	Wind and Solar energy system
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	NA
Course Objectives (CO)	The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, then focus on alternate, renewable energy sources such as solar and wind power.

SYLLABUS

UNIT-I

History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power-cumulative distribution functions.

UNIT-II

Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent-Magnet Synchronous Generators, Power electronics converters. Generator-Converter configurations, Converter Control.

UNIT-III

Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

UNIT-IV

Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems

RECOMMENDED BOOKS

S.No.	Name	Author(s)	Publisher
1	Non-Conventional Energy Sources	G.D. Rai	Khanna Publishers
2	Renewable Energy Resources	Twidell&Wier	CRC Press(Taylor & Francis)
3	Solar Energy: Principles of Thermal Collection and Storage.	S. P. Sukhatme	McGraw Hill, 1984.
4	Wind Power in Power Systems	T. Ackermann	John Wiley and Sons Ltd., 2005.



Course Code	EE473-18
Course Title	Instrumentation Engineering
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	NA
Course Objectives (CO)	To understand the principle and working of electronic instruments and their application. 2. To understand the concept of digital instruments and their comparison. 3. To be able to inculcate the knowledge regarding different types of transducers. 4. To identify the details of instrumentation and devices intended for a particular application.

SYLLABUS

UNIT-I

ELECTRONIC INSTRUMENTS:-Electronic Voltmeter and Current Probes, Tuned Type and Sampling type Voltmeter, Current Probes for D.C. and A.C. Measurements, Electronic Multimeter - Construction, Measurement of D.C. and A.C. Voltage and Current, Measurement of Resistance. CRO- Construction, Synchronization, Measurement of Voltage, Current, Phase and Frequency, DSO- Working and Operation

UNIT-II

Comparison of Analog and Digital Instruments, Digital Voltmeter, Multimeter and Frequency Meter.

UNIT-III

TRANSDUCERS:-Block Diagram Representation of Instrumentation System, Terminology and Definition, Classification, Transducing Principles and Elements, Ultrasonic, Optical and Infrared Sensors, Inductive, Capacitive and Resistive Transducers for Measurements of Length, Thickness, Displacement, Velocity, Torque, Level, Pressure, Temperature, Flow, Humidity, Moisture and ph.

UNIT-IV

Recorders: X-Y Recorders, Strip-Chart Recorder, Magnetic and Potentiometric Recorder, Digital Displays- LED and LCD, Introduction to Data Acquisition Systems.

Recommended Books

S.No.	Name	Author(s)	Publisher
1	A course in Electrical & Electronic Instrumentation,	Sawhney A.K.,	Dhanpat Rai and Sons.
2	Electronics Instrumentation and Measurements,	Bell David A	Prentice Hall, India
3	Electrical Measurements Fundamentals, Concepts, Applications,	Reissl and Martin V	Wiley Eastern Limited, New Delhi.



Course Code	ECE471-18
Course Title	Bio-Medical Electronics
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Applications Of Electronics In Medical Field.
Course Objectives (CO)	To study the methods of recording various bio-potentials, how to measure various physiological information, understand the working of biotelemetry and understand the practical application of electronics in biomedical.

SYLLABUS

UNIT I

Introduction to Biomedical Signals: The origin of Bio-potential, biological amplifiers, ECG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics. Electrode theory and Different types of Electrodes. Polarization, Electrode behavior, Electrode-skin interface.

UNIT II

Cardio Vascular Measurement: Measurement of blood pressure, balloon flow, cardiac output and cardiac rate. Assist Devices and bio-telemetry: Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Biotelemetry, radio-pill and tele-stimulation.

UNIT III

Neurological Signal Processing :Modeling of EEG Signals, Detection of spikes and spindles, Detection of Alpha, Beta and Gamma Waves, Auto Regressive (A.R.) modeling of seizure EEG, Sleep Stage analysis, Inverse Filtering, Least squares and polynomial modeling.

UNIT IV

Radiological Equipment: Ionizing radiation, Diagnostic x-ray equipment, use of Radio Isotope in diagnosis, Radiation Therapy. Recent trends in medical instrumentation: Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Electrical safety in medical equipment.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Biomedical Signal Processing: Principles and techniques	D.C.Reddy	Tata McGraw-Hill
2	Willis J Tompkins	Biomedical Signal Processing	Prentice Hall
3	Khandpur, R.S.	Handbook of Biomedical Instrumentation	Tata McGraw-Hill
4	Introduction to Biomedical equipment Technology	Joseph J.Carr and John M.Brown	John Wiley and Sons
5	Biomedical Signal Processing & Signal Modeling	Bruce	John Wiley and Sons



Course Code	ECE473-18
Course Title	Principles of VLSI Design
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Knowledge of Microprocessor 8085 and Microcontroller 8051.
Course Objectives (CO)	To introduce Microprocessor Architectural Concepts, Instructions & communications and latest microcontrollers.

SYLLABUS

UNIT I: Introduction: Introduction to Computer-aided design tools for digital systems. Hardware description languages, Introduction to VHDL, Data objects, Classes and data types, Operators, Overloading, Logical operators. Types of delays, Entity and Architecture

UNIT II: VHDL Statements: Assignment statements, sequential Statements and process, Conditional statements, Case statements, Array and loops, Resolution functions, Packages & Libraries, Concurrent statements.

UNIT III: Combinational Circuit and Sequential Circuit Design: VHDL models and simulation of combinational circuits such as Multiplexers, Encoders, Decoders, Code converters, Comparators, Implementation of Boolean functions etc VHDL Models and simulation of sequential circuits, Shift registers, Counters etc.

UNIT IV: Design of Microcomputer: Basic components of a computer, Specifications, Architecture of a simple Microcomputer system, Implementation of a simple microcomputer system using VHDL. Design with CPLDs and FPGAs: Programmable logic devices : ROM, PLAs, GAL, PEEL, CPLDs and FPGA. Design and implementation using CPLDs and FPGA

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	A VHDL Primer	Bhasker	Prentice Hall
2	“Digital System Design using VHDL	Charles. H. Roth	PWS
3	VDHL-Analysis & Modelling of Digital Systems	Navabi Z	McGraw Hill
4	Fundamentals of Digital Logic with VHDL Design.	Brown and Vranesic;	TMH

Course Code	CE471-18
Course Title	Rural Technology & Community Development
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	
Course Objectives (CO)	The objective of this course is to make students aware of the various elements of rural technology and community development.

SYLLABUS

UNIT-I

Data analysis and measures of central tendency

Meaning nature scope and limitations of statistics, collection of statistical data, classification, tabulation and diagrammatic representation of data, measures of central tendency : statistical averages means, media and mode.

