ACADEMIC REGULATIONS,

COURSE STRUCTURE & SYLLABUS

For

COMPUTER SCIENCE & ENGINEERING FOUR YEAR DEGREE COURSE

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

ACADEMIC REGULATIONS (R16) FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2016-17 onwards

1. **Award of B. Tech. Degree**

   A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:

   1. A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years
   2. The candidate shall register for 180 credits and secure all the 180 credits.

2. **Courses of study**

   The following courses of study are offered at present as specializations for the B. Tech. Courses:

S. No	Branch
01	Civil Engineering
02	Electrical and Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering
06	Information Technology
07	Petro Chemical Engineering
08	Chemical Engineering
09	Electronics and Instrumentation Engineering
10	Aeronautical Engineering
11	Automobile Engineering
12	Bio Technology
13	Electronics and Computer Engineering
14	Mining Engineering
15	Petroleum Engineering
16	Metallurgical Engineering
17	Agricultural Engineering

3. **Distribution and Weightage of Marks**

(i)The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory subject and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

(ii) For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End - Examinations.

(iii) For theory subjects, during the semester there shall be 2 tests. The weightage of Internal marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be and for Physics Virtual Labs to be consider as Assignments) Objective -10 (Conducted at College level with 20 Multiple choice question with a weightage of ½ Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 90 minutes duration conducted for 15 marks.Each subjective type test question paper shall contain **3 questions** and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 15 marks are to be added to the assignment marks of 5 for finalizing internal marks for 30.

Internal Marks can be calculated with 80% weightage for best of the two Mids and 20% weightage for other Mid Exam As the syllabus is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(iv) The end semester examination is conducted covering the topics of all Units for 70 marks. End Exam Paper: Part-A 1st Question is mandatory covering all the syllabus which contains seven 2 marks questions for 14 marks with atleast 2 marks of question for each of the six units and in Part-B 4 Questions out of 6 Questions are to be answered with each carrying 14 marks . Part-A & Part-B put together gives for 70 marks.

(v) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vi) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the Marks for 10 can be calculated with 80% weightage for best of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to day work.

(vii) For the seminar, Each student has to be evaluated based on the presentation of any latest topic with report of 10-15 pages and a ppt of min 10 slides. The student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

(viii) Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

(ix) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.

4. **Attendance Requirements**

1. A student is eligible to write the University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.
2. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee
3. Shortage of Attendance below 65% in aggregate shall not be condoned.
4. A student who is short of attendance in semester may seek re-admission into that semester when offered within 4 weeks from the date of the commencement of class work.
5. Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
6. A stipulated fee shall be payable towards condonation of shortage of attendance.
7. A student will be promoted to the next semester if he satisfies the (i)attendance requirement of the present semester and (ii) minimum required credits.
8. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

5. **Minimum Academic Requirements**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.4.

5.1 A student is deemed to have satisfied the minimum academic requirements if he has **earned the credits allotted to each theory/practical design/drawing subject/project andsecures not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the internal marks and end semester examination marks.**

5.2 A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement.

5.3 A student will be **promoted from II year to III year** if he fulfills the academic requirement **of 40% of the credits up to either II year I semester or II year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.**

5.4 A student shall be **promoted from III year to IV year** if he fulfils the academic requirements of **40% of the credits up to either III year I semesteror III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.**

5.5 A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits.

6. Course Pattern

1. The entire course of study is for four academic years, all the years are on semester pattern.
2. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
3. When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continues to be applicable to him.

7. CGPA

Marks Range Theory (Max – 100)	Marks Range Lab (Max – 75)	Letter Grade	Level	Grade Point
≥ 90	≥ 67	>90	Outstanding	10
≥80 to <90	≥60 to <67	90-80	Excellent	9
≥70 to <80	≥52 to <60	80-70	Very Good	8
≥60 to <70	≥45 to <52	70-60	Good	7
≥50 to <60	≥37 to <45	60-50	Fair	6
≥40 to <50	≥30 to <37	50-40	Satisfactory	5
			Pass	4
<40	<30	<40	Fail	0
			Absent	0

Computation of SGPA

The following procedure is to be adopted to compute the Semester Grade Point Averagae. (SGPA) and Cumulative Grade Point Average (CGPA):

The **SGPA** is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

SGPA (Si) = $\sum$ (Ci X Gi) / $\sum$ Ci

Where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

Computation of CGPA

- The **CGPA** is also calculated in the same manner taking into account all the courses undergone by a student over all the semester of a programme, i.e.
  CGPA = $\sum$ (Ci X Si) / $\sum$ Ci
  Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.
- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- Equivalent Percentage = (CGPA – 0.75) / x 10

8. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	**CGPA to be secured**	
First Class with Distinction	≥ 7.75 with no subjects	**From the CGPA secured from 180 Credits.**
First Class	≥ 6.75 with subjects failures	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 4.75 to < 5.75	

9. Minimum Instruction Days

The minimum instruction days for each semester shall be 90 working days.

10. There shall be no branch transfers after the completion of the admission process.
11. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

12. **WITHHOLDING OF RESULTS**

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

13. **TRANSITORY REGULATIONS**

1. Discontinued or detained candidates are eligible for readmission as and when next offered.
2. The readmitted students will be governed by the regulations under which the candidate has been admitted.
3. (a) In case of transferred students from other Universities, the credits shall be transferred to JNTUK as per the academic regulations and course structure of the JNTUK**.**

   (b) The students seeking transfer to colleges affiliated to JNTUK from various other Universities / Institutions have to obtain the credits of any equivalent subjects as prescribed by JNTUK. In addition, the transferred candidates have to pass the failed subjects at the earlier instiute with already obtained sessional marks to be conducted by JNTUK.

14. General

1. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
2. The academic regulation should be read as a whole for the purpose of any interpretation.
3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
4. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

ACADEMIC REGULATIONS (R13) FOR B. TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B. Tech. from the Academic Year 2017-18 onwards

1 **Award of B. Tech. Degree**

A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:

1.1 A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.

1.2 The candidate shall register for 132 credits and secure all the 132 credits.

2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech.

3. **Promotion Rule**

A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

A student shall be promoted from III year to IV year if he fulfils the academic requirements of 40% of the credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

4. **Award of Class**

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	**CGPA to be secured**	**From the CGPA secured from 132 Credits from II Year to IV Year**
First Class with Distinction	≥ 7.75 with no failures	
First Class	≥ 6.75 to <7.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 4.75 to < 5.75	

The marks obtained in the internal evaluation and the end semester examination shall be shown separately in the marks memorandum.

5. All the other regulations as applicable to **B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)**.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has

	paper during the examination or answer book or additional sheet, during or after the examination.	already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm	Expulsion from the examination hall and

	in the examination hall.	cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
   - (i) A show cause notice shall be issued to the college.
   - (ii) Impose a suitable fine on the college.
   - (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA-533003, Andhra Pradesh (India)
For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	10 Months		Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA-533003, Andhra Pradesh (India)
For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

ABSOLUTELY NO TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

vaharlal Nehru Technological University Kakinada
For Constituent Colleges and Affiliated Colleges of JNTUK

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1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY

COURSE STRUCTURE

I Year I SEMESTER

S. No.	Subjects	L	T	P	Credits
CS111	English – I	4	-	--	3
CS112	Mathematics - I	4	-	--	3
CS113	Mathematics – II (Computational Mathematics)	4	-	--	3
CS114	Applied Physics	4	-	--	3
CS115	Computer Programming using C	4	-	--	3
CS116	Engineering Drawing	4	-	--	3
CS117	English - Communication Skills Lab I	--	-	3	2
CS118	Applied Physics Lab	--	-	3	2
CS119	C-Programming Lab	--	--	3	2
	Applied Physics- Virtual Lab-Assignments	-	2	-	-
Total credits					**24**

I Year II SEMESTER

S. No.	Subjects	L	T	P	Credits
CS121	English – II	4	-	--	3
CS122	Object Oriented Programming through C++	4	-	--	3
CS123	Applied Chemistry	4	-	--	3
CS124	Engineering Mechanics	4	-	--	3
CS125	Environmental Studies	4	-	--	3
CS126	Mathematics III	4	-	--	3
CS127	Applied Chemistry Lab	--	-	3	2
CS128	Object Oriented Programming Lab	--	-	3	2
CS129	English Communication Skills Lab II	--	-	3	2
Total credits					**24**

II Year I Semester

S. No.	Subjects	L	T	P	Credits
CS211	Statistics with R Programming	4			3
CS212	Mathematical Foundations of Computer Science	4			3
CS213	Digital Logic Design	4			3
CS214	Java Programming	4			3
CS215	Data Structures through C++	4			3
CS216	Computer Graphics	4			3
CS217	Data Structures through C++Lab			3	2
CS218	Java Programming Lab			3	2
	Total credits				**22**

II Year II Semester

S. No.	Subjects	L	T	P	Credits
CS221	Software Engineering	4			3
CS222	Python Programming	4			3
CS223	Advanced Data Structures	4			3
CS224	Computer Organization	4			3
CS225	Formal Languages and Automata Theory	4			3
CS226	Principles of Programming Languages	4			3
CS227	Advanced Data Structures Lab			3	2
CS228	Python Programming Lab			3	2
CS229	Professional Ethics & Human Values		3		--
	Total credits				**22**

III Year I Semester

S.No.	Subjects	L	T	P	Credits
CS311	Compiler Design	4	-	-	3
CS312	Unix Programming	4	-	-	3
CS313	Object Oriented Analysis and Design using UML	4	-	-	3
CS314	Database Management Systems	4	-	-	3
CS315	Operating Systems	4	-	-	3
CS316	Object Oriented Analysis and Design Lab using UML	-	-	3	2
CS317	Operating Systems & Linux Programming Lab	-	-	3	2
CS318	Database Management Systems Lab	-	-	3	2
CS319	Intellectual Property Rights & Patents	-	2	-	-
Total Credits					**21**

III Year II Semester

S.No.	Subjects	L	T	P	Credits
CS321	Computer Networks	4	2	-	3
CS322	Data Warehousing and Mining	4	-	-	3
CS323	Design and Analysis of Algorithms	4	-	-	3
CS324	Software Testing Methodologies	4	-	-	3
CS325	**Open Elective:** i. Artificial Intelligence: Search Methods for Problem Solving (MOOCS-SWAYAM/NPTEL) ii. Internet of Things iii Cyber Security iv. Digital Signal Processing v. Embbeded Systems vi. Robotics	4	-	-	3
CS326	Computer Networks Lab	-	-	3	2
CS327	Software Testing Lab	-	-	3	2
CS328	Data Warehousing and Mining Lab	-	-	3	2
Total Credits					**21**

IV Year I Semester

S.No.	Subjects	L	T	P	Credits
CS411	Cryptography and Network Security	4	-	-	3
CS412	Big Data Analytics	4	-	-	3
CS413	Web Technologies	4	-	-	3
CS414	Managerial Economics and Financial Analysis	4	-	-	3
CS415	**Elective-I** i. Software Architecture & Design Patterns ii. Information Retrieval Systems iii. Mobile Computing iv. Natural Language Processing (MOOCS-SWAYAM / NPTEL)	4	-	-	3
CS416	**Elective-II** i. Cloud Computing ii. Artificial Neural Networks iii. Ad Hoc & Sensor Networks iv. Privacy and Security in Online Social Media (MOOCS-SWAYAM / NPTEL)	4	-	-	3
CS417	Big Data Analytics Lab	-	-	3	2
CS418	Web Technologies Lab	-	-	3	2
Total Credits					**22**

IV Year II Semester

S.No.	Subjects	L	T	P	Credits
CS421	Distributed Systems	4	-	-	3
CS422	Management Science	4	-	-	3
CS423	Machine Learning	4	-	-	3
CS424	**Elective-III** i. Concurrent and Parallel Programming ii. Software Project Management iii. Operations Research iv. Deep Learning for Visual Computing (MOOCS-SWAYAM / NPTEL)	4	-	-	3
CS425	Seminar	-	3	-	2
CS426	Project	-	-	-	10
Total Credits					**24**

Total Course Credits = 48 + 44 + 42 + 46 = 180

R16- I Year I Semester

Semester –I

Course Code: HS 101 **English –I** **T P C**

4 0 3

Unit-I:

Lesson -1: **Human Resources** from " **English for Engineers and Technologists**" , Orient Blackswan

Lesson -2: **An Ideal Family** from "**Panorama: A Course on Reading**", Oxford University Press

Objectives:1. To comprehend the text to get factual information
2. Writing paragraphs on a single idea/topic using connectives
3. Using table of contents to browse texts

Outcomes: 1. The students would have learnt to comprehend a text at factual level
2. The students would be able to write a paragraph elaborating a single idea
3. The students will have learnt to use table of contents to get needful information

Unit-II :

Lesson -1: **Alternative Sources of Energy** from " **English for Engineers and Technologists**" , Orient Blackswan
Lesson -2: **War** from "**Panorama: A Course on Reading**", Oxford University Press

Objectives:
The students will be able to :
1. understand the information given in the text between the lines (inferential)
2. Writing short passages (2 or 3 paragraphs) using appropriate cohesive and coherence markers
3. Using dictionary and thesaurus to find the meanings of new words

Outcomes: The students would have learnt to:
1. Comprehend a text at inferential level
2. write a meaningful short passage
3. use dictionary and thesaurus to enhance active vocabulary list

Unit-III :

Lesson -1: **Computers in India** from " English for Engineers and Technologists", Orient Blackswan
Lesson -2: **The Verger** from "Panorama: A Course on Reading", Oxford University Press
Objectives:
The students will be able to :
1. apply good reading strategies to comprehend texts of different genres
2. Writing summary of a text using notes made while reading
3. Learning the other forms of words

Outcomes: The students would have learnt to:

1. Apply good reading strategies to improve their comprehension levels
2. Write a meaningful summary of a text
3. Apply the other forms of a text in their written communication

Unit-IV :

Lesson -1: **Transport Tomorrow** from " **English for Engineers and Technologists**" , Orient Blackswan

Lesson -2: **The Scare Crow** from **"Panorama: A Course on Reading"**, Oxford University Press

Objectives:

The students will be able to :

1. use sub-skills of reading: skimming, scanning and note making while reading a text
2. Writing e-mails following netiquette
3. Expanding vocabulary by learning synonyms and antonyms of the new/learnt words

Outcomes: The students would have learnt to:

1. Skim, scan and make notes from a reading text
2. Communicate through emails following all the norms
3. Use appropriate expressions or vocabulary in written communication

Unit-V:

Lesson -1: **Evaluating Technology** from " **English for Engineers and Technologists**", Orient Blackswan

Lesson -2: **"A Village Host to Nation"** from **"Panorama: A Course on Reading"**, Oxford University Press

Objectives:

The students will be able to:

1. carry out intensive and extensive reading
2. Written communication in Social networks-dos and don'ts
3. Understanding the rules of the language to use language in written and oral forms (remedial grammar)

Outcomes: The students would have learnt to:

1. Read shorter and longer texts and make meaning out of them
2. Communicate appropriately following the norms of written communication
3. Avoid common errors in using language

Unit-VI:

Lesson -1: **Our Living Environment** from " **English for Engineers and Technologists**", Orient Blackswan

Lesson -2: **Martin Luther King and Africa** from **"Panorama: A Course on Reading"** Oxford University Press

Objectives:
The students will be able to :

1. Use the best reading strategies to different reading texts
2. Write to convey information in a meaningful manner
3. Use appropriate and accurate language

Outcomes: The students would have learnt to:

1. Read texts of all types and reconstruct the meaning of them
2. Communicate in the written form avoiding errors and using appropriate vocabulary and expressions

R16- I Year I Semester

CS112 MATHEMATICS – I (Linear Algebra and Vector Calculus)
(Common to ALL branches of First Year B.Tech.)

Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills

and techniques that are essential for an engineering course.

2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes:

At the end of the Course, Student will be able to:

1. Determine rank, Eigenvalues and Eigen vectors of a given matrix.
2. Determine double integral over a region and triple integral over a volume.
3. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals.

SYLLABUS:

UNIT I: Matrix Theory:

Rank-Echelon form-Normal form.

Eigen values - Eigen vectors– Properties – Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative and semi definite - Index – Signature.

Applications: Free vibration of a two-mass system.

UNIT II: Special functions:

Introduction to Improper Integrals-Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

Applications: Evaluation of integrals.

UNIT III: Multiple integrals:

Curve tracing: Cartesian, Polar and Parametric forms.

Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.

UNIT IV: Applications of Integration:

Length of curves, Finding Areas and Volumes. Volumes and Surfaces of solids of revolution.

UNIT V: Vector Differentiation:

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

Applications: Equation of continuity, potential surfaces

UNIT VI: Vector Integration:

Line integral –Conservative vector field – Potential function – Area- Surface and volume integrals- Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

Applications: Work done, Force.

Text Books:

1. **B.S.Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. **Greenberg,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
3. **Peter O'Neil,** Advanced Engineering Mathematics,7th edition, Cengage Learning.
4. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.

I Year – I SEMESTER

CS113 MATHEMATICS – II (Numerical Methods and Integral Transforms)
(Common to ALL branches of First Year B.Tech.)

Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

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

1. Calculate a root of algebraic and transcendental equations.
2. Compute interpolating polynomial for the given data and find Numerical differentiation and integration numerically.
3. Find Integral transforms for certain functions to the given data.
4. Solve ordinary differential equations

SYLLABUS:

UNIT I: Solution of Algebraic and Transcendental Equations:
Introduction- Bisection method – Method of false position –Secant Method- Iteration method – Newton-Raphson method.
Solution of linear systems – Gauss elimination - Gauss Jacobi and Gauss Seidel methods- Newton Raphson Method for non linear simultaneous equations. Power Method for finding Largest Eigenvalue –Eigenvector.

UNIT II: Interpolation:
Introduction– Finite differences- Forward differences- Backward differences –Central differences – Newton's forward and backward formulae – Interpolation with unequal intervals - Lagrange's and Newton's divided difference formula- Errors in polynomial interpolation.

UNIT III: Numerical Differentiation and Integration:
Numerical Differentiation (with equal and unequal interval), Numerical Integration- Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT IV: Numerical Solution of Ordinary Differential equations:
Condition for existence and uniqueness of a solution(statement only) - Solution of ordinary differential equations by Taylor's series- Euler's method – Modified Euler.
Runge-Kutta methods (second and fourth order) for first and second order initial value problems -Predictor and Corrector Methods (Adams-Bashforth and Milnes).

UNIT V: Laplace transforms:
Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT VI: Fourier Transforms:
Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

Text Books:

1. **B.S.Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. **R.K. Jain, S.R.K. Iyengar, M.K. Jain,** Numerical Methods for Scientists and Engineering, New Age Publications.
2. **S.S. Sastry,** Introduction to Numerical Analysis, PHI.
3. **V. Ravindranath and P.Vijayalakshmi,** Mathematical Methods, Himalaya Publishing House.
4. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
5. **David Kincaid, Ward Cheney**, Numerical Analysis-Mathematics of Scientific Computing, 3rd Edition, Universities Press.

I Year – I SEMESTER CS116

R16

APPLIED PHYSICS

(for circuital branches like CSE, ECE, EEE etc)

OBJECTIVES: *Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:*

- *Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.*
- *Teach Concepts of coherent sources, its realization and utility optical instrumentation.*
- *Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.*
- *Understand the physics of Semiconductors and their working mechanism for their utility in sensors.*

UNIT-I

INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – working principle of Interferometers

UNIT-II

DIFFRACTION: Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscope.

