GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University, Estd. u/s 3 of UGC Act 1956)

VISAKHAPATNAM ★ HYDERABAD ★ BENGALURU

Accredited by NAAC with 'A' Grade

REGULATIONS AND SYLLABUS
of
Bachelor of Technology
in
Computer Science and Engineering

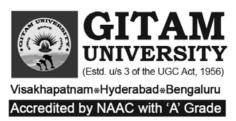(w.e.f 2015-16 admitted batch)

A University Committed to Excellence

VISION

To become a global leader in higher education.

MISSION

*To impart futuristic and comprehensive
education of global standards
with a high sense of discipline and
social relevance in a serene and
invigorating environment.*

REGULATIONS AND SYLLABUS

of

Bachelor of Technology

in

Computer Science and Engineering
(w.e.f 2015-16 admitted batch)

A University Committed to Excellence

B.Tech. in Computer Science and Engineering
REGULATIONS
(w.e.f. 2015-16 admitted batch)

1. ADMISSION

1.1 Admission into B.Tech. in Computer Science and Engineering program of GITAM University is governed by GITAM University admission regulations.

2. ELIGIBILITY CRITERIA

2.1 A first class in 10+2 or equivalent examination approved by GITAM University with Physics, Chemistry and Mathematics.

2.2 Admission into B.Tech. will be based on an All India Entrance Test (GAT) conducted by GITAM University and the rule of reservation, wherever applicable, will be followed.

3. CHOICE BASED CREDIT SYSTEM

3.1 Choice Based Credit System (CBCS) is introduced with effect from the admitted Batch of 2015-16 based on UGC guidelines in order to promote:

- Student centered learning
- Cafeteria approach
- Students to learn courses of their choice
- Learning at their own pace
- Interdisciplinary learning

3.2 Learning goals/objectives and outcomes are specified, focusing on what a student should be able to do at the end of the program.

4. STRUCTURE OF THE PROGRAM

4.1 The Program consists of

i) Foundation Courses (compulsory) which give general exposure to a student in communication and subject related area.

ii) Core Courses (compulsory).

iii) Discipline centric electives which
   a) are supportive to the discipline ⎫ Programme
   b) give expanded scope of the subject ⎬ Electives
   c) give interdisciplinary exposure ⎫ Interdisciplinary
   d) nurture the student skills ⎬ Electives

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iv)   Open electives are of general nature either related or unrelated to the discipline.

4.2   Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week.

4.3   In general, credits are assigned to the courses based on the following contact hours per week per semester.
   •   One credit for each Lecture/Tutorial hour per week.
   •   One credit for two hours of Practicals per week.
   •   Two credits for three (or more) hours of Practicals per week.

4.4   The curriculum of the eight semester B.Tech. program is designed to have a total of 190 credits for the award of B.Tech. degree.

5.   MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English.

6.   REGISTRATION

Every student has to register himself/herself for each semester individually at the time specified by the Institute/University.

7.   ATTENDANCE REQUIREMENTS

7.1   A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend the end - semester examination and he/she will not be allowed to register for subsequent semester of study. He/she has to repeat the semester along with his/her juniors.

7.2   However, the Vice-Chancellor on the recommendation of the Principal / Director of the Institute/School may condone the shortage of attendance of the students whose attendance is between 66% and 74% on genuine grounds and on payment of prescribed fee.

8.   EVALUATION

8.1   The assessment of the student's performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).

8.2   A student has to secure an aggregate of 40% in the course in the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured

a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.

8.3   Practical/ Project Work/ Industrial Training/ Viva voce/ Seminar etc. course is completely assessed under Continuous Evaluation for a maximum of 100 marks, and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table 1.

Table 1: Assessment Procedure

S.No.	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Evaluation
1	Theory	40	Continuous Evaluation	i) Thirty (30) marks for mid semester examinations. Three mid examinations shall be conducted for 15 marks each; performance in best two shall be taken into consideration. ii) Ten (10) marks for Quizzes, Assignments and Presentations.
		60	Semester-end Examination	Sixty (60) marks for semester-end examinations.
	Total	100		
2	Practicals	100	Continuous Evaluation	i) Fifty (50) marks for regularity and performance, records and oral presentations in the laboratory. Weightage for each component shall be announced at the beginning of the semester. ii) Ten (10) marks for case studies. iii) Forty (40) marks for two tests of 20 marks each (one at the mid-term and the other towards the end of the semester) conducted by the concerned lab Teacher.
3	Project work (VII & VIII Semesters)	100	Continuous Evaluation	i) Forty (40) marks for periodic evaluation on originality, innovation, sincerity and progress of the work, assessed by the Project Supervisor. ii) Thirty (30) marks for mid-term evaluation for defending the Project before a panel of examiners.

				iii)Thirty (30) marks for final Report presentation and Viva-voce, by a panel of examiners.
4	Industrial Training (VII Semester)	100	Continuous Evaluation	i) Thirty (30) marks for Project performance, assessed by the Supervisor of the host Industry Organization. Submission of Project Completion Certificate from host organization is mandatory. ii) Forty (40) marks for Report and Seminar presentation on the training, assessed by the Teacher Coordinator. iii)Thirty (30) marks for presentation on the training, before a panel of examiners.
5	Comprehensive Viva-voce (VIII Semester)	100	Continuous Evaluation	Through five periodic Viva-voce exams for 20 marks each, conducted by a panel of examiners. The course content for Viva exams shall be announced at the beginning of the semester.

9.   RETOTALING, REVALUATION & REAPPEARANCE

9.1   Retotaling of the theory answer script of the semester-end examination is permitted on request by the student by paying the prescribed fee within fifteen days of the announcement of the result.

9.2   Revaluation of the theory answer scripts of the semester-end examination is also permitted on request by the student by paying the prescribed fee within fifteen days of the announcement of the result.

9.3.1 A student who has secured 'F' grade in a theory course shall have to reappear at the subsequent semester-end examination held in that course.

9.3.2 A student who has secured 'F' grade in a practical course shall have to attend Special Instruction classes held during summer.

9.3.3 A student who has secured 'F' Grade in project work / Industrial Training / Seminar / Comprehensive Viva-Voce etc shall have to reappear at the time of Special Examination to be conducted in the summer vacation.

10.   SPECIAL EXAMINATION

10.1   A student who has completed his/her period of study and still has "F" grade in a maximum of five theory courses is eligible to appear for Special Examination normally held during summer vacation.

11.   BETTERMENT OF GRADES

11.1   A student who has secured only a pass or second class and desires to improve his/her class can appear for betterment examinations only in theory courses of any semester of his/her choice, conducted in summer vacation along with the Special Examinations.

11.2   Betterment of Grades is permitted 'only once', immediately after completion of the program of study.

12.   GRADING SYSTEM

12.1   Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

Table 2: Grades and Grade Points

S.No.	Grade	Grade Points	Absolute Marks
1	O (Outstanding)	10	90 and above
2	A+ (Excellent)	9	80 to 89
3	A (Very Good)	8	70 to 79
4	B+ (Good)	7	60 to 69
5	B (Above Average)	6	50 to 59
6	C (Average)	5	45 to 49
7	P (Pass)	4	40 to 44
8	F (Fail)	0	Less than 40
9	Ab. (Absent)	0	-

12.2   A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, subject to securing a GPA of 5 for a pass in the semester.

13.   GRADE POINT AVERAGE

13.1   A Grade Point Average (GPA) for the semester will be calculated according to the formula:

$$GPA = \frac{\Sigma \, [\, C \times G \,]}{\Sigma \, C}$$

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where,

     C = number of credits for the course.

     G = grade points obtained by the student in the course.

13.2   To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student's performance in all the courses taken, in all the semesters up to the particular point of time.

13.3   CGPA required for classification of class after the successful completion of the program is shown in Table 3.

Table 3: CGPA required for award of Class

Class	CGPA Required
First Class with Distinction	$\geq 8.0^*$
First Class	≥ 6.5
Second Class	≥ 5.5
Pass Class	≥ 5.0

* In addition to the required CGPA of 8.0 or more, the student must have necessarily passed all the courses of every semester in first attempt.

14. ELIGIBILITY FOR AWARD OF THE B.Tech. DEGREE

14.1   Duration of the program: A student is ordinarily expected to complete the B.Tech. program in eight semesters of four years. However, a student may complete the program in not more than six years including study period.

14.2   However, the above regulation may be relaxed by the Vice-Chancellor in individual cases for cogent and sufficient reasons.

14.3   A student shall be eligible for award of the B.Tech. Degree if he / she fulfills all the following conditions:

    a)   Registered and successfully completed all the courses and projects.

    b)   Successfully acquired the minimum required credits as specified in the curriculum in the branch of his/her study within the stipulated time.

    c)   Has no dues to the Institute, hostels, Libraries, NCC/NSS etc, and

    d)   No disciplinary action is pending against him/her.

15. DISCRETIONARY POWER

Not withstanding anything contained in the above sections, the Vice-Chancellor may review all exceptional cases, and give his decision, which will be final and binding.

Department of Computer Science and Engineering
(effective from the academic year 2015-16 admitted batch)

Semester-I

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EMA101	Engineering Mathematics-I	FC(MT)	3	0	0	3	
2	EHS101	Communicative English-I	FC(HS)	3	0	2	4	
3	EPH101	Engineering Physics	FC(BS)	3	0	0	3	
4	ECY101	Engineering Chemistry	FC(BS)	3	0	0	3	
5	EID101	Programming With C	FC(BE)	3	0	0	3	Common With IT
6	EEC101	Basic Electronics Engineering	FC(BE)	3	0	0	3	
7	EME123	Engineering Graphics	FC(BE)	1	0	3	3	
8	EID121	Programming with C Laboratory	FC(BE)	0	0	3	2	Common With IT
9	ECY121	Engineering Chemistry Laboratory	FC(BS)	0	0	3	2	
							26	

Semester-II

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EMA102	Engineering Mathematics-II	FC(MT)	3	0	0	3	
2	EHS102	Communicative English -II	FC(HS)	3	0	2	4	
3	EPHXXX/ ECYXXX	Engineering Physics/ Engineering Chemistry (Elective)	FC(BS)	3	0	0	3	
4	EID102	Data Structures with C	FC(BE)	3	1	0	4	Common with IT
5	EID104	Fundamentals of Digital Logic Circuits	PC(CE)	3	1	0	4	Common with IT
6	EME121	Workshop	FC(BE)	0	0	3	2	
7	EID122	Data Structures with C Laboratory	FC(BE)	0	0	3	2	Common with IT
8	EID124	Digital Circuits Laboratory	FC(BE)	0	0	3	2	Common with IT
9	EPH121	Engineering Physics Laboratory	FC(BS)	0	0	3	2	
							26	

Semester-III

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EMAXXX	Engineering Mathematics-III (Elective)	FC(MT)	3	0	0	3	
2	EID201	Object Oriented Programming with C++	PC(CE)	3	0	0	3	Common with IT
3	EID203	Computer Organization and Architecture	PC(CE)	3	1	0	4	Common with IT
4	EID205	Data Communications	PC(CE)	3	1	0	4	Common with IT
5	ECS201	Programming Language Pragmatics	PC(CE)	3	0	0	3	
6	EID221	C++ Laboratory	PC(CE)	0	0	3	2	Common with IT

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S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
7	EID223	UNIX Programming Laboratory	PC(CE)	0	0	3	2	Common with IT
8	ECS221	Computer Engineering Workshop	PC(CE)	0	0	3	2	
							23	

Semester-IV

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EMAXXX	Engineering Mathematics-IV (Elective)	FC(MT)	3	0	0	3	
2	EOEXXX	Open Elective -I	OE(OE)	3	0	0	3	
3	EHS201	Environmental Studies	FC(HS)	3	0	0	3	
4	EID202	Programming with JAVA	PC(CE)	3	0	0	3	Common with IT
5	EID204	Operating Systems	PC(CE)	3	0	0	3	Common with IT
6	EID206	Computer Networks	PC(CE)	3	1	0	4	Common with IT
7	EID222	Programming with JAVA Laboratory	PC(CE)	0	0	3	2	Common with IT
8	EID224	Operating Systems Laboratory	PC(CE)	0	0	3	2	Common with IT
							23	

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Semester-V

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EOEXXX	Open Elective -II	OE(OE)	3	0	0	3	
2	EHS301	Engineering Economics and Management	FC(HS)	3	0	0	3	
3	EID301	Database Management Systems	PC(CE)	3	1	0	4	Common with IT
4	EID303	Software Engineering	PC(CE)	3	0	0	3	Common with IT
5	EID305	Design and Analysis of Algorithms	PC(CE)	3	0	0	3	Common with IT
6	ECS301	Formal Languages and Automata Theory	PC(CE)	3	1	0	4	
7	EID321	Database Management Systems Laboratory	PC(CE)	0	0	3	2	Common with IT
8	ECS321	Unified Modeling Language Laboratory	PC(CE)	0	0	3	2	
							24	

Semester-VI

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EXXXXX	Programme Elective-I	PE(PE)	3	0	0	3	
2	EXXXXX	Programme Elective-II	PE(PE)	3	0	0	3	
3	EXXXXX	Inter Disciplinary Elective-I	IE(IE)	3	0	0	3	
4	EID302	Web Technologies	PC(CE)	3	0	0	3	Common with IT
5	ECS302	Artificial Intelligence	PC(CE)	4	0	0	4	
6	ECS304	Compiler Design	PC(CE)	3	0	0	3	
7	EID322	Web Technologies Laboratory	PC(CE)	0	0	3	2	Common with IT
8	ECS324	Compiler Design Laboratory	PC(CE)	0	0	3	2	
9	ECS392	Seminar	PC(CE)	0	0	2	1	
							24	

Semester-VII

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EXXXXX	Programme Elective-III	PE(PE)	3	0	0	3	
2	EXXXXX	Programme Elective-IV	PE(PE)	3	0	0	3	
3	EXXXXX	Inter Disciplinary Elective-II	IE(IE)	3	0	0	3	
4	EHS407	Professional Ethics and Human Values	FC(HS)	1	0	0	1	
5	EID401	Integrated Development Environment	PC(CE)	1	0	3	3	Common with IT
6	EID403	Machine Learning	PC(CE)	4	0	0	4	Common with IT
7	ECS401	Cryptography and Network Security	PC(CE)	4	0	0	4	
8	ECS491	Mini Project	PP(PW)	0	0	3	2	
9	ECS493	Summer Internship	PP(PW)				2	
							25	

Semester-VIII

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EXXXXX	Programme Elective-V	PE(PE)	3	0	0	3	
2	EXXXXX	Programme Elective-VI	PE(PE)	3	0	0	3	
3	EXXXXX	Inter Disciplinary Elective-III	IE(IE)	3	0	0	3	
4	ECS492	Comprehensive Viva	PC(CE)				2	
5	ECS494	Project Work	PP(PW)			16	8	
							19	

Number of Credits

Semester	I	II	III	IV	V	VI	VII	VIII	**Total**
Credits	26	26	23	23	24	24	25	19	**190**

Catageory and Credits

	UGC			AICTE		
	Category	**Credits**		**Category**	**Credits**	
			HS	Humanities and Social	15	
			BS	Basic Sciences	9	
			MT	Mathematics	12	
FC	Foundation Courses	61	BE	Basic Engineering	25	
PC	Programme Core	84	CE	Core Engineering	84	
PE	Programme Electives	18	PE	Programme Electives	27	
IE	Interdisciplinary Electives	9	IE			
OE	Open Electives	6	OE	Open Electives	6	
PP	Professional Practice	12	PW	Project Work	12	
	Total	**190**		**Total**	**190**	

Engineering Mathematics-III (Elective)

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EMA201	Complex Variables and Transforms	FC(MT)	3	0	0	3	
2	EMA203	Probability and Statistics	FC(MT)	3	0	0	3	
3	EMA205	Linear Algebra	FC(MT)	3	0	0	3	

Engineering Mathematics-IV (Elective)

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EMA202	Numerical Methods	FC(MT)	3	0	0	3	
2	EMA208	Discrete Mathematical Structures	FC(MT)	3	0	0	3	
3	EMA210	Fuzzy Set Theory, Fuzzy logic and applications	FC(MT)	3	0	0	3	

Engineering Physics (Elective)

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	EPH102	Materials Science	FC(BS)	3	0	0	3	
2	EPH104	Solid State Physics	FC(BS)	3	0	0	3	
3	EPH106	Physics of Nanomaterials	FC(BS)	3	0	0	3	

Engineering Chemistry (Elective)

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1	ECY102	Chemical Aspects of Engineering Materials	FC(BS)	3	0	0	3	
2	ECY104	Advanced Engineering Chemistry	FC(BS)	3	0	0	3	
3	ECY106	Chemistry of Advanced Materials	FC(BS)	3	0	0	3	

Open Elective-I

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1.	EOE202	German for Beginners	OE(OE)	3	0	0	3	All Branches
2.	EOE204	Chinese for Beginners	OE(OE)	3	0	0	3	All Branches
3.	EOE206	Introduction to Music	OE(OE)	3	0	0	3	All Branches
4.	EOE208	Gandhian Philosophy	OE(OE)	3	0	0	3	All Branches
5.	EOE210	Philosophical Foundations of Education	OE(OE)	3	0	0	3	All Branches
6.	EOE212	Analytical Essay Writing	OE(OE)	3	0	0	3	All Branches
7.	EOE214	Indian Economy	OE(OE)	3	0	0	3	All Branches
8.	EOE216	Public Administration	OE(OE)	3	0	0	3	All Branches
9.	EOE218	Environment and Ecology	OE(OE)	3	0	0	3	All Branches
10.	EOE220	Indian History	OE(OE)	3	0	0	3	All Branches

Open Elective-II

S.No	Course Code	Course Title	Category	L	T	P	C	Remarks
1.	EOE301	Indian Constitution	OE(OE)	3	0	0	3	All Branches
2.	EOE303	Japanese for Beginners	OE(OE)	3	0	0	3	All Branches
3.	EOE305	French for Beginners	OE(OE)	3	0	0	3	All Branches
4.	EOE307	Contemporary Relevance of Indian Epics	OE(OE)	3	0	0	3	All Branches
5.	EOE309	Indian National Movement	OE(OE)	3	0	0	3	All Branches
6.	EOE311	Science and Technology	OE(OE)	3	0	0	3	All Branches
7.	EOE313	Professional Communication	OE(OE)	3	0	0	3	All Branches
8.	EOE315	Ethics, Integrity and Attitude	OE(OE)	3	0	0	3	All Branches
9.	EOE317	Personality Development	OE(OE)	3	0	0	3	All Branches

Programme Elective-I

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Internet Technologies	EID342	Middleware Technologies	PE(PE)	3	0	0	3	Common With IT
2	Computer Architecture	EID344	Advanced Computer Architecture	PE(PE)	3	0	0	3	Common With IT
3	Software Engineering	EID352	Software Requirements Engineering and Estimation	PE(PE)	3	0	0	3	Common With IT
4	Intelligent Systems	EID356	Data Mining and Data Warehousing	PE(PE)	3	0	0	3	Common With IT
5	Computer Networks	EID358	Advanced Computer Networks	PE(PE)	3	0	0	3	Common With IT

Programme Elective-II

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Internet Technologies	EID348	Semantic Web	PE(PE)	3	0	0	3	Common With IT
2	Computer Architecture	EID350	Parallel and Distributed Computing	PE(PE)	3	0	0	3	Common With IT
3	Software Engineering	EID360	Agile Software Process	PE(PE)	3	0	0	3	Common With IT
4	Intelligent Systems	EID346	Information Retrieval Systems	PE(PE)	3	0	0	3	Common With IT
5	Computer Networks	EID362	Mobile Computing	PE(PE)	3	0	0	3	Common With IT

Programme Elective-III

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Internet Technologies	EID443	Social Network Analysis	PE(PE)	3	0	0	3	Common With IT
2	Computer Architecture	EID445	Cloud Computing	PE(PE)	3	0	0	3	Common With IT
3	Software Engineering	EID304	Software Project Management	PE(PE)	3	0	0	3	Common With IT
4	Intelligent Systems	EID441	Image Processing	PE(PE)	3	0	0	3	Common With IT
5	Computer Networks	ECS441	Network Management	PE(PE)	3	0	0	3	

Programme Elective-IV

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Internet Technologies	EID451	Open Source Software Development	PE(PE)	3	0	0	3	Common With IT
2	Computer Architecture	EID455	Embedded Systems	PE(PE)	3	0	0	3	Common With IT
3	Software Engineering	EID354	Software Testing Methodologies	PE(PE)	3	0	0	3	Common With IT
4	Intelligent Systems	EID449	Big Data Analytics	PE(PE)	3	0	0	3	Common With IT
5	Computer Networks	EID447	Wireless Sensor Networks	PE(PE)	3	0	0	3	Common With IT

Programme Elective-V

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Internet Technologies	ECS444	Advanced Data Mining	PE(PE)	3	0	0	3	
2	Computer Architecture	ECS446	Real Time Systems	PE(PE)	3	0	0	3	
3	Software Engineering	EEID364	Service Oriented Architecture	PE(PE)	3	0	0	3	Common With IT
4	Intelligent Systems	ECS442	Game Programming	PE(PE)	3	0	0	3	
5	Computer Networks	EID442	Steganography and Biometrics	PE(PE)	3	0	0	3	Common With IT

Programme Elective-VI

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Internet Technologies	EID444	E-Commerce	PE(PE)	3	0	0	3	Common With IT
2	Computer Architecture	EID446	Advanced Databases	PE(PE)	3	0	0	3	Common With IT
3	Software Engineering	EID453	Design Patterns	PE(PE)	3	0	0	3	Common With IT
4	Intelligent Systems	ECS448	Principles of Bioinformatics	PE(PE)	3	0	0	3	
5	Computer Networks	EID448	Internet of Things	PE(PE)	3	0	0	3	Common With IT

INTERDISCIPLINARY ELECTIVES:
Interdisciplinary Elective-I

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Professional Courses	EEC362	Fundamentals of Digital Signal Processing	IE(IE)	3	0	0	3	
2		EEC364	Introduction to Microprocessors	IE (IE)	3	0	0	3	
3		EME384	Optimization Techniques	IE(IE)	3	0	0	3	
4	Management Courses	EHS302	Organizational Behaviour	IE(IE)	3	0	0	3	All Branches
5		EHS304	Business Ethics and Corporate Governance	IE(IE)	3	0	0	3	All Branches

Interdisciplinary Elective-II

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Professional Courses	ECE453	Basics of Remote Sensing and GIS	IE(IE)	3	0	0	3	
2		EEC461	Fundamentals of Communication Engineering	IE(IE)	3	0	0	3	
3		EEC465	Fundamentals of Global Positioning Systems	IE(IE)	3	0	0	3	
4	Management Courses	EHS401	Project Management	IE(IE)	3	0	0	3	Common to All Branches
5		EHS403	Disaster Management	IE(IE)	3	0	0	3	Common to All Branches
6		EHS405	Entrepreneurship Development	IE(IE)	3	0	0	3	Common to All Branches

Interdisciplinary Elective-III

S.No	Stream	Course Code	Course Title	Category	L	T	P	C	Remarks
1	Professional Courses	EEC462	Very Large Scale Integrated System Design	IE(IE)	3	0	0	3	
2		EEC464	Introduction to Microcontrollers	IE(IE)	3	0	0	3	
3		EEC466	Fundamentals of Speech Processing	IE(IE)	3	0	0	3	
4	Management Courses	EHS402	Operations and Supply Chain Management	IE(IE)	3	0	0	3	Common to All Branches
5		EHS404	Total Quality Management	IE(IE)	3	0	0	3	Common to All Branches

ECE453 : BASICS OF REMOTE SENSING AND GIS (Elective)

L T P C
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Module I   **8 hours**
Fundamentals of Remote Sensing: Introduction, electromagnetic radiation, electromagnetic spectrum, energy interactions with earth's surface materials and atmosphere, sensors and platforms, false colour composite (FCC) image, image interpretation techniques, satellite remote sensing - Indian context.

Module II   **8 hours**
Fundamentals of GIS: Introduction, elements of GIS, vectorization, rasterization, geo-referencing, map projections, digitization process, data base handling, types of data structures, overlay analysis, surface terrain models - digital elevation model (DEM), triangulated irregular network (TIN), and slope models.

Module III   **8 hours**
RS and GIS Techniques for Natural Resources Management: Land use/ land cover classification systems, forest cover, agriculture and wasteland management. water resources management.

Module IV   **8 hours**
RS and GIS Techniques for Infrastructure Planning and Management: Urban utilities, cadastral mapping and transport network. GPS Navigation system for various applications.

Module V   **8 hours**
RS and GIS Techniques for Natural Disasters Management: Earthquakes, landslides, cyclones and floods - hazard zonation, risk assessment, relief and rehabilitation measures.

Text Book(s)
1.   P.K. Guha, Remote Sensing for the Beginner, EWP Ltd., 2013.
2.   M. Anjireddy, Text Book of Remote Sensing and Geographical Information Systems, BSP Publishers, 2012.

References
1.   T.M. Lillesand and Kiefer, Remote Sensing and Image Interpretation, R.W. John Wiley & Sons Publishers, 2008.

ECS201 : PROGRAMMING LANGUAGE PRAGMATICS

L T P C
3 0 0 3

Module I   8 hours

Introduction: The Art of language design, the programming language spectrum, why study programming languages?, compilation and interpretation, programming environments. Names, scopes, and bindings, the notion of binding time, object lifetime and storage management, static allocation, stack based allocation, heap based allocation, garbage collection, scope rules, implementing, the meaning of names within a scope.

Module II   8 hours

Control Flow: Expression evaluation, structured and unstructured flow, sequencing, selection, iteration, recursion. DataTypes : Type systems, type checking, records (structures) and variants (unions), arrays, strings, sets, pointers and recursive types, lists, files and input/output.

Module III   8 hours

Subroutines and Control Abstraction: Review of stack layout, calling sequences, parameter passing, generic subroutines and modules, exception handling, co-routines, events. Data abstraction and object orientation: Object oriented programming, encapsulation and inheritance, initialization and finalization, dynamic method binding, multiple inheritance, object oriented programming revisited.

Module IV   8 hours

Functional Languages: Historical origins, functional programming concepts, a review/overview of scheme.

Logic Languages: Logic programming concepts, prolog, logic programming in perspective.

Module V   10 hours

Concurrency: Background and motivation, concurrent programming fundamentals, implementing synchronization, semaphores, language level mechanisms message passing. Scripting Languages: What is a scripting language? problem domains, scripting the world wide web, innovative features.

Text Book(s)
1.   Michael L. Scott, Programming Language Pragmatics, 3/e, Elsevier Inc., 2009.

References
1.   Friedman, Wand and Haynes, Essentials of Programming Languages, PHI, 1998.
2.   Tennant, Principles of Programming Languages, PHI, 1981.

ECS221: COMPUTER ENGINEERING WORKSHOP

L T P C
0 0 3 2

PC Hardware

Week 1 - Task 1 : Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Week 2 - Task 2 : Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a viva.

Week 3 - Task 3 : Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a viva

Week 4 - Task 4 : Several mini tasks would be that covers basic commands in linux and basic system administration in linux which includes: Basic linux commands in bash, create hard and symbolic links, text processing, using wildcards

Week 5 - Task 5 : Hardware Troubleshooting : Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Week 6 - Task 6 : Software Troubleshooting : Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a viva.

Internet and World Wide Web

Week 7 - Task 1 : Orientation and Connectivity Boot Camp : Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should

demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Week 8 - Task 2 : Web Browsers, Surfing the Web : Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Week 9 - Task 3 : Search Engines and Netiquette : Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors.

Week 10 - Task 4 : Cyber Hygiene : Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and MS/equivalent (FOSS) tool Power Point

Week 11 - Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes : PPT orientation, slide layouts, inserting text, word art, formatting text, bullets and numbering, auto shapes, lines and arrows in both LaTeX and powerpoint.

Week 12 - Task 2 : Second week helps students in making their presentations interactive. Topic covered during this week includes : Hyperlinks, inserting images, clip art, audio, video, objects, tables and charts.

Week 13 - Task 3 : Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes :- Master Layouts (slide, template, and notes), types of views (basic, presentation, slide slotter, notes etc), Inserting: Background, textures, design templates, hidden slides.

Week 14 - Task 4 : Entire week concentrates on presentation part of LaTeX and power point. Topic covered during this week includes: Using auto content wizard, slide transition, custom animation, auto rehearsing publisher.

Week 15 : Help students in preparing their personal website using microsoft/ equivalent (FOSS) tool publisher. Topic covered during this week includes publisher orientation, using templates, layouts, inserting text objects, Editing text objects, inserting tables, working with menu objects, inserting pages, hyper linking, renaming, deleting, modifying pages, hosting website.

References

1.   Vikas Gupta, Comdex Information Technology course tool kit, WILEY Dreamtech, 2009.

2.   Cheryl A Schmidt, The Complete Computer upgrade and repair book, 3/e, WILEY Dreamtech, 2002.

3.   Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2006.

4.   Kate J. Chase, PC Hardware and A+Handbook, PHI (Microsoft), 2000.

5.   Leslie Lamport, LaTeX Companion, PHI/Pearson, 1998.

6.   All LaTeX and others related material is available at

    (a) www.sssolutions.in

    (b) www.sontisoftsolutions.org

ECS301 : FORMAL LANGUAGES AND AUTOMATA THEORY

L T P C
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Module I   **12 hours**

FINITE AUTOMATA: Central concepts of automata theory, deterministic finite automata, non-deterministic finite automata, finite automata with epsilon transitions, Moore and Mealy machines.

Module II   **12 hours**

REGULAR EXPRESSIONS and LANGUAGES: Regular expressions, finite automata and regular expressions, pumping lemma for regular languages, and Myhill Nerode theorem, minimization of DFA.

Module III   **12 hours**

GRAMMARS: Definition and classification of grammars, ambiguity, simplification of context free grammars, normal forms, pumping lemma for CFL, closure properties of CFL, membership algorithm (CYK).

Module IV   **10 hours**

PUSHDOWN AUTOMATA: The pushdown automaton, equivalence between acceptance by empty store and acceptance by final state, equivalence of CFG and PDA.

Module V   **10 hours**

TURING MACHINES: TM as acceptor, turing machine as a computing device, techniques for TM Construction, universal turing machines (UTM), undecidability problems, rice's theorem.

Text Book(s)
1.   John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, 3/e, Pearson, 2008.
2.   Kamala Krithivasan and Rama R, Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, 2009.

References
1.   Peter Linz, An Introduction to Formal Language and Automata, Narosa Pub. House, Reprint 2000.
2.   John C.Martin, Introduction to Languages and the Theory of Computation, 3/e, Tata McGrawHill, 2003.

ECS302 : ARTIFICIAL INTELLIGENCE

L T P C
4 0 0 4

Module I   **8 hours**
Introduction to AI and Intelligent Agents: Introduction: What is AI?, the foundations of artificial intelligence; Intelligent Agents: Agents and environments. Good Behaviour: The concept of rationality, the nature of environments, the structure of agents.

Module II   **12 hours**
Problem Solving by Search and Exploration: Solving Problems by Searching: Problem solving agents, example problems, Searching for solutions, Uninformed search strategies, avoiding repeated states, searching with partial information; Informed Search and Exploration: Informed (heuristic) search strategies, heuristic functions, local search algorithms and optimization problems, local search in continuous spaces.

Module III   **12 hours**
Knowledge Representation: Logical Agents: Knowledge based agents, the wumpus world, logic.
Propositional Logic: A very simple logic, reasoning patterns in propositional logic, effective propositional inference; First-Order Logic: Representation revisited, syntax and semantics of first order logic, using first order logic.