UNIT-II

Data Information and Knowledge

Concept of information, need of information(professional education, research), qualities of information, value of information, difference between data and information, properties of the needed information, information and management, planning organizing, Coordinating and controlling

UNIT-III

Concept of Marketing

Difference between marketing selling and retailing, marketing mix, market segmentation, marketing planning, strategy and approaches; modern concept of marketing

Community Development

Concept, definition, meaning, need, history, principles objectives and scope. Community building: coming age, regenerating community, community model

UNIT-IV

Consensus Organizing model

What's behind building healthy communities, participatory democracy. The role of various NGOs in community development. The role of business and government in community development initiatives, how to form a non profit corporation fund raising and grant writing.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Encouraging community development	Biddle William wishart	Mcgraw hill
2	Sustainable rural technology	M.S Virdi	Daya publishing house
3	Rural technology	Punia RD Roy	Satyaparkashan
4	Rural education and technology	S.B Verma, S.K Jiloka	Deep and deep publication

Course Code	CE473-18
Course Title	Waste Water Engineering
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Environmental Engineering
Course Objectives (CO)	It is the branch of environmental engineering in which the basic principles of science and engineering are applied to the problems of water pollution control. So, as an overview, this wastewater engineering includes wastewater treatment, sludge disposal and reuse, wastewater reclamation and reuse, effluent disposal and the role of engineer.

SYLLABUS

UNIT I

Introduction:

Terms & definitions, systems of sanitation and their merits and demerits, system of sewerage, choice of sewerage system and suitability to Indian conditions.

Design Of Sewers:

Quantity of sanitary and storm sewage flow, forms of sewers. Conditions of flow in sewers, sewers of equivalent section, self cleansing and limiting velocity, hydraulic formulae for flow of sewerage in sewers and their design.

UNIT II

Construction & Maintenance Of Sewers:

Sewer appurtenances, materials for sewers. Laying of sewers, joints in sewers, testing of sewers pipes. Maintenance, operation and precaution before entering a sewer.

House Drainage:

Principles of house drainage, traps, inspection chamber Indian and European type W.C. flushing cisterns, soil-waste and anti-syphonage pipes, plumbing system.

UNIT III

Characteristics & Testing Of Sewage:

Composition of sewage, sampling, physical & chemical analysis of sewerage, biological decomposition of sewage, kinetics of organic waste stabilization.

Treatment Of Sewage:

Unit processes of waste water treatment, importance of environmental sanitation, treatment of water; impurities in water-processes for their removal – typical flow-sheets. Sedimentation: factors affecting efficiency, design values of various parameters, tube settlers. Coagulation and flocculation: mechanisms, common coagulants, rapid mixing and flocculating devices screens, grit chambers, detritus tank, skimming tank, grease traps, sedimentation, chemical treatment, aerobic biological treatment, trickling filter (lrtf & hrtf), activated sludge processes, anaerobic treatment, units-sludge digesters and biogas plant.

UNIT IV

Low Cost Waste Water Treatment Units:

Theory, design, advantages & disadvantages of oxidation's ponds, lagoons, ditches, septic tanks and imhoff tanks.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	“Water Supply Engineering” Vol. II	Garg S K	Khanna Publishers, New Delhi, 2003
2	Environmental Engg. - A design Approach	Arcadio P. Sincero and Gregoria P. Sincero	Prentice Hall of India, New Delhi
3	Waste Water Engineering - Treatment and Reuse	Metcalf & Eddy	McGraw Hill, New Delhi, 2003
4	Waste Water Engg. (Environmental Engg.-II)	Punmia B C	Laxmi Publication, New Delhi, 2002



Course Code	CSE472-18
Course Title	Image Analysis
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer fundamentals
Course Objectives (CO)	To make students familiar with the various fundamentals & and processes involved in the processing of an image.

SYLLABUS

UNIT -I

Digital Image Fundamentals & Transforms: Introduction, Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System. Elements of Visual Perception, Sampling and Quantization, Basic Relationships between Pixels, Imaging Geometry. Introduction to the Fourier Transform, The Discrete Fourier Transform, Some Properties of the Two-Dimensional Fourier Transform.

UNIT-II

Image Enhancement: Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Smoothing Filters, Sharpening Filters, Low pass Filtering, High pass Filtering.

UNIT-III

Image Restoration & Compression: Degradations Model - Definitions, Degradation Model for Continuous, Restoration in the Spatial Domain, Geometric Transformation. Error free compression, Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression – Lossy Predictive Coding, Transform Coding.

UNIT-IV

Image Segmentation & Representation: Edge Detection, Thresholding, Region-Based Segmentation. Image Representation, Boundary and Regional Descriptors, Relational Descriptors. Object Recognition: Pattern and pattern classes, recognition based on Decision Theoretic Methods, Structural Methods.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Digital Image Processing	Rafael. C. Gonzalez & Richard E.Woods	Pearson Education
2	Digital Image Processing	W.K.Pratt.	John Wiley & sons
3	Image Processing Analysis and Machine Vision	M. Sonka	Thomson Learning

Course Code	CSE474-18
Course Title	Concepts of Cloud Computing
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Distributed System, Operating Systems and Networking
Course Objectives (CO)	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in the field of computer Science.

SYLLABUS

UNIT-I

Introduction: Principles and characteristics of cloud computing- IaaS, PaaS, SaaS; service oriented computing and cloud environment. Cloud Computing Technology: Client systems, Networks, server systems and security from services perspectives; Accessing the cloud with platforms and applications; cloud storage.

UNIT-II

Working with Cloud: Infrastructure as a Service–conceptual model and working Platform as a Service – conceptual model and functionalities. Software as a Service: conceptual model and working.

UNIT-III

Using Cloud Services: Cloud collaborative applications and services–case studies with calendars, schedulers and event management; cloud applications in project management. Case studies: Microsoft Azure, Google App Engine and Open source clouds- Open-Nebula and Eucalyptus.

UNIT-IV

Virtualization Technology, Creating VMs, Hypervisor. Storage Technology, types of Storage Devices, RAID Tech Practical Session for RAID (Hands on) File system, DAS, NAS & SAN Tech.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Cloud Computing – A Practical Approach	Anthony T.Velte, Toby J.Velte and Robert E	TMH
2	Cloud Computing – Web based Applications	Michael Miller	Pearson Publishing

Course Code	ME475-18
Course Title	Productions & Operations Management
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	NA
Course Objectives	

Syllabus

UNIT- I

Operations management: Concept, Functions. Product Design and development : Product design and its characteristics: Product development process (Technical): Product development techniques .Process selection- Project, job, Batch, Mass and Process types of Production Systems.

UNIT-II

Facility Location: importance, Factors in Location Analysis: Location Analysis Techniques. Facility Layout : Objectives: Advantages: Basic types of layouts. Capacity Planning : Concepts: Factors Affecting Capacity Planning, Capacity Planning Decisions. Production Planning & Control (PPC) :Concepts, Objectives, Functions. Work Study : Productivity: Method Study; Work Measurement.