UNIT-III

POLARIZATION: Types of Polarization – Methods of production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).

LASERS: Characteristics– Stimulated emission – Einstein's Transition Probabilities- Pumping schemes - Ruby laser – Helium Neon laser.

UNIT-IV

ELECTROMAGNETIC FIELDS: Scalar and Vector Fields – Electric Potential- Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

UNIT-V

QUANTUM MECHANICS: Introduction - Matter waves – Schrödinger Time Independent and Time Dependent wave equations – Particle in a box.

FREE ELECTRON THEORY: Defects of Classical free electron theory – concept of Fermi Energy–Density of states –Quantum Free electron theory

UNIT-VI

BAND THEORY OF SOLIDS: Bloch's theorem (qualitative) – Kronig – Penney model – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

SEMICONDUCTOR PHYSICS: Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect in semiconductors.

Outcome: *Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.*

List of Text Books:

1. A Text book of Engineering Physics – by Dr. M.N.Avadhanulu and Dr.P.G.Kshira sagar, S.Chand & Company Ltd., (2014)
2. 'Solid State Physics' by A.J.Dekker, Mc Millan Publishers (2011)

List of Reference Books:

1. Engineering Physics by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)
2. Applied Physics by P.K.Palanisamy, Scitech publications (2014)
3. Lasers and Non-Linear optics by B.B.Laud, New Age International Publishers (2008).

I Year – I SEMESTER

CS115 COMPUTER PROGRAMMING

OBJECTIVES:

Formulating algorithmic solutions to problems and implementing algorithms in C

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux
- understanding branching, iteration and data representation using arrays
- To implement the different user defined and pre-defined functions, Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation
- Understanding miscellaneous aspects of C
- Comprehension of file operations

SYLLABUS:

UNIT-I:

History and Hardware - Computer Hardware, Bits and Bytes, Components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

UNIT - II

Introduction to C Programming

Identifiers, The main() Function, The printf() Function

Programming Style - Indentation,Comments, Data Types**,** Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization. **Assignment -** Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT -III: Control Flow

Relational Expressions - Logical Operators

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

Repetition: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.

UNIT - IV Modular Programming

Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function, Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

UNIT V - Arrays &Strings

Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays- Matrices

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

UNIT- VI Pointers, Structures, Files

Pointers: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

Structures: Derived types,Structuresdeclaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

Data Files : Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

TEXT BOOKS:

1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
3. The C programming Language by Dennis Richie and Brian Kernighan, Pearson Education

REFERENCE:

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, CENGAGE
2. Programming with C, Bichkar, Universities Press
3. Programming in C, ReemaThareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge

COURSE OUTCOMES:

After learning the course, the student will be able:

CS15.1	Demonstrate the basic terminology used in computer programming	K2
CS115.2	Explain the Write, compile and debug programs, concept of variables, constants and basic data types in a C language program.	K3
CS115.3	To Develop programs using the basic elements like control statements, decision structures, loops.	K3
CS115.4	Make Use of functions to solve the given problem, Explain the difference between call by value and call by reference.	K3
CS115.5	Analyze and apply the C programs using concept of Arrays, Strings.	K4
CS115.6	Illustrate the dynamics of memory by the use of pointers, Structures, File Operations in C programming for a given application.	K2

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS115.1	3					2				
CS115.2								1		
CS115.3		2	2						1	
CS115.4			3	3	2					
CS115.5	3	2			3					
CS115.6	3	2	2		2			3		

I Year – I SEMESTER

CS116 ENGINEERING DRAWING

OBJECTIVES:

Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

OUTCOMES:

By the end of this course the student will be able to

- use drawing instruments and to draw polygons, Engg. Curves.
- use scales and orthographic projections, projections of points & simple lines.
- draw the projections of the lines inclined to both the planes.
- draw the projections of the various types of solids in different positions inclined to

one of the planes.

- represent the object in 3D view through isometric views.
- represent and convert the isometric view to orthographic view and vice versa.

SYLLABUS:

UNIT I:

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, involutes, tangents & normals for the curves.

UNIT II:

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to of the reference planes (HP,VP or PP)

UNIT III:

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

UNIT IV:

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V:

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI:

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

I Year – I SEMESTER CS117

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- I

	T	P	C
PRESCRIBED LAB MANUAL FOR SEMESTER I:	0	3	2

'INTERACT: English Lab Manual for Undergraduate Students' Published by **Orient Blackswan Pvt Ltd.**

OBJECTIVES:

Oral Communication: Listening and Speaking

- To help the learners **listen** and
  i. Understand the theme of the lectures/speeches/talks (global comprehension)
  ii. Identify specific information
  iii. Adopt appropriate accent and intonation in speeches/conversations
  iv. Understand news/programmes on media with different English accents

- To enhance **speaking** skills of the students in the following aspects
  i. Introduction to the sounds of English
  ii. Socializing by talking to different people in new contexts; focus on language functions through role plays
  iii. understand and adopt the differences between formal and informal communication contexts
  iv. neutralizing accent by avoiding Mother Tongue Influence
  v. Reading aloud texts and dialogues

OUTCOMES:

By the end of the course the students would be able to:

- Understand and apply the difference between sound and letter in English
- Appreciate and practice the social conventions
- Understand and respond to long discourses by native/other speakers and respond appropriately
- Use appropriate discourse markers to make more meaningful conversations
- Refine their accent to avoid mother tongue influence
- Improve the pace of fluency and attain acceptable levels of accuracy

UNIT 1:

1. Importance of Oral Communication Skills for Engineering professionals
2. Introduction to English Sounds and Letters

UNIT 2:

1. Responding to Requests and asking for Directions
2. Practice with English sounds

UNIT 3:

1. Syllable and Pronunciation aspects
2. Asking for Clarifications, Inviting, Expressing Sympathy,Congratulating

UNIT 4:

1. Accent and stress
2. Apologizing, Advising and Suggesting

UNIT 5:

1. Stress and intonation
2. Agreeing and Disagreeing, accepting and denying invitations

UNIT 6:

1. Intonation in connected speeches
2. Understanding Communication nuances (practice of all the functions of the language as stated in the previous units).

Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

The rubric to assess the learners:

Body language		Fluency & Audibility	Clarity in Speech	Neutralization of accent	Appropriate Language		Total 10 marks	Remarks
Gestures & Postures	Eye Contact				Grammar	Vocabulary & Expressions		

- **Lab Assessment: Internal (25 marks)**

1. Day-to-Day activities: 10 marks
2. Completing the exercises in the lab manual: 5 marks
3. Internal test (5 marks written and 5 marks oral)

- **Lab Assessment: External (50 marks)**

1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
2. Oral: Reading aloud a text or a dialogue- 10 marks
3. Viva-Voce by the externa lexaminer: 20 marks

R16

APPLIED/ENGINEERING PHYSICS LAB
(Any 10 of the following listed experiments)

LIST OF EXPERIMENTS:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge flim and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of vibrations in stretched strings – Sonometer.
8. Determination of velocity of sound – Volume Resonator.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
12. Characteristics of Thermistor – Temperature Coefficients.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p - n junction.
15. Hall Effect in semiconductors.
16. Time constant of CR circuit.
17. Determination of wavelength of laser source using diffraction grating.
18. Determination of Young's modulus by method of single cantilever oscillations.
19. Determination of lattice constant – lattice dimensions kit.
20. Determination of Planck's constant using photocell.
21. Determination of surface tension of liquid by capillary rise method.

I Year – I SEMESTER

Computer Programming Lab

OBJECTIVES:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

PROGRAMMING EXERCISES:

Exercise - 1 Basic

a). What is a OS Command, Familiarisation of Editors - vi, emacs

b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man

c). C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Maths– Output

a) Write a C Program to Simulate 3 Laws at Motion

b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I

a) Write a C Program to Find Whether the Given Year is a Leap Year or not.

b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II

a) Write a C Program to Find Whether the Given Number is

i) Prime Number ii) Armstrong Number

b) Write a C program to print Floyd Triangle

c) Write a C Program to print Pascal Triangle

Exercise – 5 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.

b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions - Continued
Write a C Program to compute the values ofsin x and cos x and e^x values using Series expansion. (usefactorial function)

Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercises - 9 Structures
a) Write a C Program to Store Information of a Movie Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 10 Arrays and Pointers
a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.
Understand the difference between the above two programs

Exercise – 12 Strings
a) Implementation of string manipulation operations **with** library function.
i) copy ii) concatenate iii) length iv) compare
b) Implementation of string manipulation operations **without** library function.
i) copy ii) concatenate iii) length iv) compare

Exercise -13 Files
a) Write a C programming code to open a file and to print it contents on screen.
b) Write a C program to copy files

Exercise - 14 Files Continued
a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

Note:

a) All the Programs must be executed in the Linux Environment. (Mandatory)
b) The Lab record must be a print of the LATEX (.tex) Format.

COURSE OUTCOMES:
After learning the course, the student will be able:

CS119.1	Apply and practice logical ability to solve the problems.	**K2**
CS119.2	Develop the C programming development environment, compiling, debugging, and linking and executing a program using the development environment.	**K3**
CS119.3	Analyzing the complexity of problems, modularize the problems into small modules and then convert them into programs.	**K4**
CS119.4	Identify and apply the in-built functions and customized functions for solving the problems using control flow statements.	**K2**
CS119.5	Experiment with the pointers, Strings, memory allocation techniques and use of files for dealing with variety of problems.	**K3**
CS119.6	Document and present the algorithms, flowcharts and programs in form of user-manuals.	**K6**

CO-PO Mapping:

	Correlation Levels as :									
	1=	**2=MODERATE**		**3=HIGH**						
CO	**PO**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO**	**PO10**
CS119.1	3									
CS119.2						2				
CS119.3		2	3					2	1	
CS119.4	3		2	3	2					
CS119.5		2								
CS119.6	3	3	2		2			2		

I Year – I SEMESTER

R16

APPLIED/ENGINEERING PHYSICS - VIRTUAL LABS – ASSIGNMENTS
(Constitutes 5 marks of 30marks of Internal-component)

LIST OF EXPERIMENTS

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson's interferometer
13. Black body radiation

URL: ***www.vlab.co.in***

I Year II SEMESTER

English –II

OBJECTIVES:

- enable the learners **read** a text and understand the information given in the text between the lines (inferencing information)
- learn the nuances of effective writing by using short and crisp sentences
- **read** a text and apply good reading strategies to comprehend texts of different genres
- write the summary of a text, paraphrase the text and synthesize the ideas from what they read
- have improved reading skills by applying good reading strategies
- to distinguish the information provided in a text as important and unimportant by writing the summaries and synthesizing the texts.
- Evaluate the evidence presented and state an opinion about what they have read
- identify author's purpose and tone

OUTCOMES:

- to infer information from the reading text
- starts learning to write short notes and paragraphs effectively
- assesses the text
- improves his extensive reading skills
- to recognize the intentions of the author
- learner improves his writing skills by writing a well organized academic essay

SYLLABUS:

Unit-I:

Lesson -1: The Greatest Resource -Education from "English Encounters", Maruthi Publications (Text book)

Lesson -2: APJ Abdul Kalam from "The Great Indian Scientists" Cengage Learning (India) Pvt. Ltd.,(Non- Detailed Text)

Unit-II :

Lesson -1: A Dilamma from " English Encounters", Maruthi Publications (Text book)

Lesson -2: C V Raman from "The Great Indian Scientists", Cengage Learning (India) Pvt. Ltd.,(Non- Detailed Text)

Unit-III :

Lesson -1: Cultural Shock from "English Encounters", Maruthi Publications (Text book)

Lesson -2: Homi Jehangir Bhabha from "The Great Indian Scientists", Cengage Learning (India) Pvt. Ltd.,(Non- Detailed Text)

Unit-IV :

Lesson -1: The Lottery from "English Encounters", Maruthi Publications (Text book)
Lesson -2: Jagadish Chandra Bose from "The Great Indian Scientists", Cengage Learning (India) Pvt. Ltd.,(Non- Detailed Text)

Unit-V:
Lesson -1: The Health Threats of Climate Change from "English Encounters", Maruthi Publications (Text book)
Lesson -2: Prafulla Chandra Ray " from "The Great Indian Scientists", Cengage Learning (India) Pvt. Ltd.,(Non- Detailed Text)

Unit-VI:
Lesson -2: The Chief Software Architecture from " "English Encounters", Maruthi Publications (Text book)
Lesson -2: Srinivasa Ramanujan from "The Great Indian Scientists", Cengage Learning (India) Pvt. Ltd.,(Non- Detailed Text)

I Year – II SEMESTER

CS122 OBJECT-ORIENTED PROGRAMMING THROUGH C++

OBJECTIVES:

- This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and portable code. The nature of C language is emphasized in the wide variety of examples and applications. To learn and acquire art of computer programming. To know about some popular programming languages and how to choose
- Programming language for solving a problem.

SYLLABUS:

UNIT-I: Introduction to C++

Difference between C and C++- Evolution of C++- The Object Oriented Technology- Disadvantage of Conventional Programming- Key Concepts of Object Oriented Programming- Advantage of OOP- Object Oriented Language.

UNIT-II: Classes and Objects &Constructors and Destructor

Classes in C++-Declaring Objects- Access Specifiers and their Scope- Defining Member Function-Overloading Member Function- Nested class, Constructors and Destructors, Introduction- Constructors and Destructor- Characteristics of Constructor and Destructor-Application with Constructor- Constructor with Arguments (parameterized Constructor-Destructors- Anonymous Objects.

UNIT-III: Operator Overloading and Type Conversion & Inheritance

The Keyword Operator- Overloading Unary Operator- Operator Return Type- Overloading Assignment Operator (=)- Rules for Overloading Operators, Inheritance, Reusability- Types of Inheritance- Virtual Base Classes- Object as a Class Member- Abstract Classes- Advantages of Inheritance-Disadvantages of Inheritance,

UNIT-IV: Pointers & Binding Polymorphisms and Virtual Functions

Pointer, Features of Pointers- Pointer Declaration- Pointer to Class- Pointer Object- The this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++- Virtual Functions- Rules for Virtual Function- Virtual Destructor.

UNIT-V: Generic Programming with Templates & Exception Handling

Generic Programming with Templates, Need for Templates- Definition of class Templates- Normal Function Templates- Over Loading of Template Function-Bubble Sort Using Function Templates- Difference Between Templates and Macros- Linked

Lists with Templates, Exception Handling- Principles of Exception Handling- The Keywords try throw and catch- Multiple Catch Statements –Specifying Exceptions.

UNIT-VI: Overview of Standard Template Library

Overview of Standard Template Library- STL Programming Model- Containers- Sequence Containers- Associative Containers- Algorithms- Iterators- Vectors- Lists- Maps.

TEXT BOOKS:

1. A First Book of C++, Gary Bronson, Cengage Learning.
2. The Complete Reference C++, Herbert Schildt, TMH.
3. Programming in C++, Ashok N Kamthane, Pearson 2nd Edition

REFERENCE BOOKS:

1.Object Oriented Programming C++, Joyce Farrell, Cengage.
2. C++ Programming: from problem analysis to program design, DS Malik, Cengage Learning

COURSE OUTCOMES:

After the completion of the course, student will be able to:

CS122.1	Demonstrate basics of object oriented mode, differences between conventional and oops programming, the top-down and bottom-up approach I/O streams in C++	**K2**
CS122.2	Explain Write, compile and debug programs and Use different data types, classes, objects and member functions in C++ language.	**K3**
CS122.3	Make use of Basic concept in C++ programming, Operators, control structures, functions, overloading, and recursion.	**K3**
CS122.4	build dynamic memory management techniques using pointers, constructors, destructors, virtual functions.	**K3**
CS122.5	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.	**K2**
CS122.6	Apply advanced features of C++ specifically templates, operator overloading, standard template libraries (STL).	**K3**

CO-PO Mapping

	Correlation Levels as :									
	1=LOW	2=MODERATE		3=HIGH						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO**	**PO9**	**PO10**
CS122.1	3					2				
CS122.2		2						1		
CS122.3		3	2						1	
CS122.4			3		2					
CS122.5					3					
CS122.6		1			2			3		
CS122.7		3								

I Year – II SEMESTER

APPLIED CHEMISTRY

OBJECTIVES:

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in automotive and aerospace industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied.
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced.

OUTCOMES:

The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.

SYLLABUS:

UNIT I: HIGH POLYMERS AND PLASTICS

Polymerisation: Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials: advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers: Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT II: FUEL TECHNOLOGY

Fuels:- Introduction – Classification – Calorific value - HCV and LCV - Problems – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses - Problems – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Bio-diesel – Gaseous fuels – Natural gas, LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

Explosives:- Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.

UNIT III: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

Corrosion:- Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating)

UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

Nano materials:- Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications

Liquid crystals:- Introduction – Types – Applications

Superconductors :- Type-I & Type-2, properties &applications

Green synthesis:- Principles - 3or 4 methods of synthesis with examples – R_4M_4 principles

UNIT V: SOLID STATE CHEMISTRY

Types of solids - close packing of atoms and ions - BCC , FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels,

Non-elemental ***semiconducting Materials***:- Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices:- p-n junction diode as rectifier – junction transistor.

Insulators(electrical and electronic applications)

Magnetic materials:- Ferro and ferri magnetism. Hall effect and its applications.

UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES

Solar Energy: - Introduction, application of solar energy, conversion of solar energy (Thermal
conversion & photo conversion) – photovoltaic cell: design, working and its importance

Non-conventional energy sources:

(i) Hydropower include setup a hydropower plant (schematic diagram)

(ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant

(iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.

(iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.

(v) Biomass and biofuels

Fuel cells:- Introduction - cell representation, H_2-O_2 fuel cell: Design and working, advantages and limitations. Types of fuel cells: Alkaline fuel cell - methanol-oxygen - phosphoric acid fuel cells - molten carbonate fuel cells.

TEXT BOOKS:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

REFERENCE BOOKS:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

I Year B.Tech. – II Sem.

ENIGINEERING MECHANICS

OBJECTIVES:

The students completing this course are expected to understand the concepts of forces and its resolution in different planes ,resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

SYLLABUS:

UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction , direction and its application. Introduction to Engg. Mechanics – Basic Concepts.
Systems of Forces : Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction , limiting friction and impending motion, coulomb's laws of dry friction , coefficient of friction, cone of friction

UNIT II

Objectives: The students are to be exposed to application of free body diagrams. Solution to
problems using graphical methods and law of triangle of forces.
Equilibrium of Systems of Forces : Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces
condition of equilibrium, analysis of plane trusses.

UNIT – III

Objectives : The students are to be exposed to concepts of centre of gravity.
Centroid : Centroids of simple figures (from basic principles) – Centroids of Composite Figures Centre of Gravity : Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

UNIT IV

Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications. Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia : Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V

Objectives : The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.

Kinematics : Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body –Tpes and their Analysis in Planar Motion. Kinetics : Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VI

Objectives : The students are to be exposed to concepts of work , energy and particle motion

Work – Energy Method : Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

TEXT BOOKS :

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4 th Edn - , Mc Graw Hill publications.