Module IV   **11 hours**
Knowledge and Reasoning: Inference in First-Order Logic: Propositional vs first order inference, unification and lifting, forward chaining, backward chaining, resolution.
Planning: Planning : The planning problem, planning with state space search, partial order planning.

Module V   **10 hours**
Uncertain Knowledge: Uncertainty: Acting under uncertainty, basic probability notation, the axioms of Probability, Inference using full joint distributions, independence, bayes' rule and its use, the wumpus world revisited.
Learning: Learning from Observations: Forms of learning, Inductive learning, learning decision trees, ensemble learning. Why Learning Works: Computational learning theory.

Text Book(s)
1.   Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2/e, Pearson Education, 2010.

References
1.   Elaine Rich, Kevin Knight and Shivashankar B. Nair, Artificial Intelligence, 3/e, McGraw Hill Education, 2008.
2.   Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI Learning, 2012.

ECS304 : COMPILER DESIGN

L T P C

3 0 0 3

Module I   8 hours

Overview of Compilation: Introduction, The structure of compiler, phases of the compiler, the science of building a compiler: boot strapping, cross compiler.

Lexical Analysis: The role of the lexical analyzer, input buffering, specification of tokens, recognition of tokens, the lexical analyzer generator (LEX/FLEX).

Module II   8 hours

Syntax Analysis (Part-I): Introduction, context free grammars, top down parsing : Brute force parsing, recursive descent parsing, predictive parsing, error recovery in predictive parsing, bottom up parsing, shift reduce parsing, operator precedence parsing, error recovery in operator precedence parsing.

Module III   8 hours

Syntax Analysis (Part-II): Introduction to LR Parsing: Simple LR parser, more powerful LR parsers canonical LR and look head LR, using ambiguous grammars, error recovery in LR parsers, parser generator (YACC).

Module IV   8 hours

Syntax Directed Translation: Syntax directed definitions, evaluation orders for SDD's. Intermediate Code Generation: SDD for syntax tree construction, postfix translation, three address codes, translation of arithmetic expressions, translation of array references; Back patching: Boolean expressions, flow-of control statements.

Run Time Environments: Storage organization, stack allocation of Space.

Module V   **10 hours**

Machine Independent Optimization: The principal sources of optimization, basic blocks, flow graphs, loop optimization, DAG representation of basic block, local optimization, introduction to data flow analysis: Reaching definitions, use definition chains, live variable analysis, available expressions.

Code Generation: Issues in the design of a code generator, a simple code generator, register allocation and assignment, peephole optimization.

Text Book(s)

1.   Alfred.V. Aho, J.D.Ullman and Ravi Sethi, Compilers: Principles, Techniques and Tools, 2/e, Pearson Education, 1986.

References

1.   Alfred.V. Aho and J.D.Ullman, Principles of Compiler Design, Narosa Publications, 2002
2.   K Muneeswaran, Compiler Design,Oxford University Press, 2012.
3.   John R. Levine, Tony Mason and Doug Brown, Lex & Yacc, O'reilly, 1992.
4.   Cooper Linda, Engineering a Compiler, Elsevier, 2011.

ECS321 : UNIFIED MODELING LANGUAGE LABORATORY

L T P C

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Mini-Project I

A Point-of-Sale (POS) System

A retail POS system typically includes a computer, monitor, keyboard, barcode scanners, weight scale, receipt printer, credit card processing system, etc. and POS terminal software. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services are temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client-side terminals and interfaces such as browser, PDAs, touch-screens.

Mini-Project II

Online Shopping

Customer uses some web site to make purchases online. Follow the various websites like snapdeal, flipkart, amazon.in so as to design an online shopping.

Mini-Project III

E-Library OPAC

An Online Public Access Catalog (OPAC) is e-Library website which is part of Integrated Library System (ILS), also known as a Library Management System (LMS), and managed by a library or group of libraries. Members of the library can search library catalog online to locate various resources - books, periodicals, audio and visual materials, or other items under control of the library. Members may reserve or renew the resources.

Mini-Project IV

A Multi-Threaded Airport Simulation

Simulate the operations in an airport. Your application should support multiple aircrafts using several runways and gates avoiding collisions/conflicts. Landing: an aircraft uses the runway, lands, and then taxis over to the terminal. Take-Off: an aircraft taxies to the runway and then takes off.

Mini-Project V

Bank ATM

An automated teller machine (ATM) or the automatic banking machine (ABM) is banking subsystem that provides bank customers with access to financial transactions in a public space without the need for a cashier, clerk or bank teller. Customer uses bank ATM to check balances of his/her bank accounts, deposit funds, withdraw cash and/or transfer funds. ATM technician provides maintenance and repairs.

Mini-Project VI

Hospital Management System

Hospital management system is a large system including several subsystems or modules providing variety of functions. Hospital subsystem or module supports some of the many job duties of hospital receptionist. Receptionist schedules patient's appointments and admission to the hospital, collects information from patient upon patient's arrival and/or by phone. For the patient that will stay in the hospital ("inpatient") she or he should have a bed allotted in a ward. Receptionists might also receive patient's payments, record them in a database and provide receipts, file insurance claims and medical reports.

Mini-Project VII

An Auction Application

Several commerce models exist and are the basis for a number of companies like eBay.com, pricellne.com etc. Design and implement an auction application that provides auctioning services. It should clearly model the various auctioneers, the bidding process, auctioning etc.

Mini-Project VIII

A Notes and File Management System

In the course of one student's years and professional career one produces a lot of personal notes and documents. All these documents are usually kept on papers or individual files on the computer. Either way the bulk of the information is often erased corrupted and eventually lost. The goal of this project is to build a distributed software application that addresses the problem. The system will provide an interface to create, organize and manage personal notes through the Internet for multiple users. The system will also allow users to collaborate by assigning permissions for multiple users to view and edit notes.

Mini-Project IX

Credit Card Processing System

Credit card processing system (Credit card payment gateway) is a system under consideration. Main part of the system is the Merchant's Credit Card Processing System. The merchant submits a credit card transaction request to the credit card payment gateway on behalf of a customer. Bank which issued customer's credit card which could approve or reject the transaction. If transaction is approved, funds will be transferred to merchant's bank account.

Mini-Project X

Airport Check-In and Security Screening

Passenger, tour guide, minor (child), passenger with special needs (e.g. with disabilities), involved in relation to airport business. Individual check-in, group check-in (for groups of tourists), security screening, etc. Representing process taking place in airport and serving the needs of passengers.

Text Book

1.   Craig Larman,Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process, 2/e, Pearson Education Asia, 2002.

References

1.   Simon Sennet, Steve McRobb, and Ray Farmer, Object Oriented Systems Analysis and Design using UML, 2/e, McGraw Hill, 2002.

2.   Andrew Haigh, Object-Oriented Analysis & Design, 2/e, Tata McGraw Hill, 2001

Various Net Resources and Projects:

http://user-mode-linux.sourceforge.net/case-studies.html
http://www.onesmartclick.com/programming/case-studies.html
http://www.tigris.org/sarvlets/ProjectList?type=P rejects
http://hotscripts.com/
http://www.developingwebs.net/
http://sourceforge.net/projects/
http://governing.com/gpp/gponline.htm
http://www.cio.com/research/government/gov.html
http://www.whitehouse.gov/omb/inforeg/egovstrategy.pdf
http://www.andhrapradesh.com/
http://www.ap-lt.com/
http://www.aponline.gov.in

ECS324 : COMPILER DESIGN LABORATORY

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List of Experiments

1. Implement transition diagram for identifying an identifier and classify whether it is either variable or array or function or structure.

2. Implement transition diagram for identifying constant and classify whether it is integer or real.

3. Write a LEX specification which takes input from a file (a C' program) and recognize valid identifiers, keywords contained in the program and store them in a file.

4. Write a LEX specification for lexical analyzer of C language in which it recognizes all possible tokens in a given program taken as a file and output all the tokens into another file.

5. The production "A $\rightarrow \alpha1 / \alpha2 / \alpha3$ ..." of the CFG uses the following structure/class representation.

    struct/class   production

    {

    char left;   //Head of the production ie., left hand side

    char right[10][10];   //body of the production ie., all alternatives as array of strings

    int noa;   //noa means no of alternatives in the production

    };

    Similarly the Context Free Grammar can be represented as

    struct / class CFG

    {

    production p[10];   // all productions of the grammar

    int nop;   //nop means no of production.

    char t[10], nt[10], s; // string of t's , nt's and start symbol (optional)

    };

31

The following programs are to be implemented using above representation

a) Write a program which reads single productions of the form "A → α1 ; A → α2 ; A → α3 ... " and make them into a single production "A → α1 / α2 / α3 ..." and display.

b) Write a program which reads single productions of the form " A → α1 ; B → α2 ; B → α3 ... " and build CFG and display.

c) Write a program which reads a production and check for Left-Recursion (may contain in more than one alternatives) and if found eliminate it and store in another production and display the result.

d) Write a program which reads a grammar and check for Left-Recursion (may contain in more than one productions) and if found eliminate it and store in another grammar and display the result.

e) Write a program which reads a production, factor out the alternatives if required using left factoring and store the result in to another production and display it.

f) Write a program which reads a grammar, factor out the alternatives of each production if required using left factoring and store the result in to another grammar and display it.

g) Write a program which reads a grammar and find First symbols of all non-terminals.

h) Write a program which reads a grammar and find Follow symbols of all non-terminals.

6. Write a program to implement Recursive Descent Parser for any given grammar.

7. Write a program to implements Operator Precedence Parsing algorithm.

8. Consider the following Expression language that used to describe the Arithmetic expressions in a Calculator The syntax of the language is defined by following grammar

<line>→<exp>\n

<exp>→<exp>+ <term>| <exp>-<term>|<term>

<term>→<term>*<factor>|<term>/<factor>/<factor>

<factor>→(<exp>)|<value>

<value>→<lettert>|<digit>

A sample arithmetic expression written in this language is:
(a+b) * c\n   or   2 + 4 * 5 - 6 /2\n

a) Design a LEX specification for the above language. (Iignore
   redundant spaces, tabs and newlines). Although the syntax
   specification states that value can be arbitrarily long, you may
   restrict the length to some reasonable value. (Implement the
   lexical analyser using JLex, flex or lex or any other tools)

b) Write YACC Specification to validate any given arithmetic
   expression accepted by the above grammar.

c) Write YACC specification to evaluate the given arithmetic
   expression accepted by the above grammar.

d) Write YACC specification to generate three address code and
   quadruples for any given expression.

e) Write YACC specification to convert an infix expression to a
   postfix expression.

9. Consider the following grammar which is used to describe the X
   language which might be used in next generation programmable
   calculators. It supports integer, real and complex numbers This
   language uses something called Hungarian notation the name of the
   variable itself tells you about the type of the data it contains if the
   starting letter is 'i' then integer , 'r' then real , 'c' then complex number

<program>→begin<stmts>end

<stmts>→<statement>;<stmts>| <statement>;

<statement>→<identifer>=<expr> | <conditional>

<expr>→<expr> + <term> |<expr>-<term>|<term>

<term>→<term>*<fact>|<fact>

<fact>→<identifier><conditional>--->if <cexpr>thenbegin<stmts>end

<cexpr>→<identifier>==<identifier> |<identifier>!=<identifier>

<identifier>→i<letters>|r<letters>|c<letters>

<letters>→<letter><letters>|<letter>

<letter>→a|b|....|z|A|B|.....|Z

a) Design a LEX specification for the above language. (Ignore the redundant spaces, tabs and newlines). Although the syntax specification states that value can be arbitrarily long, you may restrict the length to some reasonable value. (Use JLex, flex or lex or any other lexical analyser generating tools).

b) Write YACC specification to generate three address code and quadruples for the given aitthmetic statement.

c) Write YACC specification to validate the statements of the above language.

d) Write program to generate 8086 assembly code from the abstract syntax tree or three address code generated by the parser. The target assembly instructions can be simple move, add, sub, and jump. Also simple addressing modes are used.

Text Book(s)

1. Alfred.V. Aho, J.D.Ullman, Ravi Sethi, Compilers Principles, Techniques and Tools, 2/e, Pearson Education, 2002.

2. John R. Levine, Tony Mason, Doug Brown, Lex & Yacc, O'reilly, 1992.

3. K Muneeswaran, Compiler Design, Oxford University Press, 2012.

ECS392: SEMINAR

L T P C

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Student has to select a topic of his/her interest in consultation with the faculty incharge of seminar. He/She can collect information from the books, journals, internet and prepare a report. Prepare a power point presentation on the topics and present to a committee to evaluate the seminar.

Seminar is separate for each student.

ECS401 : CRYPTOGRAPHY AND NETWORK SECURITY

L T P C

4 0 0 4

Module I   10 hours

Introduction: Cryptography, cryptanalysis, attacks, services, security mechanisms.

Classical Encryption Techniques: Symmetric key cryptography caesar cipher, mono alphabetic cipher, play fair cipher, hill cipher, poly alphabetic cipher, OTP, transposition techniques, rotor machines, steganography.

Module II   11 hours

Block Ciphers: Block Ciphers and the Data Encryption Standard: DES algorithm, differential and linear cryptanalysis, triple DES.

Block cipher design principles, block cipher modes of operation, advanced encryption standard, RC6

Module III   11 hours

Arithmetic for Cryptography: Pseudorandom number generation, prime numbers, Euler's theorem and CRT. Stream Ciphers: RC4

Public Key Cryptography: Principles of public key cryptosystem, RSA algorithm, security of RSA. Diffiehellman key exchange, elliptical curve cryptography.

Module IV   12 hours

Cryptographic Hash Functions: Applications of hash Functions, two simple hash functions, secured hashing algorithm 3.3.

MAC and Digital Signatures: Message authentication requirements, message authentication functions, MAC, security of MAC, HMAC, digital signatures, digital signature standard.

Module V   **12 hours**

Authentication Protocols: Remote user authentication principles, kerberos, Federated Identity Management Email Security : Pretty Good Privacy (PGP), S/MIME.

IP Security: IP security overview, IP security Policy, malicious software, Firewalls: Need for firewalls, firewall characteristics, types of firewalls.

Text Book(s)

1. William Stallings, Cryptography and Network Security, 5/e, Pearson education, 2010.

References

1. Mao, Modern cryptography: Theory and Practice, Pearson education 2003.

2. Behrouz A .Forouzan, Cryptography and Network Security, TMH, 2008.

3. Atul Kahate, Cryptography and Network Security, 2/e, TMH, 2002.

ECS441 : NETWORK MANAGEMENT (Elective)

L T P C

3 0 0 3

Module I   **8 hours**
Introduction: Network management requirements, network management system.
Network Monitoring: Network monitoring architecture, performance monitoring, fault monitoring, accounting monitoring.
Network Control: Configuration control, security control.

Module II   **10 hours**
SNMP Network Management Concepts: Background, basic concepts. SNMP Management Information: Structure of management information, practical issues.
Standard MIB: MIB-II, ethernet interface MIB.
Simple Network Management Protocol: Basic concepts, protocol specifications, transport level support, SNMP group.

Module III   **10 hours**
Remote Network Monitoring: Statistics collection, basic concepts, groups, statistics, history, host, hostTopN, matrix, token ring extensions to RMON. Remote Network Monitoring: Alarms and filters: Groups: alarm, filter, packet capture, event. RMON2: Overview, protocol directory group, protocol distribution group, address map group, RMON2 host groups, MON2 matrix groups, user history collection groups, probe configuration group, extensions to RMON1 for RMON2 devices.

Module IV   **8 hours**
SNMPv2: Management Information: Background, structure of management information.SNMPv2: Protocol: Protocol operations, transport mappings, coexistence with SNMPv1. SNMPv2: MIBs and conformance: SNMPv2 management information base, conformance statements, evolution of the interfaces group of MIB-II.

Module V   **6 hours**
SNMPv3: Cryptographic Algorithms in SNMPv3: Conventional encryption with DES, the MD5 secure hash function, the SHA-1 secure hash function, message authentication with HMAC SNMPv3: Architecture and Applications: Background, SNMPv3 overview, SNMPv3 architecture, SNMPv3 applications, MIBs for SNMPv3 applications.

Text Book(s)
1.   William Stallings, SNMP, SNMPv2, SNMPv3, AND RMON1 and 2, 3/e, Pearson Education, 1998.
References
2.   Mani Subramanian, Network Management Principles and Practice, Pearson Education, 2012.

ECS442 : GAME PROGRAMMING (Elective)

L T P C

3 0 0 3

Module I   8 hours

Introduction to game programming, suitable languages for developing games and reasons, animation framework, worms in windows and applets, full screen worms.

Module II   8 hours

Introduction to java imaging, image loading, visual effects and animation. Loading and playing sounds, audio effects and synthesis, and sprites.

Module III   8 hours

Side scroller, isometric tile game, 3-D check board and checkers3-D, loading and managing external models, lathe to make shapes, 3D- sprites

Module IV   8 hours

Networking basics, network chat, networked two-person game, networked virtual environment.

Module V   8 hours

Game production and project management, game industry roles and economics, the publisher developer relationship, marketing, intellectual property content, law and practice, content regulation.

Text Book(s)

1. Andrew Davison, Killer Game programming in Java, O'Reilly Publishers, 2005.
2. Steve Rabin, Introduction to Game Development, CENGAGE Technology, 2009.

References

1. David Brackeen, Developing Games in Java, 2004.
2. David M Bourg & Glenn Seemann, AI for Game Developers, O'Reilly Publishers, 2004.

Web Resource

http://www3.ntu.edu.sg/home/ehchua/programming/java/ J8d_Game_Framework.html.

ECS444 : ADVANCED DATA MINING (Elective)

L T P C

3 0 0 3

Module I   **10 hours**

Introduction: Sequential pattern mining concepts, primitives, scalable methods, transactional patterns and other temporal based frequent patterns, mining time series data, periodicity analysis for time related sequence data, trend analysis. Similarity search in time series analysis.

Module II   **8 hours**

Mining stream and sequence data: Mining data stream's, methodologies for stream data processing and stream data systems, frequent pattern mining in stream data, sequential pattern mining in data streams, classification of dynamic data streams, class imbalance problem.

Module III   **8 hours**

Graph mining: Graph mining, mining frequent subgraphs, finding clusters, hub and outliers in large graphs, graph partitioning, web mining, mining the web page layout structure, mining web link structure, mining multimedia data on the web, automatic classification of web documents and web usage mining.

Module IV   **10 hours**

Distributed data mining: Distributed data mining, distribute data mining framework, distributed data source, distributed data mining techniques, distributed classifier learning, distributed clustering, distributed association rule mining and challenges of distributed data mining.

Module V   **8 hours**

Outlier Detection: Outlier detection methods, statistical approaches, proximity based approaches, Clustering based approaches, classification based approaches, mining contextual and collective outliers, outlier detection in high dimensional data.

Text Book(s)

1.   Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, 1/e, Addison-Wesley, 2006

2.   Jiawei Han, MichelineKamber, JianPei, Data Mining: Concepts and Techniques, 3/e, Morgan Kaufmann Publishers, 2011.

3.   G Dong and J Pei, Sequence Data Mining, Springer, 2007

References

1.   Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, 1/e, Pearson Publishers, 2006.

ECS446 : REAL TIME SYSTEMS (Elective)

L T P C

3 0 0 3

Module I   10 hours

Real-time Applications and Computation Model: Examples of real time computing systems; Hard versus soft Real time systems; Timing constraints. A reference model for real time systems: Processors and resources, periodic task model, precedence and data dependency, temporal, functional and resource parameters.

Module II   8 hours

Periodic-task model: Cyclic driven, priority driven approach, scheduling of periodic, a periodic and sporadic jobs in priority driven systems.

Module III   8 hours

Resource Management: Resources and resource access control, critical section, priority: Ceiling protocols, concurrent access to data objects.

Module IV   8 hours

Real time communications: Model of real time communications, switched networks round robin services,   medium access control protocols, real time protocols, communications in multicomputer.

Module V   10 hours

Implementation Aspects: Timing services and scheduling mechanisms, other basic operating system functions, processor reserves and resource kernel, open system architecture, capabilities of commercial real time operating systems, predictability of general purpose operating systems.

Text Book(s)
1.   Jane W.S. Liu, Real Time System, Pearson Education Asia, 2001.

References
1.   C.M. Krishna and Kang 0. Shin, Real Time Systems, McGraw Hill Companies Inc., 1997.
2.   Raymond J.A. Buhr, Donald L. Bailey, An Introduction to Real Time Systems, Prentice Hall International, 1999.
3.   K.V.K.K Prasad, Embedded Real Time Systems:Concepts, Design and Programming, Dream Tech, 2003.

ECS448 : PRINCIPLES OF BIOINFORMATICS (Elective)

L T P C

3 0 0 3

Module I   8 hours

Introduction: definitions, sequencing, biological sequence/structure, genome projects, pattern recognition an prediction, folding problem, sequence analysis, homology and analogy.

Protein Information Resources: Biological databases, protein pattern databases, and structure classification databases. Secondary databases, Protein pattern databases, and Structure classification databases.

Module II   8 hours

Genome Information resources: DNA sequence databases, specialized genomic resources.

DNA sequence analysis: Importance of DNA analysis, gene structure and DNA sequences, features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, gene hunting, profile of a cell, EST analysis, effects of EST data on DNA databases.

Module III   8 hours

Pair wise alignment techniques: Database searching, alphabets and complexity, algorithm and programs, comparing two sequences, subsequence, identity and similarity, the dot plot, local and global similarity, different alignment techniques, dynamic programming, pair wise database searching.

Module IV   10 hours

Multiple sequence alignment: Definition and goal, the consensus, computational complexity, manual methods, simultaneous methods, progressive methods, databases of multiple alignments and searching.

Secondary database searching: Importance and need of secondary database searches, secondary database structure and building a sequence search protocol.

Module V **10 hours**

Introduction to Algorithms and Complexity : Definition of algorithm, biological algorithms versus computer algorithms, the change problem, correct versus incorrect algorithms, recursive algorithms, iterative versus recursive algorithms, fast versus slow algorithms, big-O notation, algorithm design techniques, exhaustive search, branch and bound algorithms, greedy algorithms, dynamic programming, divide and conquer algorithms, machine learning, randomized algorithms.

Text Book(s)

1.   T K Attwood & D J Parry-Smith, Introduction to Bioinformatics, Pearson education, 1999.

2.   Neil C.Jones and Pavel A. Pevzner, A Bradford Book, An Introduction to Bioinformatics Algorithms, The MIT Press, 2004.

References

1.   M. Lesk, Introduction to Bioinformatics, Oxford publishers, 2013.

2.   Bryan Bergerar, Bioinformatics computing, Pearson, 2002.

3.   Dan E. Kranle, Fundamental concepts of Bio-Informatics, Pearson Education, 2002.

4.   Jean-Michel Claveriw, CerdricNotredame, Bioinformatics - A Beginner's Guide, WILEY Dreamtech, 1993.

ECS491 : MINI PROJECT

L T P C

0 0 3 2

Mini Project is a short project intended to train students to identify a problem of practical significance related to

i)   Software design process

ii)   Various Tools used in the industry

iii)   Application/ software development

Study of literature related to any of the above and works for a solution and submit a report.

The mini project can be individual or maximum of four persons.

ECS492 : COMPREHENSIVE VIVA

L T P C

0 0 0 2

Comprehensive viva is intended to train students to face interviews. Students are expected to prepare fundamentals in all core subjects of their branch for taking comprehensive viva.

ECS493 : SUMMER INTERNSHIP

L T P C

0 0 0 2

Summer internship is planned to expose students to industrial practices. Students have to correlate the theory learnt in classroom to the procedures adopted in industry. Students have to maintain a dairy on the work carried out in industry and submit a detailed report of her/his experience at the industry.

ECS494 : PROJECT WORK

L T P C

0 0 16 8

A graduate is expected to contribute to the industry in design, development, testing, maintenance of software project and managing the employees as soon as joining the industry. Hence it is essential to have training in any of the above areas by taking up a project work. The project work can be an extension of mini project or can be an independent.

ECY101: ENGINEERING CHEMISTRY

L T P C
3 0 0 3

Module I   **9 hours**
Water Technology: Introduction and properties of water, hardness of water, temporary and permanent, units, treatment methods, municipal water treatment, sedimentation, coagulation, filtration and sterilization. Desalination of brackish water, reverse osmosis (RO) and electrodialysis, industrial water treatment, lime-soda ash method, chemical reactions and problems, zeolite and ion-exchange processes.

Module II   **9 hours**
Energy Sources and Applications: Conventional Energy Sources: Electrode potential, determination of single electrode potential. Reference electrodes: Hydrogen and calomel electrodes, electrochemical series and its applications. Primary cell: dry or leclanche cell. Secondary cell: lead acid storage cell, nickel-cadmium cell, lithium-ion batteries (Lithium-$MnO2$). Fuel cell: hydrogen-oxygen fuel cell, methyl alcohol-oxygen fuel cell and propane-oxygen fuel cell. **Non-Conventional energy sources:** solar energy, wind energy, photovoltaic cell and applications.

Module III   **9 hours**
Corrosion Engineering: Definition, theory of corrosion: dry corrosion and electro chemical corrosion. Factors affecting corrosion: nature of the metal and nature of the environment. **Corrosion Controlling Methods:** Metallic coatings: anodic coatings, cathodic coatings, galvanizing and tinning. Organic coatings: paints and varnishes (constituents and their functions).

Module IV   **8 hours**
Surface Chemistry: Colloids: types of colloids, preparation of colloidal solutions, micelles, coagulation of sols. Origin of charge on colloids, stability of colloids, applications of colloids. **Adsorption:** classification, adsorption of gases on solids, adsorption from solutions. Langmuir's theory and Freundlich's theory of adsorption, applications of adsorption.

Module V   **8 hours**
Engineering Materials: Refractories: classification, properties of a good refractory. Preparation and properties of silica, magnesite and silicon carbide refractories. Clay-bond, silica nitride bond and self-bond in silicon carbide. **Ceramics:** Structural clay products, examples. White wares and chemical stone wares. **Adhesives:** Introduction and classification of adhesives. Adhesive action, development of adhesive strength.

Text Book(s)
1. P.C. Jain and M. Jain, Engineering Chemistry, 16/e, Dhanpat Rai Publishing Company, 2013.
2. O.V. Roussak and H.D. Gesser, Applied Chemistry - A Textbook for Engineers and Technologists, 2/e, Springer, 2013.

References
1. Sashi Chawla, A Text book of Engineering Chemistry, 3/e, Dhanpat Rai Publishing Company, 2013.
2. B.S. Murty, P. Shankar, B. Raj, B.B. Rath and J. Murday, Textbook of Nanoscience and Nanotechnology, Universities Press, 2013.
3. S.S. Dara, S.S. Umare, A Textbook of Engineering Chemistry, 12/e, S. Chand and Company, 2014.
4. V. Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2013.

ECY102: CHEMICAL ASPECTS OF ENGINEERING MATERIALS (Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Analytical Instrumental Techniques: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometry, conductometry and UV-spectroscopy.

Module II   **9 hours**
Semiconductors, Solar cells and Storage Devices: Semiconductors: definition, types of semiconductors: stoichiometric, non-stoichiometric, controlled valence semiconductors, doping and applications. **Solar cells:** Introduction, harnessing solar energy, solar water heaters. **Storage devices:** Materials used and working of compact disc and flash (pen) drive.

Module III   **9 hours**
Chemistry of Nanomaterials: Introduction to nanomaterial: nanoparticles, nanocluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: sol-gel method, reverse micellar method, electrolytic method. **Characterization:** Principle and applications of X-ray diffraction (XRD), scanning electron microscope (SEM) and transmission electron microscope (TEM).

Module IV   **8 hours**
Solid State Chemistry: Introduction, classification and properties of solids. Crystallographic systems, types of lattices, Brag's equation, Born-Haber cycle and cohesive energy. Ionic and liquid crystals - properties and applications.

Module V   **9 hours**
Polymer Chemistry: Types of polymerization, mechanism of addition polymerization, moulding constituents, differences between thermoplastic and thermo setting resins. Preparation and properties of polyethylene, polyvinylchloride, polystyrene, polyamides (nylon-6,6), polycarbonates and bakelite. engineering applications of plastics. Preparation and properties of inorganic polymers: polysiloxanes and polyphosphazenes.

Text Book(s)
1. P.C. Jain and M. Jain, Engineering Chemistry, 16/e, Dhanpat Rai Publishing Company, 2013.
2. B.K. Sharma, Engineering Chemistry, 6/e, Krishna Prakashan Media, 2011.

References

1. Sashi Chawla, A Textbook of Engineering Chemistry, 3/e, Dhanpat Rai Publishing Company, 2013.
2. B.S. Murty, P. Shankar, B. Raj, B.B. Rath and J. Murday, Textbook of Nanoscience and Nanotechnology, Universities Press, 2013.
3. S.S. Dara and S.S. Umare, A Textbook of Engineering Chemistry, 12/e, S. Chand and Company, 2014.
4. V. Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2013.

ECY104: ADVANCED ENGINEERING CHEMISTRY
(Elective)

L T P C
3 0 0 3

Module I   **9 hours**
Pollution and Its Control: Introduction to natural and manmade pollutants, particulate and gaseous pollutants. Earth radiation balance, sewage and its treatment. Radioactive pollution, lapse rate and inversion temperature. Hazardous wastes and treatment technologies (biological, physical and thermal).

Module II   **9 hours**
Control of Specific Gaseous Pollutants: Introduction of gas pollutants, control of sulphur dioxide, sulfur reduction during combustion, desulphurization of flue gases. Lime water scrubbing, magnesium oxide scrubbing. Control of oxides of nitrogen. Modification of operating conditions, low air and excess air combustion, two-stage combustion. Flue gas, recirculation, control of carbon monoxide, proper designing.

Module III   **8 hours**
Polymer Chemistry: Types of polymerization, mechanism of addition polymerization, moulding constituents, differences between thermoplastic and thermo setting resins. Preparation and properties of polyethylene, polyvinylchloride, polystyrene, polyamides (nylon-6,6), polycarbonates and bakelite. engineering applications of plastics. preparation and properties of inorganic polymers: Polysiloxanes and polyphosphazenes.

Module IV   **9 hours**
Concrete Chemistry: Constituent materials and their properties, grades of concrete, decay of concrete, hardening of concrete. Hydration reactions in concrete, hydration of calcium silicate minerals, hydration of calcium aluminate minerals. Reaction with additional sulphate ions. Durability of concrete (expansion of concrete to sulfate attack, expansion due to alkali aggregation). Curing of concrete: Hydration mechanism by Vander Waal's theory.

Module V   **9 hours**
Chemistry of Nanomaterials: Introduction to nanomaterials, nanoparticles, nano cluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: sol-gel method, reverse micellar method, electrolytic

method. **Characterization:** Principle and applications of X-ray diffraction (XRD), scanning electron microscope (SEM) and transmission electron microscope (TEM).

Text Book(s)
1. P.C. Jain and M. Jain, Engineering Chemistry, 16/e, Dhanpat Rai Publishing Company, 2013.
2. O.V. Roussak and H.D. Gesser, Applied Chemistry - A Textbook for Engineers and Technologists, 2/e, Springer, 2013.

References
1. C.S. Rao, Environmental Pollution Control Engineering, 2/e, New Age International, 2013.
2. P. Kumar Mehta and Paulo J. M. Monteiro, Concrete: Microstructure, Properties, and Materials, 3/e, Tata McGraw Hill Education, 2006.
3. B.S. Murty, P. Shankar, B. Raj, B.B. Rath and J. Murday, Textbook of Nanoscience and Nanotechnology, Universities Press, 2013.
4. V. Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2013.
5. Ozin G.A., Arsenault A.C, and Cademartiri L., Nanochemistry: A Chemical Approach to Nanomaterials, 2/e, Royal Society of Chemistry, 2009.