UNIT- III

Introduction to modern productivity techniques : just in time, Kanban system. Total Quality Management & six sigma. Functions of Purchasing Management : Objectives, Functions: Methods: Procedure. Value analysis : Concepts. Stock control systems. Virtual factory concept. Production worksheets.

UNIT- IV

Inventory Management : Concepts, Classification: Objectives: Factors Affecting Inventory Control Policy: Inventory costs: Re-order Level, Quality Management - Quality Concepts, Difference between Inspections, Quality Control, Quality Assurances, Total Quality Management: Control Charts: acceptance Sampling.

RECOMMENDED TEXT BOOKS			
S. No	Author	Title	Publisher
1	Nair	Production & Operations Management	Tata McGraw hill
2	Adam and Eben	Production & Operations Management	Prentice Hall



Course Code	ME477-18
Course Title	Industrial Safety
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	EVS
Course Objectives	To aware the students with potential Risks in operations and their Management.

SYLLABUS

UNIT- 1

Introduction Growing concern for safety and health, Safety terminology. Health and safety regulations: International and National scenario : National policy: Product and system liability, Safety cost and losses: Cost of accidents and hidden costs, Growing awakening and concern for environment: Environment protection Act 1986 (amended 1991) : Global warming . Principles of total safety and environment management: Goal, synergy and differences between safety and environment, Synergy of quality with safety, health and environment, Safety . Safety and health hazards, Types of hazards, . Measuring performance of safety and health systems : Indices, and their computation . Safety hazards: Safety in construction, Machine guards & machine tools safety, Safety in material handling.

UNIT- II

Fire safety and industrial security, Principles of fire safety : Occupational injuries and precaution, Characteristics and nature of fire : Fire hazards . Types of fires and ways of extinguishing: Automatic sprinklers : Portable extinguisher : Extinguishing agents . Fire prevention techniques: Building codes & regulation : Building materials and internal finishes . Electrical fire safety: Problems and facts : Electrical distribution and earthing : FRLS wiring : Portable genset and appliances : Electrical processes like welding & cutting . Fire regulations: Standards : Occupancy & egress : Escape plans & displays : Protective clothing : Protective strategies : Emergency preparedness . Fire losses and assessment: After effect & plan of action

UNIT- III

Health, Industrial hygiene, Loss control and productivity, Application of occupational hygiene, Health hazard agents: Chemical agents like toxic compounds and materials: Physical agents like noise, vibration & radiation : Biological hazards . Exposure risk assessment: Routes of exposure Measurement of exposure: Exposure factors . Pulmonary diseases due to environment pollution. Respiratory and personal protective equipment, Development and administering medical surveillance system, Environmental management. Sustainable development planning: National policy Environmental damage and costs : Deteriorating impact on environment . Environmental factors and safety. Environmental design of work place: Location: Work direction walkways: Area allocation and sitting/working plan . Illumination: Types of lighting (natural vs artificial) : Luminous level : Glare . Ventilation: Types (natural and mechanical): Heat calculation: Measurements. Noise: Types: Protection: Effects & productivity . Drinking water: Contamination: Causes: Precaution : Preventive maintenance Industrial pollution hazards . Air pollution: Types: Causes: Prevention and control Water pollution: Categories : Causes : Prevention and control . Soil and ground pollution: Categories: Causes: Prevention and control . Noise pollution: Causes: Prevention : Acoustic design : Monitor and controls . Industrial waste: Types: Control : Reuse . Environmental impact assessment: Objective: Environment impact in India: Other efforts in conserving nature

UNIT-IV

Compliance of environmental laws: Guidelines for location of industries: Compliance of water & air pollution acts, and other environmental laws, Imperative for sustainable development. Green house gases: Composition: Effect . Carbon emission: Kyoto protocol: Carbon credits: Emission trading: Carbon credit scenario in India : Corporate social responsibility . Carbon foot print: Measures to reduce : Initial investment . Ozone layer depletion. Mutual agreements: Member states: Scope: Responsibilities . Rain water harvesting: India's tradition in water harvesting : Rainfall data : Catch water practice and policy : Basic design : Making a mass movement . Wasteland reclamation and reforestation: Restoration of ecology: Restoration of water logged soil : Mine rehabilitation : Managed reforestation : Tree plantation : Climatic change mitigation EHS regulations and disaster management . Introduction to disaster management.

Recommended Books:

Course Code	EE472-18
Course Title	Electrical Materials
type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To familiarize about Materials used in Electrical Engineering

SYLLABUS

UNIT-I

Dielectric Materials:

Static dielectric constant, Polarization, atomic interpretation of the dielectric constant of mono-atomic and poly atomic gases, internal fields in the solids and liquids, static dielectric constants of solids, ferroelectric materials and spontaneous polarization, piezo- electricity. Frequency dependence of electronics, ionic and orientational polarization, complex dielectric constant and dielectric losses.

UNIT-II

Conductivity of Metals:

Ohm's Law and relaxation time of electrons, collision time and mean free path. Electron scattering and resistivity of metals. Heat developed in current carrying conductor, thermal conductivity of metals, superconductivity.

UNIT-III

Magnetic Materials :

Magnetization from microscopic view point, orbital magnetic dipole movement and angular momentum materials, diamagnetism, origin of permanent magnetic dipoles in material. Paramagnetic spin systems.

UNIT-IV

Properties of ferromagnetic materials:

Spontaneous magnetization and the curie-Weils Law. Ferromagnetic Domains and coercive force, anti-ferromagnetic and ferromagnetic materials, magnetic materials for electrical devices, introduction to permanent magnets.

RECOMMENDED BOOKS			
S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Electrical Engineering materials	A.J. Dekker.	
2	Electrical Engineering Materials	G.P. Chhalotra.	
3	Electrical Engineering materials	S.P. Seth and P.V. Gupta.	



Course Code	EE474-18
Course Title	Electrical & Hybrid Vehicles
type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Applied mechanics & Basic Electrical.
Course Objectives (CO)	Understand the models to describe hybrid vehicles and their performance. Understand the different possible ways of energy storage. Understand the different strategies related to energy storage systems.

SYLLABUS

UNIT-I

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics. Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT-II

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-III

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis,

UNIT-IV

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

RECOMMENDED BOOKS			
S.No.	Name	Author(s)	Publisher
1	Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives.	C. Mi, M. A. Masrur and D. W. Gao.	John Wiley & Sons, 2011.
2	Hybrid Electric Vehicles: Energy Management Strategies.	S. Onori, L. Serrao and G. Rizzoni, “	Springer, 2015.
3	Electric and Hybrid Vehicles.	T. Denton	Routledge, 2016.