REFERENCE BOOKS :

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11 th Edn – Pearson Publ.
2. Engineering Mechanics , statics – J.L.Meriam, 6 th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics , statics and dynamics – I.H.Shames, – Pearson Publ.
4. Mechanics For Engineers , statics - F.P.Beer & E.R.Johnston – 5 th Edn Mc Graw Hill Publ.
5. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston –5 th Edn Mc Graw Hill Publ.
6. Theory & Problems of engineering mechanics, statics & dynamics – .W.Nelson, C.L.Best & W.G. McLean, 5 th Edn – Schaum's outline series - Mc Graw Hill Publ.
7. Engineering Mechanics , Fedinand . L. Singer , Harper – Collins.
8. Engineering Mechanics statics and dynamics , A Nelson , Mc Graw Hill publications

I Year B.Tech. – II Sem.

ENVIRONMENTAL STUDIES

OBJECTIVES:

The objectives of the course is to impart

1. Overall understanding of the natural recourses
2. Understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges being induced because of the unplanned anthropogenic activities
4. An understanding of the assessment of impact of a developmental activity
5. Awareness on the social issues and environmental legislation and global treaties- Case studies of Minamita disease, Extinction of the Dodo, Bhopal tragedy, Polavaram Project, Narmada Valley, Mad Cow disease, Ganga Cleaning Program etc.

OUTCOMES:

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the usefulness of the conservation of the natural resources
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. Environmental Impact Assessment and the stages involved in EIA and the environmental audit.
8. Quantitative expression of values of Resources, Impacts, Green technologies etc.

SYLLABUS :

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems

UNIT - II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social and aesthetic use. Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ measures.

UNIT - IV

Environmental Pollution : Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution - Carbon trade - Pollution case studies.

Solid Waste Management: Sources, classification,effects and control measures of urban and industrial solid wastes. Sanitary Landfilling, Composting, Incineration. Consumerism and waste products.

UNIT - V

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation - Public awareness.

UNIT - VI

Environmental Management: Environmental Impact Assessment and its significance, various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism.

Note: The student should submit a report individually on any issue related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:

1. R. Rajagopalan, Environmental Studies, 2nd Edition, 2011, Oxford University Press.
2. Shaashi Chawla: A Textbook of Environmental Studies. TMH, New delhi
3. P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Environmental Studies Pearson, Chennai

REFERENCE BOOKS:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
3. Benny Joseph: Environmental Studies, Tata McGrawhill Co, NewDelhi
4. Piyush Malaviya, Pratibha Singh, Anoop singh : Environmental Studies, Acme Learning, New Delhi

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I Year B.Tech. – II Sem.

MATHEMATICS – III (Differential Equations)
(Common to ALL branches of First Year B.Tech.)

OBJECTIVES:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

OUTCOMES:

At the end of the Course, Student will be able to:

1. Solve ordinary and partial differential equations of first, second and higher order.
2. Determine Fourier Series of a function.
3. Calculate total derivative, Jacobian, maxima and minima of functions of two variables.

SYLLABUS:

UNIT I: Partial differentiation:

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables– Functional dependence-Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT II:

Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact.

Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, $e^{ax}V(x)$, $xV(x)$- Method of Variation of parameters.

Applications: LCR circuit, Simple Harmonic motion.

UNIT III: Fourier Series:

Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

UNIT IV: First order Partial differential equations:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT V: Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$.

UNIT VI: Applications of PDE:
Classification of second order partial differential equations, Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation and related problems.

TEXT BOOKS:

1. **B.S.Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

REFERENCE BOOKS:

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
2. **Micheael Greenberg,** Advanced Engineering Mathematics, 9th edition, Pearson edn
3. **Dean G. Duffy,** Advanced engineering mathematics with MATLAB, CRC Press
4. **Peter O'neil,** Advanced Engineering Mathematics, Cengage Learning.
5. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.

I Year B.Tech. – II Sem.

APPLIED CHEMISTRY LABORATORY

Outcomes: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

EXPERIMENTS:

1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis
2. Determination of HCl using standard Na_2CO_3 solution.
3. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
4. Determination of $KMnO_4$ using standard Oxalic acid solution.
5. Determination of Ferrous iron using standard $K_2Cr_2O_7$ solution.
6. Determination of Copper using standard hypo solution.
7. Determination of temporary and permanent hardness of water using standard EDTA solution.
8. Determination of Iron by a Colorimetric method.
9. Determination of acetic acid by using sodium hydroxide (pH meter method).
10. Determination of HCl using standard Potassium hydrogen phthalate (by Conductometric method).
11. Determination of HCl using standard Potassium hydrogen phthalate (by Potentiometric method).
12. Determination of Mg^{++} in an antacid.
13. Determination of $CaCO_3$ present in an egg shell.
14. Determination of Vitamin C.

Of the above experiments at-least 10 assessment experiments should be completed in a semester.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) *Laboratory Manual of engineering chemistry-II,* VGS Techno Series

I Year – II
SEMESTER

CS128 OBJECT-ORIENTED PROGRAMMING THORUGH C++ LAB

OBJECTIVES:

- To strengthen their problem solving ability by applying the characteristics of an object- oriented approach.
- To introduce object oriented concepts in C++ and Java.

Programming Exercises:

Exercise – 1 (Basics)
Write a Simple Program on printing "Hello World" and "Hello Name" where name is the input from the user

a) Convert any two programs that are written in C into C++
b) Write a description of using g++ (150 Words)

Exercise – 2 (Expressions Control Flow)

a) Write a Program that computes the simple interest and compound interest payable on principal amount(inRs.) of loan borrowed by the customer from a bank for a given period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.
b) Write a Program to calculate the fare for the passenger starveling in a bus. When a Passenger enters the bus, the conductor asks "What distance will you travel?" On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

Exercise – 3 (Variables, Scope, Allocation)

a) Write a program to implement call by value and call by reference using reference variable.
b) Write a program to illustrate scope resolution, new and delete Operators. (Dyanamic Memory Allocation)
c) Write a program to illustrate Storage classes
d) Write a program to illustrate Enumerations

Exercises –4 (Functions)
Write a program illustrating Inline Functions

a) Write a program illustrate function overloading. Write 2 overloading functions for power.

b) Write a program illustrate the use of default arguments for simple interest function.

Exercise -5 (Functions –Exercise Continued)

a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers

b) Write a program illustrate function template for power of a number.

c) Write a program to illustrate function template for swapping of two numbers.

Exercise -6 (Classes Objects)

Create a Distance class with:

- feet and inches as data members
- member function to input distance
- member function to output distance
- member function to add two distance objects

a) Write a main function to create objects of DISTANCE class. Input two distances and output the sum.

b) Write a C++ Program to illustrate the use of Constructors and Destructors (use the above program.)

c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem)

c) Write a C++ program demonstrating a BankAccount with necessary methods and variables

Exercise – 7 (Access)

Write a program for illustratingAccess Specifiers public, private, protected

a) Write a program implementing Friend Function

b) Write a program to illustrate this pointer

c) Write a Program to illustrate pointer to a class

Exercise -8 (Operator Overloading)

a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function.

i. Unary operator as member function

ii. Binary operator as nonmember function

b). Write a c ++ program to implement the overloading assignment = operator

c).Write a case study on Overloading Operators and Overloading Functions (150 Words)

Exercise -9 (Inheritance)

a) Write C++ Programs and incorporating various forms of Inheritance

i) Single Inheritance ii) Hierarchical Inheritance

iii) Multiple Inheritances iv) Multi-level inheritance v) Hybrid inheritance

b) Write a program to show Virtual Base Class

c) Write a case study on using virtual classes (150 Words)

Exercise-10 (Inheritance –Continued)

a) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance

b) Write a Program to *show* how *constructors* are invoked in *derived class*

Exercise -11 (Polymorphism)

a) Write a program to illustrate runtime polymorphism
b) Write a program to illustrate this pointer
c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.
d) Write a case study on virtual functions (150 Words)

Exercise -12(Templates)

a) Write a C++ Program to illustrate template class
b) Write a Program to illustrate class templates with multiple parameters
c) Write a Program to illustrate member function templates

Exercise -13 (Exception Handling)

a).Write a Program for Exception Handling Divide by zero
b). Write a Program to rethrow an Exception

Exercise -14 (STL)

a) Write a Program to implement List and List Operations
b) Write a Program to implementVector andVector Operations

Exercise -15 (STLContinued)

a) Write a Program to implement Deque and Deque Operations
b) Write a Program to implement Map and Map Operations

COURSE OUTCOMES:

After the completion of the course, students will be able to

CS128.1	Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.	**K2**
CS128.2	Analyze simple programs using classes and objects in C++.	**K4**
CS128.3	Experiment with programs involving constructors, destructors and reuse of code using inheritance.	**K3**
CS128.4	Examine Object Oriented Programs using templates and exceptional handling concepts.	**K4**
CS128.5	Apply an object-oriented approach to developing applications of varying complexity.	**K3**

CO-PO Mapping

	Correlation Levels as :									
	1=L	2=MODERATE		3=HIGH						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS128.1	2									
CS128.2		3				1		2		
CS128.3		2	3	3					1	
CS128.4			2		2					
CS128.5					2					
CS128.6		3	1		3			3		

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II

PRESCRIBED LAB MANUAL FOR SEMESTER II:
'INTERACT: English Lab Manual for Undergraduate Students' Published by **Orient Blackswan Pvt Ltd.**

Oral Communication: Listening and Speaking

- To help the learners **listen** (apart from global comprehension)and:
  i. Note specific details of the speech to understand the intentions of the speaker
  ii. Observe and adopt the appropriate social conventions in speech
  iii. Comprehending long discourses and make notes
  iv. Develop and ask appropriate questions on the discourses
  v. Comprehend and respond appropriately to multiple speakers

- To enhance **speaking skills** of the students in the following aspects
  i. Converse with general clarity using pronunciation/stress/ intonation patterns which allow for overall intelligibility.
  ii. Demonstrate effective word choice, vocabulary, idioms, grammar and sentence structure allowing accurate communication of meaning in written work.
  iii. Articulate in conversation and oral presentations clearly organized ideas and supporting evidence in a vocabulary appropriate to the target audience.
  iv. Recognize their own verbal mistakes and correct them.
  v. Give a standard oral presentation which informs and/or persuades the audience.

OUTCOMES
By the end of the course the students would have learnt:

- To apply appropriate social conventions in speech
- Ask questions based on long discourses
- Make their speech more intelligible
- Make persuasive presentations
- Choose appropriate expressions in the discourse

SYLLABUS:

UNIT 1:

1. Presenting self to audience
2. Paralinguistic features in oral communication

UNIT 2:

1. Group Discussions
   Practice work

UNIT 3:

1. Presentation Skills
   Practice work

UNIT 4:

1. Interview Skills
   Practice work

UNIT 5:

1. Debating
   Practice work

UNIT 6:

- Discussing movies or novels: reviews of media
- Practice work

Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education

II Year – I SEMESTER

CS211 STATISTICS WITH R PROGRAMMING

OBJECTIVE:

After taking the course, students will be able to

- Use R for statistical programming, computation, graphics, and modeling,
- Write functions and use R in an efficient way,
- Fit some basic types of statistical models
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

SYLLABUS:

UNIT-I:

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

UNIT-II:

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

UNIT-III:

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

UNIT-IV:

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function –Customizing Graphs, Saving Graphs to Files.

UNIT-V:

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

UNIT-VI:

Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models- Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

TEXT BOOKS:

1) The Art of R Programming, Norman Matloff, Cengage Learning
2) R for Everyone, Lander, Pearson

REFERENCE BOOKS:

1) R Cookbook, PaulTeetor, Oreilly.
2) R in Action,Rob Kabacoff, Manning

Course Outcomes:

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

CS211.1	**Demonstration** and implement of basic R programming framework and data structures→	**K2**
CS211.2	**Explain** critical R programming language concepts such as control structures and recursion→	**K2**
CS211.3	**Applying** mathematical and statistical operations data structures in R→	**K3**
CS211.4	**Examine** data-sets to create testable hypotheses and identify appropriate statistical t	**K4**
CS211.5	**Make use of** appropriate statistical tests using R and Create and edit visualizations with regression models	**K3**
CS211.6	**Define** model choices and results.	**K1**

CO-PO Mapping

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS211.1	3					2				
CS211.2		3						1		
CS211.3	3	2	1					2	1	
CS211.4	2	2	3	1		2		2		
CS211.5	2	2		1	1	3	2	2		
CS211.6		1	2	3	2			3		

II Year – I SEMESTER

CS212 MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

OBJECTIVES:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of

problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

SYLLABUS:

UNIT -I:

Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus:Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT -II:

Set Theory: Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

UNIT- III:

Algebraic Structures and Number Theory: *Algebraic Structures:*Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism, *Number Theory:* Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

UNIT -IV:

Combinatorics: Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

UNIT -V:

Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT -VI:

Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

TEXT BOOKS:

1.Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T. P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

COURSE OUTCOMES:

CS212.1	Ability to Understanding the logical functional skills in solving mathematical problems	K2
CS212.2	Demonstrate the information between Relations and functions in set theory.	K3
CS212.3	Analyze the algebraic structure and Number Theory.	K3
CS212.4	Formulate the combinations concept using the permutations and combinations format.	K3
CS212.5	Solving of the recurrence relation using the mathematical ideas/results verbally or in writing.	K3
CS212.6	Implement appropriate sorting/searching technique for given problem	K3

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS212.1	2	1	1							
CS212.2	1	2	2	1				1		
CS212.3			1	1		1				
CS212.4	1	2			1				2	
CS212.5		2	3	2	1				1	
CS212.6		1	3			1		1		

II Year – I SEMESTER

CS213 DIGITAL LOGIC DESIGN

OBJECTIVE:

- To introduce the basic tools for design with combinational and sequential digital logic and state machines.
- To learn simple digital circuits in preparation for computer engineering.

SYLLABUS:

UNIT- I: Digital Systems and Binary Numbers
Digital Systems, Binary Numbers, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Complements of Numbers, Signed Binary Numbers,Arithmetic addition and subtraction

UNIT -II: Concept of Boolean algebra
Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms,

UNIT- III: Gate level Minimization
Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation, Exclusive-OR Function

UNIT- IV:Combinational Logic
Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits

UNIT- V: Synchronous Sequential Logic
Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked **Sequential** Circuits, Mealy and Moore Models of Finite State Machines

UNIT -VI:Registers and Counters
Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter, Ripple Counter

TEXT BOOKS:

1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

REFERENCE BOOKS:

1. Digital Logic and Computer Design, M.Morris Mano, PEA.
2. Digital Logic Design, Leach, Malvino, Saha, TMH.
3. Modern Digital Electronics, R.P. Jain, TMH.

COURSE OUTCOMES:

A student who successfully fulfills the course requirements will have demonstrated:

CS213.1	Explain the concepts of Number systems and different weighted/Non weighted codes	K2
CS213.2	Apply the concepts of Logic gates in different applications and know how to minimize a Boolean expression through Karnaugh Maps	K3
CS213.3	Develop different combinational Logic circuits and construct higher-order circuits using modular designing	K3
CS213.4	Understand the concepts of basic flip-flops in terms of truth table & excitation table	K2
CS213.5	Apply the concepts of flip-flops in the designing of different sequential circuits like registers, counters, etc.	K3

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS213.1	2	2	1							
CS213.2		3				2				
CS213.3			3	3					1	
CS213.4	2		2	1		1				
CS213.5				1		2				
CS213.6	3	1		2					1	

II B Tech I Sem –R16

CS214 JAVA Programming

Objective: ***Implementing programs for user interface and application development using core java principles***

SYLLABUS:

UNIT I:

Objective: Focus on object oriented concepts and java program structure and its installation

Introduction to OOP

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

UNIT II:

Objective: Comprehension of java programming constructs, control structures in Java

Programming Constructs

Variables , Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary,Unary and ternary, Expressions, Precedence rules and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching,Conditional, loops.,

Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

UNIT III:

Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages , using Packages, Access protection, java.lang package

Exceptions & Assertions - Introduction, Exception handling techniques-try…catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions

UNIT IV:

Objective: Understanding of Thread concepts and I/O in Java

MultiThreading : java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive() and join(), Syncronization, suspending and Resuming threads, Communication between Threads

Input/Output: reading and writing data, java.io package

UNIT V:

Objective: Being able to build dynamic user interfaces using applets and Event handling in java

Swing:

Introduction , javax.swing package , JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box , Pluggable Look and Feel

Event Handling -Introduction, Event Delegation Model, java.awt.event Description,Sources of Events, Event Listeners, Adapter classes, Inner classes

UNIT VI:

Objective: Understanding of various collection classes in Java and writing code snippets using them

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization.

Text Books:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson

Reference Books:

1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , University Press.

COURSE OUTCOMES:

CS214.1	Discuss and understand java programming constructs, Control structures(	**K2**
CS214.2	Illustrate and experiment Object Oriented Concepts like classes,objects(	**K3**
CS214.3	Apply Object Oriented Constructs such as Inheritance, interfaces, and exception handling	**K3**
CS214.4	Construct applications using multithreading and I/O	**K3**
CS214.5	Develop Dynamic User Interfaces using applets and Event Handling in java	**K3**
CS214.6	Develop Code Snippets using Abstract Window Toolkit and Swings(	**K3**

CO-PO MAPPING:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS214.1	2	2	1							
CS214.2		3				2				
CS214.3			3	3					1	
CS214.4	2		2	1		1				
CS214.5				1		2				
CS214.6	3	1		2					1	

II Year – I SEMESTER

CS215 DATA STRUCTURES THROUGH C++

OBJECTIVES:

- To be familiar with basic techniques of object oriented principles and exception handling using C++
- To be familiar with the concepts like Inheritance, Polymorphism
- Solve problems using data structures such as linear lists, stacks, queues, hash tables
- Be familiar with advanced data structures such as balanced search trees, AVLTrees, and B Trees.

SYLLABUS:

UNIT-I: ARRAYS

Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type- Polynomial Representation- Polynomial Addition. Spares Matrices,Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

UNIT-II: STACKS AND QUEUES

Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT-III: LINKED LISTS

Single Linked List and Chains, Representing Chains in C++, Defining a Node in C++- Designing a Chain Class in C++- Pointer manipulation in C++- Chain Manipulation Operations, The Template Class Chain, Implementing Chains with Templates- Chain Iterators- Chain Operations- Reusing a Class, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input- Deleting a Sparse Matrix, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists- Recursive Algorithms for Lists- Reference Counts, Shared and Recursive Lists

UNIT-IV: TREES

Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary

Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

UNIT-V: GRAPHS

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm Sollin' s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.

UNIT-VI: SORTING

Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.

TEXT BOOKS:

1. Data structures, Algorithms and Applications in C++, S.Sahni, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

REFERENCE BOOKS:

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

COURSE OUTCOMES:

CS215.1	Illustrate Object Oriented Programming concepts using C++.	K2
CS215.2	Interpret the Basic Concepts in Data Structures, Stacks, Queues and Templates.	K2
CS215.3	Prepare programs on pointers, Singly Linked Lists, Double Linked List and Circular Linked List	K3
CS215.4	Construct various advanced data structures like Binary Trees, tree traversals and Heap	K2
CS215.5	Construct various graphs and operations and shortest path algorithm.	K2
CS215.6	Distinguish various sorting techniques.	K2

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS215.1	2	1				1			1	
CS215.2		1	1							
CS215.3		3		2					1	
CS215.4	2				1	1		2		
CS215.5		2				1			2	
CS215.6		1	2						2	

II Year – I SEMESTER

CS216 COMPUTER GRAPHICS

OBJECTIVES:

- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects.