ECY106: CHEMISTRY OF ADVANCED MATERIALS
(Elective)

L T P C
3 0 0 3

Module I   9 hours
Semiconductors, Solar cells and Storage Devices: Semiconductors:
Definition, types of semiconductors: stoichiometric, non-stoichiometric,
controlled valence semiconductors, doping and applications. **Solar cells:**
Introduction, harnessing solar energy, solar water heaters. **Storage devices:**
Materials used and working of compact disc and flash (pen) drive.

Module II   9 hours
Chemistry of Nanomaterials: Introduction to nanomaterials, nanoparticles,
nano cluster, carbon nanotube (CNT) and nanowires. Chemical synthesis
of nanomaterials: sol-gel method, reverse micellar method, electrolytic
method. **Characterization:** Principle and applications of X-ray diffraction
(XRD), scanning electron microscope (SEM) and transmission electron
microscope (TEM).

Module III   9 hours
Fuel Technology: Introduction and classifications of fuels, characteristics
of a good fuel, calorific value and units. Determination of calorific value
by Bomb calorimeter and Dulong's formula. **Solid Fuels:** Coal,
classification of coal by rank. Analysis of coal: Proximate and ultimate
analysis. **Liquid Fuels:** Refining of petroleum, petroleum products used
as fuels, knocking (detonation), octane number of gasoline. Synthetic petrol:
Bergius and Fischer tropsch's methods. Diesel: high speed and low speed
diesel, cetane number.

Module IV   8 hours
Analytical Instrumental Techniques: Electromagnetic spectrum,
absorption of radiation: Beer-Lambert's law. Principle and applications of
pH metry, potentiometry, conductometry and UV-spectroscopy.

Module V   9 hours
Lubricants: Introduction and classification of lubricants. Principles and
mechanism of lubrication: Hydrodynamic, boundary and extreme pressure
lubrications. Properties of lubricants: Viscosity, oiliness, flash and fire points,
cloud and pour points, aniline point, saponification number, carbon residue,
emulsification number, volatility, precipitation number, specific gravity and
neutralization number.

Text Book(s)
1. P.C. Jain and M. Jain, Engineering Chemistry, 16/e, Dhanpat Rai Publishing Company, 2013.
2. B.K. Sharma, Engineering Chemistry, 6/e, Krishna Prakashan Media, 2011.

References
1. Sashi Chawla, A Textbook of Engineering Chemistry, 3/e, Dhanpat Rai Publishing Company, 2013.
2. B.S. Murty, P. Shankar, B. Raj, B.B. Rath and J. Murday, Textbook of Nanoscience and Nanotechnology, Universities Press, 2013.
3. S.S. Dara, S.S. Umare, A Textbook of Engineering Chemistry, 12/e, S. Chand and Company, 2014.
4. V. Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2013.

ECY121: ENGINEERING CHEMISTRY LABORATORY

L T P C
0 0 3 2

List of Experiments

1. Calibration of volumetric apparatus.

2. Determination of sulphuric acid in lead-acid storage cell.

3. Determination of hardness of a ground water sample.

4. Estimation of active chlorine content in bleaching powder.

5. Estimation of iron as ferrous iron in an ore sample.

6. Estimation of calcium in portland cement.

7. Determination of chromium (VI) in potassium dichromate.

8. Determination of copper in a copper ore.

9. Determination of viscosity of a liquid.

10. Determination of surface tension of a liquid.

11. Determination of Mohr's salt by potentiometric method.

12. Determination of strength of an acid by pH metric method.

EEC101 : BASIC ELECTRONICS ENGINEERING

L T P C

3 0 0 3

Module I **8 hours**
Semiconductor Diodes: Basic structure and operating principle, current-voltage characteristics, applications: Rectifier circuits (Half-wave, Full wave, Rectifier with filter capacitor), voltage regulator using zener diode, clipper and clamper. LED, Photo diode.

Module II **8 hours**
Bipolar Junction Transistors (BJT): Structure and modes of operation: NPN and PNP transistors in active mode, DC analysis, BJT as an amplifier and switch. Small signal equivalent circuit, single stage BJT amplifiers(CE mode)

Module IIII **8 hours**
Metal oxide semi conductor Field effect transistor (MOSFET): Structure, physical operation of N-type and P-type MOSFET, DC analysis, MOSFET as an amplifier and switch, small signal equivalent circuit, single stage amplifier (CS mode)

Module IV **10 hours**
Feedback amplifiers and Oscillators: Basic concepts of negative feedback, block diagram of negative feedback amplifier, Feedback topologies. oscillators: Basic principle of sinusoidal oscillation, RC phase shift oscillator, wein bridge oscillator, Hartley, Colpitt's and crystal oscillator

Module V **10 hours**
Operational Amplifier: Ideal characteristics of Op-Amp, block diagram, inverting and non inverting modes, applications of Op-Amp: Summing, averaging, difference amplifier, voltage to current converter, current to voltage converter, instrumentation amplifier, differentiator, integrator

Text Book(s)
1.   Salivahanan, Electronic devices and circuits, 2/e, Tata McGraw Hill,2011
2.   Dharma raj cheruku, Electronic devices and circuits, 1/e, Pearson Education.

References
1.   Jacob Millman and Christos C.Halkias, Integrated Electronics, 1/e, Tata McGraw Hill, 1991.

EEC362 : FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING (Elective)

L T P C

3 0 0 3

Module I   8 hours
Discrete-Time Signals and Systems: Discrete time signals, linear shift invariant systems, stability and causality, linear constant coefficient difference equations, frequency domain representation of discrete time signals and systems,
The Z-Transform: Z-transform, inverse z-transform, z-transform theorems and properties, system function.

Module II   8 hours
Discrete Fourier Transform: Representation of periodic sequences, discrete fourier series, properties of discrete fourier series, fourier representation of finite duration sequences-the discrete fourier transform, properties of discrete fourier transform, computation of the discrete fourier transform: Decimation-in-time FFT algorithms, decimation-in-frequency FFT algorithms.

Module III   8 hours
IIR Filter Design: Design of IIR digital filters from analog filters, design examples- analog-digital transformation.

Module IV   8 hours
FIR Filter Design: Properties of FIR digital filters, design of FIR filters using windows, comparison of IIR and FIR digital filters.

Module V   8 hours
DSP Processors: DSP architecture for signal processing-Harvard architecture, pipelining, hardware multiplier-accumulator, fixed point digital signal processors, floating point digital signal processors.

Text Book(s)
1.   Alan V. Oppenheim, Ronald W. Schafer, Digital Signal Processing, Prentice Hall of India, 1975
2.   Ifeacher E.C, Jervis B.W, Digital Signal Processing -A Practical Approach, Pearson Education, 2002.
References
1.   Sanjay K.Mitra, Digital Signal Processing- A Computer based Approach, 4/e, Tata McGrawHill , 2011.
2.   J.G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4/e, Pearson Education, 2007.

EEC364 : INTRODUCTION TO MICROPROCESSORS
(Elective)

L T P C
3 0 0 3

Module I   8 hours

The Processor 8086: Register organization of 8086, architecture, signal description of 8086, physical memory organization, I/O addressing capability, minimum mode 8086 system and timings, maximum mode 8086 system and timings.

Module II   8 hours

Instruction Set And Programming: Machine language instruction format, addressing modes of 8086, instruction set of 8086, assembler directives and example programs (assembly programs).

Module III   8 hours

Interrupts And Programming: Interrupts and interrupt service routines, interrupt cycle of 8086, non mask able interrupt, maskable interrupt (INTR), interrupt programming. Programmable Interrupt Controller 8259A.

Module IV   10 hours

Interfacing Of Peripherals To 8086: Interfacing I/O ports, PIO 8255, [Programmable I/O ports], modes of operation of 8255, interfacing Digital to Analog converters- DAC 0800, interfacing analog to digital data converters- ADC0808/0809, programmable interval timer 8253, programmable communication interface 8251 USART.

Module-V   8 hours

Modern Microprocessors: Salient features of 80286, internal architecture of 80286, salient features of 80386DX, architecture and signal descriptions of 80386, salient features of 80586, Intel MMX architecture, salient features of Pentium 4.

Text Book(s):
1.   AK Ray, KM Bhurchandi, Advanced Microprocessors and Peripherals, 2/e, TMH , 2009.
2.   Douglas V Hall, Microprocessors and Interfacing: Programming and Hardware, 2/e, Tata McGraw Hill, 2006

References:
1.   Y.Liu and G.A. Gibson, Microcomputer systems: The 8086/8088 Family Architecture, Programming and Design, 2/e, Prentice-Hall, 1986.
2.   Kenneth J. Ayala, 8086 Micro Processor: Programming and Interfacing the PC, 1/e, Delmar Cengage learning, 2007.
3.   Ramesh .S. Gaonkar, Microprocessors, Architecture, Programming and Applications with the 8085, 5/e, Penram , 2011.

EEC461 : FUNDAMENTALS OF COMMUNICATION ENGINEERING (Elective)

L T P C

3 0 0 3

Module I   8 hours

Amplitude Modulation: Amplitude modulation, virtues, limitations, and modifications of amplitude modulation, double sideband-suppressed carrier modulation, costas receiver, quadrature-carrier multiplexing, single-sideband modulation, vestigial sideband modulation.

Module II   10 hours

Angle Modulation: Angle modulation, properties of angle-modulated waves, relationship between PM and FM waves, narrow-band frequency modulation, wide-band frequency modulation, transmission bandwidth of FM waves, generation of FM waves, demodulation of FM signals, FM stereo multiplexing.

Module III   10 hours

Pulse Modulation: Sampling process, pulse-amplitude modulation, pulse-position modulation, completing the transition from analog to digital, quantization process, pulse-code modulation, delta modulation, differential pulse-code modulation, line codes.

Module IV   8 hours

Baseband Data Transmission : Baseband transmission of digital data, the intersymbol interference problem, the nyquist channel, raised-cosine pulse spectrum, baseband transmission of M-ary data, the eye pattern, equalization.

Module V   8 hours

Digital Band-Pass Modulation Techniques: Binary amplitude-shift keying, phase-shift keying, frequency-shift keying, noncoherent digital modulation schemes, M-ary digital modulation schemes, mapping of digitally modulated waveforms onto constellationsof signal points.

Text Book(s)

1. Simon Haykin, Michael Moher, Introduction to Analog and Digital Communications, 2/e, Wiley Student Edition, India, 2007.

References

1. P. Rama Krishna Rao, Analog Communications , Tata McGraw Hill , 2011

2. George Kennedy, Bernard Davis Electronic Communication Systems, 4/e, Tata McGraw-Hill, 1998.

3. J.G.Proakis, MassodSalehi, Fundamentals of Communication Systems, Pearson Education, 2010.

EEC462 : VERY LARGE SCALE INTEGRATED SYSTEM DESIGN (Elective)

L T P C

3 0 0 3

Module I   **8 hours**

Introduction to MOS Technology: Introduction to integrated circuit technology, basic MOS transistors, enhancement mode MOS transistor, depletion mode MOS transistor, NMOS fabrication, CMOS fabrication, comparison of NMOS, CMOS, BICMOS, GaAs Technologies.

Module II   **10 hours**

Basic Electrical Properties of MOS and BiCMOS Circuits: Drain-to-source current vs voltage relationships, aspects of MOS transistor threshold voltage, MOS transistor transconductance and output conductance, the pass transistor, the NMOS inverter, determination of pullup to pulldown ratio of NMOS transistor driven by another NMOS transistor, the CMOS inverter, MOS transistor circuit model, latch up in CMOS circuits.

Module III   **10 hours**

MOS and BICMOS Circuit Design Process: MOS layers, stick diagrams, design rules and layout, 2μ.meter, 1. 2μ.meter CMOS rules. layout diagrams, symbolic diagrams. Basic circuit concepts: Sheet resistance, area capacitance of layers, delay model, wiring capacitances, choice of layers. Scaling of MOS circuits: Scaling models, scaling function for device parameters, limitation of scaling.

Module IV   **8 hours**

Sub system design and Layout: Architectural issues, switch logic, gate logic, examples of structural design (combinational logic), some clocked sequential circuits. Memory Register and Aspects of System Timing: Some commonly used storage/memory elements. Subsystem Design Process: General arrangement of 4-bit arithmetic processor, regularity. Design of an ALU subsystem.

Module V   **8 hours**

Test and Testability: System partitioning, layout and testability, reset/ initialization, design for testability, testing combinational logic, testing sequential logic, practical design for test (DFT) guidelines, scan design techniques, Built-In-Self-Test (BIST).

Text Book(s)

1. Douglas A, Pucknell, Kamran Eshraghian, Basic VLSI design, 3/e, Prentice-Hall of India, 1994.

References

1. Kang, Leblibici, CMOS Digital Integrated Circuits, 3/e, Tata McGraw Hill , 2001

2. Jan M. Rabaey, Digital Integrated Circuits, 2/e, Pearson Education, 2002.

3. Jackson, Hodges, Analysis and Design of Digital Integrated Circuits, 3/e, Tata McGraw Hill, New Delhi, 2010.

EEC464 : INTRODUCTION TO MICROCONTROLLERS (Elective)

L T P C

3 0 0 3

Module I   **9 hours**

The 8051 Microcontrollers: Microcontrollers and embedded processors, overview of the 8051 family, 8051 assembly language programming, I/O Port programming.

Module II   **9 hours**

8051 programming in C: Data types and time delay in 8051 C, I/O programming in 8051 C, logic operations in 8051 C, accessing code ROM space in 8051 C.

Module III   **9 hours**

Hardware Interfacing: 8051 hardware Connection and Intel Hex File, 8051 timer programming, 8051 serial port programming.

Module IV   **9 hours**

Interrupts Programming: ADC, DAC and sensor interfacing, 8051 interfacing to external memory.

Module V   **9 hours**

ARM 32 Bit MCUs : Introduction to 16/32 bit processors, ARM architecture and organization, ARM / Thumb programming mode, ARM / Thumb instruction set, development tools.

Text Book(s)

1.   Muhammad Ali Mazidi, Janice G. Mazidi, Rolin D. McKinlay, The 8051 Microcontroller and Embedded Systems - Using Assembly and C, 2/e, Pearson Education, India, 2006.
2.   Rajkamal, Microcontrollers, Architecture, Programming, Interfacing and System Design, 2/e, Pearson Education, India, 2012.

References

1.   Scott Mackenzie I., Raphel C.W. Phan, The 8051 Microcontroller, 4/e, Pearson Education, India, 2007.
2.   A.V. Deshmuk, Microcontrollers-Theory and Applications, Tata McGraw Hill , India, 2005.
3.   PIC Microcontroller and Embedded Systems - Using Assembly and C, Mazidi and Mazidi, Pearson Education, 2008.

EEC465 : FUNDAMENTALS OF GLOBAL POSITIONING SYSTEMS (Elective)

L T P C

3 0 0 3

Module I   **8 hours**

Overview of GPS: Basic concept, system architecture, space segment, user segment, GPS aided Geo-augmented navigation (GAGAN) architecture.

Module II   **8 hours**

GPS Signals: Signal structure, anti spoofing (AS), selective availability, difference between GPS and GALILEO satellite construction.

Module III   **8 hours**

GPS coordinate frames, Time references: Geodetic and Geo centric coordinate systems, ECEF coordinate world geodetic 1984 (WGS 84), GPS time.

Module IV   **8 hours**

GPS orbits and satellite position determination: GPS orbital parameters, description of receiver independent exchange format (RINEX) , Observation data and navigation message data parameters, GPS position determination.

Module V   **8 hours**

GPS Errors: GPS error sources - clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

Text Book(s)

1.   B. Hoffman - Wellenhof, H. Liehtenegger and J. Collins, GPS - Theory and Practice, Springer - Wien, 2001.
2.   Gottapu Sasibhushana Rao , Global Navigation Satellite Systems, McGraw Hill Education, 2010.

References

1.   B.Parkinson, J.Spilker, Jr., GPS: Theory and Applications, Vol. I & Vol. II, AIAA, 370 L'Enfant Promenade SW, 1996.
2.   James Ba - Yen Tsui, Fundamentals of GPS receivers - A Software Approach, John Wiley & Sons 2001.

EEC466 : FUNDAMENTALS OF SPEECH PROCESSING
(Elective)

L T P C

3 0 0 3

Module I   10 hours

Introduction: Speech signal, signal processing, digital speech processing.

Digital Models for Speech Signals: Process of speech production, acoustic theory of speech production, lossless tube models, digital models for speech signals, hearing and auditory perception.

Module II   10 hours

Time-domain methods for Speech Processing: Time-dependent processing of speech, short-time energy and average magnitude, short-time average zero-crossing rate, speech vs silence discrimination, pitch period estimation using the autocorrelation function.

Digital Representation of the Speech Waveform: Instantaneous quantization, adaptive quantization, general theory of differential quantization, delta modulation, differential PCM, comparison of systems.

Module III   10 hours

Short-Time Fourier analysis: Fourier transform interpretation, linear filtering interpretation, filter-bank summation method of short-time synthesis, spectrographic displays, analysis-synthesis systems.
Homomorphic Speech Processing: Homomorphic systems for convolution, complex spectrum of speech, pitch detection, formant estimation, homomorphic vocoder.

Module IV   10 hours

Linear Predictive Coding of Speech: Basic principles of linear predictive analysis, computation of the gain for the model, solution of the LPC equations, relations between the various speech parameters, synthesis of speech from linear predictive parameters, applications of LPC parameters.

Module V **10 hours**

Digital Speech Processing for Man-Machine Communications by Voice: Voice response systems, speaker recognition systems, speech recognition systems.

Speech Enhancement in Noise: Single channel speech enhancement methods, beamforming with microphone array Speech, distortion measurement.

Text Book(s)

1. L.R. Rabiner and R.W. Schafer, Digital Processing of Speech Signals, Prentice Hall of India, 1978.

References

1. Thomas F.Quatieri, Discrete-Time Speech Signal Processing, Principles and Practice, Pearson Education, 2002.

2. Ian McLaughlin, Applied Speech and Audio Processing with MATLAB examples, Cambridge University Press, 2010.

EHS101: COMMUNICATIVE ENGLISH - I

L T P C
3 0 2 4

Module I   **9 hours**
Introduction: Brief orientation, an integrated approach to LSRW skills, self-assessment of skills at the entry level. **Grammar:** Tenses; Articles, subject-verb agreement. **Writing:** Constructing complete and meaningful sentences.

Module II   **8 hours**
Choices and Implications: Reading: Researching texts for essays, skimming and scanning, identifying the sequence of ideas, understanding implicit meanings, inferring the meaning of words, understanding how essay types are organized. **Writing:** Drafting the introduction to an essay, summarizing. **Grammar and Vocabulary (Contextual):** Word families, linking words, verb-noun collocations.

Module III   **8 hours**
Risks and Hazards: Reading: Selecting and prioritizing what you read; inferring the meaning of words; Making notes. **Writing:** Using claims to plan essays; supporting claims with evidence, drafting the body of an essay using the given notes. **Grammar and Vocabulary (Contextual):** Countable and uncountable nouns, word families: adjectives meaning large and important, adjective + noun combinations, prefixes.

Module IV   **8 hours**
Language and Communication: Reading: Predicting the content of a text, reading for detail, scanning for information, understanding implicit meanings, making notes. **Writing:** Reporting what is read, writing a paragraph or two using the given notes. **Grammar and Vocabulary (Contextual):** Word families: nouns with related adjectives ending -ic and -ical; Reporting verbs.

Module V   **9 hours**
Difference and Diversity: Reading: Reading in detail; collecting information for writing tasks. **Writing:** Reporting what is read; writing a paragraph or two using the given notes (compare and contrast). **Grammar and Vocabulary (Contextual):** Linking parts of a text: conjunctions and sentence connectors, single-word verbs and multi-word verbs, word families: nouns with related adjectives.

Laboratory   **26 hours**

Listening: Listening for information; Identifying key terms, understanding outlines, identifying main and secondary points; understanding short presentations and following the logical flow of thought, taking notes; understanding short discussions, making predictions while listening to short talks, identifying topic change, following an argument, making predictions during lectures, matching phrases to functions such as introducing a topic, sub-topic, clarification/explanation.

Speaking: Discuss and decide, key terms, main and secondary points (pair work); making suggestions in group work; making mini oral presentations using appropriate discourse markers, discussing preparation strategies before a lecture starts, working in small groups, generating ideas and reporting (based on listening materials); making oral presentations based on prompts given.

Text Book(s)
1. Hewings, Martin, Cambridge Academic English B2 Student's Book, Cambridge University Press, India, 2014.

Teacher Resource Material
1. Hewings, Martin. Cambridge Academic English B2 Teacher's Book. Cambridge University Press, India, 2014.
2. Class Audio CD, DVD, Audio and DVD Pack.
3. Supplementary material chosen will be from public domain/free resources for classroom use. Sources will be cited wherever available/applicable.

EHS102: COMMUNICATIVE ENGLISH - II

L T P C
3 0 2 4

Module I   **9 hours**

The World We Live In: Reading: recognizing plagiarism, identifying the main ideas in a text, summarizing what is read. **Writing:** Using paraphrases, including quotations in writing.

Grammar and Vocabulary (Contextual): Articles: zero article and complex prepositions. vocabulary: single-word verbs and multi-word verbs, hedging adverbs.

Module II   **9 hours**

Behaving the Way We Do: Reading: Organizing information for an essay; Skimming and scanning texts; Taking notes and explaining what is read. **Writing:** writing conclusions in essays, giving references, language for writing: hedging. **Grammar and Vocabulary (Contextual):** Avoiding repetition, expressions with Wh- noun clauses, vocabulary: collocations-verb/ adjective + preposition combinations.

Module III   **9 hours**

Bringing about Change: Reading: Reading critically; Finding information and taking notes; Retelling what is read. **Writing:** Using an academic style. **Grammar and Vocabulary (Contextual):** Relative clauses, it clauses: expressing personal opinions impersonally; abstract nouns+of +-ing/to-infinitive, inferring the meaning of words.

Module IV   **8 hours**

Work and Equality: Reading: Understanding figures and tables, scanning for information; Understanding the significance of references. **Writing:** Structure and content of reports, describing events in a time sequence, cause and effect. **Grammar and Vocabulary (Contextual):** Passive voice, past perfect, -ing nouns.

Module V   **7 hours**

Writing Formal Letters: Letters of enquiry, seeking permission, complaint and adjustment, job application (cover letter).

Laboratory: **26 hours**

Listening: Listening for gist and detail, identifying contrasts while listening to lectures/ presentations (pitch, emphasis), understanding the organization of a talk, understanding the relationship between parts of a lecture, listening for a lecture summary, understanding descriptions of processes.

Speaking: Reaching a consensus in group work, referring forward and backward in presentations, concluding a presentation, taking part in discussions, group discussions, making presentations using PowerPoint slides.

Text Book(s)
1. Hewings, Martin, Cambridge Academic English B2 Student's Book, Cambridge University Press, India, 2014.

Teacher Resource Material
1. Hewings, Martin, Cambridge Academic English B2 Teacher's Book, Cambridge University Press, India, 2014.
2. Class Audio CD, DVD, Audio and DVD Pack.
3. Supplementary material chosen will be from public domain/ free resources for classroom use. Sources will be cited wherever available/applicable.

EHS201: ENVIRONMENTAL STUDIES

L T P C
3 0 0 3

Module I
12 hours

Introduction to Environment and Natural Resources: Introduction to environment: definition, scope and importance, multidisciplinary nature of environment, need for public awareness. Natural Resources: Renewable and non-renewable resources, natural resources and associated problems. Forest resources: Uses, reasons for over-exploitation, deforestation effects, timber extraction, case studies. Water resources: use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Uses, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, Impacts of overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, use of renewable and non renewable energy sources, case studies. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Module II
9 hours

Ecosystems and Biodiversity: Structural components of ecosystem: Biotic and Abiotic components. Functional components of an ecosystem: Food chains, food webs, ecological pyramids, energy flow in the ecosystem (10% law), ecological succession. Biogeochemical cycle: (Nitrogen, carbon, phosphorus cycle). Introduction, types, structure and function of the following ecosystem: Forest ecosystem, grassland ecosystem, desert ecosystem. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity: definition, levels of biodiversity: genetic, species and ecosystem diversity. Bio-geographical classification of India, values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In situ and Ex situ conservation of biodiversity.

Module III
8 hours

Environmental Pollution and Control: Environmental Pollution: Definition, causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, thermal pollution, nuclear hazards, solid waste

management, e-waste, hazardous waste management. Role of an individual in prevention of pollution. Pollution case studies. Disaster Management: floods, earthquake, cyclone and landslides.

Module IV   7 hours
Social Issues and Global Environment Problems and Efforts: Unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management, remote sensing and GIS methods, resettlement and rehabilitation of people: its problems and concerns. Case studies, environmental ethics: Issues and possible solutions. Green building concept, environmental impact assessment (Checklists, matrix methods), environmental management plan, climate change: global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

Module V   6 hours
Human Population and Environment Legislation: Population growth, variation among nations, family welfare programme. Environment and human health. HIV/AIDS, human rights, value education, women and child welfare. Role of information technology in environment and human health. Environment legislation. Air (prevention and control of pollution) act, water (prevention and control of pollution) act, wildlife protection act, forest conservation act, environmental protection act. Issues involved in enforcement of environmental legislation, public awareness, project work.

Text Book(s)
1. Kaushik, C.P. Kaushik, A Text book of Environmental Studies, 4/e, New Age International, 2014.
2. Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, 2/e, University Grants Commission, Universities Press, 2013.

References
1. Benny Joseph, Textbook of Environmental Studies for Undergraduate Courses, 2/e, Tata McGraw Hill Publishing Company, 2008.
2. K.C. Agarwal, Environmental Biology, Nidi Publishing, Bikaner, 2001.
3. Calvin Brunner, Hazardous Waste Incineration, McGraw Hill Education, 1993.

EHS301: ENGINEERING ECONOMICS AND MANAGEMENT

L T P C
3 0 0 3

Module I   **8 hours**
Economics: Utility, value, wealth, consumption, wants, necessaries, comforts and luxuries. **Demand:** law of demand, elasticity of demand, price elasticity of demand, factors affecting elasticity of demand.

Module II   **8 hours**
Costing: Cost concepts, elements of cost. Methods of distribution of overhead costs, unit costing, job costing and process costing; Simple problems. **Accounts:** Preparation of profit and loss account and balance sheet.

Module III   **6 hours**
Break-Even Analysis: Assumptions, break-even charts, simple problems. Depreciation: Depreciation methods.

Module IV   **10 hours**
Forms of Business Organization: Single trader, partnership and public limited company. **Principles of Organization:** Types of organization, span of management, authority, delegation and decentralization, source of formal authority, difference between authority and power, line and staff authority, case studies.

Module V   **10 hours**
Principles of Management: Importance of management, definition of management, management process, roles of a manager, management, a science or art - management, a profession, functions of management, leadership: difference between a leader and a manager, characteristics of leadership, functions of a leader, case studies.

Text Book(s)
1. Tara Chand, Engineering Economics, Vol-1, 13/e, Nem Chand and Brothers, 2012.
2. O.P Khanna, Industrial Engineering and Management, 14/e, Dhanpat Rai Publications, 2011.

References
1. Maheswari, Engineering and Managerial Economics, 19/e, Sultan Chand and Company, 2009.
2. Shukla, Grewal, Cost Accounting, 12/e, S. Chand and Company, 2007.
3. L.M. Prasad, Principles and Practice of Management, 8/e, Sultan Chand and Sons, 2012.

EHS302: ORGANIZATIONAL BEHAVIOUR
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Introduction: Organizational behavior, nature, management functions, management roles, management skills, systematic study, foundations of individual behavior, attitudes, types of attitudes.

Module II   **8 hours**
Perception and Motivation: Perception, factors, motivation, nature; Theories of motivation, hierarchy needs theory, two - factor theory, expectancy theory, applications of motivation.

Module III   **8 hours**
Foundations of Group Behavior: Groups, nature, classification; stages of group development, group structure, group decision, making, groups and teams; leadership, nature, theories, trait theories, behavioural theories, contingency theories.

Module IV   **8 hours**
Organizational Structure: Nature, work specialization, departmentalization, chain of command, span of control, centralization and decentralization, organizational designs, the simple structure, the bureaucracy, the matrix structure, the team structure, the virtual organization, the boundary less organization.

Module V   **8 hours**
Organizational Culture and Change Management: Organizational culture, nature, cultures functions, approaches to managing organizational change, Lewin's model, Kotter's plan for implementing change, organizational development techniques.

Text Book(s)
1. Robbins, Stephen, S. Sanghi, Organizational Behavior, Pearson Education. 2010.

References
1. Mullins, J. Laurie, Management and Organizational Behavior, Oxford Publishers, 2007.

EHS304: BUSINESS ETHICS AND CORPORATE GOVERNANCE (Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Introduction: Corporation, definition and characteristics, history of corporate form and models, corporate objectives, corporations and government, governance, corporate governance, definition, perspectives.

Module II   **8 hours**
Theoretical Foundations of Corporate Governance: Notion of conflict of interest, property rights theory, nexus of contracts, agency theory, Berle and Means' theory, concept of separation of ownership and control, shareholder, stakeholder debate.

Module III   **8 hours**
Pillars of Governance in Organizations: Owners, ownership structure, types of owners, ownership vs. control, board of directors, types of directors, board roles and board attributes, board committees, executive management, role of CEO, succession planning, managerial myopia, institutional investors, types, categories, features and role.

Module IV   **8 hours**
Work Ethos: Values and ethics, model of management in the Indian socio, political environment, need for values in global change, Indian perspective, values for managers, holistic approach for managers in decision making.

Module V   **8 hours**
Business Ethics and CSR: Corporation as a social institution, accountability and sustainability, relevance of triple bottom line reporting to CSR, codes of conduct, applications of ethical theories to decision making, ethical issues related to employment, healthcare and advertisement.

Text Book(s)
1. Praveen B. Malla, Corporate Governance: Concept, Evolution and India Story, Routledge, 2010.
2. Sadri, Business Ethics: Concepts and Cases, Tata McGraw Hill, 1998.

References
1. Robert Monks, Nell Minow, Corporate Governance, Wiley Publications, 2009.

EHS401: PROJECT MANAGEMENT
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Concept of Project: Basic concepts, classification, characteristics of project, project life cycle, project management, tools and techniques of project management, project organization.

Module II   **8 hours**
Project Identification: Identification, generation of ideas, SWOT analysis, preliminary screening, project rating index. Market and demand analysis, collection of data, market survey, market planning, market environment, project risk analysis, demand forecasting techniques.

Module III   **8 hours**
Technical Analysis: Selection of technology, material input and utilities, plant capacity, location and site, machinery and equipment, structures and civil work, environmental aspects, project charts and layouts, PERT, CPM.

Module IV   **8 hours**
Financial Estimation: Project cost, source of finance, cost of production, financial analysis: characteristics of financial statement, working capital, project income statement, projected profitability, investment evaluation, investment decision rule, techniques of evaluation, payback period, accounting rate of return, internal rate of return, discounted payback period.

Module V   **8 hours**
Social Cost Benefit Analysis: Concept of social cost benefit, significance of SCBA, approach to SCBA, Project implementation, schedule of project implementation, project planning, project control, human aspects of project management, team building, and high performance team.