Course Code	ECE472-18
Course Title	Embedded Systems
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Basics Knowledge of Microprocessor and Microcontroller and its Programming
Course Objectives (CO)	The goal of the course is to teach the concepts C Language and object oriented programming, ARM architecture and peripheral interfacing. To read and understand the C and C++ programming, ARM processor architecture and programming The course focuses on how to write program and peripheral interfacing of ARM processor and develop the applications.

SYLLABUS

UNIT-I

Embedded system introduction: Introduction to embedded system, embedded system architecture, classification of embedded system, challenges and design issues in embedded system, introduction to the register bank, families of the ARM processor, interrupt and vector table & other features of ARM: JTAG, I2C bus.

UNIT-II

ARM Programming Instructions Introduction to the instruction set of the ARM processor, Addressing modes, load store instruction, PSR (Program Status Register) instructions, conditional instructions, and interrupt instructions.

UNIT-III

C Programming Integrated Development Environment (IDE) for C/C++ Programming, C/C++ Programs using Function Calls, Structures, Pointers, Integers & Floating Point Arithmetic, and Assembly Code using Instruction Scheduling, Register Allocation, and Conditional Execution Loops.

UNIT- IV

Interfacing Peripherals ARM processor interfacing with ADC, DAC, Sensors, Memory, LCD Display, Stepper Motor, DC Motor, SD-MMC Card, Biometric & RFID, ZIGBEE, GSM Interfaces, and Debugging Tools.

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Radio Frequency & Microwave Electronics	Mathew. M. Radmanesh	Pearson Education Asia
2	Foundation of Microwave Engineering	RE Collin	Prentice Hall of India
3	Antenna and Radio Wave Propagation	RE Collin	Prentice Hall of India
4	Antennas: Theory and Practice	R Chatterjee	Pearson Education Asia



Course Code	ECE474-18
Course Title	Advanced Optical Communication System
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Electromagnetic Theory, Communication Engineering, Digital Communication
Course Objectives (CO)	To explain the need and significance of Optical Communication System and impart knowledge of types, basic laws, and transmission characteristics, components of optical fibres.

SYLLABUS

UNIT-I

Overview: The Electromagnetic Spectrum, Properties of Light, Dual Nature of Light, Concept of a photon, Wave Model, Characteristics of light waves, general communication systems, evolution of Basic Fiber Optic Communication System, Benefits and disadvantages of Fiber Optics, Transmission Through Optical Fiber, The Laws of Reflection and Refraction, Light rays and light waves, Reflection of light from optical surfaces, Refraction of light from optical interfaces, The Numerical Aperture (NA), The Optical Fiber, Types of Fiber.

UNIT-II

Losses In Optical Fiber: Attenuation, Material absorption losses, linear and non linear scattering losses, fiber bend loss, dispersion viz. inter modal dispersion and intra modal dispersion, overall fiber dispersion and polarization, Dispersion shifted and dispersion flattened fibers, attenuation and dispersion limits in fibers, Kerr nonlinearity, self phase modulation, combined effect of dispersion and self phase modulation.

UNIT-III

Optical Sources And Detectors : Sources: Basic principle of surface emitter LED and edge emitter LED- material used, structure, internal quantum efficiency and characteristics, LASER Diode - material used, structure, internal quantum efficiency and characteristics, working Principle and characteristics of Distributed feedback (DFB) laser. Detectors: PIN photodiode - material used, working principle & characteristics, Avalanche Photodiode: - material used, working principle and characteristics

UNIT-IV

Advanced Topics: Optical TDM, SCM, WDM and Hybrid multiplexing methods, Fiber Optic Networks, Transreceivers for Fiber-Optic Networks, Semiconductor Optical Amplifiers, Erbium Doped Fiber Amplifiers (EDFAs).

RECOMMENDED BOOKS			
S. No	Name	Author(S)	Publisher
1	Optical Fiber Communication Principles & Practice.	John M.Senior	PHI Publication
2	Optical Communication Systems	John Gower	PHI Publications.
3	Optical Fiber Communication	Gerd Keiser.	Mc Graw Hill International Publications



Course Code	CE472-18
Course Title	Tall BUILDING
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Design of concrete, steel structures, earthquake engineering
Course Objectives (CO)	The objective of the study is to identify the structural systems for various combinations of gravity and horizontal loading considering their functional use and heights. The students Should be able to analyze the behaviour and drift capacities of various high rise structural forms.

UNIT-I

Definition of tall building-need for constructing tall building-Historic background-factors affecting growth. Design Criteria, Design Philosophy of High Rise structures, Materials, Loading gravity loading- Dead and live load, live load reduction techniques-sequential loading, Impact loading, Wind Loading, Wind Characteristics, Static and Dynamic wind Effects.

UNIT-II

Analytical and wind tunnel experimental method, Earthquake loading-equivalent lateral force method, modal analysis, Introduction to Performance based seismic design. Structural form, Floor systems, Rigid frame Structures- rigid frame behaviour –approximate determination of member forces by gravity loading- two cycle moment distribution, approximate determination of member forces by lateral loading- Portal method, Cantilever method, approximate analysis of drift.

UNIT-III

Structural design of tall concrete and masonry buildings: commentary structure a standards, plastic analysis-strength of members and correction, non-linear analysis and limit design, stability, stiffness and crack control creep shrinkage and temperature effects. Limit state design, masonry structures.

UNIT-IV

Frame-shear wall systems: Twist of frame. Analysis of shear wall, frame wall interaction, analysis of coupled shear wall, computation of earthquake load dynamic analysis of tall building

Suggested textbooks			
S. No	Name	Author(S)	Publisher
1	High rise Building Structures”	Schumelles W	John Wiley and Sons, New York
2	Structural Analysis and Design of Tall Buildings	Taranath Bungale	McGraw Hall
3	Tall Building structures: Analysis and Design	Smith Bryan Stafford, Coull Alex.	New York Wiley-Inter science, , 1991.

Course Code	CE474-18
Course Title	Remote Sensing And Geographical Information System
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	
Course Objectives (CO)	To introduce the principles and basic concepts of Remote Sensing and GIS To introduce the remote sensing systems, data products and analysis. To introduce the spatial data models, analysis and presentation techniques. To study the applications of Remote Sensing and GIS in agriculture, soil and water resources

SYLLABUS

UNIT– I

Introduction

Basic principles of remote sensing; Conventional aerial photography; Non-conventional photography; Non-photographic sensors; Rocket and earth orbital imagery; Energy sources and radiation principles; Energy interaction in the atmosphere and with earth surface; Nature of electromagnetic radiation; Active and passive remote sensing systems; Earth resource satellite.

Photographic Systems for Remote Sensing

Fundamental consideration; Aerial photographic film, cameras and filters.

UNIT– II

Imaging and Nonimaging Sensors

Sensor fundamentals; Nonimaging sensors; Optical mechanical scanners; Radiometric calibration.