SYLLABUS:

UNIT-I:

2D Primitives : Output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformations - Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms

UNIT-II:

3D Concepts : Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces, - Visualization of data sets - 3D transformations – Viewing -Visible surface identification.

UNIT-III:

Graphics Programming : Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects - Drawing three dimensional scenes

UNIT- IV:

Rendering : Introduction to Shading models – Flat and Smooth shading – Adding texture to faces – Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows.

UNIT- V:

Fractals : Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals

UNIT- VI:

Overview of Ray Tracing : Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

TEXT BOOKS:

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition, Pearson Education,2004.

2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

Course Outcomes:

After learning the course, the student will be able:

CS216.1	**Acquire** the basics of computer graphics, different graphics systems and applications of computer graphics with various algorithms for line, circle and ellipse drawing objects for 2D transformations	K3
CS216.2	**Explain** projections and visible surface detection techniques for display of 3D scene on 2D screen	K5
CS216.3	**Develop** scene with basic graphic primitive algorithms using OPENGL programming.	K3
CS216.4	Know and be able to **Explain** selected among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).	K5
CS216.5	**Illustrate** able to create the general software architecture of programs that use 3D object sets with computer graphics.	K3
CS216.6	**Discuss** Adding texture surface with transparency Boolean operations	K6

	Correlation Levels as :									
	1=LOW	2=MODERATE		3=HIGH						
CS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CS216.1	2	2	1							
CS216.2		3			1	2				
CS216.3			3	3				1	1	
CS216.4	2		2	1		1				
CS216.5				1	1	2				
CS216.6	3	1		2				1	1	

II Year – I SEMESTER

CS217 DATASTRUCTURES THROUGH C++ LAB

OBJECTIVES:

- To develop skills to design and analyze simple linear and non linear data structures
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To Gain knowledge in practical applications of data structures

List of Experiments:

1. Implementation of Singly linked list.
2. Implementation of Doubly linked list.
3. Implementation of Multistack in a Single Array.
4. Implementation of Circular Queue
5. Implementation of Binary Search trees.
6. Implementation of Hash table.
7. Implementation of Heaps.
8. Implementation of Breadth First Search Techniques.
9. Implementation of Depth First Search Techniques.
10. Implementation of Prim's Algorithm.
11. Implementation of Dijkstra's Algorithm.
12. Implementation of Kruskal's Algorithm
13. Implementation of MergeSort
14. Implementation of Quick Sort
15. Implementation of Data Searching using divide and conquer technique

COURSE OUTCOMES:

CS217.1	Apply any Recursive algorithms for a given problem	K3
CS217.2	Apply sorting and searching techniques	K3
CS217.3	Apply stacks and queues operations	K3
CS217.4	Apply Linked List operations	K3
CS217.5	Apply Trees operations	K3

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	2=MODERATE		3=HIGH						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS217.1	1	3								
CS217.2	1	2	1			1				
CS217.3				2	1			2	2	
CS217.4		2	1					1		

II Year – I SEMESTER

CS218 JAVA PROGRAMMING LAB

Exercise - 1 (Basics)
a) Write a JAVA program to display default value of all primitive data type of JAVA
b) Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.
c) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
d) Write a case study on **public static void main(250 words)**

Exercise - 2 (Operations, Expressions, Control-flow, Strings)
a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
c) Write a JAVA program to sort for an element in a given list of elements using merge sort.
d) Write a JAVA program using StringBufferto delete, remove character.

Exercise - 3 (Class, Objects)
a) Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
b) Write a JAVA program to implement constructor.

Exercise - 4 (Methods)
a) Write a JAVA program to implement constructor overloading.
b) Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)
a) Write a JAVA program to implement Single Inheritance
b) Write a JAVA program to implement multi level Inheritance
c) Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)
a) Write a JAVA program give example for “super” keyword.
b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)
a) Write a JAVA program that describes exception handling mechanism
b) Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)
a) Write a JAVA program that implements Runtime polymorphism
b) Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise – 9 (User defined Exception)
a) Write a JAVA program for creation of Illustrating throw
b) Write a JAVA program for creation of Illustrating finally
c) Write a JAVA program for creation of Java Built-in Exceptions
d)Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)
a) Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)
b) Write a program illustrating **isAlive** and **join ()**
c) Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)
a) Write a JAVA program Producer Consumer Problem
b) Write a case study on thread Synchronization after solving the above producer consumer problem

Exercise – 12 (Packages)
a) Write a JAVA program illustrate class path
b) Write a case study on including in class path in your os environment of your package.
c) Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 13 (Applet)
a) Write a JAVA program to paint like paint brush in applet.
b) Write a JAVA program to display analog clock using Applet.
c) Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)
a) Write a JAVA program that display the x and y position of the cursor movement using Mouse.
b) Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Course Outcomes:

By the end of the course student will be able to write java program for

CS218.1	**Evaluate** default value of all primitive data type, Operations, Expressions, Control-flow, Strings.	K5
CS218.2	**Determine** Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism.	K5
CS218.3	**Illustrating** simple inheritance, multi-level inheritance, Exception handling mechanism.	K2
CS218.4	**Construct** Threads, Event Handling, implement packages, developing applets.	K6

CO-PO Mapping:

Program Outcomes										
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	1	2	1	2	2	1
CO2	2	3	2	2		2		3	3	
CO3	3	3	2		2	3	2	3	2	
CO4	2	2	3	2	2		1	2	3	1

1 - Low 2 - Moderate 3 – High

II Year – II SEMESTER

CS221 SOFTWARE ENGINEERING

OBJECTIVES

- To understand the software life cycle models.
- To understand the software requirements and SRS document.
- To understand the importance of modeling and modeling languages.
- To design and develop correct and robust software products.
- To understand the quality control and how to ensure good quality software.
- To understand the planning and estimation of software projects.
- To understand the implementation issues, validation and verification procedures.
- To understand the maintenance of software

Syllabus:

UNIT-I:

Software and Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

UNIT-II:

Requirements Analysis And Specification: Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

Software Design: Overview of the Design Process, How to Characterise of a Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

UNIT – III:

Function-Oriented Software Design: Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

UNIT – IV:

Coding And Testing: Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

UNIT – V:

Software Reliability And Quality Management: Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

Computer Aided Software Engineering: Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment

UNIT – VI

Software Maintenance: Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

Software Reuse: what can be Reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level.

TEXT BOOKS:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

REFERENCE BOOKS:

1. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
2. Software Engineering, A Precise Approach, PankajJalote, Wiley India,2010.
3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
4. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

COURSE OUTCOMES:

CS221.1	Define Software Engineering methodologies and software process	K1
CS221.2	Explain requirements engineering activities	K2
CS221.3	Classify various software design techniques.	K2
CS221.4	Apply coding principles and testing techniques.	K3
CS221.5	Explain management and estimation techniques in software development process.	K2
CS221.6	Describe Software quality and maintenance.	K2

CO-PO MAPPING:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS221.1	2	2	1							
CS221.2		3			1	2				
CS221.3			3	3				1	1	
CS221.4	2		2	1		1				
CS221.5				1	1	2				
CS221.6	3	1		2				1	1	

II Year – II SEMESTER

CS222 PYTHON PROGRAMMING

OBJECTIVES:

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science

Syllabus:

UNIT – I:
Introduction: History of Python, Python Language, Features of Python, Applications of Python, Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT – II:
Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations, Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT – III:
Data Structures Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT – IV:
Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.
Modules: Creating modules, import statement, from .. import statement, name spacing,
Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

UNIT – V:
Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding,

UNIT – VI:
Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics
Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

TEXT BOOKS

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

REFERENCE BOOKS:

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

COURSE OUTCOMES:

CS222.1	Understand and comprehend the basics of python programming.	K2
CS222.2	Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology.	K2
CS222.3	Explain the use of the built-in data structures list, sets, tuples and dictionary.	K3
CS222.4	Make use of functions and its applications.	K3
CS222.5	Identify real-world applications using oops, files and exception handling provided by python.	K3
CS222.6	Formulate and implement a program to solve a real-world problem using GUI and Turtle graphics.	K3

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS222.1	2	2	1							
CS222.2		3				2				
CS222.3			3	3					1	
CS222.4	2		2	1		1				
CS222.5				1		2				
CS222.6	3	1		2					1	

II Year – II SEMESTER

CS223 ADVANCED DATA STRUCTURES

OBJECTIVES:

- Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).
- Analyze the space and time complexity of the algorithms studied in the course.
- Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions.
- Demonstrate an understanding of external memory and external search and sorting algorithms.
- Demonstrate an understanding of simple Entity-Relationship models for databases.

Syllabus:

UNIT-I: SORTING

External Sorting, Introduction, K-way Merging - Buffer Handling for parallel Operation- Run Generation- Optimal Merging of Runs.

UNIT-II: HASHING

Introduction-Static Hashing- Hash Table- Hash Functions- Secure Hash Function- Overflow Handling- Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing -Dynamic Hashing Using Directories- Directory less Dynamic, Hashing,

UNIT-III:PRIORITY QUEUES (HEAPS)

Model, Simple Implementation, Binary Heap-Structure Property-Heap-Order Property-Basic Heap Operations- Other Heap Operation, Applications of Priority Queues- The Selection Problem Event Simulation Problem, Binomial Queues- Binomial Queue Structure – Binomial Queue Operation- Implementation of Binomial Queues

UNIT-IV: EFFICIENT BINARY SEARCH TREES

Optimal Binary Search Trees, AVL Trees, Red-Black Trees, Definition- Representation of a Red- Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree.

UNIT-V: MULTIWAY SEARCH TREES

M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- Number of Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- B+-Tree Definition- Searching a B+-Tree- Insertion into B+-tree- Deletion from a B+-Tree.

UNIT-VI: DIGITAL SEARCH STRUCTURES

Digital Search Trees, Definition- Search, Insert and Delete- Binary tries and Patricia, Binary Tries, Compressed Binary Tries- Patricia, Multiway Tries- Definitions- Searching a Trie- Sampling Strategies- Insertion into a Trie- Deletion from a Trie- Keys with Different Length- Height of a Trie- Space Required and Alternative Node Structure- Prefix Search and Applications- Compressed Tries- Compressed Tries With Skip Fields- Compressed Tries With Labeled Edges- Space Required by a Compressed Tries, Tries and Internet Packet Forwarding ,-IP Routing- 1-Bit Tries- Fixed-Stride Tries-Variable-Stride Tries.

TEXT BOOKS:

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.
2. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Anderson-freed, Universities Press
3. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson

REFERENCE BOOKS:

1. Web : http://lcm.csa.iisc.ernet.in/dsa/dsa.html
2. http://utubersity.com/?page_id=878
3. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms
5. File Structures :An Object oriented approach with C++, 3rd ed, Michel J Folk, Greg Riccardi, Bill Zoellick
6. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu & EV Prasad, S Chand, 2010.

COURSE OUTCOMES:

CS223.1	Explain external sorting method.	K2
CS223.2	Illustrate various hash function with appropriate examples	K3
CS223.3	Illustrate various priority queues with appropriate examples.	K3
CS223.4	Construct self balanced tree with appropriate examples	K3
CS223.5	Discuss Multiway search trees.	K2
CS223.6	Demonstrate digital search trees and binary tries	K3

CO-PO MAPPING:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS223.1	2	2	1							
CS223.2		3				2				
CS223.3			3	3					1	
CS223.4	2		2	1		1				
CS223.5				1		2				
CS223.6	3	1		2					1	

II Year – II SEMESTER

CS224 COMPUTER ORGANIZATION

OBJECTIVES:

- Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
- In addition to this the memory management system of the computer.

OUTCOMES:

- Students can understand the architecture of modern computers.
- They can analyze the Performance of a computer using performance equation
- Understanding of different instruction types.
- 4. Students can calculate the effective address of an operand by addressing modes
- 5. They can understand how computer stores positive and negative numbers.
- 6. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

SYLLABUS:

UNIT -I:

Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

UNIT -II:

Machine Instruction and Programs:

Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

UNIT -III:

Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

UNIT -IV:

INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

UNIT -V:

The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING **Secondary Storage:** Magnetic Hard Disks, Optical Disks,

UNIT -VI:

Processing Unit: Fundamental Concepts: Register Transfers, Performing an Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control, **Micro programmed Control:** Microinstructions, Microprogram Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

TEXT BOOKS:

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
4. "Computer Organization and Design: The Hardware/Software Interface" by David A.
Patterson and John L. Hennessy.
5. J .P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

Course Outcomes:

CS224.1	Learn the history and architectural development of a computer	K1
CS224.2	Identify the addressing mode of instructions, applying data structure in programming equations.	K1
CS224.3	Demonstrate the use of addressing modes with different instruction types for different architecture.	K3
CS224.4	Analyze how to handle devices, enabling and disabling of interrupts, applicability of various bus architectures and DMA in input output organization.	K4
CS224.5	Distinguish types of memories and storage devices . Applying different mapping functions for cache operations.	K6
CS224.6	Articulate design issues in the development of processor or other components that satisfy design requirements and objectives.	K8

CO_PO Mapping

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CS224.1	3	1			2	2				
CS224.2	3		2	2	1	2		2	1	
CS224.3		2	3	2		3		3		
CS224.4				3		2		1		
CS224.5	1	2	2			3		1		
CS224.6				1		2	2	3		

II Year – II SEMESTER

CS225 FORMAL LANGUAGE AND AUTOMATA THEORY

OBJECTIVE:

- Introduce the student to the concepts of Theory of computation in computer science
- The students should acquire insights into the relationship among formal languages, formal Grammars and automat.

OUTCOMES:

- Classify machines by their power to recognize languages,
- Employ finite state machines to solve problems in computing,
- Explain deterministic and non-deterministic machines,
- Comprehend the hierarchy of problems arising in the computer science

Syllabus:

UNIT – I: Finite Automata

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT – II: Regular Expressions

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

UNIT – III: Context Free Grammars

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

UNIT – IV: Pushdown Automata

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

UNIT – V: Turning Machine

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

UNIT – VI: Computability

Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Classes of P and NP, NP-Hard and NP-Complete Problems.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3rd Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, 3rd Edition, PHI, 2007.

REFERENCE BOOKS:

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

II Year – II SEMESTER

CS226 PRINCIPLES OF PROGRAMMING LANGUAGES

OBJECTIVES:

- To understand and describe syntax and semantics of programming languages
- To understand data, data types, and basic statements
- To understand call-return architecture and ways of implementing them
- To understand object-orientation, concurrency, and event handling in programming languages
- To develop programs in non-procedural programming paradigms

OUTCOMES:

- Describe syntax and semantics of programming languages
- Explain data, data types, and basic statements of programming languages
- Design and implement subprogram constructs, Apply object - oriented, concurrency, and event handling programming constructs
- Develop programs in Scheme, ML, and Prolog
- Understand and adopt new programming languages

Syllabus:

UNIT I:

Syntax and semantics: Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing

UNIT II:

Data, data types, and basic statements: Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions , assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

UNIT III:

Subprograms and implementations: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

UNIT IV:

Object- orientation, concurrency, and event handling: Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores,
Monitors, message passing, threads, statement level concurrency, exception handling, event handling

UNIT V:

Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML,

UNIT VI:

Logic programming languages: Introduction to logic and logic programming, Programming with Prolog, multi - paradigm languages

TEXT BOOKS:

1. Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley, 2012.
2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

REFERENCE BOOKS:

1. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press, 2009.
2. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall, 1998.
3. Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
4. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003

COURSE OUTCOMES:

CS226.1 : Describe the syntax and semantics of programming languages and gain practical knowledge in lexical analysis and parsing phases of a compiler → K4

CS226.2 : Make use of different constructs in programming languageswith merits and demerits → K3

CS226.3 : Design and implement sub programs in various programming languages → K5

CS226.4 : Developing the knowledge ondifferent programming language features like object-orientation, concurrency, exception handling and event handling → K3

CS226.5 : Analyzing functional paradigm and ability to write small programs using Scheme and ML → K4

CS226.6 : Develop programs logic paradigm and ability to write small programs using Prolog → K6

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS226.1			3	3		2			2	
CS226.2	3	3			2	2		1		
CS226.3		2		2		2		3	2	
CS226.4	2	3	2	3	3					
CS226.5	3		1						3	
CS226.6		3		2	2			2	1	

II Year – II SEMESTER

CS227 ADVANCED DATA STRUCTURES LAB

OBJECTIVES:

- To understand heap and various tree structures like AVL, Red-black, B and Segment trees
- To understand the problems such as line segment intersection, convex shell and Voronoi diagram

OUTCOMES:

- Implement heap and various tree structure like AVL, Red-black, B and Segment trees
- Solve the problems such as line segment intersection, convex shell and Voronoi diagram

Syllabus:

1. To perform various operations i.e., insertions and deletions on AVL trees.
2. To implement operations on binary heap.
   i) Vertex insertion
   ii) Vertex deletion
   iii) Finding vertex
   iv) Edge addition and deletion
3. To implement Prim's algorithm to generate a min-cost spanning tree.
4. To implement Krushkal's algorithm to generate a min-cost spanning tree.
5. To implement Dijkstra's algorithm to find shortest path in the graph.
6. To implementation of Static Hashing (Use Linear probing for collision resolution)
7. To implement of Huffmann coding.
8. To implement of B-tree.

COURSE OUTCOMES:

On successful completion of the course module students will be able to,

CS227.1	Implement basic operations such as Insertion, Deletion, and Search on Advanced Data structures like Heaps, AVL trees, and B-Trees	**K2**
CS227.2	Understand the practical applications of several advanced techniques like Hashing, Data compression techniques, and spanning trees in the domains of DBMS, Compiler design, and in Network routing.	**K2**
CS227.3	Identify the appropriate data structure for the given problem definition.	**K3**
CS227.4	Apply advanced concepts and data structures to improve the efficiency of real time systems.	**K4**

CO/PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CS227.1	3	2	2	2		2			1	
CS227.2	2	3	2	3		2			1	
CS227.3		3	3	2		2			1	
CS227.4				3	1	1			1	

II Year – I SEMESTER

CS228 PYTHON PROGRAMMING LAB

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script
b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)

b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10
c) Write a program using a for loop that loops over a sequence. What is sequence ?
d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million.
Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:
1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
c) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS - Continued

a) Write a program combine_lists that combines these lists into a dictionary.
b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints

b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules

a) Install packages requests, flask and explore them. using (pip)

d) Write a script that imports requests and fetch content from the page. Eg. (Wiki)

e) Write a simple script that serves a simple HTTPResponse and a simple HTML Page

Exercise - 13 OOP

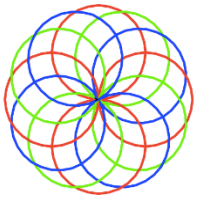
a) Class variables and instance variable and illustration of the self variable

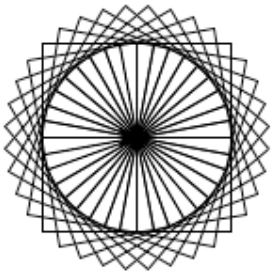
i) Robot

ii) ATM Machine

Exercise - 14 GUI, Graphics

1. Write a GUI for an Expression Calculator using tk
2. Write a program to implement the following figures using turtle





Exercise - 15 - Testing

a) Write a test-case to check the function even_numbers which return True on passing a list of all even numbers

b) Write a test-case to check the function reverse_string which returns the reversed string

Exercise - 16 - Advanced

a) Build any one classical data structure.

f) Write a program to solve knapsack problem.