Text Book(s)
1. Prasanna Chandra, Projects: Planning, Analysis, Implementation and Review, Tata McGraw Hill, 2009.

References
1. Marwah, Project Management, Wiley Dreamtech, 2011.

EHS402: OPERATIONS AND SUPPLY CHAIN MANAGEMENT (Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Introduction to Operations Management: History of operations management, types of manufacturing systems, role and responsibilities of operations manager, services operations.

Module II   **8 hours**
Understanding the Logistics and Supply Chain: Introduction to supply chain, supply chain links, role of logistics in supply chain, drivers and metrics in supply chain, designing the supply chain network, online sales and distribution network, factors influencing the network design.

Module III   **8 hours**
Impact of Uncertainty in Network: Globalization and supply chain, risk management in global supply chain, demand forecasting in supply chain role of information technology in forecasting.

Module IV   **8 hours**
Coordination in Supply Chain: Collaborative planning and replenishment strategies, CPFR, managing uncertainties in inventory.

Module V   **8 hours**
Impact of Replenishment Policies in Safety Inventory: Role of information technology in inventory management, transportation in supply chain.

Text Book(s)
1. Sunil Chopra, Supply Chain Management, Pearson Education, 2012.

References
1. Sridhara Bhatt, Logistics and Supply Chain Management, Himalaya Publishers, 2011.
2. D. K. Agarwal, Logistics and Supply Chain Management, Macmillan Publishers, 2013.

EHS403: DISASTER MANAGEMENT
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Introduction to Disasters: Concepts and definitions (disaster, hazard, vulnerability, resilience, risks). **Disasters:** Classification causes, impacts (including social, economic, political, environmental, health, psychosocial etc.). Differential impacts in terms of caste, class, gender, age, location, disability. Global trends in disasters, urban disasters, pandemics, complex emergencies, climate change.

Module II   **8 hours**
Approaches to Disaster Risk Reduction: Disaster cycle its analysis, phases, culture of safety, prevention, mitigation and preparedness community based DRR, structural- nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, centre and other stake-holders.

Module III   **8 hours**
Inter-Relationship Between Disasters and Development: Factors affecting vulnerabilities, differential impacts, impact of development projects such as dams, embankments, changes in land-use etc. Climate change adaptation, relevance of indigenous knowledge, appropriate technology and local resources.

Module IV   **8 hours**
Hazard and Vulnerability Profile of India Components of Disaster Relief: Water, food, sanitation, shelter, health, waste management institutional arrangements (mitigation, response and preparedness, DM Act and Policy, other related policies, plans, programmes and legislation).

Module V   **8 hours**
Project Work: (Field Work, Case Studies): The project/fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located. A few ideas or suggestions to be discussed.

Text Book(s)
1. G.K. Ghosh, Disaster Management, A.P.H. Publishing Corporation, 2011.
2. Mukesh Kapoor, Disaster Management, Dhanpat Rai, 2012.

References
1. Parag Diwan, A Manual on Disaster Management, 2007.
2. A. K. Jain, A Practical Guide to Disaster Management, 2013.
3. Nikuj Kumar, Disaster Management, Alfa Publications, 2012.

EHS404: TOTAL QUALITY MANAGEMENT
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Quality, Strategic Planning and Competitive Advantage: Brief history, definitions of quality, quality in manufacturing and service systems, quality and price, quality and market share, quality and cost, quality and competitive advantages. ISO 9000, 14000.

Module II   **8 hours**
Managing and Organization for Quality: Quality policy, quality objectives, leadership for quality, quality and organization culture, cross-functional teams, supplier/customers partnerships.

Module III   **8 hours**
Quality Control and Improvement Tools : Cheek sheet, histogram, pareto chart, cause and effect diagram, scatter diagram, control chart, graph, affinity diagram, tree diagram, matrix diagram, process decision program chart, arrow diagram, acceptance sampling, process capability studies, zero defect program (POKA-YOKE).

Module IV   **8 hours**
Quality Circles: Concept and total quality through bench marking, Japanese 5-S, quality management systems QS 9000, ISO 14000. Statistical process control: Control chart - X-R, P, np and C Charts, benefits of control charts and applications (10 %).

Module V   **8 hours**
Customer Focus: The customer-driven quality cycle, quality function deployment, customer satisfaction measurement techniques, customer relationship management techniques.

Text Book(s)
1. J.M. Juran, F.M. Gryna, Quality Planning and Analysis, McGraw-Hill, 1993.

References
1. J. Bank, Essences of Total Quality Management, Prentice Hall, 2007.
2. Joel E. Ross, Text and Cases, Total Quality Management, St. Lucie Press, 1995.
3. D.L. Goetsch, S. Davis, Introduction to Total Quality, Prentice Hall, 2002.

EHS405: ENTREPRENEURSHIP DEVELOPMENT
(Elective)

L T P C
3 0 0 3

Module I **8 hours**
Introduction: Evolution of entrepreneurship, characteristics of entrepreneur, entrepreneurial mindset, theories of entrepreneurship, motivation for entrepreneurship, role of entrepreneurship in economic development, entrepreneurship development programmes, corporate entrepreneurship, meaning and benefits of corporate entrepreneurship.

Module II **8 hours**
Sources Of Innovative Ideas: Methods of generating ideas, opportunity identification, setting-up new ventures, acquiring existing business, franchising, business model, components of business model, types of business model.

Module III **8 hours**
Business Plan: Contents of business plan, the marketing plan, the organisational plan, the financial plan, sources of finance, institutional support to entrepreneurs, management of business, financial management, human resource management, marketing management, production and operation management.

Module IV **8 hours**
Family Businesses: Importance, types and responsibilities, challenges and issues in family business, succession planning and grooming the successor, best practices in family business, live examples of family businesses.

Module V **8 hours**
Social Entrepreneurship: Introduction, definition, importance, characteristics of social enterprise, funding of social enterprise, significance of social entrepreneurs, measures of success in a social enterprise, live examples of social entrepreneurs.

Text Book(s)
1.   Rodert D. Hisrich, M.J. Manimala, M.P. Peters, D.A. Shepherd, Entrepreneurship, McGraw Hill, 2014.
2.   Rajeev Roy, Entrepreneurship, 3/e, Oxford University Press, 2012.

References
1.   Donald F. Kuratko, Entrepreneurship: Theory, Process, Practice, 9/e, Cengage Learning, 2012.
2.   Poornima M. Charantimath, Entrepreneurship Development - Small Business Enterprises, Pearson Education, 2012.
3.   Arya Kumar, Entrepreneurship: Creating and Leading an Entrepreneurial Organization, Pearson Education, 2012.

EHS407: PROFESSIONAL ETHICS AND HUMAN VALUES

L T P C
1 0 0 1

Module I **3 hours**
Introduction: Morals, values and ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, caring, sharing, honesty.

Module II **3 hours**
Engineering Ethics: Senses of Engineering Ethics, variety of moral issues, types of inquiry, moral dilemmas, moral autonomy.

Module III **3 hours**
Engineering as Social Experimentation: Decomposing the system, overview of system design, system design concepts, system design activities, addressing design goals, managing system design.

Module IV **3 hours**
Safety, Responsibilities and Rights: Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, the Three Mile Island and Chernobyl case studies. Collegiality and loyalty, respect for authority, conflicts of interest, occupational crime, professional rights.

Module V **3 hours**
Global Issues: Multinational corporations, environmental ethics, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership.

Text Book(s)
1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw-Hill, 1996.
2. M. Govindarajan, S. Natarajan, V.S. Senthil Kumar, Engineering Ethics, Prentice Hall of India, 2004.

References
1. Charles D. Fleddermann, Engineering Ethics, Prentice Hall, 2004.
2. Charles E Harris, Michael S. Protchard, Michael J Rabins, Engineering Ethics: Concepts and Cases, Wadsworth Thompson Learning, 2000.
3. John R. Boatright, Ethics and the Conduct of Business, Pearson Education, 2003.
4. Edmund G Seebauer, Robert L Barry, Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, 2001.

EID101 : PROGRAMMING WITH C

L T P C

3 0 0 3

Module I
8 hours

Introduction to Programming, Algorithms and Flowcharts: Programs and programming, programming languages, compiler, interpreter, loader and linker, classification of programming languages, structured programming concept, algorithms and flowcharts.

Basics of C: Developing programs in C, a simple C program, structure of a C program, concept of variable, data types in C, program statement, declaration.

Module II
10 hours

Tokens: All tokens, operators and expressions, type conversions in C.

Input and Output: Introduction, non-formatted input and output, formatted input and output.

Control Statements: Introduction, conditional execution (if, if-else, nested if), and selection (switch), unconditional types (break, continue, goto).

Module III
8 hours

Loops: Iteration and repetitive execution (for, while, do-while), nested loops.

Arrays and Strings: Introduction, one dimensional array, one dimensional character arrays (strings), two dimensional arrays and character arrays (array of strings).

Module IV
10 hours

Functions: Concept of function, using functions, call by value and call by reference mechanism to working with functions-example programs, passing arrays to functions, scope and extent, storage classes, recursion.

Pointers: Dynamic memory allocation, understanding memory addresses, pointer operators (& and *), pointers-declaration, initialization, void pointer, null pointer, use of pointers, 1-d arrays and pointers, pointers and strings.

Module V **10 hours**

Structures: Declaring structures and structure variables, accessing members of a structure, arrays of structures, arrays within a structure.

Union: Declaring union and its members, accessing and initializing members of a union, structure versus union.

Files : Using files in C: declaration of file pointers, opening a file, closing a file; Working with text files: reading from and writing into text files.

Text Book(s)

1. Pradip Dey and Manas Ghosh, Programming in C, 2/e, Oxford University Press, 2013.

References

1. R.S. Bichkar, Programming with C, Universities Press (India) Pvt. Ltd., 2012.
2. K.R.Venugopal and S.R.Prasad , Mastering C, McGraw Hill, 2009.
3. B.A. Forouzan and R.F. Gilberg, Computer Science: A Structured Programming Approach using C, 3/e, Cengage learning.
4. E.Balagurusamy, Programming in ANSI C, 6/e, McGraw Hill.
5. Ashok N. Kamthane, Programming with ANSI and Turbo C, Pearson Education, India.

EID102 : DATA STRUCTURES WITH C

L T P C

3 1 0 4

Module I   **11 hours**

Data representation: Introduction, linear lists, array based representation and operations, indirect addressing and operations, linked representation, comparisons.

Searching: Linear search, Binary search,

Arrays: Arrays, matrices, sparse matrices.

Module II   **11 hours**

Linked lists: Creation of single linked list, double linked list, circular linked list, and operations on it.

Module III   **11 hours**

Stacks: Definitions, operations and applications, array and linked representation of stacks.

Queues: Definitions and operations, array and linked representation of queues.

Module IV   **11 hours**

Graphs: Introduction, representation of graphs, graph traversals, applications, spanning trees.

Introduction to Sorting: Insertion sort, selection sort, bubble sort, merge sort, quick sort.

Module V   **11 hours**

Trees: Definitions and properties, representation of binary trees, operations, binary tree traversals, binary search tree, AVL trees and operations on AVL trees, heap sort.

Text Book(s)

1.   Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2/e, Universities Press, 2008.

References

1.   Seymour Lipschutz, Data Structures with C, McGraw Hill, 2011.

EID104 : FUNDAMENTALS OF DIGITAL LOGIC CIRCUITS

L T P C

3 1 0 4

Module I   10 hours

Number Representation: Positional representation of numbers, decimal, binary, octal, hexadecimal number systems, general radix 'r' system, numbers, conversions, complements, binary codes, arithmetic with signed unsigned numbers(addition, subtraction), introduction to error detection and error correction.

Module II   10 hours

Introduction to logic circuits: Variables and functions, truth tables, logic gates and networks, Boolean algebra, synthesis using AND, OR and NOT gates, NAND and NOR logic networks.

Module III   10 hours

Optimized implementation of logic functions: Karnaugh map, strategy for minimization, minimization of product of sums forms, incompletely specified functions, multiple output circuits, multilevel synthesis, a tabular method for minimization, cubical technique for minimization.

Module IV   10 hours

Combinational logic: Design procedures, adders, subtractors, multiplexers, demultiplexers, encoders, decoders, priority encoder, code converters, seven segment display, Programmable Logic Devices-PAL,PLA.

Module V   10 hours

Sequential circuits: Flip flops, basic latch, gated SR latch, gated D latch, Master-slave and edge triggered D flip flop, T flip flop, JK flip flop, registers, shift registers, counters-synchronous and asynchronous counters, other types of counters-BCD counter,Ring counter, Johnson counter.

Text Book(s)

1.   Stephen Brown & ZVONKO VRANESIC, Fundamental of digital logic with Verilog Design, Tata McGrawHill.

References

1.   Z.V. Kohavi, Switching Theory and Finite Automata, McGrawHill, 1978.
2.   Morris Mano, Digital Design, Pearson Education, 1979.

EID121 : PROGRAMMING WITH C LABORATORY

L T P C

0 0 3 2

LAB CYCLE

Develop C Programs for the following problems:

1. Conversion of an upper-case character to a lower-case character.

2. Finding the Sizes and Ranges of different types.(Hint: Use sizeof() and limits.h)

3. Roots of a Quadratic Equation using 'if'.

4. Print whether the given number is perfect (for a perfect number, the sum of divisors-except the number itself-will be equal to that number; Exs: 6,28,496, etc.).

5. First n terms of Fibonacci Sequence using (i) any loop and (ii) if statement (use 'switch'to decide the choice).

6. Print Twin Primes up to a Specified limit.(Exs: 3-5,5-7,11-13, 17-19, etc.)

7. Generate one hundred random integers in the range of 1 to 100, store them in an array and print the average. (using any loop)

8. Print the average of the given numbers and also the numbers greater than the average.

9. Converting a decimal value to binary.

10. Program that uses a function to perform multiplication of two matrices.

11. Program that uses a function to perform transpose of a given Matrix.

12. Determine if the given string is a Palindrome or not (use a function)

13. Sort the given array of strings in dictionary order (use a function).

14. Recursive and non-recursive functions for Towers of Hanoi.

15. Program that performs all the five arithmetic operations using Pointers.

16. Print the details of students of a class (the details may be : Roll number, name, department, class, address, marks in five subjects and average of marks) using nested structures (calculate average).

17. Program that demonstrates the memory allocation done by a structure and a union (declare Structure and Union in the same program).

18. Program to demonstrate member access in a union (declare three different types of variables in union, assign values and print them).

19. Program that illustrates the function fprintf() to write into a text file.

20. Program that illustrates the function fscanf() to read from a text file.

21. Program that accepts the names of two files and copies the first file into the second line by line using fgets() and fputs() functions.

EID122 : DATA STRUCTURES WITH C LABORATORY

L T P C

0 0 3 2

1. Write a program to read a linear list of items and store it in array.
   - Copy the contents from one array to another array
   - Copy the contents from one array to another in reverse order
   - Store the numbers from high index to low index
   - Print the contents in normal order and reverse order

2. Write a program to create an array of pointers and create the records dynamically. What are the observations with respect to experiment no.1?

3. Perform Linear Search and Binary Search on a list stored in array. Compare and contrast.

4. Write programs for:
   - Reading and printing matrices
   - Matrix addition
   - Matrix transpose
   - Matrix transpose into the same matrix
   - Matrix multiplication

5. Write program for
   - Representing sparse matrix
   - Sparse matrix transpose
   - Sparse matrix addition

6. Write a program to
   - Create a singly linked list, traversal, backward printing the content using recursion
   - Insert, delete nodes at various positions in a singly linked list
   - Make the list Circular

7. Write a program to
   - Create a doubly linked list, traversal: forward, backward
   - Insert, delete nodes at various positions in a doubly linked list

8. Write a program to create a stack and perform various operations on it.
   - Evaluate a postfix expression
   - Convert the given expression in infix form to postfix form

9.   Write a program to create a queue and perform various operations on it.

10.   Represent the graph in adjacency matrix form.

11.   Implement DFS, BFS traversals on a graph.

12.   Implement various sorting techniques: a. Insertion sort, b. selection c. Bubble,

13.   Implement various sorting techniques: a. Merge, b. Quick Sort, c. Heap Sort

14.   Write a program to create a binary tree and perform various traversals.

15.   Write a program to create a binary search tree and perform search operation.

EID124 : DIGITAL CIRCUITS LABORATORY

L T P C

0 0 3 2

List of Experiments

1.   Verification of the truth tables of basic gates and study of pin configuration of the IC's.
2.   Design and construct half adder and full adder circuits and verify the truth tables.
3.   Design and construct half subtractor and full subtractor circuits and verify the truth tables.
4.   Design and construct any two combinational circuits and verify the truth tables.
5.   Design and construct 2x4 Decoder and verify the truth table.
6.   Design and construct 4X1 Multiplexer and verify the truth table.
7.   Design and construct 4 Bit Up counter and verify the function.
8.   Design and construct BCD ripple counter and verify the function.
9.   Design and construct R-S, J-K, D and T flip-flops and verify the truth tables.
10. Design and construct register with parallel load and verify the function.
11. Design and construct unidirectional shift register and verify the function.
12. Design and construct a 4 Bit Ring counter and verify the function.

EID201: OBJECT ORIENTED PROGRAMMING WITH C++

L T P C

3 0 0 3

Module I   10 hours

Introduction to OOP: Procedure oriented programming, object oriented programming, basic concepts of OOP, benefits and applications of OOP, simple C++ program, namespace scope, structure of C++ Program, creating, compiling and linking a file.

Tokens : Keywords, identifiers, constants, basic data types, user defined data types, storage classes, derived data types, dynamic initialization of variables, reference variables, operators in C++, scope resolution operator, member dereferencing operators, memory management operators.

Module II   9 hours
Control Structures.

Classes and Objects: Specifying a class, defining member functions, C++ program with class, private member functions, arrays within class, memory allocation for objects, static data members, static member functions, arrays of objects, returning objects.

Functions in C++: Main function, function prototyping, call by reference, return by reference, inline functions, default arguments.

Module III   8 hours

More about Functions: Function overloading, friendly functions: friend function, a function friendly to two classes, objects as function arguments.

Constructors & Destructors: Constructors, parameterized constructors, multiple constructors in a class, constructors with default arguments, copy constructors, dynamic constructors, destructors.

Module IV   9 hours

Inheritance: Introduction to inheritance, single inheritance, making a private member inheritable (protected member), multi-level inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance.

Operator Overloading: Rules for overloading operators, overloading unary operators, overloading binary operators.

Pointers: Introduction to pointers, declaring and initializing pointers, arithmetic operations on pointers, pointers with arrays, arrays of pointers, pointers to objects, 'this' pointer.

Module V   **8 hours**

Polymorphism and Virtual Functions: Compile-time polymorphism, run-time polymorphism, virtual functions.

Managing Console I/O Operations: Unformatted I/O operations, formatted console i/o operations (width( ), precision( ), fill( )), managing output with manipulators (setw( ), endl).

Templates: Introduction, function templates, class templates.

Exception Handling: Introduction, exception handling mechanism, throwing mechanism, catching mechanism.

Text Book(s)
1.   E. Balagurusamy, Object Oriented Programming with C++, 6/e, McGraw Hill, 2013.

References
1.   Sourav Sahay, Object Oriented Programming with C++, 2/e, Oxford University Press, 2012.
2.   Behrouz A. Forouzan and Richard F. Gilberg, Computer Science : A Structured Approach Using C++, 2/e, Cengage Learning, 2003.
3.   Ashok N. Kamthane, Object Oriented Programming with ANSI and Turbo C++, 1/e, Pearson Education, 2006.

EID202 : PROGRAMMING WITH JAVA

L T P C

3 0 0 3

Module I   **10 hours**

Java Evolution & Environment: Java evolution, overview of java language, java history, features of java, how java differs from C and C++, java and World Wide Web, web browser.

Java Environment: Java Development kit (JDK), Application Programming Interface (API), java programming structure, java tokens, constants, variables, expressions, decision making statements and looping, java statements, overview of arrays and strings, machine neutral, Java Virtual Machine (JVM), Command Line Arguments.

Arrays And Strings

Arrays: One-dimensional arrays, creating an array, declaration of arrays, initialization of arrays, two-dimensional arrays, string arrays, string methods, string buffer class, vectors, wrapper classes. Basic I/O Streams: Scanner, buffered reader.

Module II   **14 hours**

Classes, Objects And Methods: Introduction, defining a class, creating objects, accessing class members, constructors, methods overloading, static members.

Inheritance: Defining a sub class, sub class constructor, multilevel variables, final classes, and finalize methods, abstract methods and classes, visibility control.

Managing Errors and Exceptions: Introduction, types of errors: compile time and run time errors, exceptions, types of exceptions, syntax of exception handling code, multiple catch statements, using finally statement, throwing our own exceptions.

Module III   **10 hours**

Interfaces, Package & Multithreaded Programming: Introduction, defining interfaces, extending interfaces, implementing interfaces.

Package: Creation, importing a package and user defined package.

Threads: Introduction to threads, creating threads, extending the thread class, implementing the 'runnable' interface, life cycle of a thread, priority of a thread, synchronization, and deadlock.

Module IV 9 **hours**

Applet Programming

Introduction, how applets differ from applications, building applet code, applet life cycle, about HTML, designing a web page, passing parameters to applets, getting input from the user.

Module V 13 **hours**

Graphics Programming: Introduction, abstract window toolkit class hierarchy, frames, event-driven programming, layout managers, panels, canvases, drawing geometric figures.

Introduction to Swings: Introduction to swings, overview of swing components: Jbutton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList.

Introduction to Networking- InetAddress class, socket class, URL class.

Text Book(s)

1.   Herbert Schildt, The Java complete References, 9/e, Tata McGraw Hill, 2014.

References

1.   Y.DanielLiang , An Introduction to JAVA Programming, Tata McGraw Hill, 2009.

2.   Kathy Sierra, Head First Java, 2/e, Shroff Publishers, 2012.

3.   Balagurusamy , Programming with JAVA, 2/e, Tata McGraw Hill, 2014.

EID203: COMPUTER ORGANIZATION AND ARCHITECTURE

L T P C
3 1 0 4

Module I   **7 hours**

Register Transfer and Micro operations: Register transfer language, register transfer, bus and memory transfers, arithmetic microoperations, logic microoperations, shift microoperations, arithmetic logic shift unit

Module II   **15 hours**

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory-references instructions, input-output and interrupt, complete computer description. design of the basic computer, design of accumulator logic.

Microprogrammed Control: Control memory, address sequencing, microprogram example, design of control unit.

Module III   **14 hours**

Central Processing Unit: Introduction, general register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control.

Pipeline and Vector Processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline

Computer Arithmetic: Introduction, addition and subtraction, decimal arithmetic unit, booth multiplication algorithm.

Module IV   **10 hours**

Input/Output Organization- Accessing I/O devices, interrupts, DMA, buses, interface circuits, standard i/o interfaces.

Module V   **10 hours**

The Memory system- Some basic concepts, semiconductor RAM Memories, Read Only Memories, cache memories, performance considerations, virtual memories, secondary storage.

Text Book(s)
1.   M. Morris Mono, Computer System Architecture, 3/e, Pearson education, 2008.
2.   Carl Hamacher, Zvonko Vranesic, Safwat Zaky,Computer Organization, 5/e, McGraw Hill, 2001.

References
1.   John P. Hayes, Computer Architecture and Organization, 3/e, McGraw Hill, 1998.
2.   William Stallings, Computer Organization and Architecture, 6/e, Pearson/ PHI, 2012.

EID204 : OPERATING SYSTEMS

L T P C

3 0 0 3

Module I   **8 hours**

Introduction: Introduction to operating systems, types of operating systems: batch systems, multi programmed systems, timesharing systems, multiprocessor systems, distributed systems, real-time systems.

Operating system Structures: System components, operating system services, system calls, system programs, system structure.

Module II   **10 hours**

Process Management &synchronization: Process concepts, process scheduling, threads,

CPU Scheduling: Scheduling-criteria, algorithms, algorithm evaluation, interprocess communication.

Process Synchronization: Critical section problem, synchronization hardware, semaphores, classic problems of synchronization, monitors.

Case studies UNIX, Linux, and Windows

Module III   **8 hours**

Deadlock: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

File Concepts: File system interface, implementation: File concept, access Methods, directory structure, protection.

Module IV   **8 hours**

Memory Management: Swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual memory: Demand paging, process creation, page-replacement, algorithms, allocation of frames, thrashing.

Case studies: UNIX, Linux, Windows.

Module V   **10 hours**

I/O systems: Hardware, application interface, kernel I/O subsystem, transforming I/O to hardware operation, performance, case studies: UNIX, Linux, Windows.

Mass-storage structure: Disk structure, disk scheduling, disk management, protection: Goals of protection, domain of protection, access matrix.

Text Book(s)

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Operating System Concepts with Java, 8/e, John Wiley, 2010.

References

1. Andrew S Tanenbaum, Modern Operating Systems, 2/e, Pearson/PHI, 2014.

2. Crowley, Operating System, A Design Approach, McGraw-Hill, 2012.

3. Stallings, Operating Systems - Internal and Design Principles, 5/e, 2013.

4. Pal Chaudhary, Operating system principles & Design, PHI Learning, 1/e, 2013.

5. Deitel and Deitel, Operating System, Pearson Education, 2003.

6. D.M. Dhamdhere, Operating systems- A Concept baed Approach-2/e, McGraw Hill, 2010.

7. Gary Nutt, Operating systems, 3/e, Pearson education, 2009.

EID205 : DATA COMMUNICATIONS

L T P C

3 1 0 4

Module I   **10 hours**

Data communication, Data networking and the Internet: A communication model, data communications, networks, the internet.

Protocol Architecture: Need for protocol architecture, TCP/IP protocol architecture, OSI model, TCP/IP Vs OSI model.

Module II   **11 hours**

Data transmission: Concepts and terminology, analog and digital data transmission, transmission impairments, channel capacity.

Transmission Media: Guided and unguided.

Module III   **12 hours**

Signal encoding techniques: Digital data to digital signals, digital data to analog signals, analog data to digital signals, analog data to analog signals.

Module IV   **10 hours**

Digital Data Communication Techniques: Asynchronous and synchronous transmission, types of errors, error detection techniques, error correction techniques (single bit)

Data link control protocols: Flow control, error control, high level data link control (HDLC) protocol.

Module V   **10 hours**

Multiplexing: Frequency division multiplexing, characteristics, synchronous time division multiplexing, characteristics. statistical time division multiplexing, characteristics.

Text Book(s)
1.   William Stallings, Data and Computer Communications, 8/e, Pearson Education., 2013.

References
1.   Fred Harshall, Data Communications, Computer Networks and Open systems, 4/e, Pearson Education, 2005.
2.   Behrouz A Forouzan, Data Communications and Networking, 4/e, McGraw Hill, 2012.

EID206 : COMPUTER NETWORKS

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Module I   **11 hours**
Introduction: Uses of the computer networks, references models, network standardization.
Medium access control: channel allocation problems, multiple access protocols: ALOHA, CSMA, collision free protocols.

Module II   **11 hours**
Ethernet: Ethernet physical layer, ethernet MAC sub layer protocol, ethernet performance, switched ethernet, fast ethernet, gigabit ethernet.
Data link layer switching: Uses of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

Module III   **12 hours**
Network Layer: Network layer design issues, routing algorithms, optimality principle, shortest path, flooding, distance vector routing, count to infinity problem, link state algorithm, hierarchical routing. congestion control algorithms. Quality of service: Introduction, traffic shaping.
The Network layer in the Internet: IPv4, IP addresses, IPv6 Protocol, CIDR, Internet Control Protocols: ICMP, ARP, RARP and DHCP.

Module IV   **12 hours**
Transport Layer: The transport service: Services provided to the upper layers, transport service primitives, Berkeley Sockets, elements of transport protocols.
The Internet Transport Protocols: UDP, TCP, the TCP service model, the TCP protocol, the TCP segment header, TCP connection establishment, TCP connection release.

Module V   **9 hours**
Application Layer: The Domain Name System, electronic mail, World Wide Web: Architectural over view.

Text Book(s)
Andrew S Tanenbaum and David J Wetherall, Computer Networks, 5/e, Pearson Education, 2010.

References
1.   Behrouz A Forouzan and Firouz Mosharraf, Computer Networks: A Top-Down Approach, McGraw Hill, 2011.
2.   S.Keshav, An Engineering Approach to Computer Networks, 2/e, Pearson Education, 1997.
3.   Larry L Peterson and Bruce S Davi, Computer Networks: A Systems Approach, 4/e, Elsevier Publication, 2003.

EID221 : C++ LABORATORY

L T P C

0 0 3 2

1. Write a program that contains a function to exchange (swap) values of two arguments by using pointers and References parameters.

2. Write a program to check the given string is palindrome or not using a private member function.

3. Write a program to find transpose of 2-D matrix by allocating memory dynamically to the matrix. Initialize and display contents of the matrix and deallocate memory.

4. Write a program to add corresponding elements of two 2-D matrices using friend function. Create two classes each capable of storing one 2-D matrix. Declare the matrices under private access specifier and access them outside the class.

5. Write a program for finding area of different geometric shapes (Circle, Rectangle and Cube) using function overloading.

6. Write a Program to generate Fibonacci Series by using Constructor to initialize the Data Members.

7. Write a program to add two matrices of same copy. Create two objects of the class and each of which refers to one 2-D matrix. Use constructor to allocate memory dynamically and use copy constructor to allocate memory when one array object is used to initialize another.

8. Write a program to demonstrate single inheritance distinguishing public and private derivation.

9. Write a program to illustrate the implementation of both Multilevel and Multiple (Hybrid) inheritance.

10. Write a program to find transpose of a given matrix of mxn size using unary operator overloading.

11. Write a program to add two matrices of mxn size using binary operator overloading.

12. Write a program to demonstrate the usage of virtual functions.

13. Write a program to sort a given set of elements using function template.

14. Write a program to search a key element in a given set of elements using class template.

15. Write a program to find average marks of the subjects of a student. Throw multiple exceptions and define multiple catch statements to handle division by zero as well as array index out of bounds exceptions.

EID222 : PROGRAMMING WITH JAVA LABORATORY

L T P C

0 0 3 2

1.   Develop a program that will take a string from a command line argument and check whether it is a palindrome or not.

2.   Given are two one dimensional arrays A and B which are sorted in ascending order. Write a program to merge them into a single sorted array C that contains every item from arrays A and B in ascending order.

3.   Develop a program to implement the following string methods.

a) equals() b) compareTo() c) substring() d) indexOf() e)toLowerCase()

4.   Write a program to find the roots of a quadratic equation using interface and packages.

   • Declare an interface in package Quad1

   • Declare another package Quad2 and implement the interface

5.   Develop a program to demonstrate constructor overloading.

6.   Develop a program to demonstrate exception handling by using THROW, FINALLY & MULTIPLE CATCH statements.

7.   Develop a program to implement the concept of user defined exception.

8.   Design a vehicle class hierarchy in Java, and develop a program to demonstrate Polymorphism.

9.   Develop a program to demonstrate multiple inheritance through interface.

10.   Write a program to throw an exception (checked) for on employee details

   • If an employee name is a number, a name exception must be thrown.

   • If an employee age is greater than 50, an age exception must be thrown

11.   Develop a program to illustrate the concept of multithreading through implementing Runnable interface and extending Thread class

12.   Develop an applet that receives three numeric values as input from the user and then display the largest of the three.

13.   Develop an applet that displays different bar charts.

14. Create an applet program for banner; banner text (Your Roll No.) should be passed as parameter. This applet creates a thread that scrolls the message contained in message right to left across the applet's window & also uses status window.