Remote Sensing Data Systems Processing and Management

Information system; Image data storage and retrieval; Image data input and output; Image processing principles; Image processing implementation; Pattern recognition.

UNIT–III

Ground Investigations in Support of Remote Sensing

Test sites; Common measurements; Geologic investigations; Agriculture and Forestry investigations; Atmospheric investigation.

Image Interpretation

Activities of image interpretation; Elements of image interpretation; Techniques of Image interpretation; Visual requirements for image interpretation; Image interpretation equipment.

UNIT-- IV

Digital Image Processing and Geographic Information System

Image rectification and restoration; Image enhancement; Contrast manipulation; Multi image manipulation; Image classification; Post classification smoothing; Classification accuracy assessment; Basic concepts of GIS; Data imagery and GIS application for land and water resources.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Introduction to Environmental Remote Sensing	Barret, E.C. and Curits, L.F.	John Wiley and Sons Inc. New York
2	Space Remote Sensing System Introduction	Chern, H.S.	Academic Press Inc. New York
3	Remote Sensing and Image Interpretation	Lillesand, T.M. and Kiefer, R.W.	John Wiley and Sons Inc. New York
4	Remote Sensing: Methods and Applications	Hard, R.M.	John Wiley and Sons Inc. New York
5	Manual of Remote Sensing	Reeves, R.G., Ansom, A. and David Landen	

Course Code	CSE476-18
Course Title	Big Data
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Knowledge of Database Management System.
Course Objectives (CO)	To understand big data analytics as the next wave for businesses looking for competitive advantage, To understand the financial value of big data analytics, To explore tools and practices for working with big data, To understand how big data analytics can leverage into a key component, To understand how to mine the data, To learn about stream computing, To know about the research that requires the integration of large amounts of data.

SYLLABUS

UNIT I

Introduction to Big Data

Analytics, Nuances of big data, Value, Issues, Case for Big data, Big data options Team challenge, Big data sources, Acquisition, Nuts and Bolts of Big data. Features of Big Data, Security, Compliance, auditing and protection, Evolution of Big data.

UNIT II

Data Analysis

Evolution of analytic scalability, Convergence, parallel processing systems, Cloud computing, grid computing, map reduce, enterprise analytic sand box, analytic data sets, Analytic methods, analytic tools, Cognos, Microstrategy, Pentaho. Analysis approaches, Statistical significance, business approaches, Analytic innovation, Traditional approaches

UNIT III

Stream Computing

Introduction to Streams Concepts, Stream data model and architecture, Stream Computing, Sampling data in a stream, Filtering streams, Counting distinct elements in a stream, Estimating moments, Counting oneness in a window, Decaying window.

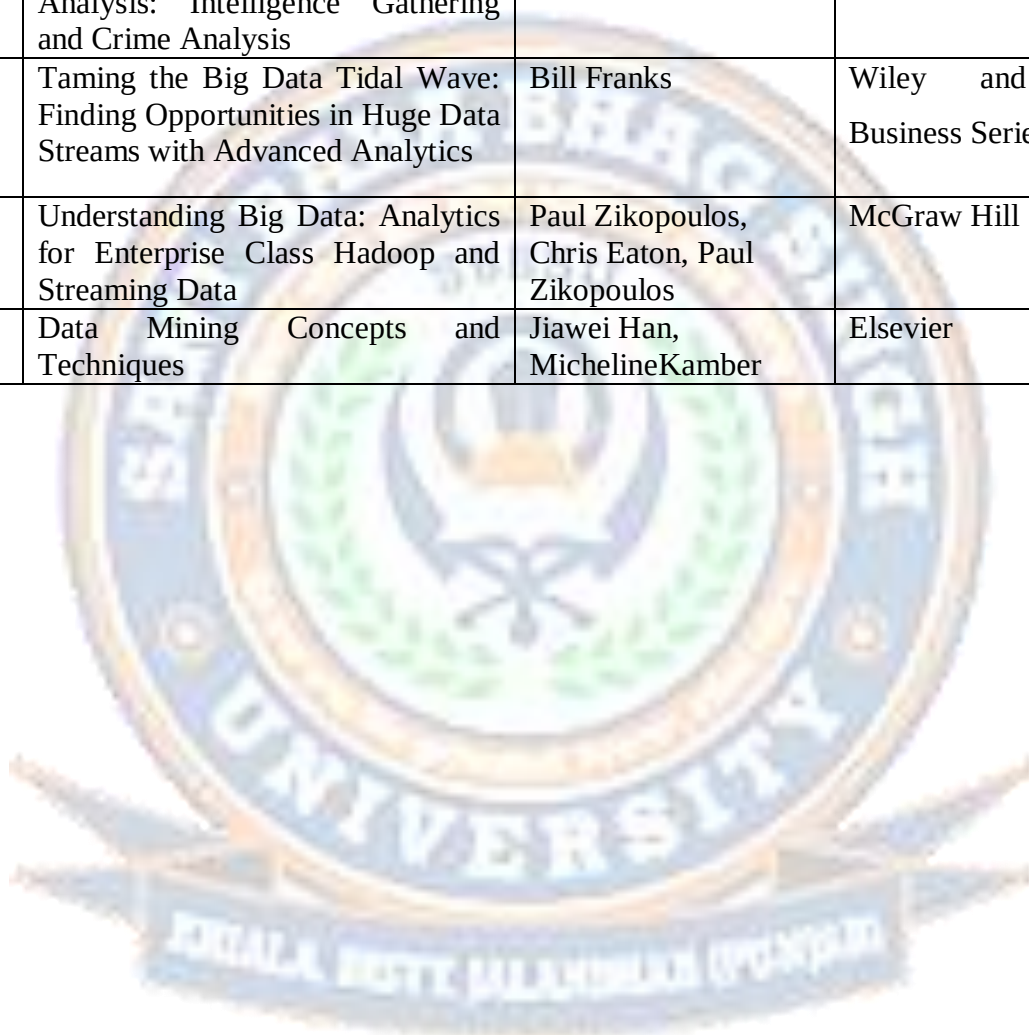
UNIT IV

Predictive Analytics And Visualization

Predictive Analytics, Supervised, Unsupervised learning, Neural networks, Kohonen models, Normal, Deviations from normal patterns, Normal behaviours, Expert options, Variable entry, Mining Frequent itemsets, Market based model, Apriori Algorithm, Handling large data sets in Main memory, Limited Pass algorithm, Counting frequent itemsets in a stream, Clustering Techniques, Hierarchical, K- Means, Clustering high dimensional data Visualizations, Visual

data analysis techniques, interaction techniques; Systems and applications:

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Big Data Analytics: Turning Big Data into Big Money	Frank J Ohlhorst	Wiley and SAS Business Series
2	Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis	Colleen Mccue	Elsevier
3	Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics	Bill Franks	Wiley and SAS Business Series
4	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Paul Zikopoulos, Chris Eaton, Paul Zikopoulos	McGraw Hill
5	Data Mining Concepts and Techniques	Jiawei Han, MichelineKamber	Elsevier



Course Code	CSE478-18
Course Title	Network Security
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Computer Networks
Course Objectives (CO)	It aims to introduce students to the fundamental techniques used in implementing secure network communications, and to give them an understanding of common threats and attacks.