COURSE OUTCOMES:

CS228.1	Understand the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python	K2
CS228.2	Demonstrate different Decision Making statements and Functions.	K4
CS228.3	Interpret Object oriented programming in Python.	K3
CS228.4	Make use and summarize different File handling operations.	K4
CS228.5	Identify how to design GUI Applications in Python and evaluate different database operations	K3
CS228.6	Design and develop Client Server network applications using Python.	K4

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS228.1	2	2	1							
CS228.2		3				2				
CS228.3			3	3					1	
CS228.4	2		2	1		1				
CS228.5				1		2				
CS228.6	3	1		2					1	

III B. Tech. I Semester
CS311 COMPILER DESIGN

OBJECTIVES:
Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.

SYLLABUS:

UNIT-I Overview of Compilation: Introduction, Language Processors, Compiler, Interpreter, Assembler, Pre-processor, Linker, Loader, Phases (Structure) of a Compiler, Pass and Phases of Translation, Bootstrapping. **Lexical Analysis:** Role of Lexical Analysis, Input Buffing, Tokens, Lexemes and Patterns, Recognitions of Tokens, Finite Automata, Regular Expressions, Lexical Analyzer Generators-Lex, Flex

UNIT-II Top-Down Parsing: Role of a Parser, Context Free Grammars, Derivations, Parse Trees, Ambiguity, Left Recursion, Left Factoring, Top-down parsing, Backtracking, Recursive Descent Parsing, Predictive Parsing, LL(1) Grammars.

UNIT-III Bottom-Up Parsing: Bottom-Up Parsing, Shift-Reduce Parsing, Shift-Reduce Conflicts, LR Parsers-SLR, CLR, LALR; Error Recovery in Parsing, Handling Ambiguous Grammars. **Syntax Directed Translation:** Syntax Directed Definition, Evaluation Orders for SDDs, Attribute Grammars, S-attributed and L-attributed Definitions, Syntax Directed Translation Schemes, Application of SDTS.

UNIT-IV Intermediate Code Generation: Different Types of Intermediate Forms-Abstract Syntax Trees, Polish Notation and Three Address Code, Types of Three Address Statements, Types and Decelerations, Translation of Expressions, Type Checking, Type Expressions, Type Systems, Equivalence of Type Expressions, Control Flow, Back Patching.

UNIT-V Run-Time Environment: Storage Organization, Storage Allocation Strategies, Storage Allocation for Arrays, Strings and Records, Activation Records, Access to Non-Local Data, Parameter Passing, Symbol Tables, Symbol Table Management, Heap Management.

UNIT-VI Code Optimization: Principal Sources of Optimization, Machine Dependent and Independent Optimization, Organization of Code Optimizer, Basic Graphs and Flow Graphs, DAG Representation of Basic Blocks, Loop Optimization, Peephole Optimization, Global Dataflow Analysis.
Code Generation: Issues in the Design of Code Generation, Object Code Forms, Target Machine, Simple Code generator, Register Allocation and Assignment, Generic Code Generation Algorithms

TEXT BOOKS:
1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monical S. Lam, Ravi Sethi and Jeffery D. Ullman, 2nd Edition, Pearson Education, 2011.

2. Principles of Compiler Design, Alfred V. Aho and Jeffery D. Ullman, Pearson Education, 2001.

3. Modern Compiler Implementation in C, Andrew W. Appel, Cambridge University Press, 2004.

COURSE OUTCOMES:

CS311.1	Acquire knowledge in different phases and passes of Compiler, and Specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.	K2
CS311.2	Explain Parser and its types i.e. Top-down and Bottom-up parsers.	K2
CS311.3	Construction of LL, SLR, CLR and LALR parse table.	K3
CS311.4	Discover Intermediate Forms-Abstract Syntax Trees, Polish Notation, Type Checking.	K2
CS311.5	Develop Syntax directed translation, synthesized and inherited attributes.	K2
CS311.6	Implement Techniques for code optimization.	K2

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS311.1	2	1	2	3	2			2	2	
CS311.2	1		2	1				1		
CS311.3	3	2	2	1						
CS311.4		2								
CS311.5	1	1	2	2				1	1	
CS311.6	2	1	1	2				1	1	

CS312 UNIX PROGRAMMING

OBJECTIVES:
Understating the shell commands, shell programming, system calls of files and processes, signals, inter-process communication concepts and programming.

SYLLABUS:

UNIT-1 An Introduction: Architecture of unix, features of unix. **Unix commands**: file utilities, process utilities, text processing utilities, network utilities, disk utilities, backup utilities, filters, Security by file permissions.

UNIT-2 Filters: The grep family,The stream editor, the awk, **Shell Programming**: shell variables, The Export command, The Profile File a Script Run During starting, The First Shell Script, The read command, Positional Parameters, The $? Variable , Knowing the exit Status- More about the Set Command, The Exit command, Branching Control Structures, Loop Control Structures, The Continue and Break Statement- The Expr Command, Performing Integer Arithmetic- Real Arithmetic in Shell Programs- The here Document(<<), The Sleep Command, Debugging Scripts, The Script command, The Eval command, The Exec Command

UNIT-3 Files - Introduction, file descriptors, open, creat, read, write, close, lseek, dup2, file status information-stat family, file and record locking- fcntl function, file permissions - chmod, fchmod, file ownership-chown, lchown, links-soft and hard links-symlink, link, unlink. **Directories-**Creating, removing and changing Directories-mkdir, rmdir, chdir, obtaining current working directory-getcwd, Directory contents, Scanning Directories-opendir, readdir, closedir, rewinddir functions

UNIT-4

waitpid functions, exec functions, user identif

Process Control: process identifiers, fork function, vfork function, exit function, wait and

waitpid functions, exec functions, user identif

Process Control: process identifiers, fork function, vfork function, exit function, wait and waitpid functions, exec functions, user identification **Signals**: signal handling using signal function, unreliable signals, interrupted system calls, kill and raise, alarm, pause, abort and sleep functions.

UNIT-5 IPC: introduction, pipes, FIFO's, client –server examples for pipes and FIFO's message queues: message queue structure in kernel, system calls of message queue, client-server example for message queue. **Semaphores:** definition, system calls of semaphores, semaphores structure in kernel, file locking using semaphores.

UNIT-6 Shared memory-system calls of shared memory, semaphore structure in kernel, client server example. **Sockets:** Introduction, overview, elementary socket system calls, TCP Echo program, UDP Echo program

TEXT BOOKS:

1. Unix the ultimate guide, 3rd edition, sumitabha Das, TMH.
2. Advanced programming in the unix environment by W. Richard Stevens.
3. Unix network programming by W. Richard Stevens.

REFERENCE BOOKS:

1. Introduction to Unix and shell programming, Venkateshmurhty
2. Unix and shell programming by B.M. Harwani, OXFORD university press.

COURSE OUTCOMES:

CS312.1	Illustrate the Unix basics and the working of the built in commands in Unix	K3
CS312.2	Demonstrate the file system and change the permissions associated with files	K3
CS312.3	Use command line arguments and Parameters to create a sample shell Script	K3
CS312.4	Describe the grep family and data transforming programs sed, and awk	K2
CS312.5	Illustrate the working of shell programming and debugging scripts	K3
CS312.6	Explain the concept of process and certain essential commands	K2

CO-PO MAPPING:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS312.1	2	1	2	3	2			2	2	
CS312.2	1		2	1				1		
CS312.3	3	2	2	1						
CS312.4		2								
CS312.5	1	1	2	2				1	1	
CS312.6	2	1	1	2				1	1	

III B. Tech. I Semester
CS313 OBJECT ORIENTED ANALYSIS & DESIGN USING UML

UNIT-I: Introduction: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems.

UNIT-II:The Object Model: Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

UNIT-III: Introduction to UML: Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

UNIT-IV: Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.

UNIT-V: Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-VI: Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. Case Study:The Unified Library application.

TEXT BOOKS:

1."Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON(Unit I &Unit II).

2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON.
(Unit III,Unit IV,Unit V &Unit VI)

REFERENCE BOOKS:

1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly
3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
4. "The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley

COURSE OUTC0MES:

CS313.1	Discuss Object Model.	K2
CS313.2	Describe classes and Objects.	K2

CS313.3	Demonstrate conceptual model of UML.	K3
CS313.4	Develop Interaction, Use case and Activity Diagrams.	K3
CS313.5	Illustrate advanced behavioral modeling.	K3
CS313.6	Prepare a Case Study on any application.	K3

CO-PO MAPPIG:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS313.1	2	1	2	3	2			2	2	
CS313.2	1		2	1				1		
CS313.3	3	2	2	1						
CS313.4		2								
CS313.5	1	1	2	2				1	1	
CS313.6	2	1	1	2				1	1	

III B. Tech. I Semester
CS314 DATABASE MANAGEMENT SYSTEMS

OBJECTIVES:
To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

SYLLABUS:
UNIT-I: INTRODUCTION-Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

UNIT-II: RELATIONAL MODEL: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance **BASIC SQL:** Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

UNIT-III: ENTITY RELATIONSHIP MODEL: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams. **SQL:** Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

UNIT-IV: SCHEMA REFINEMENT (NORMALIZATION): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

UNIT V: TRANSACTION CONCEPT: Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

UNIT VI: INDEXING TECHNIQUES: B+ Trees: Search, Insert, Delete algorithms, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes , Index data Structures, Hash Based Indexing: Tree base Indexing ,Comparison of File Organizations, Indexes and Performance Tuning

TEXT BOOKS:
1. Data base Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke, TMH

2. Data base System Concepts,5/e, Silberschatz, Korth, TMH
3. Introduction to Database Systems, 8/e C J Date, PEA.

REFERENCE BOOKS:

1. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA
2. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

COURSE OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

CS314.1	Implement and describe the structure of distributed systems programs.	K2
CS314.2	Write programs that can interoperate using well-defined protocols and debug the code on multiple machines of multiple cores.	K3
CS414.3	Understand about distributed algorithms for locking, synchronization and concurrency, scheduling and replication and use standard primitives such as UDP and TCP.	K3
CS314.4	Understand the general properties of networked communication necessary for distributed systems programming in clusters and on the Internet.	K3
CS314.5	Employ and create common paradigms for easing the task of distributed systems programming and able to clearly elucidate their benefits, drawbacks, and limitations	K2
CS314.6	Identify the security challenges faced by distributed systems programs and able to select appropriate security solutions to meet the needs of commonly encountered distributed programming scenarios.	K4
CS314.7	Comprehend and design a new distributed system with the desired features and able to develop new distributed applications.	K2

CO-PO MAPPING:

CS	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CS314.1	3					2					3		3
CS314.2		2						1			2	3	
CS314.3		3	2						1			1	3
CS314.4			3		2						2	3	
CS3134.5					3						1		2
CS314.6		1			2			3			3	3	1
CS3134.7		3					1				2		2

III B. Tech. I Semester
CS315 OPERATING SYSTEMS

OBJECTIVES:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

SYLLABUS:

UNIT-I: Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

UNIT-II: Process Management – Process concept, The process, Process State Diagram , Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT-III: Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation **Virtual Memory Management:** Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT-IV: Concurrency: ProcessSynchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples **Principles of deadlock**: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

UNIT-V: File System Interface: Concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection. **File System Implementation:** File system structure, allocation methods, free-space management
Mass-storage Structure: Overview of Mass-storage structure, Disk scheduling, Device drivers,

UNIT VI: Linux System: Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call. **Android Software Platform**: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

TEXT BOOK:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.

3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.

REFERENCES:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata McGraw Hill Education, 1996.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata McGraw-Hill Education, 2007.

COURSE OUTCOMES:

COS315.1	Describe Computer Operating System Functions, Structures and System Calls.	K1
CS315.2	Demonstrate various Process Management Concepts and CPU Scheduling Algorithms and Process Synchronization Techniques.	K3
CS315.3	Illustrate Memory Management Techniques and Page Replacement Algorithms.	K2
CS315.4	Apply Deadlock Prevention and Avoidance Techniques	K3
CS315.5	Demonstrate File System Concepts and Mass Storage Structures	K3
CS315.6	Discriminate about Android platforms	K2

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS315.1	2	2	1							
CS315.2		3				2				
CS315.3			3	3					1	
CS315.4	2		2	1		1				
CS315.5				1		2				
CS315.6	3	1		2					1	

III B. Tech. I Semester
CS316 OBJECT ORIENTED ANALYSIS & DESIGN LAB USING UML

LAB EXPERIMENTS:
The UML diagrams should be drawn for the following case studies:
a. Satellite-Based navigation
b. Traffic Management
c. Cryptanalysis
d. Weather Monitoring Station
e. Vacation Tracking System

Experiment 1: Use Case Diagram.
Experiment 2: Class Diagram.
Experiment 3: Sequence Diagram.
Experiment 4: Collaboration Diagram.
Experiment 5: State chart Diagram
Experiment 6: Activity Diagram.
Experiment 7: Component Diagram
Experiment 8: Deployment Diagram.

TEXT BOOK:

"Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON(Unit I &Unit II).

COURSE OUTCOMES:

CS316.1	Use OOAD and UML concepts to identify Classes, Use Cases and their relationships	K3
CS316.2	Develop Use case diagrams and Class Diagrams	K3
CS316.3	Construct Interaction diagrams and packages	K3
CS316.4	Develop State chart, Activity, Component and Deployment Diagrams	K3

CO-PO MAPPING:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS316.1	2	2	1							
CS316.2		3				2				
CS316.3			3	3					1	
CS316.4	2		2	1		1				

CS317 OPERATING SYSEMS AND LINUX PROGRAMMING LAB

OBJECTIVES:

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.
- To study the storage management concepts.
- To familiarize students with the Linux environment
- To learn the fundamentals of shell scripting/programming
- To conceptualize Data Mining and the need for pre-processing.
- To learn the algorithms used for various types of Data Mining Problem

LAB EXPERIMENTS:

OPERATING SYSTEMS

1. Simulate the following CPU scheduling algorithms:
(a) Round Robin (b) SJF (c) FCFS (d) Priority

2. Multiprogramming-Memory management-Implementation of fork (), wait (), exec() and exit (), System calls

3. Simulate the following:
(a) Multiprogramming with a fixed number of tasks (MFT)
(b) Multiprogramming with a variable number of tasks (MVT)

4. Simulate Bankers Algorithm for Dead Lock Avoidance

5. Simulate Bankers Algorithm for Dead Lock Prevention.

6. Simulate the following page replacement algorithms:
(a) FIFO (b) LRU (c) LFU

7. Simulate the following File allocation strategies
(a) Sequenced (b) Indexed (c) Linked

LINUX PROGRAMMING

1. (a) Study of Unix/Linux general purpose utility command list: man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.(b) Study of vi editor (c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system (d) Study of Unix/Linux file system (tree structure) (e) Study of .bashrc, /etc/bashrc and Environment variables.
2. Write a C program that makes a copy of a file using standard I/O, and system calls

3. Write a C program to emulate the UNIX ls –l command.

4. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: - ls –l | sort

5. Write a C program that illustrates two processes communicating using shared memory

6. Write a C program to simulate producer and consumer problem usingsemaphores

7. Write C program to create a thread using pthreads library and let it run its function.

8. Write a C program to illustrate concurrent execution of threads using pthreads library.

COURSE OUTCOMES:

CS317.1	Describe Unix/Linux concepts and commands.	K2
CS317.2	Develop CPU scheduling algorithms.	K3
CS317.3	Apply Bankers Algorithm for Dead Lock Avoidance and Dead Lock Prevention	K3
CS317.4	Use Page replacement algorithms for memory management.	K3
CS317.5	Use shared memory for inter-process communication.	K3
CS317.6	Use pthreads library for multithreading.	K3

CO-PO MAPPING:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS317.1	2	2	1							
CS317.2		3				2				
CS317.3			3	3					1	
CS317.4	2		2	1		1				

III B. Tech. I Semester
CS318 DATA BASE MANAGEMENT SYSTEMS LAB

OBJECTIVES:

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
- To give a good formal foundation on the relational model of data
- To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

LIST OF EXPERIMENTS:

SQL

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.

2. Queries using operators in SQL

3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update

4. Queries using Group By, Order By, and Having Clauses

5. Queries on Controlling Data: Commit, Rollback, and Save point

6. Queries to Build Report in SQL *PLUS

7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints

8. Queries on Joins and Correlated Sub-Queries

9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

10. Create a separate database, Experiments on it illustrating GRANT and REVOKE

PL/SQL

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation

11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

12. Write a PL/SQL block using SQL and Control Structures in PL/SQL

13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc.

16. Demonstration of database connectivity

Note: The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

TEXT BOOKS/SUGGESTED READING:

1. Oracle: The Complete Reference by Oracle Press

2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007

3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007

COURSE OUTCOMES:

CS318.1	Explain the underlying concepts of database technologies	K2
CS318.2	Use SQL to execute queries for creating database and performing data manipulation operations	K3
CS318.3	Apply integrity constraints to build efficient databases	K3
CS318.4	Develop PL/SQL programs including stored procedures, stored functions, cursors and packages	K3
CS318.5	Design and build a GUI application using a 4GL	K6

CO-PO MAPPING:

	Correlation Levels as :								
	1= LOW	**2=MODERATE**		**3=HIGH**					
CS	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS318.1	2	2	1							
CS318.2		3				2				
CS318.3			3	3					1	
CS318.4	2		2	1		1				
CS318.5	1	1		2						

III B. Tech. I Semester

CS319 INTELLECTUAL PROPERTY RIGHTS AND PATENTS

OBJECTIVES:

*To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.

*Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

OUTCOME:

* IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.

*Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

UNIT I: INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS (IPR) Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

UNIT II: COPYRIGHTS AND NEIGHBORING RIGHTS Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers **–** Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

UNIT III: PATENTS Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

UNIT IV: TRADEMARKS Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V: TRADE SECRETS Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

Unit VI: CYBER LAW AND CYBER CRIME Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

- Relevant Cases shall be dealt where ever necessary.

REFERENCES:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
5. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
6. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
7. R. Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

III B. Tech. II Semester
CS321 COMPUTER NETWORKS

OBJECTIVES:

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach—Analysis—

SYLLABUS:

UNIT-I: INTRODUCTION: OSI overview, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT-II: PHYSICAL LAYER AND OVERVIEW OF PL SWITCHING: Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

UNIT-III: DATA LINK LAYER: Design issues, Framing: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. **SLIDING WINDOW PROTOCOL**: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi-link PPP.

UNIT-IV: RANDOM ACCESS: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).

UNIT-V: NETWORK LAYER: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing. **IEEE STANDARDS**: – data link layer, physical layer, Manchester encoding, Standard Ethernet: MAC sub layer, physical layer, Fast Ethernet: MAC sub layer, physical layer, **IEEE-802.11**: Architecture, MAC sub layer, addressing mechanism, frame structure.