15. Create an applet program for menu demonstration. Menu bar should contain File, Edit, View and its submenus. Draw colour lines, rectangle, filled rectangle, rounded rectangle, filled rounded rectangle, oval, filled oval, arc, fill arc, & polygon every drawing shape should be in different colour, Write a text "hello everyone" at the center.

16. Write program which handles KeyBoardEvent

17. Write a program that displays the x and y position of the cursor movement using Mouse

18. Develop a program for the demonstration of button event.

19. Design a HTML page (web page) describing your profile in one paragraph.Design in such a way that it has a heading, a horizontal rule, three links and a photo of your institution. Also, write three HTML documents for the links.

20. Develop a program for the demonstration of the following Layout Managers:

    Border Layout, Flow Layout, Grid Layout, and Grid Bag Layout

EID223 : UNIX PROGRAMMING LABORATORY

L T P C

0 0 3 2

1. Operating System Introduction, history, architecture of Unix/Linux operating System.

2. File handling utilities (1): the vi editor, security by file permissions, process utilities, disk utilities like:vi, cp, mv, ln, rm, unlink, mkdir, cd, rmdir, du, df, mount, unmount,

3. File handling utilities (2): find, unmask, ulimit, ps, who, finger, arp, ftp, telnet, rlogin.

4. Text processing utilities: cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm., cmp,

    diff, tr, awk, tar, cpio.

5. General purpose utilities: banner, cal, date, calendar, tty, bc, spell, fspell.

6. Write a C program that takes one or more file or directory names as command line input and reports the following information on the file: File type, Number of links, permissions, Time of last access (Note : Use stat/fstat system calls)

7. Write a program to remove blank lines from a file using: grep and sed (A blank line may contain either nothing or only whitespace characters).

8. Write a Program to frame regular expressions to match these patterns:

    (i) Jefferies Jeffery jeffreys (ii) hitchen hitchin hitching (iii) Heard herd Hird (iv) dix dick dicks Dickson Dixon (v) Mcgee mcghee magee.

References

1. Sumitabha Das, Unix Concepts and Applications, 2nd Edition. Tata McGraw Hill, 2001

2. Brain W. Kernighan and Rob Pike, The Unix Programming Environment, PHI, 1987.

EID224 : OPERATING SYSTEMS LABORATORY

L T P C

0 0 3 2

1. Scheduling algorithms, simulation of first cum first serve cpu scheduling algorithm.
2. Simulation of shortest job first cpu scheduling algorithm.
3. Simulation of shortest job first preemptive cpu scheduling algorithm.
4. Bankers algorithm for dead lock avoidance.
5. Page replacement algorithms, implement first in first out page replacement algorithm.
6. Page replacement algorithms, implement least recently used page replacement algorithm.
7. Page replacement algorithms, implement optimal page replacement algorithm.
8. Write a program to implement concurrent programming constructs through semaphores -dining philosophers' problem, consumer-producer, readers-writers etc.
9. Write a C program to implement deadlock avoidance algorithms.
10. Write a program to page replacement algorithms.
11. Write a program to implement virtual memory.

EID301 : DATABASE MANAGEMENT SYSTEMS

L T P C

3 1 0 4

Module I   **12 hours**

Introduction to DBMS: Overview, File system vs DBMS, advantages of DBMS, storage data, queries, transaction management, DBMS structure.

Data Models: Data modelling and data models, the importance of data models, data model basic building blocks, the evolution of data models, degree of data abstraction.

E-R model: Entities, attributes and entity sets, relationship and relationship sets, mapping cardinalities, keys, features of ER model, conceptual database design with ER model.

Module II   **12 hours**

Relational model: Integrity constraints over relations and enforcement, querying relation data, logical database design, views, destroying/altering tables and views.

Relational Algebra and Relational Calculus.

Module III   **12 hours**

Structured Query Language (SQL): Introduction to SQL, data definition commands, data manipulation commands, SELECT queries, advanced data definition commands-advanced SELECT queries, creating a view, joining database tables.

Advanced SQL: Relational set operators, SQL join operators, sub queries and correlated queries, SQL functions, procedural SQL, embedded SQL, cursors, ODBC and JDBC, triggers and active database, designing active databases

Module IV   **10 hours**

Normalization of database tables: Database tables and normalization, the need for normalization, the normalization process, improving the design, higher level normal forms, normalization and database design, schema refinement, fds, fds reasoning normal forms, decomposition, normalization, denormalization.

Module V   **10 hours**

Transaction Management and Concurrency Control: What is a transaction? transaction state implementation of atomicity and durability.

Concurrency control: Lock Management, serializability, concurrency control with locking methods, concurrency control with time stamping methods, concurrency control with optimistic methods, specialized locking techniques.

Crash Recovery: Aries, recovering from a system crash, media recovery.

Text Book(s)

1.   Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, McGrawHill, 2002.

2.   H.F.Korth and A.Silberschatz, Database System Concepts, McGrawHill, 2002.

References

1.   Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 2008.

2.   Elmasri, Navathe, Somayajulu Gupta, Fundamentals of Database Systems, Pearson Education, 2007.

EID302 : WEB TECHNOLOGIES

L T P C

3 0 0 3

Module I   **8 hours**

Introduction to HTML Version5: Basic syntax, HTML document structure, text formatting, images, lists, links, tables, forms, frames, section, article, range and date.

Cascading Style Sheets Version3: Levels of style sheets, style specification formats, selector forms, font properties, list properties, color properties, alignment of text, background images, span and div tags.

Module II   **10 hours**

Introduction to Java Script: Overview of java script, syntactic characteristics, primitives, operator and expression, control statements, arrays, functions, errors in scripts, Document Object Model(DOM), event driven computation, element access in java script, the navigator object.

Dynamic Document with Java Script: Element positioning, moving elements, changing colors and fonts, dynamic content, locating the mouse cursor, slow movements of elements, dragging and dropping elements.

Module III   **8 hours**

Introduction to XML: Syntax of XML, document structure, and document type definition, namespaces, XML schemas, document object model, presenting XML using CSS.

Introduction to other XML Technologies: XLink, XPointer, XQuery and XPath, XQuery and XSLT, XQuery processor and FLWOR expression.

Module IV   **8 hours**

Introduction to Servlets: Lifecycle of a servelet, the servlet api, the javax.servelet package, the javax.servlet.http package, handling http request & responses, using cookies, session tracking and security issues and servlets with database connectivity.

Introduction to Model View Controller (MVC): Architecture, its structure, components.

Module V   **8 hours**

Introduction to JSP: The problem with servlet, the anatomy of a JSP page, JSP processing, JSP applications, JSP components, comments, expressions, scriplets, JSTL tag library, JSP database connectivity.

Introduction to Web Servers: Installing the Java software development kit, tomcat server & testing tomcat, structure of web application, deploying web application, IIS web server, and GWS web server.

Text Book(s)

1. Robert W.Sebesta, Programming the World Wide Web, 4/e, Pearson, 2007.

2. Chris Bates, Web Technologies, 2/e, Wiley, 2002.

3. Jason Hunter, William Crawford, Java Servlet Programming, 2/e, O'Reilly, 2003.

References

1. Dietel and Nieto, Internet and World Wide Web - How to program, PHI/Pearson   Education, 2006.

2. Herbert Schildt, JAVA The Complete References, 8/e, McGraw Hill, 2014

3. Uttam K.Roy, Web Technologies, Oxford Higher Education publication, 2004.

4.   Bai Ekedaw, Web Warrior Guide to Web Programmming, Thompson Publications, 2012.

EID303 : SOFTWARE ENGINEERING

L T P C

3 0 0 3

Module I   10 hours

Introduction to Software Engineering: Software, software engineering, the changing nature of software, software myths.

A Generic view of process: Software engineering, a layered technology, a process framework, CMMI.

Process models: The waterfall model, incremental process models, evolutionary process models.

Module II   10 hours

Requirements engineering: Requirements engineering tasks, initiating the requirements engineering process, eliciting requirements, negotiating requirements, validating requirements.

Building the analysis model: Requirements analysis, data modeling concepts, scenario-based modeling ,flow-oriented modeling ,class-based modeling, creating a behavioral model.

Module III   8 hours

Design Engineering: Design process and design quality, design concepts, the design model.

Creating an architectural design: Software architecture, architectural styles and patterns.

Performing User interface design: Golden rules.

Module IV   9 hours

Testing Strategies: A strategic approach to software testing, test strategies for conventional software unit testing, integration testing, validation testing, system testing.

Testing tactics: Software testing fundamentals, white-box testing : Basis path testing, control structure testing, black-box testing methods.

Module V   **8 hours**

Product metrics: Software quality, measurement principles, product metrics landscape, function based metrics.

Risk management: Reactive vs. Proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews.

Text Book(s)

Roger S. Pressman, Software Engineering: A Practitioner's Approach, 7/e, McGraw Hill, International Edition, 2009.

References

1.   K.K. Agarwal & Yogesh Singh, Software Engineering, New Age International Publishers, 2007.
2.   Waman S Jawadekar, Software Engineering Principles and Practice, McGraw Hill, 2004.
3.   Rajib Mall, Fundamentals of Software Engineering, 4/e, PHI, 2009.

EID304 : SOFTWARE PROJECT MANAGEMENT
(Elective)

L T P C

3 0 0 3

Module I   **9 hours**

Conventional Software Management: The waterfall model, conventional software management performance, evolution of software economics: software economics , pragmatic software cost estimation.

Improving software economics: Reducing software product size, improving software processes, improving team effectiveness, improving automation, achieving required quality, peer inspections.

Module II   **9 hours**

Conventional And Modern Software Management: Principles of conventional software engineering, principles of modern software management, transitioning to an interactive process,

Life cycle phases: Engineering and production stages, inception, elaboration, construction, transition phases.

Module III   **9 hours**

Artifacts of the Process: The artifact sets, management artifacts, engineering artifacts, programmatic artifacts. Model based software architectures: A management perspective and technical perspective.

Module IV   **9 hours**

Flows of The Process: Software process workflows, iteration workflows. Checkpoints of the process: Major mile stones, minor milestones, periodic status assessments.

Iterative process planning: Work breakdown structures, planning guidelines, cost and schedule estimating process, the iteration planning process, pragmatic planning.

Module V **9 hours**

Project Organizations and Responsibilities: Line-of-Business organizations, project organizations, evolution of organizations. Process automation: building blocks, the project environment.

Project Control and Process Instrumentation: The seven core metrics, management indicators, quality indicators, life cycle expectations, pragmatic software metrics, metrics automation.

Text Book(s)

1.   Walker Royce, Software Project Management, A Unified Frame Work, PEA, 1998.

2.   Henrey, Software Project Management, Pearson, 2008.

References

1.   Richard H.Thayer, Software Engineering Project Management, IEEE Computer Society, 2004.

2.   K.D. Shere, Software Engineering and Management, PHI, 1998.

3.   S.A. Kelkar, Software Project Management: A Concise Study, PHI, 2012.

EID305 : DESIGN AND ANALYSIS OF ALGORITHMS

L T P C
3 0 0 3

Module I   **11 hours**
Introduction to algorithms: Algorithm specification, performance analysis.
Divide and conquer: the general method, binary search, finding maximum and minimum merge sort, quick sort selection, strassen's matrix multiplication.

Module II   **11 hours**
The Greedy Method: The general method, knapsack problem, job sequencing with deadlines optimal storage on tapes, minimum cost spanning trees, single source shortest paths.

Module III   **11 hours**
Dynamic Programming: The general method, multistage graphs, all pair's shortest paths, optimal binary search trees, reliability design, the traveling sales person problem.

Module IV   **11 hours**
Basic search and traversing techniques: Techniques for binary trees, techniques for graphs, connected components and spanning trees, bi-connected components and depth first search.
Back Tracking: The general method, eight queen's problem, sum of subsets, graph coloring, Hamiltonian cycle.

Module V   **11 hours**
Branch and Bound: The method, traveling sales person problem, efficiency considerations.
Algebraic Problems: The general method, evaluation and interpolation.

Text Book(s)
1.   Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekharan, Fundamentals of Computer Algorithms, 2/e, Universities Press, 2001.

References
1.   Sara Baase and Allen Van Gelder, Computer Algorithms: Introduction to Design and Analysis, Pearson Education, 2004.
2.   Jon Kleinberg and Eva Tardo, Algorithm Design, Pearson Education, 2008.
3.   Thomas H. Coremen, Charles E. Leiserson et.al, Introduction to Algorithms, 3/e, MIT Press, 2002.

EID321 : DATABASE MANAGEMENT SYSTEMS LABORATORY

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Course Measurable outcomes: At the end of course student will be able to do

1. Design and implement the database schema
2. Devise the queries using DDL, DML, TCL and DCL.
3. Develop programs using PL/SQL.
4. Design and implement the project using Java and SQL.

Detailed syllabus:

1. Developing a sample ER model for the specified database.
2. Familiarization of SQL DDL commands-create, alter, drop, rename and truncate
3. Use of DML commands-select, insert, update and delete
4. Use of different of operators for nested sub-queries.
5. Creating Views, grouping functions and performing joins.
6. Use of DCL and TCL commands.
7. PL/SQL programming environment
8. Declaring triggers and use of cursors.
9. Implementation of small database project

References

1. James, Paul and Weinberg, Andy Oppel, SQL: The Complete References, 3/e, Tata McGraw -Hill, 2011.
2. Michael McLaughlin, Oracle Database 11g PL/SQL Programming, Oracle Press, 2001.

EID322 : WEB TECHNOLOGIES LABORATORY

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Experiment-1:

Design the static web pages required for any online services web site.

1) HOME PAGE:

The static home page must contain three frames.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue Page, Cart Page etc.

Left frame: At least four links for navigation, which will display the catalogue of respective links.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

2) LOGIN PAGE:

This page has to contain Login Form, Forgot Password, and Link to new user Registration Form, back to Home page etc. If the user is authenticated user, can access the web site. Otherwise he has to register.

3) Registration page:

This page has to contain user registration form minimum of 10 Fields (use all the form Widgets). If the user is authenticated user, can access the web site.

4) Catalogue PAGE:

The catalogue page should contain the details of all the items available in the web site in a table.

5) Cart page:

Selected list of items has to display in table format & compute cost before submitting. (Use Event Handler functions)

Experiment -2:

Design a web page using CSS (Cascading Style Sheets) which includes the following:

1.   Use different font, styles: In the style definition you define how each selector should work (font, color and style etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.

2.   Set a background image for both the page and single elements on the page. You can define the background image for the page like this:

3.   Define styles for links as

4.   Work with layers such as Span&Div Tags.

Experiment-3:

VALIDATION:

Write JavaScript to validate the following fields of the above registration page.

1.   Name (Name should contains alphabets and the length should not be less than 6 characters).

2.   Password (Password should not be less than 6 characters length).

3.   E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)

4.   Phone number (Phone number should contain 10 digits only). Note: You can also validate the login page with these parameters.

Experiment -4:

Write an XML file which will display the item (your wish) information which includes the following (for example)

1)   Title of the book

2)   Author Name

3)   ISBN number

4)   Publisher name

5)   Edition

6)   Price

Write a Document Type Definition (DTD) to validate the above XML file. Display the XML file as follows.

1)   The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns.

2)   Use XML schemas XSL and CSS for the above purpose. Note: Give at least for 4 books. It should be valid syntactically. Hint: You can use some xml editors like XML-spy

Experiment -5:

Install TOMCAT web server and APACHE.

While installation assign port number 4040 to TOMCAT and 8080 to APACHE. Make sure that these ports are available i.e., no other process is using this port.

1.   Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.

Access the pages by using the urls: http://localhost:4040/rama/ books.html (for tomcat) http://localhost:8080/books.html (for Apache)

Experiment -6:

User Authentication:

Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following.

1)   Create a cookie and add these four user id's and passwords to this cookie.

2)   Read the user id and passwords entered in the login form and authenticate with the values (user id and passwords) available in the cookies.

3)   If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ".

4)   Use init-parameters to do this. Store the user-names and passwords in the webinf.xml and access them in the servlet by using the getInitParameters () method.

Experiment -7:

Install a database (Oracle or MySql or MS-Access).

1)   Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).

Practice 'JDBC' connectivity.

2)   Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

3)   Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page

Experiment -8:

Write a JSP which does the following job:

Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (Oracle or MySql or MS-Access).

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Experiment -9:

Install a database (MySql).

1)   Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).

2)   Write a JSP to connect to that database and extract data from the tables and display them. Experiment with various Oracle/MySql/MS-Access queries.

3)   Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

Experiment -10:

Airline Ticket Booking System, develop using HTML5, CSS3, XML and Servlets or JSP with any Database (Oracle 10g/MySql/Ms-Access) mainly it has the below functions:

•   Flight Status function

•   Finding Deals function

Simulate: Flight Status

Click "Flight Status":

Description: The customer can use this function to check the status of a flight.

Inputs: Confirmation number, date, origin and destination.

Source: The input is provided by the user.

Outputs: Date, departure time, arrival time, origin and destination.

Destination: The outputs are displayed on the screen by retrieving information from the database.

Requires: User needs to have a confirmation number while inside secure website.

Pre-condition: The user is inside the website.

Post-condition: The user has viewed the information about flight status and schedule.

Stimulus: Finding Deals

Click: "Finding Deals"

Description: This function allows user to search for deals. The user enters the source, destination, time period that the user wants to go on a vacation, and the price range.

Input: Scheduled flights on the selected date with origin and destination, class (single/double), check-in and check-out date and time.

Outputs: A list of deals satisfying the criteria will be displayed by prices from the lowest to the highest.

Source: All the inputs are provided by the user.

Pre-Condition: The user should be logged in.

Post-Condition: The user has viewed the information about stay schedules and flight schedule

EID 342: MIDDLEWARE TECHNOLOGIES (Elective)

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Module I   10 hours

Client / Server concepts: client-server, file server, database server, group server, object server, web server, middleware, general middleware, service specific middleware, client / server building blocks, RPC, messaging, peer-to-peer.

Module II   8 hours

EJB Architecture: EJB, EJB architecture, overview of EJB software architecture, view of EJB, conversation, building and deploying EJBs, roles in EJB.

Module III   12 hours

EJB Applications: EJB APPLICATIONS: EJB session beans, EJB entity beans, EJB clients, EJB deployment, building an application with EJB

Module IV   8 hours

CORBA: CORBA, distributed systems, purpose, exploring CORBA alternatives, architecture overview, CORBA and networking model, CORBA object model, IDL, ORB, building an application with CORBA

Module V   12 hours

COM: COM, data types, interfaces, proxy and stub, marshalling, implementing server/client, interface pointers, object creation, invocation, destruction, comparison COM and CORBA .

Introduction to .NET, overview of .NET architecture, marshalling, remoting.

Text Book(s)

1. Robert Orfali, Dan Harkey and Jeri Edwards, The Essential Client / Server Survival Guide, Galgotia Publications, 2002.

2. Tom Valesky, Enterprise Java Beans, Pearson Education, 2002.

References

1. Mowbray, Inside CORBA, Pearson Education, 2002.

2. Jeremy Rosenberger, Teach Yourself CORBA in 14 days, TEC Media, 2000.

3. Jason Pritchard, COM and CORBA Side by Side, Addison Wesley, 2000.

4. Jesse Liberty, Programming C#, 2/e, O'Reilly Press, 2002.

EID344: ADVANCED COMPUTER ARCHITECTURE
(Elective)

L T P C

3 0 0 3

Module I   **8 hours**
Introduction to Parallel Processing: Trends towards parallel processing, parallel processing mechanisms.
Parallel Computer Structures: Pipeline computers, array processors, multiprocessor systems.
Architectural Classification Schemes: Multiplicity of instruction data streams, serial vs parallel processing.

Module II   **10 hours**
Principles of Pipelining and Vector Processing: Pipelining: Basic concepts of pipelining, data hazards, control hazards, and structural hazards. Techniques for overcoming or reducing the effects of various hazards.
Vector Processor: The Architecture of CRAY-1.

Module III   **8 hours**
Instruction-level parallelism: Concepts of instruction-level parallelism (ILP), techniques for increasing ILP, superscalar, super-pipelined and VLIW processor architectures, vector and symbolic processors.

Module IV   **10 hours**
Multiprocessors Architecture and Programming: Functional structures, loosely coupled multiprocessors, tightly coupled multiprocessors.
SIMD Types of Interconnected Networks:- Shuffle- Exchange, omega, cube, barrel shifter,
Parallel memory organization:- Interleaved memory configurations.

Module V   **8 hours**
Non von Neumann Architectures: Data flow computers: Static data flow computer, dynamic data flow computers, systolic architectures.

Text Book(s)
1.   Kai Hwang and Faye A. Briggs, Computer Architecture and Parallel Processing, 1990.
2.   John L. Hennessey and David A. Patterson, Computer Architecture: A Quantative Approach , 3/e, MorganKaufmann,2003.

References
1.   Kai Hwang , Advanced Computer Architecture, McGraw Hill, 1992.

EID346 : INFORMATION RETRIEVAL SYSTEMS
(Elective)

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Module I   **9 hours**
Introduction To IRS & Cataloguing And Indexing: Definition, objectives, functional overview, relationship to dbms, digital libraries and data warehouses, information system capabilities-search, browse, miscellaneous. objectives, indexing process, automatic indexing, information extraction.

Module II   **9 hours**
Data Structure & Automatic Indexing: Introduction, stemming algorithms, inverted file structures, n-gram data structure, PAT data structure, signature file structure, hyper data structure. classes of automatic indexing, statistical indexing, natural language, concept indexing, hypertext linkages.

Module III   **8 hours**
Document & Term Clustering & User Search Techniques: Introduction, thesaurus generation, item clustering, hierarchy of clusters. search statements and binding, similarity measures and ranking, relevance feedback, selective dissemination of information search, weighted searches of boolean systems, searching the internet and hypertext.

Module IV   **8 hours**
Information Visualization & Text Search Algorithms: Introduction, cognition and perception, information visualization technologies. introduction, software text search algorithms, hardware text search systems.

Module V   **8 hours**
Information System Evaluation & Multimedia Information Retrieval: Introduction, measures used in system evaluation, measurement example - TREC results, models and languages: Data modelling, query languages, indexing and searching.

Text Book(s)
Kowalski, Gerald, Mark T Maybury, Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 2013.

Referencess
1. Ricardo Baeza-Yates, Modern Information Retrieval, Pearson Education, 2008.
2. Robert Korfhage, Information Storage & Retrieval, John Wiley & Sons, 1997.
3. C. J. van Rijsbergen, Information Retrieval, (PDF Version), 1979.

EID348 : SEMANTIC WEB (Elective)

L T P C

3 0 0 3

Module I   8 hours

Web Intelligence: Thinking and intelligent web applications, the information age ,the world wide web, limitations of today's web, the next generation web, machine intelligence, artificial intelligence, ontology, inference engines, software agents, berners-lee www, semantic road map, logic on the semantic web.

Module II   10 hours

Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, ontologies languages for the semantic web - Resource Description Framework(RDF) / RDF schema, Ontology Web Language(OWL),UML,XML/XML schema.

Module III   12 hours

Ontology Engineering: Ontology engineering, constructing ontology, ontology development tools, ontology methods, ontology sharing and merging, ontology libraries and ontology mapping, logic, rule and inference engines.

Module IV   12 hours

Semantic Web Applications, Services and Technology: Semantic web applications and services, semantic search, e-learning, semantic bioinformatics, knowledge base, XML based web services, creating an OWL-S ontology for web services, semantic search technology, web search agents and semantic methods.

Module V   12 hours

Social Network Analysis and semantic web: What is social networks analysis? Development of the social networks analysis, electronic sources

for network analysis, electronic discussion networks, blogs and online communities, web based networks, building semantic web applications with social network features.

Text Book(s)

1. Berners Lee, Godel and Turing, Thinking on the Web, Wiley inter science, 2008.

2. Peter Mika, Social Networks and the Semantic Web, Springer, 2007.

References

1. Davies, R.Studer, P.Warren, Semantic Web Technologies, Trends and Research in Ontology Based Systems, J John Wiley and Sons, 2007.

2. Liyang Lu Chapman and Hall, Semantic Web and Semantic Web Services, CRC Publishers,2007.

3. Heiner Stuckenschmidt, Frank Van Harmelen, Information Sharing on the semantic Web, Springer Publications, 2004.

4. T.Segaran, C.Evans, J.Taylor, Programming the Semantic Web, O'Reilly, 2009.

EID350 : PARALLEL AND DISTRIBUTED COMPUTING
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**

Motivation and History: Introduction to parallel computing, modern scientific method, evolution of supercomputing, modem parallel computers, seeking concurrency, data clustering, programming parallel computers.
Parallel Architectures: Interconnection networks, processor arrays, multiprocessors, multicomputer, Flynn's taxonomy,

Module II   **8 hours**

Parallel Algorithm Design: The task/channel model, foster's design methodology: partitioning, communication, agglomeration, mapping, finding the maximum: partitioning, communication, agglomeration, mapping, analysis, adding data input: communication, analysis.

Module III   **8 hours**

Introduction to distributed systems, what is distributed systems? hard ware concepts, software concepts, design issues, communication in distributed systems layered protocols, ATM networks, the client-server model, remote procedure call, group communication.

Module IV   **8 hours**

Process and processors in distributed system threads, system models, processors allocation, scheduling in distributed systems, fault tolerance, real time distributed system.

Module V   **8 hours**

Distributed file systems, distributed file system design, distributed file system implementation, trends in distributed file system, distributed shared memory.

Text Book(s)
1.   M.J. Quinn, Parallel Programming in C with MPI and OpenMP, McGraw Hill, 2008.

References
1.   Grama, George Karypis, Vipin Kumar, and Anshul Gupta, Introduction to Parallel Computing by Ananth , Thompson publications, 2002.
2.   Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems, Principles and paradigms, 2/E, Prentice Hall India Publications, 2006.
3.   Andrew S. Tanenbaum, Distributed Operating Systems, Prentice Hall India Publications, 2009.
4.   Barry Wilkinson, Michael Allen, Parallel Programming, 2/e, Pearson, 2006.
5.   M.J. Quinn, Parallel Computing Theory and Practice , McGraw Hill, 2002.

EID352 : SOFTWARE REQUIREMENTS ENGINEERING AND ESTIMATION   (Elective)

L T P C

3 0 0 3

Module I   8 hours

Introduction, requirements, requirement engineering, requirements document, best way to write requirements, detailed requirements ,difference between functional and nonfunctional requirements, system stakeholders, requirements engineering process, recognizing requirements engineering process problems, suggesting a good requirements engineering process.

Practical process improvement: Process maturity, process assessment, process improvement, top ten guidelines.

Module II   8 hours

Requirements Elicitation: Assess system feasibility, identify and consult system stakeholders, record requirement sources, system's operating environment, using business concerns to drive requirements elicitation, domain constraints, collect requirements from multiple view points, use scenarios to elicit requirements, operational process.

Requirements Analysis and Negotiation: System boundaries prioritize requirements, assess requirements risk.

Module III   9 hours

Describing Requirements: Standard templates use language, use diagrams, supplement natural language requirements, specifying requirements quantitatively.

Requirements Management: Uniquely identify each requirement, policies for requirements management, traceability policies, maintaining a traceability manual, change management policies, identify global system requirements, identify volatile requirements, record rejected requirements.

Module IV   8 hours

Software Size Estimation: Software estimation, size based estimation, two views of sizing, function point analysis, mark II FPA, full function points, loc estimation, and conversion between size measures

Module V   **10 hours**

Effort, Schedule & Cost Estimation: What is productivity?, estimation factors, approaches for effort and schedule estimation, COCOMO II, Putnam estimation model, algorithmic models, cost estimation tools: Desirable features of requirements management tools, some requirements management tools available, rational pro, desirable features in software estimation tools, some software estimation tools.

Text Book(s)

1.   Ian Sommerville and Pete Sawyer, Requirements Engineering: A good practice guide, John Wiley, 1997.

2.   Rajesh Naik , Swapna Kishore, Software Requirements and Estimation, TMH, 2001.

References

1.   Don, Managing Software Requirements, A Use Case Approach, 2/e, Dean, Addision- Wesley, 2003.

2.   Ian Graham, Requirements Engineering and Rapid Development, Addision-Wesley, 1998

3.   S.Robertson, J.Robertson, Mastering the Requirements Process, 2/e, Pearson, 2006.

4.   Elizabeth Hull, Ken Jackson and Jeremy Dick, Requirements engineering, 2/e, Springer, 2005.

EID354 : SOFTWARE TESTING METHODOLOGIES
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Introduction: Software testing definition, evaluation of software testing, software testing myths and facts, goals and model of software testing, software testing terminology, software testing life cycle, testing methodology, verification and validation activities.

Module II   **12 hours**
Dynamic testing: Block-Box testing: Boundary value analysis, equivalence class testing. White-box testing: Introduction, basic path testing, loop testing. Static testing: inspections, structured walkthroughs, technical reviews.

Module III   **9 hours**
Validation activities: Module validation testing, integration testing, function testing, system testing, accepting testing. Regression Testing: Objectives of regression testing, regression testing types, regression testing techniques.

Module IV   **10 hours**
Test management: Test organization, structure of testing group, test planning, test design and test specification. Efficient test suite management: Introduction, minimizing the test suite and its benefits, defining test suite minimization problem, test suite prioritization, types of test case prioritization, prioritization techniques.

Module V   **10 hours**
Software Quality Management: Software quality, quality cost, quality control and quality assurance, quality management, QM and project management, quality factors, methods of quality management, software quality metrics, SQA models, measurement and improvement of testing process, test process maturity models

Text Book(s)
1.   Naresh Chauhan, Software Testing: Principles and Practices, 1/e, Oxford University Press, 2010.

References
1.   William E. Perry, Effective Methods for Software Testing, 3/e, Wiley, 2006.
2.   Paul C. Jorgensen, Software Testing: A Craftsman's Approach, 3/e, Auerbach publication, 2015.

EID356 : DATA MINING AND DATA WAREHOUSING
(Elective)

L T P C
3 0 0 3

Module I
12 hours

Introduction: What motivated data mining? why is it important? what is data mining? data mining-on what kind of data? data mining functionalities, what kinds of patterns can be mined? are all of the patterns interesting? classification of data mining systems, data mining task primitives, integration of a data mining system with a database or data warehouse system. Data preprocessing: Types of data sets and attribute values, basic statistical descriptions of data, data visualization, measuring data similarity, data quality, major tasks in data preprocessing, data reduction, data transformation and data , discretization, data cleaning and data integration

Module II
10 hours

Data Warehousing and On-Line Analytical Processing: Data Warehouse-Basic concepts, data warehouse modeling: Data cube and OLAP, data warehouse design and usage, data warehouse implementation, data generalization by attribute-oriented induction, efficient methods for data cube computation, exploration and discovery in multidimensional databases.

Module III
8 hours

Mining frequent patterns, associations and correlations: Basic concepts, applications of frequent pattern and associations, frequent pattern and association mining: A road map, mining various kinds of association rules, apriori algorithm, FP growth algorithm, constraint-based frequent pattern mining.

Module IV
10 hours

Classification Analysis: Classification: Basic concepts, decision tree induction, Bayes classification methods, rule-based classification, model evaluation and selection, classification by neural networks, techniques to improve classification accuracy: Ensemble methods.

Module V   **8 hours**

Cluster Analysis: Basic concepts and methods, clustering structures, major clustering approaches, partitioning methods, hierarchical methods, density-based methods, model-based clustering: the expectation-maximization method.

Text Book(s)

1.   Jiawei Han, Micheline Kamber, Jian Pei , Data Mining: Concepts and Techniques, 3/e, Morgan Kaufmann publishers, 2011.