SYLLABUS

UNIT- I

Introduction to Network Technology: SLIP/PPP Dedicated lines, BOOTP, DHCP, Domain management (DNS), Transport Layer issues, TCP/IP, Gateway, Dial-up, Internet networking TCP/IP protocols, IP addressing.

UNIT-II

Basics of Network security- Fundamentals of network security, Basics of IPv6, IPsec: overview of IPsec, IP and IPv6, Authentication header (AH), Encapsulating Security Payload (ESP).

Security Trends – Attacks and services, Classical crypto systems, Different types of ciphers, LFSR sequences, Basic Number theory, Congruences, Chinese Remainder theorem, Modular exponentiation, Fermat and Euler's theorem, Legendre and Jacobi symbols, Finite fields, continued fractions.

UNIT-III

Model of Network security- Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Block Cipher and the Data Encryption Standard - Modes of operation, Triple DES, AES, RC4, RSA, Attacks, Primality test, Factoring.

Discrete Logarithms –Digital signatures, RSA, ElGamal, DSA, Unwanted traffic: denial of service attacks.

UNIT-IV

Authentication applications – Kerberos, X.509, PKI, Electronic Mail security, PGP, S/MIME, IP security, Web Security, SSL, TLS, SET.

System Security – Intruders, Malicious software, viruses, Firewalls and filters, Security Standards.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Network Security and Ethical Hacking	Rajat Khare	Luniver Press
2	Cryptography and Network Security	AtulKahate	Tata Mc-Graw Hill
3	Computer Networks	A.S Tanenbaum	Pearson



Course Code	ME477-18
Course Title	Power plant engineering
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	Applied thermodynamics
Course Objectives	To provide an overview of power plants and the associated energy conversion issues.

Syllabus

UNIT-I

Coal based thermal power plants, basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam and heating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems Gas turbine and combined cycle power plants, Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

UNIT-II

Basics of nuclear energy conversion, Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.

UNIT-III

Hydroelectric power plants, classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems.

UNIT-IV

Energy, economic and environmental issues, power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

Recommended Text Books

S. No	Author	Title	Publisher
1	El Wakil M.M	Power Plant Technology	McGraw Hill, 2010.
2	Elliot T.C&Chen K	Power Plant Engineering	McGraw Hill, 1998.
3	Nag P.K.,	Power Plant Engineering	Tata McGraw Hill, 2008



Course Code	ME472-18
Course Title	Supply Chain Management
Type of Course	OE
L T P	3 0 0
Credits	3
Course pre-requisite	None
Course Objectives	To familiarize the students with production requirements, inventory control and product marketing techniques.

Syllabus

UNIT-I

Introduction to supply chain management . Historical perspective : Definition of Supply Chain Management (SCM) . Flows in supply chain : Flow of Value, Information and Cash . Customer service dimension : Eight “R” Principles . Process view of a supply chain: Cyclic view : Push pull view . Responsiveness and efficiency of supply chain : The responsiveness spectrum . Supply chain macro processes in a firm: CRM : ISCM : SRM . Supply chain drivers and metrics: Facilities : Inventory : Transportation : Information : Sourcing : Pricing Obstacles to achieving strategic fit : Competitive advantage through SCM Designing the supply chain network Distribution networks in practice Network design in supply chain: Role of network design in supply chain : Factors influencing network design decisions : Framework for network design decisions : Models for facility location and capacity allocation : Role of IT in network design : Making network design decisions in practice

UNIT-II

Purchase and stores management Purchase management: Scope : Importance : Objectives : Functions Purchase systems & procedures: Methods of purchasing : Negotiation : Purchase price analysis Stores and store keeping: Types of stores : Codification and standardization : Purpose of store-keeping : Store location and layout . Store systems and procedures: Receipt : Physical storage & location : Issue . Stocking policies: Costs of inventory : Selective controls : ABC analysis : VED analysis : Stores accounting and stock verification : Obsolete, surplus and scrap management Planning demand and supply in a supply chain . Demand forecasting in a supply chain . Aggregate planning in a supply chain . Managing predictable variability in supply & demand: Alternative for managing demand : Alternative for managing supply . Managing economies of scale in a supply chain: Cycle inventory . Managing uncertainty in a supply chain:

Safety inventory : Service level . Determining the optimal level of product availability: Cost and profitability : Managerial lever to improve profitability

UNIT- III

Designing and planning transportation networks. Role of transportation in supply chain, Modes of transportation and Key performance indicators - Inbound and outbound transportation, Transportation infrastructure & policies. Transportation network: Scheduling and routing decision : Network suitability & design options. Trade-offs in transportation design: Choices of transport mode : Inventory aggregation : Cost & response trade-off . Tailored transportation: Customer density : Customer size : Distance : Product demand and value . Risk management in transportation: Types of delays and disruption : Challenges . Transport economics: Distance : Volume : Density : Stowability : Handling : Liability : Market factors : Routing and scheduling cost . Concept of warehousing: Location consideration :

UNIT-IV

Modern trends and other aspects . Sharing risks in inter-organizational relationships: Confidentiality: Research and development: Increased service expectation. Environment friendly supply chain practices. Benchmarking and performance measurement in supply chain. Outsourcing and partnerships: Role of sourcing-related process : Sourcing planning and decision 3rd parties supplier-risk management . Supply chain and e-commerce: Pricing and revenue. Role of IT and revenue management. Supply chain for lean manufacture: Reduce the supply base: Develop strategic long term partners: Manage supplies with commodity teams

S. No	Author	Title	Publisher
1	Chopra, Sunil; Meindl, Peter and Kalra	Supply Chain Management	Pearson Education
2	Handfield, Robert B. and Nichols, Ernest L. Jr	Introduction to Supply Chain Management; Pearson Education.	Pearson Education
3	Christopher, Martin	Logistics and Supply Chain Management	Pearson Education

Course Code	EE476-18
Course Title	Electrical Measurement
Type of Course	Open Elective
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical
Course Objectives (CO)	To understand various electrical quantities, their measurements and to familiarize with the construction, working principle and applications of various electrical instruments.