UNIT-VI: TRANSPORT LAYER: Process to Process Delivery, UDP, TCP, Congestion, Congestion Control, QOS, and Techniques to improve QOS **APPLICATION LAYER (WWW AND HTTP)**: ARCHITECTURE: Client (Browser), Server, Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format

TEXT BOOKS:

1. Data Communications and Networks – Behrouz A. Forouzan, Third Edition TMH.
2. Computer Networks, 5ed, David Patterson, Elsevier
3. Computer Networks: Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
4. Computer Networks, Mayank Dave, CENGAGE

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson
3.The TCP/IP Guide, by Charles M. Kozierok, Free online Resource, http://www.tcpipguide.com/free/index.htm

COURSE OUTCOMES:

CS321.1	**Demonstrate** OSI, TCP/IP structures and other examples networks	**K2**
CS321.2	**Organize** Physical Layer Functionalities and **Make use of** PL Switching.	**K3**
CS321.3	**Analyze** Functionalities of Data link layer and **examine** various protocols.	**K4**
CS321.4	**Summarize** Random Access and Channelization.	**K2**
CS321.5	**Design** Routing Algorithms and **Choose** IEEE Standards.	**K6**
CS321.6	**Importance** of Transport Layer and Application Layers.	**K5**

CO/PO Mapping:

Course Outcomes	**Program Outcomes** **1 - Low 2 - Moderate 3 – High**									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS321.1	3	2						3	2	
CS321.2	2	3	2	2		1		2	2	
CS321.3	2	2	3			2	1	3	3	
CS321.4		1		2	3	1	2		3	
CS321.5	2	1		3	3	2		2	2	1
CS321.6	2	3	3	2	2	2		2	2	

III B. Tech. II Semester
CS322 DATA WAREHOUSING AND MINING

OBJECTIVES:

1. Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
2. They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
3. They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

UNIT–I: INTRODUCTION: Need of Data Warehouse, Need and Usage of Data Mining Technologies, Types of Data and Patterns to be mined, In Real Time Applications. Brief Introduction of Pattern Recognition: Pattern, Feature, Database Query Vs Mining, Curse of Dimensionality, Need for Efficiency. Major Issues in Data Mining. Data Objects And Attribute Types, Basic Statistical Descriptions Of Data, Data Visualization, Measuring Data Similarity And Dissimilarity

UNIT–II: DATA PRE-PROCESSING: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT–III: CLASSIFICATION: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

UNIT–IV: CLASSIFICATION: ALTERATIVE TECHNIQUES, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

UNIT–V: ASSOCIATION ANALYSIS: BASIC CONCEPTS AND ALGORITHMS: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. **(Tan &Vipin)**

UNIT–VI: CLUSTER ANALYSIS: BASIC CONCEPTS AND ALGORITHMS: OVERVIEW: Basics and Importance of Cluster Analysis, Clustering techniques, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. **(Tan &Vipin)**

TEXT BOOKS:

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

REFERENCE BOOKS:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.

2. Data Mining :VikramPudi and P. Radha Krishna, Oxford.
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
5. http://onlinecourses.nptel.ac.in/noc18_cs14/preview

(NPTEL course by Prof.Pabitra Mitra)

6. http://onlinecourses.nptel.ac.in/noc17_mg24/preview

(NPTEL course by Dr. Nandan Sudarshanam & Dr. Balaraman Ravindran)

7. http://www.saedsayad.com/data_mining_map.htm

COURSE OUTCOMES:

CS322.1	Explain the concept of Data Mining and its functionalities	[K2]
CS322.2	Discuss about Data Preprocessing Techniques like data cleaning, integration, transformation and reduction	[K3]
CS322.3	Illustrate need for data mining and in what ways it is different from traditional statistical techniques.	[K2]
CS322.4	Demonstrate Alternative techniques for Bayes' Theorem	[K2]
CS322.5	Demonstrate Association analysis techniques for generating association rules from data.	[K2]
CS322.6	Use different Clustering techniques to cluster data	[K3]

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS322.1	2	2	1							
CS322.2		3				2				
CS322.3			3	3					1	
CS322.4	2		2	1		1				
CS322.5				1		2				
CS322.6	3	1		2					1	

III B. Tech. II Semester
CS323 DESIGN AND ANALYSIS OF ALGORITHMS

OBJECTIVES:

Upon completion of this course, students will be able to do the following:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations

UNIT-I: INTRODUCTION: Algorithm- introduction, Algorithm characteristics, Pseudocode Conventions Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Probabilistic Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement, Big and little- O notations.

UNIT-II: DIVIDE AND CONQUER: General Method, Defective Chessboard, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort, Performance Measurement, Randomized Sorting Algorithms, Strassen's matrix multiplication.

UNIT-III: THE GREEDY METHOD: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Tree, Prim's Algorithm, Kruskal's Algorithm, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT-IV: DYNAMIC PROGRAMMING: All - Pairs Shortest Paths, Single – Source Shortest paths General Weights, String Editing, 0/1 Knapsack, Reliability Design, Floyd-Warshall algorithm for shortest path.

UNIT-V: BACKTRACKING: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring , Hamiltonian Cycles.

UNIT-VI: BRANCH AND BOUND: The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem, LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson problem.

TEXT BOOKS:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press
2. Introduction to AlgorithmsThomas H. Cormen, PHI Learning

REFERENCE BOOKS

1. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman
2. Algorithm Design, Jon Kleinberg, Pearson.

COURSE OUTCOMES:

CS323.1	Describe asymptotic notation and basic concepts of algorithms	(K2)
CS323.2	Apply divide and conquer paradigm to solve various problems	(K3)
CS323.3	Use greedy technique to solve various problems	(K3)
CS323.4	Apply dynamic programming technique to various problems	(K3)
CS323.5	Employ backtracking technique to various problems	(K2)

CS323.1: Describe asymptotic notation and basic concepts of algorithms (K2)

CS323.2: Apply divide and conquer paradigm to solve various problems (K3)

CS323.3: Use greedy technique to solve various problems (K3)

CS323.4: Apply dynamic programming technique to various problems (K3)

CS323.5: Employ backtracking technique to various problems (K3)

CS323.6: Apply branch and bound technique to various problems (K3)

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	2=MODERATE		3=HIGH						
CS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CS323.1	2	2	1							
CS323.2		3				2				
CS323.3			3	3					1	
CS323.4	2		2	1		1				
CS323.5				1		2				
CS323.6	3	1		2					1	

III B. Tech. II Semester
CS324 SOFTWARE TESTING METHODOLOGIES

OBJECTIVE:

1. To know fundamentals for various testing methodologies.
2. Describe the principles and procedures for designing test cases.
3. Provide supports to debugging methods.
4. Acts as the reference for software testing techniques and strategies.

SYLLABUS:

UNIT-I: INTRODUCTION: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. **FLOW GRAPHS AND PATH TESTING:**Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-II: TRANSACTION FLOWS TESTING: Transaction Flows, Transaction Flow Testing Techniques. **DATAFLOW TESTING:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

UNIT-III: DOMAIN TESTING: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability. **PATHS, PATH PRODUCTS AND REGULAR EXPRESSIONS:** Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

UNIT-IV: SYNTAX TESTING: Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips. **LOGIC BASED TESTING:** Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

UNIT-V: STATE, STATE GRAPHS AND TRANSITION TESTING: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips. **GRAPH MATRICES AND APPLICATION:-**Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

UNIT-VI: SOFTWARE TESTING TOOLS: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, Selenium, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

TEXT BOOKS:

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Cambridge

REFERENCE BOOKS:

1. The Craft of software testing - Brian Marick, Pearson Education.

2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).

3. Software Testing, N.Chauhan, Oxford University Press.

4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.

5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.

6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press

7. Win Runner in simple steps by Hakeem Shittu, Genixpress, 2007.

8. Foundations of Software Testing, D.Graham& Others, Cengage Learning.

COURSE OUTCOME:

CS324.1	Define Software testing terminology and methodology	(K1)
CS324.2	Discuss various software testing techniques.	(K2)
CS324.3	Classify various testing techniques for conducting different types of software testing	(K2)
CS324.4	Apply different software testing techniques.	(K3)
CS324.5	Construct test cases by understanding test suite management and software quality management.	(K2)
CS324.6	Demonstrate modern software testing tools and testing of Object Oriented Software and Web based software	(K2)

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS324.1	2	2	1							
CS324.2		3				2				
CS324.3			3	3					1	
CS324.4	2		2	1		1				
CS324.5				1		2				
CS324.6	3	1		2					1	

III B. Tech. II Semester

CS325OE1ARTIFICIAL INTELLIGENCE: SEARCH METHODS FOR PROBLEM SOLVING

(Under MOOCS – SWAYAM / NPTEL)

Course Duration: 12 weeks **Credits: 3**

This Course is offered aiming to enhance the self and lifelong learning capabilities of student

Tentative Syllabus:

Introduction: Overview and Historical Perspective, Turing test, Physical Symbol Systems and the scope of Symbolic AI, Agents.

State Space Search: Depth First Search, Breadth First Search, DFID.

Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search.

Randomized Search: Simulated Annealing, Genetic Algorithms, Ant Colony Optimization.

Finding Optimal Paths: Branch and Bound, A*, IDA*, Divide and Conquer approaches, Beam Stack Search.

Problem Decomposition: Goal Trees, AO*, Rule Based Systems, Rete Net.

Game Playing: Minimax Algorithm, AlphaBeta Algorithm, SSS*.

Planning and Constraint Satisfaction: Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graph plan, Constraint Propagation.

Logic and Inferences: Propositional Logic, First Order Logic, Soundness and Completeness, Forward and Backward chaining.

Reference

https://onlinecourses.nptel.ac.in/noc16_cs08/preview

COURSE OUTCOMES:

CS325OE1.1	Demonstrate working knowledge in Lisp in order to write simple Lisp programs and explore more sophisticated Lisp code on their own	K3
CS325OE1.2	Understand different types of AI agents	K2
CS325OE1.3	Distinguish various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic	K3

	algorithms	
CS325OE1.4	Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving (a, b, c).	K2
CS325OE1.5	Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information (a, c).	K3
CS325OE1.6	Develop Ability to carry out independent research and communicate it effectively in a seminar setting (f).	K3

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS325OE1.1	2	2	1	2	2			2		
CS325OE1.2	1	3				2				
CS325OE1.3	1	2	1	2					1	
CS325OE1.4	2		2	1		1			1	
CS325OE1.5	1	2		1		2				
CS325OE1.6	3	1		2	1				1	

III B. Tech. II Semester
CS325OE2 INTERNET OF THINGS
(Open Elective)

OBJECTIVES:

1. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
2. Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
3. Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
4. Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

OUTCOMES:

1. Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
2. Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
3. Develop critical thinking skills
4. Compare and contrast the threat environment based on industry and/or device type

UNIT I: The Internet of Things: An Overview of Internet of Things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles For Connected Devices

UNIT II: Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT III: Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT IV: Data link layer of IoT, Wireless Communication Technologies, Wired Communication Technologies, Manet Networks: Network Layer of IoT, 6lowPAN adaptation layer for devices with limited resources, Dynamic routing protocols for wireless adhoc networks Communication protocols for IoT, Service oriented protocol(COAP), Commuication protocols based on the exchange of messages(MQTT), Service discovery protocols

UNIT V: Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/ Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT VI: Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications /Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.

TEXTBOOKS:

1. Internet of Things: Architecture, Design Principles And Applications,Rajkamal, McGraw Hill Higher Education

2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

3. Internet of Things from Hype to Reality: Th erOad to Digitization, Ammar Rayes Samersalam

REFERNCE BOOKS:

1. Designingthe Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley

2. Getting Started with the Internet of Things CunoPfister , Oreilly.

3. Internet of Things and Data Analytics Handbook, HWAIYU GENG , Wiley publications

COURSE OUTCOMES:

CS325OE2.1	Explain the definition and usage of the term 'the internet of things' in different contexts	K2
CS325OE2.2	Discover the various network protocols used in IoT	K2
CS325OE2.3	Be familiar with the key wireless technologies used in IoT systems, such as Wi-Fi, 6LoWPAN, Bluetooth and ZigBee	K3
CS325OE2.4	Define the role of big data, cloud computing and data analytics in a typical IoT system.	K3
CS325OE2.5	Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software	K2
CS325OE2.6	Build and test a complete working IoT system.	K2

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	2=MODERATE		3=HIGH						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS325OE2.1	2		2					2		
CS325OE2.2	2	2	2	1	1	2		2		
CS325OE2.3	3	2		1	3	2		1		
CS325OE2.4	2	2	2		2	1			1	
CS325OE2.5	1	2	1	2		2				
CS325OE2.6	2	1	2	3	2	2		2	2	

III B. Tech. II Semester
CS325OE3 CYBER SECURITY
(Open Elective)

OBJECTIVES:

1. The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
2. Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

OUTCOMES:

- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices
- Evaluation of decision making outcomes of Cyber Security scenarios

UNIT-I: INTRODUCTION TO CYBERCRIME: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

UNIT-II: CYBER OFFENSES: Planning of Offenses by Cyber Criminals– Introduction, Planning attacks by criminals, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT-III: CYBERCRIME MOBILE AND WIRELESS DEVICES: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT-IV: TOOLS AND METHODS USED IN CYBERCRIME: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft)

UNIT-V: CYBERCRIMES AND CYBER SECURITY: Need for Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information

Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

UNIT-VI: UNDERSTANDING COMPUTER FORENSICS: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Antiforensics

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, Sunit Belapure, Wiley.

REFERENCES:

1. Principles of Information Security, Micheal E.Whitman and Herbert J.Mattord, Cengage Learning.
2. Information Security, Mark Rhodes, Ousley, MGH.

COURSE OUTCOMES:

CS325OE3.1	Analyze Cyber Security architecture principles	K2
CS325OE3.2	Identifying System and application security threats and Vulnerabilities	K2
CS325OE3.3	Identifying different classes of attacks	K2
CS325OE3.4	Describe Cyber Security incidents to apply appropriate respons	K3
CS325OE3.5	Describing risk management processes and practices	K3
CS325OE3.6	Evaluation of decision-making outcomes of Cyber Security scenarios	K3

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS325OE3.1	2	1						2	2	
CS325OE3.2	2	3		1	2	1		1		
CS325OE3.3	1	2	1							
CS325OE3.4	1		2	1				2		
CS325OE3.5	2					1				
CS325OE3.6	3	1		2					1	

III B. Tech. II Semester
CS325OE4 DIGITAL SIGNAL PROCESSING
(Open Elective)

OBJECTIVES:

1. To study DFT and its computation
2. To study the design techniques for digital filters
3. To study the finite word length effects in signal processing
4. To study the non-parametric methods of power spectrum estimations
5. To study the fundamentals of digital signal processors.

SYLLABUS:

UNIT-I DISCRETE FOURIER TRANSFORM DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods

UNIT-II INFINITE IMPULSE RESPONSE DIGITAL FILTERS Review of design of analogue Butterworth and Chebyshev Filters, Frequency transformation in analogue domain - Design of IIR digital filters using impulse invariance technique - Design of digital filters using bilinear transform - pre warping - Realization using direct, cascade and parallel forms.

UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS Symmetric and Ant symmetric FIR filters - Linear phase FIR filters - Design using Hamming, Henning and Blackman Windows - Frequency sampling method - Realization of FIR filters - Transversal, Linear phase and Polyphase structures.

UNIT IV FINITE WORD LENGTH EFFECTS Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error –

UNIT V OVERFLOW ERROR - Round off noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling

UNIT VI MULTIRATE SIGNAL PROCESSING Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion-Design of narrow band filters - Applications of Multirate signal processing.

TEXT BOOKS:

1. John G Proakis and Manolakis, “Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
2. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw Hill International, 2007

REFERENCE BOOKS:

1. E.C. Ifeachor and B.W. Jervis, " Digital signal processing - A practical approach", Second edition, Pearson, 2002.

2. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata Mc GrawHill, 1998.
3. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.
4. Johny R. Johnson, Introduction to Digital Signal Processing, PHI, 2006.

COURSE OUTCOMES:

CS325OE4.1	Ability to function as part of a multi-disciplinary team Identify the signals and systems	K2
CS325OE4.2	Apply the principles of discrete-time signal analysis to perform various signal operations	K2
CS325OE4.3	Identify the principles of z-transforms to finite difference equations	K2
CS325OE4.4	Organize the principles of Fourier transform analysis to describe the Frequency characteristics of discrete-time signals and systems	K3
CS325OE4.5	Apply the principles of signal analysis to filtering	K2
CS325OE4.6	Analyze computer programming tools to process and visualize signals	K3

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS325OE4.1	2	1	2					2	1	
CS325OE4.2	2	2	2	1	2			1		
CS325OE4.3	1	1	2			3			1	
CS325OE4.4	2		2	1		1		2		
CS325OE4.5	1		2	1		1				
CS325OE4.6		1		2		2		1	2	

III B. Tech. II Semester
CS325OE5 EMBEDDED SYSTEMS
(Open Elective)

OBJECTIVES:

1. Technology capabilities and limitations of the hardware, software components
2. Methods to evaluate design tradeoffs between different technology choices.
3. Design Methodologies

UNIT-I: Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components

UNIT-II: 8-bit microcontrollers architecture**:** Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

UNIT-III: RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT-IV: Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

UNIT-V: The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

UNIT-VI: Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

TEXT BOOK:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

REFERENCE BOOKS:

1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2.Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, Pearson
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson

COURSE OUTCOMES:

CS325OE5.1	Describe the differences between the general computing system and the embedded system	K3
CS325OE5.2	Elaborate Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level	K2
CS325OE5.3	Discover the interrupts, hyper threading and software optimization	K2
CS325OE5.4	Design real time embedded systems using the concepts of RTOS.	K2
CS325OE5.5	Analyze various examples of embedded systems based on ATOM processor.	K3
CS325OE5.6	Design Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC)	K3

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**
CS325OE5.1	2	2	1							
CS325OE5.2	1	1	2	1	1					
CS325OE5.3	1			1		2		1		
CS325OE5.4	2		2	1		1		1		
CS325OE5.5	1	2		1		1				
CS325OE5.6		1		2		2		1	2	

III B. Tech. II Semester
CS325OE6 ROBOTICS
(Open Elective)

OBJECTIVES:

1. To introduce the basic concepts, parts of robots and types of robots.
2. To make the student familiar with the various drive systems for robot, sensors and their applications in robots and programming of robots.
3. To discuss about the various applications of robots, justification and implementation of robot.

SYLLABUS:

UNIT-I: INTRODUCTION SPECIFICATIONS of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,

UNIT-II: ORIENTATIONS AND FRAMES, MAPPINGS Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and inverse Kinematics Of Six Degree of Freedom Robot Arm – Robot Arm dynamics

UNIT-III: ROBOT DRIVES AND POWER TRANSMISSION SYSTEMS Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,

UNIT-IV: MANIPULATORS Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators

UNIT-V: ROBOT END EFFECTORS Classification of End effectors – Tools as end effectors. Drive system for grippers-Mechanical adhesive-vacuum-magnetic-grippers. Hooks&scoops. Gripper force analysis and gripper design. Active and passive grippers.

UNIT-VI: PATH PLANNING & PROGRAMMING Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.