References

1.   Michael Steinbach, Vipin Kumar, Pang-Ning Tan, Introduction to Data Mining, 1/e, Addison-Wesley, 2006

2.   Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, 1/e, Pearson publishers, 2006

EID358 : ADVANCED COMPUTER NETWORKS
(Elective)

L T P C

3 0 0 3

Module I 8 hours

Introduction: Building a network, network architecture, layering and protocols, OSI architecture, internet architecture, implementing network software, application programming interface (sockets), protocol implementation issues, performance, bandwidth and latency, delay × bandwidth product, high-speed networks, application performance needs.

Module II 8 hours

Direct Link Networks: Reliable transmission, stop-and-wait, sliding window, concurrent logical channels, wireless, bluetooth (802.15), Wi-Fi (802.11), WiMAX (802.16), cell phone technologies, bridges and LAN switches, learning bridges, spanning tree algorithm, broadcast and multicast, limitations of bridges.

Module III 10 hours

Internetworking: Simple Internetworking (IP), what is an internetwork? service model, global addresses, datagram forwarding in IP, address translation (ARP), host configuration (DHCP), error reporting (ICMP), virtual networks and tunnels, routing - network as a graph, distance vector (RIP), link state (OSPF), metrics, routing for mobile hosts, subnetting - classless routing (CIDR), inter- domain routing (BGP), routing areas.

Module IV 12 hours

End-to-End Protocols, simple demultiplexer (UDP), reliable byte stream (TCP) - end-to-end issues, segment format, connection establishment and termination, sliding window revisited, triggering transmission, adaptive retransmission, record boundaries, transport for real-time applications (RTP), requirements, RTP details, control protocol, congestion control and resource allocation, issues in resource allocation, network model, taxonomy, evaluation criteria, TCP congestion control, additive increase/multiplicative

decrease, slow start, fast retransmit and fast recovery, quality of service - application requirements, integrated services (RSVP), differentiated services (EF, AF).

Module V   **7 hours**

Applications, web Services, custom application protocols (WSDL, SOAP), a generic application protocol (REST), overlay networks , routing overlays, peer-to-peer networks (Gnutella, BitTorrent), content distribution networks.

Text Book(s)

1.   Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, 4/e, Morgan Kaufmann, 2007.

References

1.   D. Bertsekas and R. Gallager, Data Network, Prentice Hall India, 1992.

2.   J.Walrand and P. Varaiya, High Performance Communication Network, Morgan Kaufmann, 2000.

3.   Y. Zheng and S. Akhtar, Networks for Computer Scientists and Engineers, Oxford University Press, 2001.

4.   Andrew S. Tanenbaum, Computer Networks, 5/e, Prentice Hall India, 2015.

EID360 : AGILE SOFTWARE PROCESS (Elective)

L T P C

3 0 0 3

Module I   **10 hours**

INTRODUCTION: What is Agile? The Agile manifesto, Agile methods, XP: Extreme Programming, DSDM,SCRUM, feature-Driven Development, modelling misconceptions, agile modelling, tools of misconceptions, updating agile models.

Module II   **8 hours**

Extreme Programming: Introduction, core XP values, the twelve XP practises, about extreme programming? planning XP projects, test first coding, making pair programming work.

Module III   **8 hours**

Agile Modelling and XP: Introduction, the fit, common practises, modelling specific practises, XP objections to agile modelling, agile modelling and planning XP projects, XP implementation phase.

Module IV   **8 hours**

Feature-Driven Development: Introduction, incremental software development, Regaining Control: The motivation behind FDD, planning an iterative project, architecture centric, FDD and XP.

Module V   **10 hours**

Agile Methods with RUP and PRINCE2 and Tools and Obstacles: Agile modelling and RUP, FDD and RUP, agile methods and prince2, tools to help with agile development, Eclipse: An agile IDE, obstacles to agile software development, management intransigence, the failed project syndrome, contractual difficulties, familiarity with agility.

Text Book(s)

1.   Craig Larman, Agile and Iterative Development, Addison-Wesley, Pearson Education, 2004.

References

1.   Agile Software Development, Principles, Patterns and Practices, Pearson New International Edition, 2013.

2.   Pearson, Robert C. Martin, Juli, James Shore, Chromatic, The Art of Agile Development, O'Reilly Media, 2013.

EID362 : MOBILE COMPUTING (Elective)

L T P C

3 0 0 3

Module I   **8 hours**

Introduction to Mobile Communications and Computing : Introduction to mobile computing, novel applications, limitations, and architecture. (Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA,CDMA.

Module II   **10 hours**

GSM : Mobile services, system architecture, radio interface, protocols, localization and calling, handover, security, and new data services.

Module III   **9 hours**

Mobile Network Layer : Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP)

Module IV   **9 hours**

Mobile Transport Layer : Traditional TCP, indirect TCP, snooping TCP, mobile TCP, fast retransmit/fast recovery, transmission /time-out freezing, selective retransmission, transaction oriented TCP.

Module V   **10 hours**

Wireless application Protocols: Architecture, wireless data gram protocol, wireless transport layer protocol, wireless transaction layer protocol, wireless session layer protocol, wireless application environment.

Text Book(s)

Jochen H.Schiller, Mobile Communications, 2/e, Pearson Education, 2003.

References

1.   Hansmann, Merk, Nicklous, Stober, Principles of Mobile Computing, 2/e, Springer,2003.
2.   Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, Fundamentals of Mobile and Pervasive Computing, 2005.
3.   Martyn Mallick ,Mobile and Wireless Design Essentials, Wiley DreamTech, 2003.

EID364: SERVICE ORIENTED ARCHITECTURE
(Elective)

L T P C

3 0 0 3

Module I   **8 hours**

FUNDAMENTALS OF SOA: Introduction, defining SOA, evolution of SOA, service oriented enterprise, comparing SOA to client server and distributed internet architectures, basic SOA architecture concepts, key service characteristics, technical benefits, business benefits.

Module II   **10 hours**

COMBINING SOA AND WEB SERVICES: Web services , service descriptions , messaging with soap ,message exchange patterns, web service platform, service contract, service level data model, service discovery, service level security, service level interaction patterns, atomic and composite services, service enabling legacy system, enterprise service bus pattern.

Module III   **10 hours**

MULTI   CHANNEL   ACCESS   AND   WEB   SERVICES COMPOSITION: SOA for multi, channel access, business benefits, tiers, business process management, web service composition, BPEL, RESTFUL services, comparison of BPEL and RESTFUL services.

Module IV   **10 hours**

JAVA WEB SERVICES: SOA support in J2EE , java API for XML, based web services(JAX,WS), java architecture for XML binding (JAXB) , java API for XML registries(JAXR), java API for XML based RPC (JAX,RPC), web services interoperability, SOA support in .NET , ASP.NET web services, case studies, web services enhancements (WSE).

Module V   **8 hours**

WEB SERVICES SECURITY AND TRANSACTION: Meta data management, advanced messaging, addressing , reliable messaging, policies, WS- policy, security, WS- security, notification and eventing, transaction management.

Text Book(s)

1. Eric Newcomer, Lomow, Understanding SOA with Web Services, Pearson Education, 2005.

2. James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, Java Web Services Architecture, Elsevier, 2003.

References

1. Thomas Erl, Service Oriented Architecture, Pearson Education, 2005.

2. Sandeep Chatterjee, James Webber, Developing Enterprise Web Services, An Architect's Guide, Pearson Education, 2005.

3. Dan Woods and Thomas Mattern, Enterprise SOA: Designing IT for Business Innovation, O'REILLY, 1/e, 2006.

4. Frank Cohen, FastSOA, Elsevier, 2007.

5. Jeff Davies, The Definitive Guide to SOA, Apress, 2007.

EID401: INTEGRATED DEVELOPMENT ENVIRONMENT

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Student will be given exposure to the industry standard application development IDEs like:

- Microsoft .NET
- Eclipse
- LAMP

To create applications of various forms like:

- Console
- Windows
- Client/Server
- Web based
- Enterprise applications
- Sharepoint servers

EID403 : MACHINE LEARNING

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Module I   **10 hours**
Introduction: Learning problems, perspectives and issues, concept learning, version spaces and candidate eliminations, inductive bias, decision tree learning, representation, algorithm, heuristic space search.

Module II   **10 hours**
Neural Networks And Genetic Algorithms: Neural network representation, problems, perceptrons, multilayer networks and back propagation algorithms, advanced topics, Genetic algorithms, hypothesis space search, genetic programming, models of evaluation and learning.

Module III   **12 hours**
Bayesian and Computational Learning: Bayes theorem , concept learning, maximum likelihood, minimum description length principle, Bayes optimal classifier, Gibbs Algorithm, Naïve Bayes Classifier, Bayesian belief network, EM algorithm, probability learning, sample complexity, finite and infinite hypothesis spaces, mistake bound model.

Module IV   **10 hours**
Instance Based Learning: K-Nearest neighbour learning, locally weighted regression, radial basis functions, case based learning.

Module V   **10 hours**
Hidden Markov Models: Introduction, discrete Markov processes, hidden Markov models, three basic problems of HMMs evaluation problem, finding the state sequence, learning model parameters, continuous observations, the HMM with input, model selection in HMM.

Text Book(s)
1.   Tom M. Mitchell, Machine Learning, McGraw Hill , 2013.
2.   Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press, 2004

References
1.   T. Hastie, R. Tibshirani, J. H. Friedman, The Elements of Statistical Learning, 1/e, Springer, 2001.
2.   M Narasimha Murty, Introduction to Pattern Recognition and Machine Learning, World Scientific Publishing Company, 2015

EID441 : IMAGE PROCESSING (Elective)

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Module I   **10 hours**

Introduction: Digital image representation, fundamental steps in digital image processing, elements of digital image processing systems.

Digital Image Fundamentals: Elements of visual perception, a simple image model, image sensing and acquisition, image sampling and quantization, basic relationships between pixels, mathematical operations used in digital image processing.

Module II   **8 hours**

Image Enhancement in Spatial Domain: basic intensity transformation, histogram processing: histogram equalization, histogram matching, fundamentals of spatial filtering, smoothing filters, sharpening filters.

Fourier Transform: Discrete Fourier Transform (DFT) on one variable and two variables, Properties of DFT

Module III   **8 hours**

Image Enhancement in Frequency Domain: Basics of filtering in the frequency domain, smoothing filters, sharpening filters, homomorphic filters

Color Image Processing: Color fundamentals, color models, smoothing and sharpening.

Module IV   **8 hours**

Other Transforms: HAAR Transform, discrete cosine transform.

Image compression: Fundamentals, basic compression methods: huffman coding, arithmetic coding, run,length coding, LZW coding, contour coding, predictive coding, wavelet coding.

Module V   **8 hours**

Morphological Image Processing: Erosion and dilation, opening and closing, hit - or - miss transform morphological algorithms, grey level morphological processing.

Image Segmentation: Fundamentals, point, line, and edge detection, basic global thresholding, region based segmentation, watersheds, image segmentation based on colour.

Text Book(s)

1.   Rafael C. Gonzalez and Richard E. Woods, Digital Image processing, 3/e, Pearson Education, 2009.

References

1.   B. Chanda, D. Dutta Majumder, Digital Image Processing and Analysis, PHI, 2006.

2.   A.K. Jain, Fundamentals of Digital Image Processing, PHI, 2006.

3.   Qidwai and Chen, Digital Image Processing, An algorithmic approach with MATLAB, Taylor & Francis, 2010.

4.   Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing using MATLAB, Mc Graw Hill, 2011.

EID442 : STEGANOGRAPHY AND BIOMETRICS
(Elective)

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Module I   **8 hours**

Steganography : Steganographic communication, the channel, the building blocks, notation and terminology, information,theoretic foundations of steganography, cachin's definition of steganographic security, practical steganographic methods, statistics preserving steganography, model based steganography, masking embedding as natural processing, minimizing the embedding impact, matrix embedding, non-shared selection rule.

Module II   **8 hours**

Steganalysis : Steganalysis scenarios, detection, forensic steganalysis, the influence of the cover work on steganalysis, some significant steganalysis algorithms, LSB embedding and the histogram attack, sample pairs analysis, blind steganalysis of JPEG images using calibration, blind steganalysis in the spatial domain.

Module III   **8 hours**

Biometrics: Introduction, benefits of biometrics over traditional authentication systems, benefits of biometrics in identification systems, selecting a biometric for a system, applications, Key biometric terms and processes, biometric matching methods, accuracy in biometric systems.

Module IV   **10 hours**

Physiological Biometric Technologies: Fingerprints: Technical description, characteristics, Competing technologies, strengths, weaknesses, deployment. Facial scan: technical description, characteristics, weaknesses, deployment. Iris scan: technical description, characteristics, strengths, weaknesses, deployment. Retina vascular pattern: technical description, characteristics, strengths, weaknesses, deployment. Hand scan: technical description, characteristics, strengths, weaknesses deployment, DNA biometrics.

Module V   **8 hours**

Multi biometrics: Multi biometrics and multi factor biometrics, two factor authentication with passwords, tickets and tokens, executive decision, implementation plan.

Text Book(s)

1. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, and Ton Kalker, Digital Watermarking and Steganography, 2/e, Morgan Kaufmann Publishers, 2008.
2. Samir Nanavathi, Michel Thieme, and Raj Nanavathi, Biometrics : Identity verification in a network, Wiley Eastern, 2002.

References

1. John Chirillo and Scott Blaul, Implementing Biometric Security, Wiley Eastern Publications, 2005.

EID443 : SOCIAL NETWORK ANALYSIS (Elective)

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Module I 10 hours

Introduction to Social Networks: Fundamental concepts in network analysis, features, social network data: network data, boundary specification and sampling, types of networks, network data, measurement and collection.

Module II 8 hours

Mathematical Representations of Social Networks: Notations for social network data, sociometric notation, algebraic notation, two sets of actors, graphs and matrices.

Module III 8 hours

Network centrality and Prestige: Prominence, non directional relations, directional relations.

Structural balance and transitivity: Structural balance, cluster ability.

Module IV 10 hours

Cohesive subgroups: Sub groups based on complete mutuality, reach ability and diameter, subgroups based on nodal degree, subgroups based on nodal degree, measures of subgroup cohesion, directional relations, valued relations, interpretation of cohesive subgroups.

Module V 10 hours

Overlapping Subgroups: Affiliation networks, representing affiliation networks, one mode networks, properties of affiliation networks, analysis of actors and events.

Roles and Positions: Structural equivalence, positional analysis, measuring structural equivalence, representation of network positions.

Text Book(s)

1.   Stanley Wasserman and Katherine Faust, Social Network Analysis: Methods and Applications, Cambridge University Press, 1994.
2.   Robert A. Hanneman, Introduction to Social Network Methods, University of California, 2005.

References

1.   Freeman, L. C, The Development of Social Network Analysis: A Study in the Sociology of Science, Empirical Press, 2004.
2.   David Easley and Jon Kleinberg Networks, Crowds, and Markets: Reasoning about a Highly Connected World, Cambridge University Press, 2010.
3.   Stephen P Borgatti, Martin G Everett, Jeffrey C Johnson, Analyzing social networks, SAGE publications, 2013.

EID444 : E-COMMERCE (Elective)

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Module I   8 hours

Electronic Commerce: Frame work, anatomy of e-commerce applications, e-commerce consumer applications, e-commerce organization applications, consumer oriented electronic commerce, mercantile process models.

Module II   8 hours

Electronic payment systems: Digital token based, smart cards, credit cards, risks in electronic payment systems.

Inter Organizational Commerce: EDI, EDI implementation, value added networks.

Module III   8 hours

Intra Organizational Commerce: Work flow, automation customization and internal commerce, supply chain management.

Corporate Digital Library: Document library, digital document types, corporate data warehouses, advertising and marketing, information based marketing, advertising on internet, online marketing process, market research.

Module IV   10 hours

Consumer Search and Resource Discovery: Information search and retrieval, commerce catalogues, information filtering.

Module V   10 hours

Multimedia: Key multimedia concepts, digital video and electronic commerce, desktop video processing, desktop video conferencing.

Text Book(s)

Ravi Kalakota and Andrew B. Whinston, Frontiers of electronic commerce, Pearson, 1996.

References

1.   Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, E-Commerce fundamentals and applications, John Wiley, 2008.
2.   S. Jaiswal, E-Commerce, Galgotia Publications, 2003.

EID445 : CLOUD COMPUTING (Elective)

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3 0 0 3

Module I   **8 hours**
Understanding Cloud Computing: Cloud origins and influences, basic concepts and terminology, goals and benefits, risks and challenges.
Fundamental Concepts and Models: Roles and boundaries, cloud characteristics, cloud delivery models, cloud deployment models.

Module II   **6 hours**
Cloud Enabling Technology: Data center technology, virtualization technology, web technology, multitenant technology, service technology.

Module III   **6 hours**
Cloud Infrastructure Mechanisms: Logical network perimeter, virtual server, cloud storage device, cloud usage monitor, resource replication.

Module IV   **10 hours**
Fundamental Cloud Architectures: Workload distribution architecture, resource pooling architecture, dynamic scalability architecture, elastic resource capacity architecture, service load balancing architecture, cloud bursting architecture, elastic disk provisioning architecture, redundant storage architecture.

Module V   **10 hours**
Cloud Delivery Model Considerations: The cloud provider perspective: Building IaaS environments, equipping PaaS environments, optimizing SaaS environments, the cloud consumer perspective: Working with IaaS environments, working with PaaS environments, working with SaaS services.

Text Book(s)

1.   Thomas Erl, Ricardo Puttini, Zaigham Mahmood ,Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013.

References

1.   John W. Rittinghouse, James F.Ransome, Cloud Computing: Implementation, Management and Security, CRC Press, 2012.
2.   Anthony T.Velte, Toby J Velte Robert Elsenpeter, Cloud Computing a practical approach, , Mc Graw Hill,2010.
3.   Michael Miller, Cloud Computing: Web,Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, 2008.
4.   Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, 2008.
5.   Gautam Shroff, Enterprise Cloud Computing: Technology, Architecture, applications, Cambridge University Press, 2010.
6.   Ronald L. Krutz,Russell Dean Vines A Comprehensive Guide to Secure Cloud Computing, 2010.

EID446 : ADVANCED DATABASES (Elective)

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3 0 0 3

Module I   **10 hours**
Review of the fundamental principles of modern Database Management systems (DBMS): Architecture and functionality, relational databases (the relational data model, the relational algebra), SQL (select, union, minus, intersect, sub queries, In, Exists, different types of joins, group by, having clause etc.), views, object oriented databases (ODMG data model and query language), object relational DBMS: Oracle 10g.

Module II   **8 hours**
Query processing and query optimization: Overview, measures of query cost, selection operation, sorting, join operation, other operations , evaluation of expressions, types of optimization : heuristic query optimization vs cost based query optimization.

Module III   **8 hours**
Transaction Management: ACID properties, concurrency control, and crash recovery.

Module IV   **8 hours**
Distributed Databases: Study of DDBMS architectures, comparison of homogeneous and heterogeneous databases, analysis of concurrency control in distributed databases, implementation of distributed query processing. distributed data storage, distributed transactions, commit protocols, availability, distributed query processing, distributed data storage and transaction.

Module V   **8 hours**
Heterogeneous databases: Architecture, schema translation and schema integration, query processing, transaction management, and alternative transaction models.

Text Book(s)
1.   R. Ramakrishnan, Database Management Systems, McGraw Hill, 2007.
2.   M.T. Oszu, P. Valduriez, Principles of Distributed Database Systems, 2/e, Prentice Hall 1999.

References
1.   P.A. Bernstein, V. Hadzilacos, N. Goodman, Concurrency Control and Recovery in Database Systems, Addison,Wesley, 1987.
2.   A. Elmagarmid, M. Rusinkiewicz, A. Sheth (eds) Management of Heterogeneous and   Autonomous Database Systems, Morgan Kaufmann, 1999.
3.   M. Piattini and O. Diaz (eds) Advanced Database Technology and Design, Artech House, 2000.
4.   Abraham Silberschatz, Henry Korth, S. Sudarshan, Database system concepts, 5/e, Tata McGraw Hill, 2008.
5.   Jiawei han, Micheline Kamber, Data Mining: Concepts and systems, Morgan Kaufmann Publishers, 2011.

EID447: WIRELESS SENSOR NETWORKS (Elective)

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Module I   **6 hours**

Overview of wireless sensor networks: The vision of ambient intelligence, application example, types of applications, challenges for wireless sensor networks, enabling technologies for wireless sensor networks.

Module II   **8 hours**

Architectures: Single node architecture, hardware components, operating systems and execution environments, network architecture, sensor network scenarios.

Module III   **8 hours**

Physical Layer: Introduction, wireless channel and communication fundamentals, physical layer and transceiver design considerations in WSNs. MAC protocols, contention based protocols, schedule based protocols.

Module IV   **10 hours**

Link layer protocols: Fundamentals: Tasks and requirements, error control, causes and characteristics of transmission errors, ARQ techniques, FEC techniques, framing, adaptive schemes, intermediate checksum schemes, combining packet size optimization and FEC, link management, link quality characteristics, link quality estimation.

Module V   **8 hours**

Advanced application support: Advanced, network processing, going beyond mere aggregation of data, distributed signal processing, distributed source coding. Security, fundamentals security considerations in wireless sensor networks, denial of service attacks.

Text Book(s)

Holger Karl & Andreas Willig, Protocols And Architectures for Wireless Sensor Networks, John Wiley, 2005.

References

1. Feng Zhao & Leonidas J. Guibas, Wireless Sensor Networks, An Information Processing Approach, Elsevier, 2007.

2. Raghavendra, Cauligi S, Sivalingam, Krishna M., Zanti Taieb, Wireless Sensor Network, Springer 1/e, 2004 (ISBN: 978,4020,7883,5).

3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, Wireless Sensor Networks, Technology, Protocols and Applications, John Wiley, 2007.

4. N. P. Mahalik, Sensor Networks and Configuration: Fundamentals, Standards, Platforms, and Applications, Springer Verlag, 2007.

5. Anna Hac, Wireless Sensor Network Designs, John Wiley, 2003

EID448 : INTERNET OF THINGS (Elective)

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Module I   **8 hours**

Introduction: The Internet of Things: An Overview, the flavour of the internet of things, the "internet" of "things", the technology of the internet of things, enchanted objects, who is making the internet of things?

Design principles for connected devices: Calm and ambient technology, magicas metaphor, privacy, web thinking for connected devices, affordances.

Module II   **10 hours**

Internet Principles: Internet communications: An overview (IP, TCP, the IP protocol suite (TCP/IP), UDP), IP addresses (DNS, Static IP Address assignment, dynamic IP address assignment,IPv6), MAC addresses, TCP and UDP ports, application layer protocols.

Module III   **10 hours**

Prototyping: Thinking About Prototyping: Sketching, familiarity, costs versus ease of prototyping, prototypes and production, open source versus closed source, tapping into the community.

Prototyping embedded devices : Electronics, embedded computing basics, developing on the arduino, raspberry pi beaglebone black, electric imp, mobile phone and tablets, plug computing, always on internet of things.

Module IV   **10 hours**

Prototyping the Physical Design: Preparation, sketch, iterate and explore, non digital methods, laser cutting, 3D printing, CNC milling, repurposing/ recycling.

Techniques for Writing Embedded Code: Memory management, performance and battery life, libraries, debugging.

Module V   **10 hours**

Prototype to Reality: Business Models: A short history of business models, the business model canvas, models, funding an internet of things startup, lean startups.

Moving to manufacture : Designing kits, designing printed circuit boards, manufacturing printed circuit boards, mass producing the case and other fixtures, certification, costs, scaling up software.

Text Book(s)

1. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, 1/e, Wiley publication, 2013

References

1. Charalampos Doukas , Building Internet of Things with the Arduino, Create space, 2002

2. Dieter Uckelmann et.al, Architecting the Internet of Things, Springer, 2011

3. Luigi Atzor et.al, The Internet of Things: A survey, Journal on Networks, Elsevier Publications, 2010

EID449 : BIG DATA ANALYTICS (Elective)

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Module I   **10 hours**

Introduction: Big data and its importance, a flood of mythic "start up" proportions, big data is more than merely big why now? a convergence of key trends, a wider variety of data, the expanding universe of unstructured data, industry examples of big data: Digital marketing and the online world, the right approach, cross channel lifecycle marketing.

Module II   **10 hours**

Big Data Technology: The elephant in the room: Hadoop's parallel world, old vs. new approaches. Data discovery: Work the way people's minds work, open source technology for big data analytics, the cloud and big data, predictive analytics moves into the limelight, a brief history of hadoop, apache hadoop and the hadoop ecosystem.

Module III   **10 hours**

MapReduce: Analyzing the data with hadoop, map and reduce, java mapreduce, scaling out, data flow, combiner functions, running a distributed mapreduce job, hadoop streaming, the hadoop distributed file system, the design of HDFS, HDFS concepts, blocks, name nodes and data nodes, HDFS federation, HDFS high, availability, the command, line interface, basic file system operations, hadoop file systems.

Module IV   **10 hours**

Information Management: The big data foundation, big data computing platforms, big data computation, more on big data storage, big data computational limitations, big data emerging technologies. Business analytics : The last mile in data analysis, geospatial intelligence will make your life better, consumption of analytics, from creation to consumption. Visualizing: How to make it consumable? organizations are using data visualization as a way to take immediate action.

Module V   **10 hours**

Data Privacy and Ethics : The privacy landscape, the great data grab isn't new, preferencess, personalization, and relationships, rights and responsibility, playing in a global sandbox , conscientious and conscious responsibility, privacy may be the wrong focus can data be anonymized? balancing for counter intelligence.

Text Book(s)

1.   Michael Minelli, Michele Chambers, Big Data,Big Analytics, Wiley Publications, 2013
2.   Tom White, Hadoop: The Definitive Guide, 3/e, O'Reilly Publications, 2012.

References

1.   Bill Franks Taming, The Big Data Tidal Wave, 1/e, Wiley, 2012.
2.   Frank J. Ohlhorst, Big Data Analytics, 1/e, Wiley, 2012

EID451 : OPEN SOURCE SOFTWARE DEVELOPMENT
(Elective)

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Module I   **8 hours**

Introduction: Overview of open source software: what is software source code? the open source definition, need, applications, examples of OSD, compliant licenses, examples of open source software products, the open source software development process.

A History of open source software: The Berkeley software distribution, tex, the free software foundation, GNU unix, linux, apache.

Module II   **8 hours**

Python Programming, Introduction: Features, using the python interpreter, an introduction to python, control statements, functions, input and output, reading and writing files.

Module III   **8 hours**

Python Programming: Data structures, modules, standard modules, packages, errors and exceptions, handling exceptions, user defined exceptions.

Module IV   **8 hours**

Python Programming: Classes, inheritance, generators, standard library (part I), command line arguments, string pattern matching, internet access, data compression.

Module V   **8 hours**

Python Programming, Standard Library (Part II): Output formatting , templating, working with binary data record layouts, multithreading, logging

Text Book(s)
1.   Joseph Feller, Brian Fitzgerald, Understanding Open Source Software development, Pearson Education, 2001.
2.   Bill Lubanovic, Introducing Python, Oreilly, 2014.

References
1.   Mark Pilgrim, Dive into Python, http://www.diveintopython.net/

Web Resources
1.   Python Tutorial: http://docs.python.org/tutorial/

EID453 : DESIGN PATTERNS (Elective)

L T P C

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Module I   10 hours

Introduction: History and origin of patterns, design patterns in MVC, describing design patterns, how design patterns solve design problems, selecting a design pattern, using a design pattern.

Module II   10 hours

Design Patterns-1: Creational: Abstract factory, builder, factory method, prototype, singleton.

Module III   12 hours

Design Patterns-2: Structural Patterns: Adapter, bridge, composite, decorator, façade, flyweight, proxy.

Module IV   12 hours

Design Patterns-3 : Behavioral patterns: Chain of responsibility, command, interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

Module V   10 hours

Advanced Patterns : Pattern catalogs and writing patterns. Patterns and Case Study: Designing a document editor, anti-patterns, case studies in UML, pattern community.

Text Book(s)

1.   Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design patterns: Elements of reusable object, oriented software, Addison Wesley, 1995.

References

1.   Alan Shalloway and James R. Trott, Design Patterns Explained: A New Perspective on Object Oriented Design, 2004.

2.   Craig Larman, Applying UML and Patterns: An Introduction to object, oriented analysis and design and the unified process, 2/e, Prentice Hall, 2001.

3.   William J Brown et al, John Wiley, Anti, Patterns: Refactoring Software, Architectures and Projects in Crisis, 1998.

EID455 :   EMBEDDED SYSTEMS (Elective)

L T P C
3 0 0 3

Module I   10 hours

Overview of embedded systems: Examples of embedded systems, typical hardware. The 8051 microcontroller : microcontrollers and microprocessors, overview of the 8051, its family, pin description of 8051, inside the 8051, introduction to 8051, assembly program, assembling and running an 8051 program, the program counter and ram space and 8051, data types and directives, flag bits and psw register, register banks and stack.

Module II   8 hours

Jump, Loop and call instructions, arithmetic instructions, logical instructions addressing modes.

Minimum circuits of 8051: Power supply, crystal, oscillator, reset circuits.IO port programming.

Module III   8 hours

Timer/Counter programming in 8051, Serial communication in 8051, interrupt programming, **real world interfacing I:** LCD, ADC and sensors.

Module IV   8 hours

Real world interfacing II: Keyboard, display, stepper motor, traffic light controller, elevator.

Introduction to RTOS: Tasks and task states, tasks and data, semaphores and shared data (Chapter 6 from Text Book(s) 2, Simon).

Module V   9 hours

Other operating system services: Message queues, mail boxes and pipes, timer functions, events, memory management, interrupt routines in an RTOs environment.

Basic design using RTOs: Principles, semaphores and queues, hard real, time scheduling considerations, saving memory and power embedded software development tools, host and target machines, linker/locators for embedded software, getting embedded software into the target system;

Text Book(s)
1.   M A Mazidi and J G Mazidi, 8051 Microcontroller and Embedded Systems, Pearson Education, 2005.
2.   David E Simon, An Embedded Software Primer, Pearson Education, 2001.

References
1.   Kenneth J. Ayala, The 8051 Microcontroller, 3/e, Thomson, 2004.
2.   Raj Kamal, Embedded Systems, McGraw Hill, 2003.
3.   Ajay V Deshmukhi, Micro Controllers, McGraw Hill, 2005.
4.   Rajkamal, Microcontrollers, Pearson Education, 2011.

EMA101: ENGINEERING MATHEMATICS-I
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Linear Differential Equations of Higher Order: Definition, complete solution, rules for finding complimentary function, rules for finding particular integral, method of variation of parameters, method of undetermined coefficients.

Module II   **8 hours**
Equations Reducible to Linear Differential Equations and Applications: Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, applications of linear differential equations like mass-spring systems and LCR - circuits.

Module III   **8 hours**
Partial Differentiation I: Euler's theorem, total derivative, differentiation of implicit functions, change of variables, Jacobians, tangent plane and normal to a surface.

Module IV   **8 hours**
Partial Differentiation II: Taylor's theorem for functions of two variables, maxima and minima of functions of two variables, Lagrange's method of multipliers, differentiation under integral sign, Leibnitz rule.

Module V   **10 hours**
Laplace Transforms: Transforms of elementary functions, properties of Laplace transforms, existence conditions, inverse transforms, transforms of derivatives, transforms of integrals, multiplication by tn, division by t, convolution theorem, applications to ordinary differential equations, periodic functions, unit step function, unit impulse function.