SYLLABUS

UNIT-I

UNITS, DIMENSIONS AND STANDARDS: Introduction to MKS (**Meter-Kilogram-Second**) and Rationalized MKSA (**Meter-Kilogram-Second-Ampere**) System, SI Units (International System of Units), Standards of electromotive force (EMF), Resistance, Capacitance and Inductance, Systematic errors

GENERAL THEORY OF ANALOG MEASURING INSTRUMENTS: Operating torque, damping and controlling torque, Torque-weight ratio, Pointers and Scales. Principles of operation of various types of electro mechanical indicating / registering instruments viz. Permanent Magnet Moving Coil (PMMC), dynamometer, induction, thermal, etc. for direct current and alternating current measurement of voltage, current, power, frequency, phase and power factor etc., energy meter: their sources of error and compensation, shunts and multipliers, multi-meter.

UNIT-II

POTENTIOMETERS: Basic direct current (DC) potentiometer circuit, Modern form of DC potentiometer, measurement of voltage, current, Resistance and calibration of voltmeter and ammeter using DC potentiometer, volt ratio box, Self-balancing potentiometer, Alternating current (AC) potentiometers and their applications.

UNIT-III

MAGNETIC MEASUREMENTS: Flux meter, B-H Curve, Hysteresis loop, Permeameters, AC Testing of Magnetic materials, Separation of iron losses, iron loss measurement by Wattmeter and Bridge methods

UNIT-IV

INSTRUMENT TRANSFORMERS: Theory and construction of current and potential transformers, ratio and phase angle errors and their minimization, Characteristics of current

transformers (CT) and potential transformers (PT) and their Testing.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	A Course in Electrical and Electronics Measurement and Instrumentation.	Sawhney A. K	Dhanpat Rai and Sons.
2	Electrical Measurements and Measuring instruments	Golding Edward William and Widdis Frederick Charles	Wheelers India .
3	Modern Electronic Instrumentation. and Measurement Techniques	Helfrick A.D. and Cooper W.D.	Prentice Hall



Course Code	EE478-18
Course Title	Energy Auditing & Management.
Type of Course	Open Elective
L T P	3 0 0
Credits	3
Course Prerequisites	Basic electrical.
Course Objectives (CO)	To understand how energy is used within the plant and to find opportunities for improvement, energy saving, energy audits concepts to evaluate the effectiveness of an energy efficiency project or program.

SYLLABUS

UNIT-I

Energy Scenario: Energy needs of growing economy, Long term energy scenario, Energy pricing, Energy sector reforms, Energy and environment: Air pollution, Climate change, Energy security, Energy conservation and its importance, Energy strategy for the future, Energy conservation Act- 2001 and its features.

UNIT-II

Energy Management and Audit: Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments

UNIT-III

Financial Management: Investment-need, Appraisal and criteria, Financial analysis techniques- Simple payback period, Return on investment, Net present value, Internal rate of return, Cash flows, Risk and sensitivity analysis, Financing options, Energy performance contracts and role of energy savings companies (ESCOs).

UNIT-IV

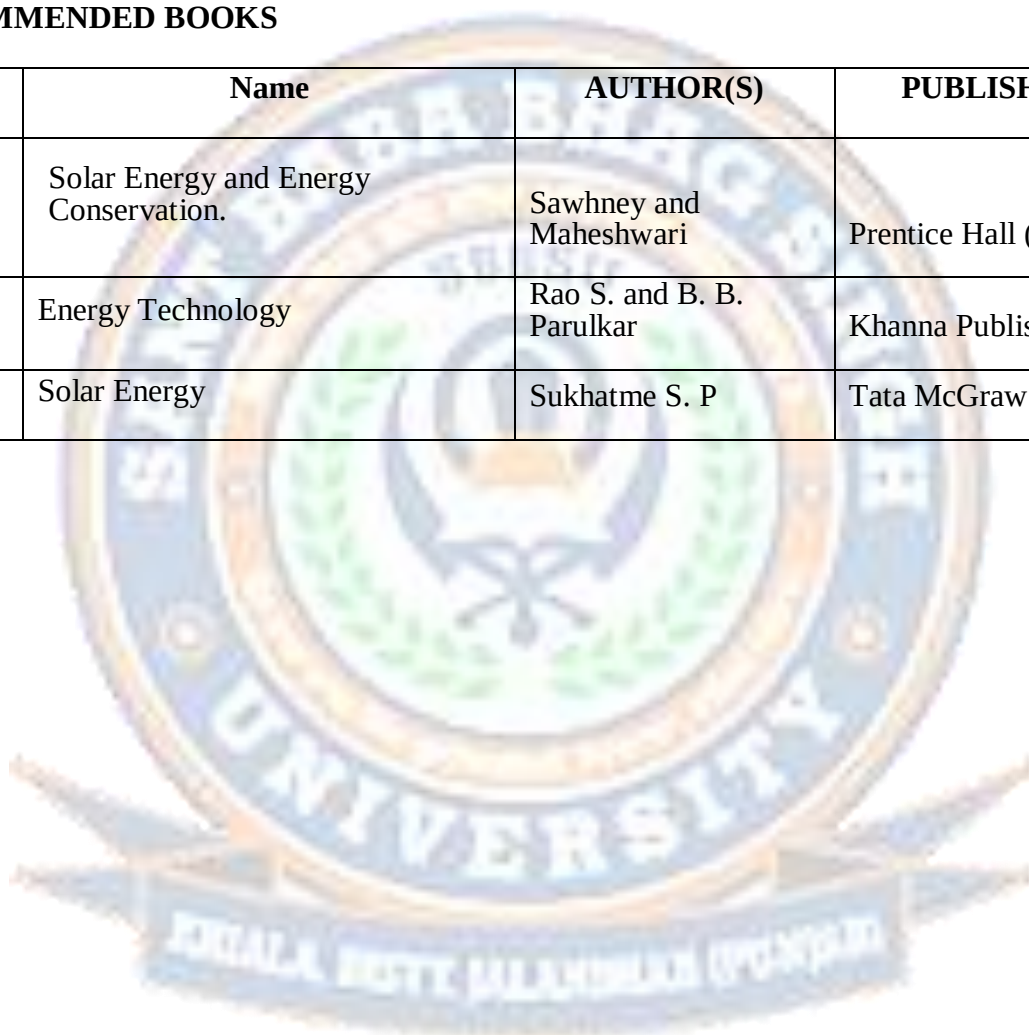
Electrical system: Electricity tariff, Load management and maximum demand control, Power factor improvement, Distribution and transformer losses. Losses in induction motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement issues,

energy efficient motors. Light source, Choice of lighting, Luminance requirements, and Energy conservation avenues

Compressed air system: Types of air compressors, Compressor efficiency, efficient compressor operation, Compressed air system components, Capacity assessment, Leakage test Factors affecting the performance and efficiency.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Solar Energy and Energy Conservation.	Sawhney and Maheshwari	Prentice Hall (India)
2	Energy Technology	Rao S. and B. B. Parulkar	Khanna Publishers
3	Solar Energy	Sukhatme S. P	Tata McGraw Hill



Course Code	ECE478-18
Course Title	Broadband Communication
Type of course	OE
L T P	3 0 0
Credits	3
Course prerequisites	Knowledge of Analog and Digital Communication.
Course objectives (CO)	Study the principles and features of various possible alternatives for realizing high speed communication systems. Analyze and identify the suitability of a specific broadband system from the available alternatives depending on the geographical location, subscriber density.