TEXT BOOKS:

1. Deb S. R. and Deb S., “Robotics Technology and Flexible Automation”, Tata McGraw Hill Education Pvt. Ltd, 2010.
2. John J.Craig, “Introduction to Robotics”, Pearson, 2009
3. Mikell P. Groover et. al., "Industrial Robots - Technology, Programming and Applications", McGraw Hill, New York, 2008

REFERENCE BOOKS:

1. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering – An Integrated Approach", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd., 2006.
2. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, 1987

COURSE OUTCOMES:

CS325OE6.1	Demonstrate Specifications of Robots- Classifications of robots – Work envelope	K2
CS325OE6.2	Illustrateimportance of robotics in today and future goods production	K2
CS325OE6.3	Distinguishrobot configuration and subsystems	K3
CS325OE6.4	Elaborateprinciples of robot programming and handle with typical robot Working of mobile robots	K2
CS325OE6.5	Design automatic manufacturing cells with robotic control using	K2
CS325OE6.6	Discoverthe principle behind robotic drive system, end effectors, sensor, machine vision, robot Kinematics and programming	K3

CS325OE6.1: Demonstrate Specifications of Robots- Classifications of robots – Work envelope->K2
CS325OE6.2: Illustrateimportance of robotics in today and future goods production ->K3
CS325OE6.3: Distinguishrobot configuration and subsystems ->K2
CS325OE6.4: Elaborateprinciples of robot programming and handle with typical robot
Working of mobile robots->K3
CS325OE6.5: Design automatic manufacturing cells with robotic control using->K2
CS325OE6.6: Discoverthe principle behind robotic drive system, end effectors, sensor, machine vision, robot Kinematics and programming. ->K3

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS25OE6.1	1	2	1							
CS25OE6.2		2	2	1	1			2		
CS25OE6.3	1	1		1		2		1		
CS25OE6.4	2	2	2	3	2	1				2
CS25OE6.5	1	2	1	1	2	2				
CS25OE6.6	2	1	2	3		2		1	2	2

III B. Tech. II Semester
CS326 COMPUTER NETWORKS LAB

OBJECTIVES

1. Intended to provide practical exposure of the concepts in computer networks.
2. Provide hands on experience of designing, modeling, and evaluation of computer Networks

COURSE OUTCOMES:

CS326.1	Implement data link layer framing methods.
CS326.2	Implement error correction and detection techniques.
CS326.3	Implement data link layer protocols
CS326.4	Implement routing and congestion algorithms
CS326.5	Implement encryption algorithms

EXPERIMENTS:

1. Implement the data link layer farming methods such as character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra's algorithm to compute the Shortest path through a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm
5. Take an example subnet of hosts. Obtain broadcast tree for it.
6. Programs to implement error correction and detection
7. Programs for IP address conversion function
8. Client server applications using inter process communication and synchronous mechanisms: (a)FIFO (b)Message queues (c)Shared memory
9. Connection oriented Client server applications with TCP
10. Connectionless Client server applications with UDP
11. Programs using RPC remote procedure call
12. client server applications using cocurrent server
13. client server applications using Multi protocol server
14. client server applications using super server
15. Implement a chat and mail server

III B. Tech. II Semester
CS327 SOFTWARE TESTING LAB

OBJECTIVES:
1. Demonstrate the UML diagrams with ATM system descriptions.
2. Demonstrate the working of software testing tools with c language.
3. Study of testing tools- win runner, selenium etc.
4. Writing test cases for various applications

LIST OF EXPERIMENTS:

1. Write programs in 'C' Language to demonstrate the working of the following constructs: (i) do…while (ii) while….do (iii) if…else (iv) switch (v) for

2. "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.

3. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.

4. Write the test cases for any known application (e.g. Banking application)

5. Create a test plan document for any application (e.g. Library Management System) How to update the GUI object descriptions which in turn supports test scripts as the application changes.

6. Write the test cases to test the following features of actiTime application. Automate the test cases using selenium tool. Execute the test cases from the tool and manually. See the difference in time taken: a. Login b. tasks c. users

7. Write the test cases to test the following features of actiTime application.Automate the test cases using selenium tool. Execute the test cases from the tool and manually. See the difference in time taken: a. Login b. Time-track c. My account

8. Automate the testing of any two modules of actiTime using **selenium-RC.**

9. Perform the testing of any two modules of actiTime using **Selenium-Automation-Framework.**

10. Perform security testing of the actiTIM

COURSE OUTCOMES:

CS327.1	Describe the testing process.	(K2)

CS327.2	Apply different software testing techniques.	(K3)
CS327.3	Construct test cases by understanding test suite management and software quality management	(K3)
CS327.4	Demonstrate modern software testing tools and testing of Object Oriented Software and Web based software.	(K3)

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	***PO1***	***PO2***	***PO3***	***PO4***	***PO5***	***PO6***	***PO7***	***PO8***	***PO9***	***PO10***
CS327.1	2	2	1							
CS327.2		3				2				
CS327.3			3	3					1	
CS327.4	2		2	1		1				

III B. Tech. II Semester
CS328 DATA WARE HOUSING AND MINING LAB

OBJECTIVES:

1. Practical exposure on implementation of well known data mining tasks.
2. Exposure to real life data sets for analysis and prediction.
3. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
4. Handling a small data mining project for a given practical domain.

Software Requirements: WEKA Tool/R Programming/Python Programming

LIST OF EXPERIMENTS:

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48
7. algorithm
8. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
9. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
10. Demonstration of clustering rule process on dataset iris.arff using simple k-means Demonstration of clustering rule process on dataset student.arff using simple k- means.

COURSE OUTCOMES:

CS328.1	Understand the Datasets and Data Pre-processing.	[K2]
CS328.2	Demonstrate the working of Apriori algorithm for data mining tasks such association rule mining.	[K3]
CS328.3	Demonstrate the working of j48 algorithm for data mining tasks such as classification rule.	[K3]
CS328.4	Demonstrate the working of id3 algorithm for data mining tasks such as classification rule.	[K3]
CS328.5	Demonstrate working of simple k-means algorithm for data mining tasks such as clustering rule process	[K3]

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	2=MODERATE		3=HIGH						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS328.1	2	2	1							
CS328.2		3				2				
CS328.3			3	3					1	
CS328.4	2		2	1		1				
CS328.5				1		2				

IV B. Tech. I Semester
CS411 CRYPTOGRAPHY AND NETWORK SECURITY

SYLLABUS:

UNIT I: CLASSICAL ENCRYPTION TECHNIQUES: Security Attacks, Services & Mechanisms,Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber Threats, Phishing Attack, Web Based Attacks, SQL Injection Attacks, Buffer Overflow & Format String Vulnerabilities, TCP session hijacking, UDP hijacking.

UNIT II: BLOCK CIPHERS & SYMMETRIC KEY CRYPTOGRAPHY: Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, IDEA, Block Cipher Modes of Operations

UNIT III: NUMBER THEORY & ASYMMETRIC KEY CRYPTOGRAPHY: NUMBER THEORY: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms. **PUBLIC KEY CRYPTOGRAPHY**: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elliptic Curve Cryptography.

UNIT IV: CRYPTOGRAPHIC HASH FUNCTIONS & DIGITAL SIGNATURES: Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm, Key Management and Distribution

UNIT V: USER AUTHENTICATION, TRANSPORT LAYER SECURITY & EMAIL SECURITY: USER AUTHENTICATION: Remote user authentication principles, Kerberos **TRANSPORT LEVEL SECURITY:** Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH) **ELECTRONIC MAIL SECURITY:** Pretty Good Privacy (PGP) and S/MIME.

UNIT VI: IP SECURITY & INTRUSION DETECTION SYSTEMS: IP SECURITY: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management. **FIREWALLS:** Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration, Trusted systems.

TEXT BOOKS:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

REFERENCE BOOKS:

1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford

2. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

COURSE OUTCOMES:

CS411.1	Discuss about the concept of Cryptography and security problems.	(K2)
CS411.2	Illustrate the various Symmetric key Cryptography algorithms.	(K2)
CS411.3	Demonstrates the Number System and various Asymmetric key Cryptography algorithms	(K3)
CS411.4	Discuss about HASH functions & Digital Signatures to provide secure communication	(K2)
CS411.5	Explain the User authentication, Transport layer security and Electronic mail security.	(K2)
CS411.6	Explain the overview IP Security and intrusion detection techniques.	(K2)

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS411.1	2	2	1							
CS411.2		3				2				
CS411.3			3	3					1	
CS411.4	2		2	1		1				
CS411.5				1		2				
CS411.6	3	1		2					1	

IV B. Tech. I Semester

CS412 BIG DATA ANALYTICS

OBJECTIVES:

1. Optimize business decisions and create competitive advantage with Big Data analytics
2. Introducing Java concepts required for developing map reduce programs
3. Derive business benefit from unstructured data
4. Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
5. To introduce programming tools PIG & HIVE in Hadoop echo system.

SYLLABUS:

UNIT-I: Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II: Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III: Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV: Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-V: Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

UNIT-VI: Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

TEXT BOOKS:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

REFERENCE BOOKS:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne
3. "Map Reduce: Simplified Data Processing on Large Clusters", Jeffry Deon and Sanjay ghemawat

SOFTWARE LINKS:

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
   Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

Course Outcomes:

CS412.1	Discuss about the concept of Cryptography and security problems.	K2
CS412.2	Illustrate the various Symmetric key Cryptography algorithms	K2
CS412.3	Demonstrates the Number System and various Asymmetric key Cryptography algorithms.	K3
CS412.4	Discuss about HASH functions & Digital Signatures to provide secure communication.	K3
CS412.5	Explain the User authentication, Transport layer security and Electronic mail security	K3
CS412.6	Explain the overview IP Security and intrusion detection techniques.	K2

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS412.1	3	2	1	2						
CS412.2	3			2		1				
CS412.3	3	2		1						
CS412.4				3						
CS412.5		2	1							
CS412.6		1		2						

IV B. Tech. I Semester
CS413 WEB TECHNOLOGIES

SYLLABUS:

UNIT-I: INTRODUCTION TO WEB Internet and World Wide Web, Domain Name service, Protocols: HTTP, FTP and SMTP, Request and Response, Web browser and Introduction to Web server, web container, application servers. **HTML**: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, GET and POST method, HTML5

UNIT-II: CSS, Javascript, CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution **The Basic of Javascript**: Objects, Primitives Operations and Expressions, ScreenOutput and Keyboard Input, Control Statements, Object Creation and Modfication, Arrays, Functions, Constructors, Patttern Matching using Regular Expressions, **DHTML**: Positioning Moving and Changing Elements

UNIT-III: XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches, **AJAX A New Approach:** Introduction to AJAX, Integrating PHP and AJAX.

UNIT-IV: PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables, Using constants, Data types, Operators. **Controlling program flow:** Conditional statements, Control statements, Arrays, functions

UNIT-V: Web Servers-IIS (XAMPP, LAMP) and Tomcat Servers. Java Web Technologies-Introduction to Servlet, Life cycle of Servlet, Servlet methods. Java Server Pages, Java Server Faces, Web Technologies in Netbeans, Building Web Application in Netbeans, JSF Components, Session Tracking, Cookies

UNIT-VI: Database connectivity with MySql – Servlets, JSP, PHP, Practice of SQL Queries. Case studies- Student information system, Health Management system.

TEXT BOOKS

1. Robert W Sebesta, "Programming with World Wide Web", Pearson, 4th Edition, 2008

2. David William Barron, "The world of Scripting Languages", Wiley Publications, 2000.

3. Web Technologies, Uttam K Roy, Oxford.

REFERENCE BOOKS

1. Web Technologies, HTML, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.

2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.

Course Outcomes:

CS413.1	Outline the history of the web and technologies that makes the web pages. Design web pages using the concepts of Html, CSS and JavaScript.	K2
CS413.2	Acquire the concepts of XML, DTD and XML Schemas	K2
CS413.3	Learn AJAX and write simple client-side scripts using AJAX	K2
CS413.4	Build web applications using PHP by integrating PHP to Databases	K3
CS413.5	Learn and create dynamic and interactive web pages using PERL	K3
CS413.6	Design dynamic websites with latest technical advancements in RUBY	K3

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS413.1	2	3	1	2	1	2		1		
CS413.2		3		1		2				
CS413.3	1		2	3					1	
CS413.4	3	2	2		1	1				
CS413.5				1	2	2			2	
CS413.6	3	2		2	2			2		

IV B. Tech. I Semester
CS414 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

OBJECTIVES:

1. To understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting
2. To understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis
3. To understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods
4. To understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods
5. To understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation
6. To know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles

SYLLABUS:

UNIT-I: INTRODUCTION TO MANAGERIAL ECONOMICS AND DEMAND ANALYSIS: Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.

UNIT-II: PRODUCTION AND COST ANALYSES: Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem)

UNIT-III: INTRODUCTION TO MARKETS, THEORIES OF THE FIRM & PRICING POLICIES: Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

UNIT-IV: TYPES OF BUSINESS ORGANIZATION AND BUSINESS CYCLES: Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

UNIT-V: INTRODUCTION TO ACCOUNTING & FINANCING ANALYSIS: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)

UNIT-VI: CAPITAL AND CAPITAL BUDGETING: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

TEXT BOOKS

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:

1. V. Maheswari: Managerial Economics, Sultan Chand.
2. Suma Damodaran: Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.

S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers,

Course Outcomes:

CS414.1	Equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand.	K2
CS414.2	Ability to understandthe Cost Concepts for decision making and to estimate the least Cost combination of inputs**.**	K2
CS414.3	Acquire the knowledge of the nature of different markets and Price Output determination under various market conditions.	K3
CS414.4	To evaluate various investment project proposals with the help of capital budgeting techniques for decision making.	K3
CS414.5	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis	K2

CS414.1: Equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand. ->K2

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CO-PO Mapping:

	Correlation Levels as:									
	1= LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS414.1		1		3						
CS414.2			2	1						
CS414.3	1					3				
CS414.4		1						2		
CS414.5			1	3						

IV B. Tech. I Semester
CS415E1 SOFTWARE ARCHITECTURE AND DESIGN PATTERNS
(Elective-I)

SYLLABUS:

UNIT-I: ENVISIONING ARCHITECTURE The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. **CREATING AND ARCHITECTURE**Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT-II: ANALYZING ARCHITECTURES: Architecture Evaluation, Architecture design decision making, ATAM, CBAM**, MOVING FROM ONE SYSTEM TO MANY**: Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT-III: PATTERNS : Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage. **CREATIONAL PATTERNS :** Abstract factory, Builder, Factory method, Prototype, Singleton

UNIT-IV: STRUCTURAL PATTERNS : Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

UNIT-V: BEHAVIORAL PATTERNS: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT-VI: CASE STUDIES: A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in Interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.
A CASE STUDY (DESIGNING A DOCUMENT EDITOR): Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

TEXT BOOKS:
1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

REFERENCE BOOKS:
1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.

5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006
6. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
8. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.

Course Outcomes:

CS415E1.1	Demonstrate interrelationships, principles and guidelines governing architecture and Evolution over time.	(K2)
CS415E1.2	Distinguish various architectural styles of software systems	(K4)
CS415E1.3	Make use of the knowledge of design patterns and their underlying object oriented concepts.	(K3)
CS415E1.4	Apply design patterns and providing solutions to real World software design problems.	(K3)
CS415E1.5	Evaluate the patterns with each other and understanding the consequences of combining patterns on the overall quality of a system	(K5)

CO-PO Mapping:

	Correlation Levels as:									
	1= LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS415E1.1	3	1		1						
CS415E1.2		2				1				
CS415E1.3	3		1	1						
CS415E1.4		1			2					
CS415E1.5			1			2				

IV B. Tech. I Semester
CS415E2 INFORMATION RETRIEVAL SYSTEMS
(Elective-I)

OBJECTIVES

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

SYLLABUS:

UNIT-I: INTRODUCTION TO INFORMATION STORAGE AND RETRIEVAL SYSTEM: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

UNIT-II: INVERTED FILES: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

UNIT-III: SIGNATURE FILES: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT-IV: NEW INDICES FOR TEXT:PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

UNIT-V: STEMMING ALGORITHMS: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

UNIT-VI: THESAURUS CONSTRUCTION: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri

TEXT BOOK:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrieval by Yates Pearson Education.
3. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.

REFERENCES:

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Information retrieval Algorithms and Heuristics, 2ed, Springer

Course Outcomes:

CS415E2.1	Identify basic theories in information retrieval systems	(K3)
CS415E2.2	classify the analysis tools as they apply to information retrieval systems.	(K4)
CS415E2.3	Illustrate the problems solved in current IR systems.	(K2)
CS415E2.4	Discuss the advantages of current IR systems	(k6)
CS415E2.5	Summarize the difficulty of representing and retrieving documents.	(k2)
CS415E2.6	Translate the latest technologies for linking, describing and searching the web.	(k2)

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS415E2.1	3	1								
CS415E2.2				3						
CS415E2.3	1		1			3				
CS415E2.4		2								
CS415E2.5	1		2					1		
CS415E2.6		1		3		1				

IV B. Tech. I Semester
CS415E3 MOBILE COMPUTING
(Elective-I)

OBJECTIVE:

- To make the student understand the concept of mobile computing paradigm, Generations,its novel applications and limitations.
- To understand the architectures of mobile systems and Mobility management
- To understand the issues and solutions of mobile Network Layer & Transport Layer
- To understand the issues in Next Generation Networks.
- To understand the platforms and file systems, protocols used in mobile environment.

SYLLABUS:

UNIT-I: MOBILE SYSTEM ARCHITECTURES *GSM:*System Architecture, functional subsystems of GSM:Radio Interfaces, Protocols, Handover, New Data Services *GPRS:*System Architecture, Protocol layers, Comparison of GSM and GPRS. *Mobility Management:* Location Management, Handover, Mobility Management in GSM and GPRS *Wireless Access Technologies*: WPAN- Blue tooth, WLAN – Wi-Fi, WMAN-WiMAX

UNIT-II: MOBILE NETWORK LAYER *IPV4:* Features of IPV4, Classes in IPV4 Addressing *Mobile IP:*Entities and Terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, IPV6, IPV4 versus IPV6,DHCP.

UNIT-III: MOBILE TRANSPORT LAYER *Traditional TCP:* Congestion control, Slow start, Fast retransmit/fast recovery, Implications of mobility *Wireless TCP:* Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction-oriented TCP, TCP over 2.5/3G wireless networks

UNIT-IV: DATA DISSEMINATION AND SYNCHRONIZATION Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization-Introduction, Software, and Protocols.

UNIT-V: FILE SYSTEMS *File Systems:* Coda, Little work, Ficus, Mio-NFS, Rover *Mobile Operating Systems:* Symbian, Android Wireless Markup Language (WML) and WML Script, Extensible Markup Language (XML) and its applications, WAP.

UNIT-VI: DATABASE ISSUES Database Hoarding& Caching Techniques, Client-Server Computing& Adaption, Transactional Models, Query Processing, Data Recovery Process & Qos Issues.