Text Book(s)
1.   B.S. Grewal, Higher Engineering Mathematics, 42/e, Khanna Publishers, 2012.

References
1.   Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, Wiley Eastern, 2013.
2.   N.P. Bali, Manish Goyal, Textbook of Engineering Mathematics, 8/e, Laxmi Publications, 2011.

EMA102: ENGINEERING MATHEMATICS-II
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Matrices: Solution to system of linear simultaneous equations, Gauss elimination method, eigenvalues and eigenvectors of a matrix, Cayley-Hamilton theorem, reduction to diagonal form, quadratic forms and canonical forms.

Module II   **8 hours**
Multiple Integrals I: Double integrals, change of order of integration, double integrals in polar coordinates, area enclosed by plane curves.

Module III   **10 hours**
Multiple Integrals II: Triple integrals, volume of solids, change of variables, beta and gamma functions, relation between beta and gamma function.

Module IV   **6 hours**
Vector Differentiation: Scalar and vector fields, gradient, divergence, curl, directional derivative, vector identities, irrotational and solenoidal fields.

Module V   **10 hours**
Vector Integration: Line integral, surface integral, Green's theorem in plane, Stoke's theorem and Gauss divergence theorem.

Text Book(s)
1.   B.S. Grewal, Higher Engineering Mathematics, 42/e, Khanna Publishers, 2012.

References
1.   Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, Wiley, 2013.
2.   N. P. Bali, Manish Goyal, A Text Book of Engineering Mathematics, 8/e, Laxmi Publications, 2011.
3.   T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N.Prasad, Engineering Mathematics, Volume I, Volume II, S. Chand Publishers, 2013.

EMA201: COMPLEX VARIABLES AND TRANSFORMS
(Elective)

L T P C
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Module I   **8 hours**
Calculus of Complex Functions: Analytic functions, Cauchy-Riemann equations, harmonic functions, applications to flow problems, some standard transformations, bilinear transformation, conformal mappings, special conformal transformations ($w = z2$, $w= z+1/z$, $w = ez$, $w= coshz$).

Module II   **8 hours**
Complex Integration: Cauchy's theorem, Cauchy's integral formula, series of complex functions, Taylor's series, Laurent's series, Cauchy residue theorem, calculation of residues.

Module III   **8 hours**
Fourier Series: Periodic functions, Fourier series, conditions for a Fourier expansion, functions of any period, even and odd functions, half range expansions.

Module IV   **6 hours**
Fourier Transforms: Fourier integrals, Fourier cosine and sine integrals, Fourier transforms.

Module V   **10 hours**
Z-Transforms and Difference Equations: Definition of Z transform, linearity property, damping rule, Shifting un to the right and left, multiplication by n, initial value theorem, final value theorem, inverse Z transforms, convolution theorem, evaluation of inverse Z transforms, formation of difference equations, solving difference equations using Z transforms.

Text Book(s)
1. B. S. Grewal, Higher Engineering Mathematics, 42/e, Khanna Publishers, 2012.

References
1. R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, 2014.
2. N. P. Bali, Manish Goyal, A Text Book of Engineering Mathematics, 8/e, Lakshmi Publications, 2012.

EMA202: NUMERICAL METHODS
(Elective)

L T P C
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Module I   **8 hours**
Solution of Algebraic and Transcendental Equations: Bisection method,
secant method, false position method, Newton Raphson method.

Module II   **10 hours**
Interpolation: Difference operators and relations, difference tables,
Newton's forward and backward interpolation formulae, divided difference
formula, Lagrange's interpolation formula.

Module III   **6 hours**
Linear System of Algebraic Equations: Iteration method, Jacobi method,
Gauss-Seidal method, power method.

Module IV   **10 hours**
Numerical Differentiation: Derivatives using forward, backward and
central difference formulae. Numerical Integration: Newton-cotes quadra-
ture formula, trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule.

Module V   **8 hours**
Numerical Solutions of Ordinary Differential Equations: Introduction-
Picard's method, Taylor's series method, Euler's method, modified Euler's
method, Runge-Kutta method, predictor - corrector method.

Text Book(s)
1. M.K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical Methods for Scientific and
    Engineering Computation, 5/e, New Age International, 2007.

References
1. S.S. Sastry, Introductory Methods of Numerical Analysis, 4/e, Prentice Hall
    of India, 2009.

EMA203: PROBABILITY AND STATISTICS
(Elective)

L T P C
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Module I   **8 hours**
Probability: Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density laws, properties, mathematical expectation.

Module II   **8 hours**
Probability Distributions: Probability Distribution-Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

Module III   **10 hours**
Correlation - Regression Sampling Distribution and Estimation: Correlation, correlation coefficient, rank correlation, regression coefficients, principle of least squares, method of least squares, working procedure, regression lines, curvilinear regression, fitting of other curves, **Estimation:** Types of sampling, sample, populations, statistic, parameter, sampling distribution and standard error.

Module IV   **8 hours**
Testing of Hypothesis: Formulation of null hypothesis, critical regions, level of significance and power of the test. **Large Sample Tests:** Test for single proportion, difference of proportions, test for single mean and difference of means.

Module V   **8 hours**
Small Sample Tests: Student t-distribution (single mean, two means and paired t-test), testing of equality of variances (F-test), $\div 2$ - test for goodness of fit, $\div 2$ - test for independence of attributes.

Text Book(s)
1. Miller, Freunds, Probability and Statistics for Engineers,7/e, Pearson Education, 2008.
2. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand and Sons, 2012.

References
1. Sheldon P. Gordon, Florence S. Gordon, Contemporary Statistics: A Computer Approach, 2/e, McGraw Hill, 1994.
2. T. Veerarajan, Probability Statistics and Random Processes, 3/e, Tata McGraw Hill, 2008.
3. Kishor S. Trivedi, Probability Statistics with Reliability, Queuing and Computer Science Applications, 2/e, Prentice Hall of India, 2005.
4. M. R. Spiegel, J. Schiller, R. Alu Srinivasan, Probability and Statistics, Schaum Series, 2010.

EMA205: LINEAR ALGEBRA (Elective)

L T P C

3 0 0 3

Module I   10 hours

Vector Spaces: Vector space definition, general properties of vector spaces, vector subspaces, algebra of subspaces, linear combination of vectors, linear span, linear sum of two subspaces, linear independence and linear dependence of vectors, basis of a vector space, finite dimensional vector spaces, dimension of a vector space, dimension of a sub space.

Module II   8 hours

Homomorphism of vector Spaces: Homomorphism of vector spaces or linear transformations, isomorphism, quotient spaces, direct sum of spaces.

Module III   10 hours

Linear Transformations: Linear transformations, linear operator, range and null space of linear transformation, rank and nullity of a linear transformation, linear transformations as vectors, product of linear transformations, algebra or linear algebra, invertible linear transformation, singular and non singular transformations.

Module IV   8 hours

Inner product spaces: Inner product spaces, definition, euclidean and unitary spaces, norm or length of a vector, Schwartz's inequality, orthogonality, orthonormal set, complete ortho normal set, Gram - Schmidt orthogonalization process.

Module V   8 hours

Bilinear Forms: Bilinear forms, definition, bilinear forms as vectors, matrix of bilinear form, symmetric bilinear forms, skew - symmetric bilinear forms.

Text Book(s)

A.R. Vasishtha and J.N. Sharma, Linear Algebra, 42/e, Krishna Prakashan, 2010.

References

1.   S. Arumugam, Modern Algebra, Scitech Publications, 2004.
2.   J.B. Fraleigh, A First Course in Algebra, 3/e, Addison Wesley. 1986.
3.   S. Lipschutz, Beginning Linear Algebra, Tata McGraw Hill, 2005.
4.   M.L. Santiago, Modern Algebra, Tata McGraw Hill, 2002.
5.   Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Vikas Publishing House, 1982.

EMA208: DISCRETE MATHEMATICAL STRUCTURES
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**

Mathematical Logic: Connectives, negation, conjunction, disjunction, conditional and bi-conditional, well formed formulae, tautologies, equivalence of formulae, duality, tautological implications, functionally complete set of connectives, principal disjunctive and conjunctive normal forms, inference calculus, rules of inference, indirect method of proof, conditional proof, automatic theorem proving.

Module II   **10 hours**

Recurrence Relations: Recurrence relations, solving linear recurrence relations by characteristic roots method, system of recurrence relations, non - linear recurrence relations.

Module III   **8 hours**

Groups: Groups, subgroups, Lagrange's theorem on finite groups, normal subgroups, group codes.

Module IV   **8 hours**

Graph Theory: Definitions, finite and infinite graphs, incidence and degree, isolated pendant vertices, isomorphism, sub graphs, walk, path and circuit, connected and disconnected graphs, components, Euler graphs, Euler graph theorem, operations on graphs, decomposition of Euler graphs into circuits, arbitrarily traceable Euler graphs, Hamiltonian paths and circuits, number of edge disjoint Hamiltonian circuits in complete graph with odd number of vertices, travelling salesman problem.

Module 5   **8 hours**

Trees: Some properties of trees, pendant vertices, distance and centers, rooted and binary trees, spanning trees, fundamental circuit, shortest spanning trees, Kruskal's algorithm.

Text Book(s)

1.   J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 1997. (Modules 1 and 3)
2.   Joe L. Mott, Abraham Kandel and T. P. Baker, Discrete Mathematics for computer scientists & Mathematicians, 2/e, Prentice Hall of India Ltd, 2012. (Module 2)
3.   Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India, 2006. (Modules 4 and 5).

References

1.   Keneth. H. Rosen, Discrete Mathematics and its Applications, 6/e, Tata McGraw-Hill, 2009.
2.   Richard Johnsonbaug, Discrete mathematics, 7/e, Pearson Education, 2008.

EMA210: FUZZY SET THEORY, FUZZY LOGIC AND APPLICATIONS (Elective)

L T P C
3 0 0 3

Module I   **9 hours**

Fuzzy Sets: Introduction, t-norms, t-co norms, algebra of fuzzy sets, mixed fuzzy logic, alpha cuts, distance between fuzzy sets, fuzzy numbers, introduction, fuzzy numbers, fuzzy arithmetic, fuzzy Max. and Min., defuzzification.

Module II   **9 hours**

Fuzzy equations: Linear equations, classical solution, extension principal solution, alpha cut and interval, arithmetic solution, fuzzy inequalities, introduction, solving.

Module III   **8 hours**

Fuzzy Relations: Introduction, definitions, transitive, closure, fuzzy equivalence relation, fuzzy relation equations, fuzzy functions, introduction, extension, principle, alpha cut, interval, arithmetic, types of fuzzy functions, inverse functions, derivatives.

Module IV   **8 hours**

Approximate Reasoning: Introduction, approximate reasoning, multiple rules, discrete case.

Module V   **8 hours**

Fuzzy Optimization: Introduction, maximum / minimum of fuzzy functions, fuzzy problems.

Text Book(s)

James J. Buckley and Esfandiar Eslami, Advances in Soft Computing - An Introduction to Fuzzy Logic and Fuzzy Sets, 1/e, Springer International Edition, 2007.

References

1. George J. Klir and Bo Yuan, Fuzzy Sets, Fuzzy Logic and Fuzzy Systems, 5/e, Prentice Hall, 2007.
2. Selected papers by Lotfy A . Zadeh, Advances in Fuzzy systems - Applications and theory, 6/e, World Scientific, 1996.

EME121: WORKSHOP

$$\begin{array}{cccc} L & T & P & C \\ 0 & 0 & 3 & 2 \end{array}$$

Wood Working: **3 Classes**

Familiarity with different types of woods used and tools used in wood working and make following joints (a) half-lap joint (b) mortise and tenon joint (c) corner dovetail joint or bridle joint.

Sheet Metal Working: **3 Classes**

Familiarity with different types of tools used in sheet metal working, developments of following sheet metal jobs from GI sheets (a) tapered tray (b) conical funnel (c) elbow pipe.

Fitting: **3 Classes**

Familiarity with different types of tools used in fitting and following fitting exercises (a) V - fit (b) dovetail fit (c) semi-circular fit

Electrical Wiring: **3 Classes**

Familiarity with different types of basic electrical circuit connections and make the following connections (a) parallel and series (b) two way switch (c) godown lighting (d) tube light (e) three phase motor

EME123: ENGINEERING GRAPHICS

L T P C
1 0 3 3

Manual Drawing
Module I   **2L+6P**
Lettering, line types, dimensioning and scales. General construction method for polygons. Construction of pentagon and hexagon by special methods. **Conic Sections:** Ellipse, parabola, hyperbola with eccentricity method, tangent and normal to these curves. **Cycloidal curves:** Cycloid, epicycloid, hypocycloid, inferior and superior trochoid. Involute of a circle.

Module II   **3L+9P**
Projections of Points: Projections of points in different quadrants. **Projections of Straight lines:** 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 the other, line inclined to both the planes, inclinations, true length of the line and its traces. **Projections of Planes:** Types of planes, plane perpendicular to one plane and parallel to other plane, perpendicular to one plane and inclined to other plane.

Module III   **2L+6P**
Projections of Solids: Types of solids, projection of prism, pyramid, cylinder and cone in simple positions, axis inclined to one plane and parallel to other, axis inclined to both the planes.

Computer Based Drawing:
Module IV   **5L+15P**
Introduction to CAD package software commands. **Free Hand Sketching:** Free hand sketches of 2D. **Computer Aided Sketching:** Creation of 2D sketches by CAD package. **Orthographic Projections:** Principle of projection, orthographic projection, planes of projection, first angle and third angle projection. Orthographic views of geometric shapes.

Module V   **2L+6P**
Free Hand Sketching: Free hand sketches 3D of simple solids. Isometric Views: Pictorial drawing, isometric views of plane figures and simple solids represented by multi-view drawings.

Text Book(s)
1. M.B Shah, B.C Rana, Engineering Drawing, 2/e, Pearson Education, 2009.

References
1. N. D. Bhatt, V. M. Panchal, Engineering Drawing, 49/e, Charotar Publishing House, 2008.
2. K. L. Narayana, P. Kanniah, A Textbook on Engineering Drawing, SciTech Publications, 2014.

EME384 : OPTIMIZATION TECHNIQUES (Elective)

L T P C

3 0 0 3

Module I   10 hours

Introduction to Optimization: Engineering applications of optimization, statement of an optimization problem-design vector, design constraints, constraint surface, objective function, classification of optimization problems, optimization techniques. Classical optimization techniques: introduction, single variable optimization, multi variable optimization with no constraints, multi variable optimization with equality and inequality constraints-kuhn-tucker conditions, constraint qualification.

Module II   8 hours

Non-linear programming I: Unimodal function, elimination methods-unrestricted search, exhaustive search, dichotomous search, interval halving method, Fibonacci method, golden section method, interpolation method, cubic interpolation method, direct root method-Newton method, Secant method.

Module III   8 hours

Non-linear programming II: Classification of unconstrained minimization methods, random search methods, univariate method, pattern direction, Hooke's and Jeeve's method, Powell's method, indirect search methods-steepest descent method (Cauchy's method).

Module IV   8 hours

Non linear programming III: Characteristics of a constrained problem, direct methods - Random search methods, Complex method, Sequential linear programming, basic approach in the methods of feasible directions, indirect methods-transformation techniques, basic approach of the penalty function method.

Module V   8 hours

Integer Programming: Graphical Representation, Gomory's cutting plane method, Bala's algorithm for zero-one programming, Branch-and- bound method, generalized penalty function method.

Text Book(s)
1.   Singiresu S. Rao, Engineering Optimization-theory and practice, New Age International Pvt. Ltd., 3/e, 2013.

References
1.   Kalyan Moy Deb., Optimization for engineering design, PHI Learning Pvt. Ltd., 2/e, 2012.
2.   P.K Gupta, & D.S. Hira, Operation Research, S. Chand Publishers, 6/e, 2006.

EOE202: GERMAN FOR BEGINNERS
(Elective)

L T P C
3 0 0 3

Module I   **9 hours**
Introduction to the German language, grammar and pronunciation. Language: Greetings; Introducing oneself, asking the way, giving directions. Grammar: The nouns, gender distinctions, cases, definite and indefinite articles. Pronunciation: Vowels.

Module II   **8 hours**
Language: Asking for and giving information; Discussing home and the household. Grammar: Conjugation of verbs, verbs with separable and inseparable prefixes, modal verbs. Pronunciation: Vowels.

Module III   **8 hours**
Language: Describing people and their qualities, describing shape, size and colour of objects.
Grammar: Personal pronouns, possessive pronouns, reflexive pronouns. Pronunciation: Consonants.

Module IV   **8 hours**
Language: The Working World: Returning faulty goods to a shop, asking someone to repeat something; Refusing or declining politely. Grammar: Cases: nominative, accusative, dative. Pronunciation: Diphthongs.

Module V   **9 hours**
Language: Making Comments and Suggestions: Asking for and giving opinions. Grammar: Structure of sentence and categories of sentences; subordinate clause - causative and conditional sentences. Pronunciation: Umlaut.

References
1. Deutsch als Fremdsprache IA Grundkurs
2. Ultimate German Beginner - Intermediate (Coursebook), Living Language, 2004.

EOE204: CHINESE FOR BEGINNERS
(Elective)

L T P C
3 0 0 3

Module I   **9 hours**
Introduction to the Chinese language and pronunciation system; Tones; Chinese numbers; Language: Saying hello, greetings. Pronunciation: Initials: b p m n l h; Finals: a o e I u ü / ao en ie in ing uo; First tone.

Module II   **8 hours**
Language: Asking what someone wants; Identifying people; Asking someone's name and nationality Grammar: Word order in Chinese sentence. Pronunciation: Initials: d t g k f; Finals: ei ou an ang eng iao iou(iu); Second tone.

Module III   **8 hours**
Language: Introducing oneself; Asking for permission. Grammar: Sentence with an adjectival predicate; "Yes-no" question. Pronunciation: Initials: zh ch sh r; Finals : -I / ai uai ong; Third tone.

Module IV   **8 hours**
Language: Introducing oneself; Asking for permission. Grammar: Questions with an interrogative pronoun. Pronunciation: Initials: j q x; Finals: ia ian iang / uei(-ui) uen(-un) üe üan; Fourth tone.

Module V   **9 hours**
Language: Making comments and suggestions; Asking someone to repeat something; Refusing or declining politely. Grammar: Sentences with a verbal predicate. Pronunciation: Initials: z c s; Finals:-i er iong ua uan uang ün; Neutral tone; Retroflex ending.

*The course will focus on the pronunciation system, the introduction of common Chinese expressions and every-day phrases in the context of communicative activities.

References
1. Liu, Yuehua, Integrated Chinese: Simplified Characters Textbook, Level 1, Part 1. Cheng and Tsui Company, Inc. Boston, 2008.

EOE206: INTRODUCTION TO MUSIC
(Elective)

L T P C
3 0 0 3

Module I   8 hours
Introduction to Indian Classical Music: Heritage-Contribution of various races and tribes to the evolution of music in India, technical aspects of Indian classical music, influences Persian music especially on hindustani music, significance of music in bringing about social change.

Module II   9 hours
History of Indian Music: Origin-Vedas, scriptures and bharata's natyasastra, traditions- hindustani and carnatic, basic elements, shruthi, swara, raaga and taala, similarities and variations in hindustani, carnatic and western classical music, octave, semitones, introduction to shruthi, swara, raaga and taala, fundamental ragas, importance of taala in indian music, introduction to pallavi, anupallavi and charana.

Module III   8 hours
Hindustani Music: Brief history of hindustani music, concepts of raaga and taala, introduction to various gharanas, classification of music (folk, semi-classical, bhajans, light), appreciation of music.

Module IV   8 hours
Carnatic Music: History of carnatic music, traditions, the musical trinity, Syama Sastri, Thyagaraja, Muthuswami Dikshitar, introduction to technical terms in carnatic music, compositional forms/strategies.

Module V   9 hours
Connections-Music, Art and Culture: Musical oral tradition as a transmitter of culture, music as an expression of societal change, music as a means of communication across cultures.

References
1. Rangaramanuja Iyengar R., History of South Indian Carnatic Music: From Vedic Times To The Present, Wilco Publishing House, 1972.
2. Beni Madhab Barua, Swami Prajnanananda, The Historical Development of Indian Music: A Critical Study, Buddh Gaya, India, 1973.
3. G.H. Ranade, Hindustani Music, Popular Prakashan, 1971.

EOE208: GANDHIAN PHILOSOPHY
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Gandhi -The Man and His Times: Early life and education, lessons learnt
from his wife, in South Africa, influence of Thoreau, Tolstoy and other
thinkers, return to India, Sabarmati ashram, role in the Indian national
movement, his impact during his life time.

Module II   **8 hours**
Interpretation and Pursuit of Truth: Learning through trial and error;
power of introspection, truth in thought, speech and action, pursuit of truth
as true devotion to god, truth leads to courage and victory.

Module III   **8 hours**
Peace and Conflict Resolution: Ahimsa as practical idealism - the means
to the goal of truth, non-violent civil resistance, living faith in the power
of nonviolence, prerequisites for practice, faith, courage and humility,
prevention of structural violence, two pronged approach - conflict reso-
lution and establishing peace, examples of methods and practices.

Module IV   **8 hours**
Transformation of the Individual: Liberating the mind from dogmatism,
control of the senses, thoughts and actions, respect for all faiths and
universalism, a few strategies- Anasakta Karma, non-discrimination, simple
living and self-sufficiency.

Module V   **10 hours**
Contemporary Relevance: Gandhi's social, political and economic thought,
sarva dharma sambhava - tolerance, respect towards all religions, educa-
tional reform - basic education and adult education, social equality-
sarvodaya, removal of untouchability, communal unity, women empow-
erment, prohibition, service of backward classes, village sanitation, po-
litical solutions-swaraj, decentralization of power, democracy of enlight-
ened majority, economic solutions-swadeshi, trusteeship, khadi and vil-
lage industries, decentralization of wealth, sustainable development and
equal opportunity, youth as agents of change.

References
1. Gandhi M.K., Mahadev H. Desai, Gandhi An Autobiography: The Story of
    My Experiments With Truth, Beacon Press, 1993.
2. Fischer, Louis, The Essential Gandhi: An Anthology of His Writings on His
    Life, Work, and Ideas. Vintage Books, 1983.
3. http://www.mkgandhi.org/main.htm
    Comprehensive Website by Gandhian Institutions - Bombay Sarvodaya Mandal
    and Gandhi Research Foundation

EOE210: PHILOSOPHICAL FOUNDATIONS OF EDUCATION (Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Introduction: Philosophy's relevance to education; Philosophical roots of education, education as transmission of knowledge, education as the fostering of inquiry or reasoning skills, education as an agent of social change or personal liberation, liberal education and vocational education.

Module II   **9 hours**
Philosophical Concepts Related to Education: Indian: from the vedic to the modern - an overview; Western: an overview - metaphysics - naturalism or supernaturalism; Epistemology - reason or faith; Human nature - dualism, reductive materialism or integrationism; Ethics - egoism, predation or altruism; Idealism, Realism, Pragmatism, Behaviorism, Existentialism.

Module III   **9 hours**
Knowledge and Wisdom: Interrelation between education, science, technology, society and environment, Galileo to today-an overview.

Module IV   **8 hours**
Purposes of Education: Personal growth or self-improvement, intellectual purposes, political purposes, economic purposes such as job preparation, social purposes such as the development of social and moral responsibility.

Module V   **8 hours**
A Few Thinkers on Education and their Impact on Education: Eastern and western-Confucius, Socrates, Plato, Aristotle, Michel Foucault, Bertrand Russel, Rabindranath Tagore, Sri Aurobindo, Swami Vivekananda, J. Krishnamurti, S. Radhakrishnan, M.K. Gandhi.

References
1. Sharma, A.P., Indian and Western Educational Philosophy, Pustak Mahal, 2010.
2. Ozmon, Howard, Philosophical Foundations of Education, Prentice-Hall, 2011.
3. Palmer Joy, Bresler Liora, Cooper David, Fifty Major Thinkers on Education: From Confucius to Dewey, Routledge, 2001.
4. Noddings N., Philosophy of Education, Boulder, CO, Westview Press, 1995.
5. Gailbraith D., Analyzing Issues: Science, Technology and Society, Trifolium Books. Inc., Toronto, 1997.

EOE212: ANALYTICAL ESSAY WRITING (Elective)

L T P C
3 0 0 3

Module I   **9 hours**
Mechanics of Essay Writing: Framework of an essay, introduction, hypothesis/statement of claim, body-claims and counter claims, refuting or disproving the opposing position with reasons and examples, providing evidence and examples that prove or support one's claim, conclusion-restatement of the claim and summary of the main ideas, paragraphing, discourse markers.

Module II   **9 hours**
Analyzing an Argument: Terms and definitions, statement, argument, claim, truth value, premise, identifying premises and claims/conclusions, strengths and weaknesses of an argument, discussion on the validity of a claim, scope for counter-argument if any, critiquing an argument.

Module III   **8 hours**
Analyzing an Issue: An issue statement or statements followed by specific task instructions, discussing the extent to which one agrees or disagrees with the statement, rationale for the position one takes, developing and supporting one's position, discussion on the validity of the given statement/claim, addressing the different views that are presented, remaining unbiased in assessing a claim, taking a stand and justifying it, writing a response.

Module IV   **9 hours**
Writing an Argumentative Essay on a Topic of Contemporary Interest: Planning, writing and revising, clear, concise and defined thesis statement that occurs in the introduction, clear and logical transitions. **Body Paragraphs that include Evidential Support** (factual, logical, statistical or anecdotal), conclusion that does not simply restate the thesis, but re-addresses it in light of the evidence provided.

Module V   **7 hours**
Peer Review: Preparing a template for peer review that is derived from the response rubric given to the student and assessment rubric used for evaluation, formulating and communicating constructive feedback on a peer's work, responding to feedback on one's work, checklist for peer review-lead strategy use in the introduction, thesis statement, supporting details given in the body, the writer's acknowledgement of a counterargument and his/her response to it, closing strategy used in the conclusion.

References
1. Bailey S., Academic Writing: A Handbook for International Students, Routledge, London and New York, 2001.
2. Jordan R.R., Academic Writing Course, Nelson/Longman, London, 1999.
3. Hamp-Lyons L., Heasley B., Study Writing, Cambridge University Press, 2006.

EOE214: INDIAN ECONOMY
(Elective)

L T P C
3 0 0 3

Module I   8 hours
Structure of Indian Economy: Meaning of economic growth and development, features of Indian economy, changing structure of Indian economy, trends in national income, sources of growth, agriculture, industry and service sectors.

Module II   8 hours
Demography, Poverty and Unemployment in India: Demography: Population size and growth rates, age and gender distribution, trends of urbanization, occupational distribution of labour force. Poverty: Nature of poverty causes for poverty, measures to eradicate poverty. Unemployment: Nature and types of unemployment, causes for unemployment, remedial measures of unemployment.

Module III   8 hours
Public Finance: Sources of government revenue, Indian tax structure, direct and indirect taxes, composition of the government expenditure, role of monetary and fiscal policies, federal finance in India, 14th finance commission.

Module IV   8 hours
Foreign Trade: Importance, composition and direction of foreign trade, foreign direct investment, BoPs equilibrium, Foreign Exchange Management Act (FEMA).

Module V   8 hours
Economic Reforms in India: Industrial policy 1991, economic reforms, liberalization, privatization, and globalization.

Text Book(s)
1. V. K. Puri, S.K. Misra, Indian Economy, 31/e, Himalaya Publishing House, 2014.

References
1. R.C. Dutt, K.P.M. Sundaram, Indian Economy, S. Chand and Company, 2010.
2. A. N. Agarwal, Indian Economy, New Age International Limited, 2012.
3. I.C Dhingra, Indian Economy, Sultan Chand and Company, 2007.

EOE216: PUBLIC ADMINISTRATION
(Elective)

L T P C
3 0 0 3

Module I   **10 Hours**
Introduction: Meaning, scope and significance of public administration, evolution of the discipline and its present status, challenges of liberalisation, privatization and globalization, good governance, electronic governance-concepts and applications, New Public Management (NPM).

Module II   **8 Hours**
Administrative Thought: Scientific management theory, classical theory, bureaucratic theory, human relations theory, system theory.

Module III   **8 Hours**
Accountability and Control: Legislative, executive and judicial control over administration, role of media, interest groups, NGOs, civil society, Right to Information Act (RTI), social audit, citizen chapters.

Module IV   **8 Hours**
Union and State Governments Administration: President, prime minister, council of ministers, cabinet, central and state secretariats, boards and commissions, governor, chief minister and council of ministers, central- state relations, finance commission, Neeti ayog.

Module V   **8 Hours**
Civil Services: Recruitment, training and other condition of services, district administration, role of collector, local self governing institutes-73rd and 74th constitutional amendments act.

Text Book(s)
1. Avasti, Maheswari, Public Administration, 31/e, Lakshmi Narain Agarwal Books, India, 2014.
2. B. L. Fadia, Kuldeep Fadia, Indian Administration, 8/e, Sahitya Bhawan, India, 2014.

References
1. Nicholas Henry, Public Administration and Public Affairs, 21/e, Prentice Hall of India, 2012.
2. D. Ravindra Prasad, ?V. Sivalinga Prasad, ?P. Satyanar?yana, Administrative Thinkers, 2/e, Sterling Publishers, 1991.
3. D. D. Basu, Introduction to the Indian Constitution, 21/e, Lexis Nexis Butterworths, Wadhwa Nagpur, 2013.
4. Ramesh K. Arora, Rajni Goyal, Indian Public Administration, 3/e, New Age International Publishers, India, 1995.

EOE218: ENVIRONMENT AND ECOLOGY
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Basic Concepts: Environment types, features of environment, structure of atmosphere, earth's four spheres, ecology, ecological principles, photosynthesis, components of ecosystem, carbon and oxygen cycles, nitrogen, hydrological, sedimentary, phosphorous and energy cycles.

Module II   **8 hours**
Biomes: Terrestrial biomes, Aphine Tundra biomes, extinction of species. Bio-diversity: Biodiversity in American contents, Europe, central Asia and Africa. Categorization of species, biogeographic zones of India, biodiversity conservation, strategies, biodiversity conservation in India.

Module III   **8 hours**
Environmental Degradation and Management: Greenhouse effect and global warming, acidification, world distribution of acid rain, impact of acid of precipitation, ozone depletion, Antarctic ozone hole, some basic facts about ozone depletion, salinisation, desertification or desertisation, soil erosion, types of soil erosion, soil conservation, deforestation, waste disposal, sustainable development.

Module IV   **8 hours**
Natural Hazards and Disaster Management: Disaster, natural hazards, earthquakes in India, seismic zones of India, earthquake prediction, tsunami, landslides, types of landslides, avalanches, cyclones, thunderstorms, tornadoes, surge, sea-surge or storm surge. Floods: floods in India, flood disaster management. Drought hazards: causes of droughts, consequences of droughts, biological hazards and disasters, famines, wildfire (forest fire), forest fires in India.

Module V   **8 hours**
Climate Change: Evidence of global warming, consequences of climatic change, consequences of climate change in India. Biodiversity and Legislation: Earth summit, the five earth summit agreements, the Montréal protocol, Kyoto protocol on climatic change.

Text Book(s)
1. Majid Husain, Environment and Ecology, 2/e, Access Publishing, New Delhi, 2014.

References
1. S. V. S. Rana, Essentials of Ecology and Environmental Science, Prentice Hall India, New Delhi, 2011.