SYLLABUS

UNIT I

Mobile and Satellite Communication - Mobile Communication Principles, Architecture of GSM, Introduction to 2G to 4G Systems such as GSM, HSCSD, GPRS, EDGE etc, Principles of CDMA. Satellite technology evolution, LEO, MEO, GEO satellites and their special services, orbital equations, link budget for C- band satellite, impact of satellite in Indian scenario.

UNIT II

Fixed Wireless System and Wireless System-Microwave Links, Private Unlicensed links(Spread Spectrum), MMDS(Multi channel Multi- point distribution service), LMDS (Local multipoint Distribution Service), Introduction to Wi- Fi and Wi- MAX , Principles and Parameters for Wireless LAN (IEEE 802.11 Standards), Operating Principles for Wi- MAX(IEEE 802.16 standard) , Comparison of Wi- Fi and Wi- MAX.

UNIT III

Optical Fiber Communication.-Principles of optical fiber communication, significant features and advantages of optical fiber communications, Recent trend- FTTH(Fiber – to –the – Home) System.

UNIT IV

Quality of Service (Qos) in Broadband. Qos issues in broadband communication.

RECOMMENDED BOOKS			
S. No.	Name	Author(S)	Publisher
1	Mobile Communication Design Fundamentals	William C.Y. Lee	John Wiley & Sons

2	Satellite Communications	Timothy Pratt	John Wiley & Sons
3	Wireless Communications	T.L Singhal	Tata McGraw-Hill
4	Optical Fibre Communications	Senior.John.M	Prentice Hall



Course Code	CE476-18
Course Title	Infrastructure And Real Estate Management
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Engineering Economics
Course Objectives (CO)	The objective of this course is to make students aware of the various elements of infra structure and real estate management.

SYLLABUS

UNIT- I

Introduction:

Impact of Infrastructure development on economic development, standard of living and environment. Reasons for rise of public sector and government in infrastructural activities. Changed socio-economic scenario and current problems and related issues.

Infrastructure Management:

Importance, scope and role in different sectors of construction.

- **Highway Sector:**

Repayment of Funds, Toll Collection Strategy, Shadow tolling, and direct tolls, Maintenance strategy, Review of toll rates & structuring to suit the traffic demand

- **Irrigation Projects:**

Large / Small Dams - Instrumentation, monitoring of water levels, catchments area, rainfall data management, prediction, land irrigation planning & policies, processes Barrages, Canals.

- **Power Projects:**

Power scenario in India, Estimated requirement, Generation of Power distribution strategies, national grid, load calculation & factors, Hydropower - day to day operations, management structures, maintenance, Thermal Power, Nuclear Power.

- **Airports:**

Requisites of domestic & International airports & cargo & military airports, facilities available, Terminal management, ATC.

- **Railways:** Mass Rapid Transport System MRTS, LRT, Multi-modal Transport System.

UNIT- II

Real estate management

Introduction, functions of real estate project management.

Project management –I

Project management processes and organizational pattern, work breakdown structure, time scheduling techniques, CPM/PERT network analysis, resource management and scheduling techniques, material management, time cost analysis, project organization, project peculiarities, good practices and managerial responsibilities, project cost control.

Project management II

The application of management processes such as scope management, cost management, risk

management, communication management and time management during the different construction phases. Some of the major techniques to be discussed are value engineering, quality function deployment, cost benefit analysis, risk identification and its quantification.

UNIT- III

Operation management

Introduction , nature & scope of operation/production management, relationship with other functional areas, recent trends in operation management, manufacturing & theory of constraints, types of production system, just in time(JIT) and lean system

Product design and process selection

Stages in product design processes, value analysis, facility location and layout: types characteristics, merits and demerits, work measurement, job design

UNIT- IV

Forecasting and capacity planning

Method of forecasting, overview of operation planning, aggregate production planning, production strategies, capacity requirement planning, MRP, scheduling supply chain management, purchase management, inventory management.

Quality management

Definition, dimension, cost of quality, continuous improvement(kaizen), ISO (9000&14000 series), quality awards, statistical quality control, variable and attribute, process control, control chart(X,R,P,np and C Charts) acceptance sampling operating characteristic curve(AQL, LTPD, a & b risk) total quality management(TQM)

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Project planning analysis, selection, financing, implementation and review	Chandra, prassanna	Tata McGraw Hill.Pub
2	Infrastructure development & financing towards a public private partnership	Raghuram.G& Jain R	Macmillan India ltd
3	Production and operation management, concepts methods & strategy	Charry S.N(2005)	John willy &sons asiapvt ltd

Course Code	CE478-18
Course Title	Site Investigation
Type of Course	OE
L T P	3 0 0
Credits	3
Course Prerequisites	Soil Mechanics
Course Objectives (CO)	The course is intended for geotechnical engineers/engineering geologists to gain a practical understanding of the planning and design of site investigations, the spectrum of investigation techniques available, laboratory test scheduling, and interpretation of result

UNIT-I

Introduction: Soil formation Processes – Characteristics of major soil deposits of India. Necessity and Importance of soil exploration Method of sub surface exploration Test pits , Trenches, Caissons, Tunnels and drifts, Wash boring , Percussion drilling , Rotary drilling, Factors affecting the selection of a suitable method of boring. Extent of boring, Factors controlling spacing and depth of bore holes, Spacing and depth for various Civil engineering structures.

UNIT-II

Indirect method of exploration, Seismic method, Electrical resistivity, Resistivity sounding and profiling, Qualitative and quantitative interpretation of test results, Comparison of resistivity and seismic surveys, Shortcomings.

Ground water Observation: Different method of ground water observation: Time lag in observation, Sampling of ground water.

UNIT-III

Sampling: Source of disturbance and their influence, Type of sampler, Principle of design of sampler, Representative and undisturbed sampling in various types of soils, Surface sampling, Amount of sampling, Boring and sampling record, Preservation and shipment of sample preparation of bore log. Standard penetration test

UNIT-IV

Investigation below sea/river bed – methods and equipment's – interpretation of offshore exploration, Instrumentation in soil engineering - strain gauges - resistance and inductance type.

Suggested textbooks

S. No	Name	Author(S)	Publisher
1	Site investigation"	Simon and Cayton	
2	Foundation Analysis and Design	Bowles J E	McGraw Hill, New York