EOE220: INDIAN HISTORY (Elective)

L T P C
3 0 0 3

Module I   **10 hours**
Ancient Indian History and Culture (Earliest Times to 700 AD): Indus valley civilisation, origin, significance. art and architecture, aryans and vedic period, expansions of Aryans in India, significance of the vedic age, evolution of monarchy and varna system, political conditions and administration under Mauryas, Guptas, social and economic conditions in ancient India, philosophy and religions in ancient India.

Module II   **8 hours**
Medieval Indian History and Culture: Delhi sultanate, great mughals, bahumanis, rise of south supremacy and conflicts, Pallava, Chalukya, Chola and Rasthrakutas.

Module III   **8 hours**
Modern Indian History and Culture: European penetration into India, the Portuguese and the Dutch, the English and the French east India companies, their struggle for supremacy, the battle of Plassey and its significance, consolidation of British rule in India.

Module IV   **8 hours**
Impact of British Colonial Rule: Economic: Commercialization of agriculture, dislocation of traditional trade and commerce, de-industrialisation, decline of traditional crafts, drain of wealth, famine and poverty in the rural interior. **Social and Cultural Developments:** The state of indigenous education and its dislocation, orientalist, anglicist controversy, introduction of western education in India, the rise of print media, literature and public opinion, the rise of modern vernacular literature, progress of science, rail and road connectivity.

Module V   **8 hours**
The Rise of Indian National Movement: Indian response to British rule, the great revolt of 1857, the peasant movements of the 1920s and 1930s, the foundation of the Indian national congress, the moderates and extremists, the partition of Bengal (1905), the swadeshi movement in Bengal, the economic and political aspects of swadeshi movement. Gandhian nationalism: Gandhi's popular appeal, Rowlett Act, satyagraha, the Khilafat movement, the non-cooperation movement, civil disobedience movement, Simon commission, the peasant and working class movements, Cripps mission, the quit India movement, declaration of independence.

Text Book(s)

1. Romila Thapar, A History of India, Vol. I, Penguin Books, 2013.
2. R.C. Majumdar, The History and Culture of the Indian People: Volume 1, The Vedic Age, Bharatiya Vidya Bhavan, 2010.
3. B. L. Grover, Modern Indian History: From 1707 to the Modern Times, S. Chand, 1998.
4. R.C. Majumdar, History of the Freedom Movement in India, South Asia Books, 1988.

References

1. D. N. Jha, Ancient India in Historical Outline, Manohar Publishers and Distributors, 2001.
2. G. S. Chabra, Advanced Study in the History of Modern India, Lotus Press, 2007.
3. M.K. Gandhi, Hind Swaraj: Indian Home Rule, Sarva Seva Sangh Prakashan, Varanasi, 2014.
4. W. W. Hunter, History of British India, Read Books Design, India, 2010.
5. A. R. Desai, Social Background of Indian Nationalism, 6/e, Popular Prakashan, 2005.

EOE301: INDIAN CONSTITUTION
(Elective)

L T P C
3 0 0 3

Module I   **10 Hours**
Introduction to Indian Constitution: Constitutional history, constituent assembly, salient features of the constitution, significance of preamble, amending process of the constitution.

Module II   **8 Hours**
Rights and Duties: Citizenship, fundamental rights and directive principles, fundamental duties.

Module III   **8 Hours**
Union Government: President and vice president, election, removal and powers, prime minister and council of ministers, parliament, supreme court, union, state relations, emergency provisions.

Module IV   **8 Hours**
State and Local Governments: Governor, state legislature, assembly and council, chief minister and council of ministers, high court, rural and urban local governments with special reference to 73rd and 74th constitutional amendment acts.

Module V   **8 Hours**
Other Constitutional and Statutory Bodies: Comptroller and auditor general, election commission, finance commission, attorney general and advocate general, union public service commission (UPSC), state public service commissions (SPSCs), tribunals, national human rights commission (NHRC).

Text Book(s)
1. J. C. Johari, Indian Government and Politics, Vishal Publications, Delhi, 2010.
2. M. V. Pylee, Introduction to the Constitution of India, 5/e, Vikas Publishing House, Mumbai, 2009.

References
1. D.D. Basu, Introduction to the Indian Constitution, 21/e, Lexis Nexis, Gurgaon, India.
2. Subhas C. Kashyap, Our Constitution, 2/e, National Book Trust India, New Delhi.

EOE303: JAPANESE FOR BEGINNERS
(Elective)

L T P C
3 0 0 3

Module I   **9 hours**

Introduction to Japanese language, simple explanation of writing and pronunciation systems, characteristics of Japanese, grammar, meeting people, introductions, exchanging business cards, identifying people and things, useful daily expressions.

Module II   **8 hours**

Asking about business hours, shopping, time and numbers, large numbers, counters. Grammar: Pronouns and noun modifiers. Useful daily expressions.

Module III   **8 hours**

Getting around, confirming schedules (including going/coming), visiting another company (including month/week/day). Grammar: Motion verbs. Useful daily expressions.

Module IV   **8 hours**

Existence of people and things, asking/telling location, dining out, making plans for a weekend.
Grammar: State of being/existence, basic verbs. Useful daily expressions.

Module V   **9 hours**

Giving and receiving, expressing gratitude, talking about plans (usage of Te-Form), Grammar: Adjectives, present form of i-adjective, present form of na-adjective, past forms of i-adjective and na-adjective, the Te-Form. Useful daily expressions.

References

1. Ajalt, Japanese for Busy People: Romanized Version Volume 1, 2006.

   *Study through Romanized Textbook - No reading/writing in Japanese letters

EOE305: FRENCH FOR BEGINNERS
(Elective)

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Module I   **9 hours**

Asking for and giving personal information, asking for and giving directions, gender and number. Grammar: Verbs "avoir" and "etre", present tense, questions, vocabulary: countries and nationalities, professions, family, food

Module II   **8 hours**

Asking and giving the time, asking when something is open or someone is available, asking for prices and describing what one wants. Grammar: Alphabet and numbers, possessive adjectives, negative sentences. Vocabulary: Days of the week, months, money.

Module III   **8 hours**

Asking for information related to travel and accommodation, expressing one's wants/needs.
Grammar: Present tense for verbs in -er, -ir and -re, present tense of irregular verbs. Verbs: to be able to, to want, to know. Vocabulary: Food, shops, packaging and measures.

Module IV   **8 hours**

Talking about daily routine and the working day, describing things, expressing oneself when buying things. Grammar: Possessive pronouns, reflexive verbs. Vocabulary: Clothes, colours and shapes, weather.

Module V   **9 hours**

Describing places; visiting the doctor, reading short advertisements, describing places, feelings and symptoms. Grammar: Using avoir aller, etre faire, vouloir pouvoir. Vocabulary: Parts of the body, rooms and features of interior spaces.

References
1. LE NOUVEAU SANS FRONTIÈRES - Textbook
2. LE NOUVEAU SANS FRONTIÈRES - Workbook
   CD and selected passages/ exercises

EOE307: CONTEMPORARY RELEVANCE OF INDIAN EPICS (Elective)

L T P C
3 0 0 3

Module I   8 hours
Reading the Texts: Reading for gist, chapter summaries, plot, pair work and discussions in small groups.

Module II   8 hours
Understanding the Texts: Basic themes, characterization-major characters, watching short videos followed by discussion, analysis and writing short reviews.

Module III   8 hours
Story Retelling and Responsive Writing: Narrating short episodes, enacting select scenes, role play, writing short paragraphs and short essays based on basic themes, plot and major characters.

Module IV   9 hours
Exploring the Texts from Socio-cultural and Political Perspectives: Identifying examples of mutual co-existence, duties and responsibilities of individuals in the context of family and society, righteous action, conflict between good and evil, possibilities of redefining cultural and political systems, identifying spaces for reconciliation in conflict situations.

Module V   9 hours
Contemporary Relevance of the Epics: Human relations, team play, leadership lessons, resource management, core competencies and competitiveness.

References
1. C. Rajagopalachari, Ramayana, 44/e, Bharatiya Vidya Bhavan, Mumbai, India, 1951.
2. C. Rajagopalachari, Mahabharata, 57/e, Bharatiya Vidya Bhavan, Mumbai, India, 2012.
3. R. K. Narayan, The Mahabharata: A Shortened Modern Prose Version of the Indian Epic, Penguin Group, 2009.
4. R. K. Narayan, The Ramayana: A Shortened Modern Prose Version of the Indian Epic, Penguin Classic, 2006.

EOE309: INDIAN NATIONAL MOVEMENT
(Elective)

L T P C
3 0 0 3

Module I   9 hours
Background: Early British colonialism in India, early rebellions-Pazhassi Raja (the cotiote war - Kerala, 18th century), Veerapandiyan Kattabomman (Tamilnadu/Madras Presidency - 18th century), Paik rebellion (Kalinga/ Odisha, early 19th century), Vellore mutiny (early 19th century); The Sepoy Mutiny of 1857 and its consequences.

Module II   8 hours
Contributory Factors: Socio-political consciousness, growth of Western education and its impact on socio-religious movement, British economic policies and their impact.

Module III   8 hours
Rise of Organized Movements: Emergence of Indian national congress, its policies and programmes, partition of Bengal, rise of radical nation- alists, Bal-Lal-Pal, formation of the Muslim league; Minto-Morley reforms, the national movement during the first world war.

Module IV   9 hours
Gathering Momentum: Non-cooperation and civil disobedience, emer- gence of Gandhi, some prominent revolutionaries - Khudiram Bose, Prafulla Chaki, Bhupendra Nath Dutt, V.D. Savarkar, Sardar Ajit Singh, Lala Hardayal, Sardar Bhagat Singh, Raj Guru, Sukh Deo, Chandra Shekhar Azad, development of socialist ideas, communal divide.

Module V   8 hours
Towards Independence: Constitutional developments, provincial elections, quit India movement and after, participation of women, national move- ment during the second world war, Indian national army, naval mutiny of 1946, freedom and partition, impact on the world.

References
1. K. Majumdar, Advent of Independence, Bhartiya Vidya Bhavan, Mumbai, 1969.
2. R. Desai, Social Background of Indian Nationalism, 5/e, Popular Prakashan, Mumbai, 1976.
3. Bandyopadhyay, Sekhar, Nationalist Movement in India: A Reader, Oxford University Press, 2008.
4. Chandra, Bipin, Nationalism and Colonialism in Modern India, Orient Longman Limited, New Delhi, 1979.

EOE311: SCIENCE AND TECHNOLOGY
(Elective)

L T P C
3 0 0 3

Module I   8 hours
Planet Earth: Introduction, the crust in motion, earth quakes, mineral future, promise of oceans, changing climate, green house effect, global environmental issues, meteorological science, preserving mother earth.

Module II   8 hours
Living State: Introduction, molecular genetics, cell biology, immunology, neuro sciences, biology and agriculture, storage of food grains, agriculture products and their preservation, biotechnology in food processing.

Module III   8 hour
Energy: Introduction, some important time perspectives, mid-term energy options, mid-term supply strategies, hydro, wind, thermal, solar and nuclear energies, environmental and health effects in harvesting energy, long term energy options, some research needs.

Module IV   8 hours
Computer and Communications: Introduction, development of communication system, telegram, telephone, wireless communication, current technology and systems, theoretical computer science and contribution from mathematics, computer and communications, artificial intelligence, television and entertainment.

Module V   8 hours
Materials and Processing: Materials in ancient India, development in materials, materials processing and manufacturing: recent concepts in materials, polymer materials, composites, nano sciences and nano technologies, super conductivity, laser and photonics.

Text Book(s)
1. Ashok Singh, Science and Technology, 2/e, Access Publishing, 2014.
2. WH Freeman and Company, National Academy of Sciences, Washington D.C., 1979.

References
1. K D Sharma, M. A. Qureshi, Science, Technology and Development, Sterlings Publishers Pvt. Ltd., New Delhi, 1978.
2. B. R. Nanda (Editor), Science and Technology in India, Vikas Publishing House Pvt Ltd, 1977.

EOE313: PROFESSIONAL COMMUNICATION
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Internal Communication: Memo-structure, layout and style, e-mail-structure, style, content and etiquette, notice-structure, content and layout, conducting a meeting, purpose and preparation, drafting agenda and minutes, conducting effective meetings, meeting etiquette.

Module II   **9 hours**
Making a Business Presentation: Planning-define the purpose, analyze audience and occasion, preparation-developing central idea, main ideas, gathering supporting materials, audio-visual aids, organization-introduction, body and conclusion, delivery-addressing the audience, body language, eye contact, use of appropriate language, style and tone.

Module III   **8 hours**
Business Letters: Form and structure, style and tone, letters of enquiry, letters placing orders/ giving instructions/urging action, letters of complaint and adjustment.

Module IV   **9 hours**
Proposals and Reports: Proposals, types, structure, prefatory parts, body of the proposal, supplementary parts, reports, types, informative, analytical, formal/informal, oral/written, individual/group, format and structure.

Module V   **8 hours**
Resume, Cover Letter, Interview and Telephone Etiquette: Resume, design and structure, cover letter, cover letters, accompanying resumes, opening, body, closing; Interview, planning, purpose, pre-interview preparation, conversation, two-way interaction, projecting a positive image, telephone etiquette-guidelines for telephone conversations in a professional context.

References
1. Seely, John, Oxford Guide to Effective Writing and Speaking, Oxford University Press, India, 2013.
2. Olsen Leslie, Huckin Thomas, Technical Writing and Professional Communication for Non-Native Speakers, McGraw Hill, 1991.
3. Rizvi, M. Ashraf, Effective Technical Communication, Tata McGraw Hill, 2005.

EOE315: ETHICS, INTEGRITY AND ATTITUDE
(Elective)

L T P C
3 0 0 3

Module I   **8 hours**
Basic Concepts: Terminology, morals, ethics, values, integrity and spirituality, edicts-religious, social and constitutional edicts, the question of universality, personal and professional ethics, emotional intelligence, dimensions of ethics.

Module II   **8 hours**
Rights and Responsibilities: As citizens, as professionals, concepts of justice and fairness, preservation, production, exchange for mutual fulfilment vs. storage for future use, social responsibility and individual rights.

Module III   **9 hours**
Global Issues in Ethics: Technology and globalization, business ethics, corporate social responsibility, environmental ethics, media ethics, protecting the common good while respecting the values and beliefs of nations/ethnic groups, issues of compliance and governance, equal opportunities.

Module IV   **8 hours**
Ethical Integrity and Attitudes: Integrity as wholeness and consistency of character, beliefs, actions, methods and principles, core group of values, accountability, prioritization, subjectivity and objectivity, attitude, components (cognitive, behavioral and affective), attitude formation and attitude change.

Module V   **9 hours**
Ethical Living: Needs of life, materialistic and non-materialistic, qualitative and quantitative, harmony in living, self (physical and mental well being), family, building trust, sharing of responsibilities, cultivating sense of security, society, peace, non-violence, diversity, multiculturalism and oneness, nature, environmental sustainability, reorganizing living conditions, reappraising economic sectors and work practices, developing green technologies, ethical consumerism.

References
1. G. Subba Rao, Roy Chowdhury, P.N. Ethics, Integrity and Aptitude: For Civil Services Main Examination Paper V, Access Publishing, 2013.
2. Singer, Peter. Practical Ethics, Cambridge University Press, 1999.
3. Swami Tathagatananda, Healthy Values of Living, Advaita Ashrama, Kolkata, 2010.
4. M. Frost (Ed), Values and Ethics in the 21st Century, BBVA, Available at https://www.bbvaopenmind.com/wp-content/uploads/2013/10/Values-and-Ethics-for-the-21st-Century_BBVA.pdf

EOE317: PERSONALITY DEVELOPMENT
(Elective)

L T P C
3 0 0 3

Module I **8 hours**
Self Awareness: Know yourself, have a snapshot of yourself, assess your personal traits, discover natural potential. Activities and Tasks: Class discussion, questionnaires, Johari Window, SWOC analysis (strengths, weaknesses, opportunities and challenges).

Module II **8 hours**
Self Discipline: Importance of self discipline, characteristics of a self disciplined achiever, self discipline in personal life and career. Activities and Tasks: Viewing short videos followed by discussion and analysis, brainstorming in small groups, creating an action plan to realize academic and career goals.

Module III **8 hours**
Motivating Oneself: Self motivation, confidence building, goal setting, decision making. Activities and Tasks: Discussion and analysis of case studies, completing self-assessment questionnaires.

Module IV **9 hours**
Managing Oneself: Handling emotions, time management, stress management, change management. Activities and Tasks: Discussion and analysis of case studies, completing self-assessment questionnaires.

Module V **9 hours**
Interpersonal Behaviour: Attitude towards persons and situations, team work, leadership skills, problem solving skills, interpersonal adaptability, cultural adaptability. Activities and Tasks: Team-building games and activities.

References
1. Hurlock Elizabeth B., Personality Development, McGraw Hill Education, India, 1979.
2. Covey, Stephen R., The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change, Free Press, 2004.
3. Carnegie, Dale, Levine, Stuart. R., The Leader In You: How to Win Friends, Influence People and Succeed in a Changing World, Pocket Books, 1995.
4. Swami Vivekananda, Personality Development, Advaita Ashrama, 1993.

* This will be supplemented by materials and activities from internet-related sources.

EPH101: ENGINEERING PHYSICS

L T P C
3 0 0 3

Module I   **10 hours**
Interference: Introduction, interference in thin films due to reflected light, interference in wedge shaped film, Newton's rings, Michelson's interferometer, Applications: To find the diameter of a wire, to find the wavelength of light and refractive index of liquids and thin transparent sheets, flatness of surface, thickness of thin-film coating, anti-reflection coatings.
Diffraction: Introduction, Fraunhoffer diffraction at single slit, diffraction due to N-slits (diffraction grating), highest possible orders, determination of wavelength of light with a plane transmission grating, resolving power of a grating, dispersive power of a grating.

Module II   **8 hours**
Polarisation: Introduction, double refraction, double refraction in calcite crystal, negative and positive crystals, Nicol's prism, retarders (quarter and half-wave plates), production and detection of linearly, circularly and elliptically polarised lights, analysis of polarized light. Applications: Sunglasses, photography, optical microscopy, liquid crystal display, photoelasticity.

Module III   **8 hours**
Lasers: Introduction, spontaneous and stimulated emissions, population inversion, components of a laser, lasing action, types of lasers-ruby laser, He-Ne laser, semiconductor laser, applications: in industry, medicine, new materials. **Fiber Optics:** Introduction, structure of an optical fiber, principle of propagation, acceptance angle, numerical aperture, types of optical fibers, single mode and multimode step index fibers, multimode graded index fiber, classification of fibers based on materials, fibre optics in communication, applications of fiber optics.

Module IV   **8 hours**
Modern Physics (Quantum Physics): Introduction, matter waves and its properties, Davisson-Germer experiment, GP Thomson experiment, Heisenberg's uncertainty principle, Schrodinger's time independent wave equation, physical significance of wave function, particle in a one-dimensional infinite well, rectangular potential barrier (transmission coefficient), band theory of solids (qualitative), distinction between metals, insulators and semiconductors, introduction to Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstien statistics.

Module V **9 hours**

Ultrasonics: Introduction, properties of ultrasonic waves, production of ultrasonics by magnetostriction and piezoelectric effects, detection (Kundt's tube, sensitive flame, acoustic grating and piezoelectric methods), applications of ultrasonics. Electromagnetism: Coulomb's law, Flux, Gauss' law of electrostatics in free space, significance of gradient, divergence, and curl operators, divergence of electric field, differential form of Gauss' law, Ampere's law, Gauss' law for magnetism, integral form of Faraday's law, equation of continuity, displacement current, Maxwell's equations.

Text Book(s)
1. M.N. Avadhanulu, P.G. Kshirsagar, A Textbook of Engineering Physics, S.Chand, 2014.

References
1. Resnick, Halliday, Krane, Physics, Part I and II, 5/e, Wiley India, 2007.
2. A.Ghatak, Optics, 4/e, Tata McGraw Hill Education, 2008.
3. Arthur Bieser, Concepts of Modern Physics, 6/e, Tata McGraw Hill, 2009.
4. A Marikani, Engineering Physics, 2/e, Prentice Hall of India, 2013.

EPH102: MATERIALS SCIENCE
(Elective)

L T P C
3 0 0 3

Module I   **10 hours**
Crystallography: Forces between atoms, bonding in solids, ionic, covalent and metallic bonding; Fundamental concepts of crystals, lattice points and space lattice, crystal systems, Bravais lattices, directions, planes and Miller indices, atomic packing fraction, structure of simple cubic, body centered cubic (CsCl), face centered cubic (NaCl), hexagonal closed packed (HCP), diamond structure; X-ray diffraction, Bragg's law.

Module II   **8 hours**
Characterization Techniques: X-ray diffraction, powder X - ray diffractometer, construction and working, crystalline phase analysis, fundamentals of transmission electron microscopy and scanning electron microscopy(SEM), study of crystal structure using TEM, study of microstructure using SEM, scanning electron microscopy with EDS, construction and working, grain size and chemical analysis atomic force microscopy, construction and working, scanning tunneling microscope, construction and working.

Module III   **10 hours**
Crystal Imperfections: Point defects, vacancies and self interstitials, impurities in solids, dislocations, linear defects, interfacial defects, bulk or volume defects edge and screw dislocation. **Mechanical Behaviour:** Elastic behaviour of metals, stress-strain relation, Hooke's law, atomic model of elastic behaviour, plasticity, ductile and brittle materials, tensile strength, hardness, fatigue, creep, fracture, types of fracture.

Module IV   **8 hours**
Diffusion and Phase Transformation in Solids: Fick's laws of diffusion, experimental determination of diffusion coefficient, Kirkendall effect, atomic model of diffusion. Time scale of phase changes, nucleation and growth, nucleation kinetics, applications, solidification and crystallization, glass transition.

Module V   **10 hours**
Nanoscience: Overview of nanotechnology, quantum effect, nanotechnology in nature, energy levels in nano films, nanowires and

nanodots. Growth techniques, physical vapor deposition, ball milling, lithography techniques, properties at nanoscale, size dependence, structural, chemical, optical, mechanical, electrical and magnetic properties. Applications of Nanomaterials: Sensors and actuators, catalysis, biomedical, advanced electronic materials, current challenges and future trends, safety and societal implications.

Text Book(s)
1. V. Raghavan, Materials Science and Engineering: A First Course, Prentice Hall of India, 2007.
2. Charles P. Poole, Frank J. Owens, Introduction to Nanotechnology, John Wiley and Sons, 2007.

References
1. S. O. Pillai, Solid State Physics, New Age International, 2008.
2. M. Arumugam, Materials Science, Anuradha Agencies, Kumbhakonam, 2007.
3. Rakesh Rathi, Nanotechnology: Technology Revolution of 21st Century, S. Chand, 2009.

EPH104: SOLID STATE PHYSICS
(Elective)

L T P C
3 0 0 3

Module I   **9 hours**
Crystallography: Classification of solids, forces between atoms, bonding in solids, ionic, covalent and metallic bonding, fundamental concepts of crystals, lattice points and space lattice, crystal systems, Bravais lattices, directions, planes and Miller indices, atomic packing fraction, structure of simple cubic, body centered cubic (CsCl), face centered cubic (NaCl), hexagonal closed packed (HCP), diamond structure, X-ray diffraction, Bragg's law.

Module II   **8 hours**
Dielectric Properties: Introduction, fundamental definitions, local field, Claussius-Mossotti relation, different types of electric polarizations, electronic, ionic, and dipolar polarizations (qualitative and quantitative), dielectric loss, dielectric breakdown, piezoelectricity and ferroelectricity, spontaneous polarization in BaTiO3, applications of dielectrics and ferroelectrics.

Module III   **7 hours**
Magnetic Properties: Introduction, fundamental definitions, classification of magnetic materials, Weiss theory of ferromagnetism, domain theory of ferromagnetism, hysteresis, soft and hard magnetic materials, eddy current losses, ferrites (structure and magnetic properties), Applications: transformer cores, magnetostrictive sensors, data storage.

Module IV   **8 hours**
Semiconductors I: Introduction, intrinsic and extrinsic semiconductors, carrier concentration in intrinsic semiconductors, carrier concentration in n-type and p-type semiconductors, conductivity of extrinsic semiconductors, variation of carrier concentration and conductivity with temperature, drift and diffusion currents in semiconductors, carrier transport phenomena.

Module V   **10 hours**
Semiconductors II: Recombination of electron hole pairs, p-n junction diode and junction layer formation, direct and indirect band gap of semiconductors, Hall effect and its applications, magneto resistance, optical and thermal properties of semiconductors, fundamentals of LED, photovoltaic cell (solar cell), tunnel diode.

Text Book(s)
1. M.N. Avadhanulu, P.G. Kshirsagar, A Text book of Engineering Physics, S. Chand, 2014.

References
1. Simon M. Sze, Kwok K. Ng, Physics of Semiconductor Devices, 3/e, John Wiley, 2006.
2. S. O. Pillai, Solid State Physics, 7/e, New Age International, 2014.
3. B.G. Streetman, S. Banerjee, Solid State Electronic Devices, 6/e, Prentice Hall of India, 2006.
4. P. K. Palanisamy, Applied Physics, SciTech Publications, 2009.
5. Marius Grundmann, The Physics of Semiconductors, 2/e, Springer, 2010.

EPH106: PHYSICS OF NANOMATERIALS
(Elective)

L T P C
3 0 0 3

Module I   6 hours
Nanotechnology: Introduction, significance of nanotechnology, finite size effects and properties, classification of nanostructure materials, challenges and future prospects.

Module II   8 hours
Properties of Nanomaterials: Microstructure and defects in nanomaterials, dislocations, twins, stacking faults and voids, grain boundaries, effect of nanodimension on material, tunnelling, mechanical properties, melting point, diffusivity, grain growth characteristics, solubility, magnetic, electrical and thermal properties of nanomaterials.

Module III   10 hours
Growth Techniques in Nanomaterials: Introduction, top down and bottom up approaches, lithographic process and limitations, non-lithographic processes, plasma arc discharge, sputtering, evaporation, chemical, tunnel deposition, molecular beam epitaxy, sol-gel technique, electrodeposition.

Module IV   10 hours
Characterization Techniques of Nanomaterials: X-ray diffraction, small angle X-ray scattering, scanning electron microscopy with energy dispersive spectroscopy, transmission electron microscope, scanning, tunnelling microscope.

Module V   8 hours
Application of Nanomaterials: Sectors influenced by nanomaterials-health, communication, energy, environment, safety, security and defence, nanophotonic devices, nanosensors, Quantum dots, MEMS and NEMS.

Text Book(s)
1. P.P. Charles, J.O. Frank, Introduction to Nanotechnology, Wiley Inter-Science, 2003.
2. K. K. Chattopadhyay, A.N. Banerjee, Introduction to Nanoscience and Nanotechnology, Prentice Hall of India, 2011.

References
1. L.W. Edward, Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience, 2/e, Wiley-VCH, 2006.
2. C. Guozhong, Ying Wang, Nanostructures and Nanomaterials: Synthesis, Properties, and Applications, 2/e, Imperial College Press, 2004.

EPH121: ENGINEERING PHYSICS LABORATORY

L T P C
0 0 3 2

List of Experiments

1. J - by Callender and Barne's method.

2. Thermal conductivity of a bad conductor-Lee's method.

3. Magnetic field along the axis of a circular coil carrying current Stewart and Gee's galvanometer.

4. Hall effect - measurement of hall coefficient.

5. Carey Foster's bridge - laws of resistance and specific resistance.

6. Calibration of low range voltmeter - potentiometer bridge circuit.

7. Thickness of a paper strip - wedge method.

8. Newton's rings - radius of curvature of a plano convex lens.

9. Diffraction grating - normal incidence.

10. Determination of refractive indices (o and e) of a bi - refringent material (Prism).

11. Cauchy's constants - using a spectrometer.

12. Dispersive power of a prism-using a spectrometer.

13. Determination of Rydberg constant.

14. LASER - diffraction.

15. Determination of band gap in a semiconductor.

16. Optical fibres - numerical aperture and loss of signal.

17. VI characteristics of a pn - junction diode.

18. Response of a series RLC circuit.

LIST OF COURSES

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29	EEC462	Very Large Scale Integrated System Design	IE(IE)	61
30	EEC464	Introduction to Microcontrollers	IE(IE)	63
31	EEC465	Fundamentals of Global Positioning Systems	IE(IE)	64
32	EEC466	Fundamentals of Speech Processing	IE(IE)	65
33	EHS101	Communicative English-I	FC(HS)	67
34	EHS102	Communicative English –II	FC(HS)	69
35	EHS201	Environmental Studies	FC(HS)	71
36	EHS301	Engineering Economics and Management	FC(HS)	73
38	EHS302	Organizational Behaviour	IE(IE)	74
39	EHS304	Business Ethics and Corporate Governance	IE(IE)	75
40	EHS401	Project Management	IE(IE)	76
41	EHS402	Operations and Supply Chain Management	IE(IE)	77
42	EHS403	Disaster Management	IE(IE)	78
43	EHS404	Total Quality Management	IE(IE)	79
44	EHS405	Entrepreneurship Development	IE(IE)	80
37	EHS407	Professional Ethics and Human Values	FC(HS)	81
45	EID101	Programming With C	FC(BE)	82
46	EID102	Data Structures with C	FC(BE)	84
47	EID104	Fundamentals of Digital Logic Circuits	PC(CE)	85
48	EID121	Programming with C Laboratory	FC(BE)	86
49	EID122	Data Structures with C Laboratory	FC(BE)	88
50	EID124	Digital Circuits Laboratory	FC(BE)	90
51	EID201	Object Oriented Programming with C++	PC(CE)	91
52	EID202	Programming with JAVA	PC(CE)	93
53	EID203	Computer Organization and Architecture	PC(CE)	95
54	EID204	Operating Systems	PC(CE)	96
55	EID205	Data Communications	PC(CE)	98
56	EID206	Computer Networks	PC(CE)	99

57	EID221	C++ Laboratory	PC(CE)	100
58	EID222	Programming with JAVA Laboratory	PC(CE)	101
59	EID223	UNIX Programming Laboratory	PC(CE)	103
60	EID224	Operating Systems Laboratory	PC(CE)	104
61	EID301	Database Management Systems	PC(CE)	105
62	EID302	Web Technologies	PC(CE)	107
63	EID303	Software Engineering	PC(CE)	109
64	EID304	Software Project Management	PE(PE)	111
65	EID305	Design and Analysis of Algorithms	PC(CE)	113
66	EID321	Database Management Systems Laboratory	PC(CE)	114
67	EID322	Web Technologies Laboratory	PC(CE)	115
68	EID342	Middleware Technologies	PE(PE)	121
69	EID344	Advanced Computer Architecture	PE(PE)	122
70	EID346	Information Retrieval Systems	PE(PE)	123
71	EID348	Semantic Web	PE(PE)	124
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73	EID352	Software Requirements Engineering and Estimation	PE(PE)	127
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75	EID356	Data Mining and Data Warehousing	PE(PE)	130
76	EID358	Advanced Computer Networks	PE(PE)	132
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78	EID362	Mobile Computing	PE(PE)	135
79	EID364	Service Oriented Architecture	PE(PE)	136
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81	EID403	Machine Learning	PC(CE)	139
82	EID441	Image Processing	PE(PE)	140
83	EID442	Steganography and Biometrics	PE(PE)	142
84	EID443	Social Network Analysis	PE(PE)	143
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GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)
Gandhi Nagar Campus, Rushikonda,Visakhapatnam-530 045, A.P. INDIA
Phones: +91-0891-2795311, 2840501, EPABX: +91-891-2790101, Fax: +91-891-2795311

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