TEXT BOOKS

1. John Schiller, Mobile Communications, Addison-Wesley, Second Edition, 2009
2. Raj Kamal, Mobile Computing, Oxford University Press, 2007, ISBN: 0195686772

REFERENCES

1. Asoke K Talukder and Roopa R Yavagal, Mobile Computing, Tata-McGraw-Hill, 2008
2. Ivan Stojmenovic, Handbook of Wireless Networks and Mobile Computing, John Wiley & Sons, Inc. ISBNs: 0-471-41902-8
3. ChanderDhawan, Mobile Computing: A Systems Integrator's Handbook, Tata-McGraw-Hill, 1997
4. http://www.zdnet.com/article/next-generation-wireless-networks-from-gigabit-wi-fi-to-white-space/
5. http://www.techrepublic.com/blog/data-center/key-features-of-next-generation-networks/
6. http://www.telecomabc.com/n/ngn.html
7. http://www.etsi.org/technologies-clusters/technologies/past-work/next-generation-networks
8. http://www.webopedia.com/TERM/N/Next_Generation_Network.html
9. http://www.slideshare.net/HavarBathaee/ngn-nextgeneration20network

Course Outcomes:

CS415E3.1	Discuss fundamental challenges in mobile communications and potential Techniques in GSM	(K 6)
CS415E3.2	Explain Wireless local area networks (WLAN): MAC design principles, 802.11 WIFI	(K 2)
CS415E3.3	Demonstrate Mobile IP in Network layer.	(K 2)
CS415E3.4	Elaborate TCP/IP Protocols and database issues.	(K 6)
CS415E3.5	Illustrate different data delivery methods and synchronization protocols.	(K 2)
CS415E13.6	Develop applications that are mobile-device specific and demonstrate current Practice in mobile computing contexts.	(K 6)

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**	**3=HIGH**							
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS415E3.1	3		1	2						
CS415E3.2		1		3		1			1	
CS415E3.3	3		1		1					
CS415E3.4		2		1						
CS415E3.5		1		2		1				
CS415E3.6	1		2				1			

IV B. Tech. I Semester
CS415E14 NATURAL LANGUAGE PROCESSING
(MOOCS-SWAYAM/NPTEL)

Course Duration: 12 Weeks **Credits: 3**

This Course is offered aiming to enhance the self and lifelong learning capabilities of student

Tentative Syllabus

- Introduction and Basic Text Processing
- Spelling Correction, Language Modeling
- Advanced smoothing for language modeling, POS tagging
- Models for Sequential tagging – MaxEnt, CRF
- Syntax – Constituency Parsing
- Dependency Parsing
- Lexical Semantics
- Distributional Semantics
- Topic Models
- Entity Linking, Information Extraction
- Text Summarization, Text Classification
- Sentiment Analysis and Opinion Mining

Reference:
https://onlinecourses.nptel.ac.in/noc17_cs03/preview

Course Outcomes:

CS415E4.1	Illustrate approaches to syntax and semantics in NLP	(K2)
CS415E4.2	Contrast approaches to discourse, generation, dialogue and Summarization within NLP.	(K2)
CS415E4.3	Analyze current methods for statistical approaches to machine Translation	(K3)
CS415E4.4	Identify machine learning techniques used in NLP, including hidden Markov models And probabilistic context-free grammars, clustering and Unsupervised methods	(K3)
CS415E4.5	Analyze current methods for statistical approaches to Sentiment Analysis.	(K4)

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS415E4.1	1			3		1				
CS415E4.2		1		2						
CS415E4.3	2	1	1		1				1	
CS415E4.4	3		1			1				
CS415E4.5		2	2	1				1		

IV B. Tech. I Semester
CS416E1 CSCLOUD COMPUTING
(Elective-II)

OBJECTIVES:

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

SYLLABUS:

UNIT-I: SYSTEMS MODELING, CLUSTERING AND VIRTUALIZATION Scalable Computing over the Internet, Technologies for Network Based Systems, System models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security and Energy Efficiency

UNIT-II: VIRTUAL MACHINES AND VIRTUALIZATION OF CLUSTERS AND DATA CENTERS Implementation Levels of Virtualization, Virtualization Structures/ Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Center Automation.

UNIT-III: CLOUD PLATFORM ARCHITECTURE Cloud Computing and Service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms. Service Oriented Architecture.

UNIT-IV: CLOUD PROGRAMMING Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure.

UNIT-V: CLOUD RESOURCE MANAGEMENT AND SCHEDULING Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, introduction to scheduling Algorithms for Computing Clouds-Fair Queuing, Start Time Fair Queuing.

UNIT-VI: STORAGE SYSTEMS Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3)

TEXT BOOKS:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press

REFERNCE BOOKS:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH

Course Outcomes:

CS416E1.1	Interpret the key dimensions of the challenge of Cloud Computing	(K2)
CS416E1.2	Examine the economics, financial, and technological implications for selecting cloud computing for own organization.	(K4)
CS416E1.3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications	(K5)
CS416E1.4	Evaluate own organizations' needs for capacity building and training in cloud computing-related IT areas.	(K5)
CS416E1.5	To Illustrate Virtualization for Data-Center Automation.	(K2)

CO-PO Mapping:

	Correlation Levels as:									
	1= LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS416E1.1	3		1	1			1			
CS416E1.2		2			2					
CS416E1.3	1			3					1	
CS416E1.4		1		2		1				
CS416E1.5			1		2					

IV B. Tech. I Semester
CS416E2 ARTIFICIAL NEURAL NETWORKS
(Elective-II)

OBJECTIVES:

1. Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
2. Provide knowledge of supervised learning in neural networks
3. Provide knowledge of computation and dynamical systems using neural networks
4. Provide knowledge of reinforcement learning using neural networks.
5. Provide knowledge of unsupervised learning using neural networks.
6. Provide hands-on experience in selected applications

SYLLABUS:

UNIT-I: INTRODUCTION AND ANN STRUCTURE-Neural Network- Introduction, Human Brain, Models of a Neuron, Neural Network viewed as Direct Graphs, Feedback, network Architectures, Activation functions used in ANNs.

UNIT-II: Mathematical Foundations and Learning mechanisms, Re-visiting vector and matrix algebra. State-space concepts, Concepts of optimization. Error-correction learning. Memory-based learning. Hebbian learning. Competitive learning

UNIT-III: SINGLE LAYER PERCEPTRONS-adaptive filetring problem, Linear least square filters, LMS algorithm, Learning, perceptron convergence theorem, Bayes classifier

UNIT-IV: MULTILAYER PERCEPTRONS-Introduction, preliminaries, back-propagation algorithm, XOR problem, feature detection, cross-validation, network pruning techniques, limitations and convergence of back propagation learning, supervised learning, convolutional networks.

UNIT-V:RADIAL BASIS FUNCTION NETWORKS-Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks.RBF network design and training. Approximation properties of RBF

UNIT-VI: SUPPORT VECTOR MACHINES-Linear separability and optimal hyperplane.Determination of optimal hyperplane. Optimal hyperplane for nonseparablepatterns, Design of an SVM.Examples of SVM.

TEXT BOOKS:

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.
3. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

IV B. Tech. I Semester
CS416E3 AD HOC & SENSOR NETWORKS
(Elective-II)

UNIT-I: INTRODUCTION TO AD HOC WIRELESS NETWORKS Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs**ROUTING IN MANETS-**Classification of Routing Protocols, Topology-based versus Position-based Approaches, Topology-based Routing Protocols, Position-based Routing Protocols and Other Routing Protocols.

UNIT-II: DATA TRANSMISSION IN MANETS The Broadcast Storm, Multicasting, Geocasting, **TCP OVER AD HOC NETWORKS** – TCP Protocol Overview, TCP and MANETs, Solutions for TCP over Ad Hoc.

UNIT-III: SECURITY IN MANETS Security in Ad Hoc Wireless Networks, Key Management, Secure Routing, Cooperation in MANETs, Intrusion Detection Systems (IDS).

UNIT-IV: BASICS OF WIRELESS SENSORS AND APPLICATIONS Classification of WSNs, Architecture of Sensor Networks, The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Physical Layer, Link Layer.

UNIT-V: DATA RETRIEVAL IN SENSOR NETWORKS MAC layer, Routing layer, Transport layer, High-level Application layer support, Adapting to the Inherent Dynamic Nature of WSNs, Mobile Robots.

UNIT-VI: SENSOR NETWORK PLATFORMS AND TOOLS Sensor Node Hardware, Sensor Network Programming Challenges, Node-level Software Platforms, Node-level Simulators **Security in WSNs**-Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Introduction to Vehicular Ad Hoc Networks (VANETs), Introduction to Wireless Mesh Networks (WMNs).

TEXT BOOKS

1. Carlos de Morais Cordeiro and Dharma Prakash Agrawal, "*Ad Hoc & Sensor Networks: Theory and Applications*", World Scientific Publishing, 2006.

2. Feng Zhao and Leonidas Guibas, "*Wireless Sensor Networks: An Information Processing Approach*", Elsevier, 2004.

3. C. Siva Ram Murthy and B. S. Manoj, "*Ad Hoc Wireless Networks: Architectures and Protocols*", Prentice Hall PTR, 2004.

4. Edgar H. Callaway, Jr., "*Wireless Sensor Netwoks: Architectures and Protocols*", Auerbach, 2004.

Course Outcomes:

CS416E3.1	Demonstrate the Concepts, Network Architecture and Applications of Ad-hoc and Wireless Sensor Networks..	(K2)
CS416E3.2	Analyze the protocol design issues of Ad-hoc Networks	(K4)
CS416E3.3	Make use of the the design of routing protocols for ad-hoc and wireless networks.	(K3)
CS416E3.4	Develop the Concepts, Architecture of ad-hoc and sensor networks and MAC layer protocols.	**(K3)**
CS416E3.5	Evaluate the QOS related performance measurements of ad-hoc and sensor networks	(K5)

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS416E3.1	3			2		1				
CS416E3.2		1	2						1	
CS416E3.3	2		1			1				
CS416E3.4		2		2						
CS416E3.5			2			1			1	

IV B. Tech. I Semester
CS416E4 PRIVACY AND SECURITY IN ONLINE SOCIAL MEDIA
(MOOCS-SWAYAM/NPTEL)

Course Duration: 12 Weeks **Credits: 3**

This Course is offered aiming to enhance the self and lifelong learning capabilities of student

Tentative Syllabus

- What is Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs
- Collecting data from Online Social Media.
- Trust, credibility, and reputations in social systems
- Online social Media and Policing
- Information privacy disclosure, revelation and its effects in OSM and online social networks
- Phishing in OSM & Identifying fraudulent entities in online social networks
- Refresher for all topics

REFERENCE:
https://onlinecourses.nptel.ac.in/noc16_cs07/preview

IV B. Tech. I Semester
CS417 BIG DATA ANALYTICS LAB

Week 1, 2:

1. Implement the following Data structures in Java
   a)Linked Lists b) Stacks c) Queues d) Set e) Map

Week 3, 4:

2. (i)Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed, Fully distributed
   (ii)Use web based tools to monitor your Hadoop setup.

Week 5:

3. Implement the following file management tasks in Hadoop:
   - Adding files and directories
   - Retrieving files
   - Deleting files

   Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 6:

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 7:

5. Write a Map Reduce program that mines weather data.
   Weather sensors collecting data every hour at many locations across the globe
   gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

Week 8:

6. Implement Matrix Multiplication with Hadoop Map Reduce

Week 9, 10:

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 11, 12:

8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

Course Outcomes:

CS417.1	Demonstrate the set up of Big Data in distributed environment.(K1,K3) Efficiently Work with Big Data Platform.	(K1,K3)

CS417.2	Have Hands-on experience on developing applications using Map Reduce concepts	(K2,K3,K6)
CS417.3	Collect, manage, store, query, and analyze big data and identify the need of interfaces to perform I/O operations in Hadoop	(K2,K4,K6)
CS417.4	Demonstrate the understanding of storing and managing Big Data by HDFS, Pig and Hive tools	(K3)
CS417.5	Design and implement algorithms for Big Data Mining for various real time applications	(K4,K6)

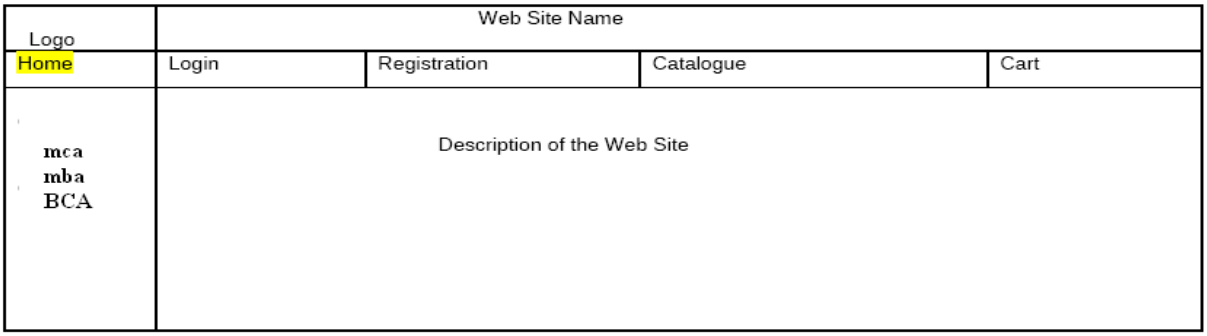
CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CS417.1	H	L			M	M				
CS417.2	M	M		M		L				
CS417.3		M		H	H					
CS417.4				H	H	H				
CS417.5				H	H	H				
CS417.6		H		M						

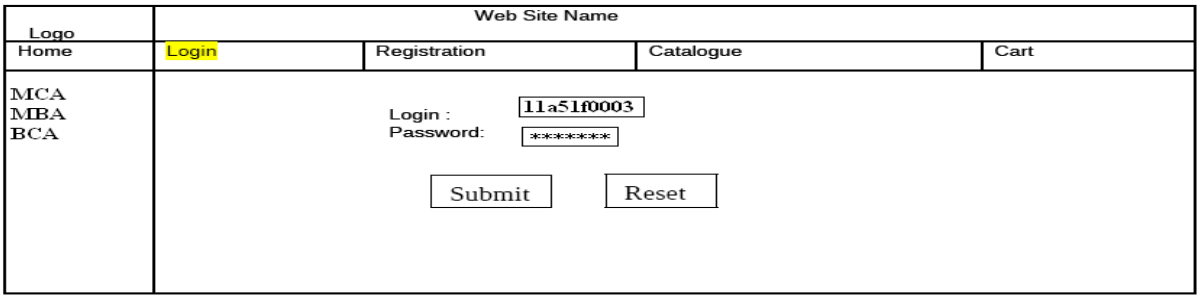
IV B. Tech. I Semester
CS418 WEB TECHNOLOGIES LAB

1. Design the following static web pages required for an online book store web site:

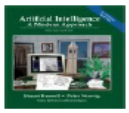
(a) **HOME PAGE:**
The static home page must contain three **frames**.
Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
Left frame: At least four links for navigation, which will display the catalogue of respective links.
For e.g.: When you click the link **"MCA"** the catalogue for MCABooks should be displayed in the Right frame.
Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.



(b) **LOGIN PAGE:**



(c) **CATOLOGUE PAGE:**
The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:
1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
BCA		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam	$ 50	Add to cart

(d). **REGISTRATION PAGE:**
Create a "*registration form* "with the following fields
1) Name (Text field) 2) Password (password field)
3) E-mail id (text field) 4) Phone number (text field)
5) Sex (radio button) 6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

2. Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following: Use different font, styles:
In the style definition you define how each selector should work (font, color etc.).
Then, in the body of your pages, you refer to these selectors to activate the styles

3. Write an XML file which will display the Book information which includes the following:
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.

4. Create Web pages using AJAX.

5. Implement a Servlet program on request response processing.

6. Connect to a database using JSP and practice SQL Queries (MySql or Oracle).

7. Example PHP program for contact us page.

8. User Authentication:
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP 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 (week1) and authenticate with the values (user id and passwords) available in the cookies.
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 ".
Use init-parameters to do this.

9. Example PHP program for registering users of a website and login.

10. Install a database (Mysql or Oracle).
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).
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

11. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

12. Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP

13.HTTP is a stateless protocol. Session is required to maintain the state.
The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of local host). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session. Invalidate ().
Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.

Course Outcomes:

CS418.1	Create dynamic and interactive web pages using HTML, CSS & Java Script
CS418.2	Learn and implement XML concepts
CS418.3	Develop web applications using PHP
CS418.4	Install Tomcat Server and execute client-server programs

CS418.5	Implement programs using Ruby programming
CS418.6	Integrate PHP and Perl to databases

CO-PO Mapping:

	Correlation Levels as :									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS418.1	2	1			1	1		1		
CS418.2			2							
CS418.3	1	1	1	3				1	1	
CS418.4	2	2	2	2	2	1			1	
CS418.5	1			1		2			2	
CS418.6		2	1	2	2	2		2	1	

IV B. Tech. II Semester
CS421 DISTRIBUTED SYSTEMS

OBJECTIVES:

1. Provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
2. Expose students to current technology used to build architectures to enhance distributed Computing infrastructures with various computing principles

SYLLABUS:

UNIT-I: CHARACTERIZATION OF DISTRIBUTED SYSTEMS: Introduction, Examples of Distributed Systems, Focus on Resource Sharing, Challenges.

SYSTEM MODELS: Introduction, Physical Models, Architectural Models, Fundamental Models

UNIT-II: INTERPROCESS COMMUNICATION: INTRODUCTION, THE API FOR THE INTERNET PROTOCOLS, EXTERNAL DATA REPRESENTATION and Marshalling, Multicast Communication, Network Virtualization: Overlay Networks

UNIT-III: REMOTE INVOCATION: Introduction, Request-reply Protocols, Remote Procedure Call, Remote Method Invocation **INDIRECT COMMUNICATION:** Introduction, Group Communication, Public-subscribe Systems, Message Queues, Shared Memory Approaches

UNIT-IV: OPERATING SYSTEM SUPPORT: Introduction, The Operating System Layer, Protection, Processes and Threads, Communication and Invocation, Operating System Architecture, Virtualization at the Operating System Level. **DISTRIBUTED OBJECTS AND COMPONENTS:** Introduction, Distributed Objects, From Objects to Components

UNIT-V: PEER-TO-PEER SYSTEMS & DISTRIBUTED FILE SYSTEMS: Introduction, Peer-to-Peer Middleware, Routing Overlays, File Service Architecture, Case Study: Sun Network File System, Enhancements and Further Developments

COORDINATION AND AGREEMENT: Introduction, Distributed Mutual Exclusion, Elections, Coordination and Agreement in Group Communication

UNIT-VI: TRANSACTIONS AND CONCURRENCY CONTROL & DISTRIBUTED TRANSACTIONS: Introduction, Transactions, Nested Transactions, Locks, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery **REPLICATION:** Introduction, System Model and the role of Group Communication, Fault-Tolerant Services, Transactions with Replicated Data

TEXT BOOKS:

George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair “Distributed Systems-Concepts and Design”, Fifth Edition, Pearson Publications

REFERENCE BOOKS

1. Ajay D Kshemkalyani, Mukesh Singhal, "Distributed Computing-Principles, Algorithms and Systems", Cambridge
2. Andrew S Tanenbaum, Maarten Van Steen, "Distributed Systems-Principles and Paradigms-PHI

COURSE OUTCOMES:

CS421.1	Demonstrate on the distributed systems basic concepts, challenges and system models	**K2**
CS421.2	Explain interprocess communication mechanism, sockets, TCP & UDP Communication and representing multicast mechanism	**K3**
CS421.3	Make them to analyze on distributed objects, remote method invocation and its implementation	**K3**
CS421.4	Identify the operating system support and analyze processes & threads	**K4**
CS421.5	Determine the distributed files and explain the importance coordination and agreement	**K5**
CS421.6	Elaborate on transactions, concurrency control, distributed deadlocks, and replications	**K6**

CO-PO MAPPING:

Course Outcomes	**Program Outcomes**									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS421.1	**3**								**2**	
CS421.2	**2**	**3**	**2**	**2**		**1**	**2**	**2**		
CS421.3		**2**	**1**				**1**	**1**	**1**	
CS421.4					**3**					
CS421.5	**2**		**2**	**2**			**3**	**2**	**1**	
CS421.6	**2**	**3**	**3**	**1**		**2**				

IV B. Tech. II Semester
CS422 MANAGEMENT SCIENCE

COURSE OBJECTIVES:

*To familiarize with the process of management and to provide basic insight into select contemporary management practices

*To provide conceptual knowledge on functional management and strategic management.

SYLLABUS:

UNIT-I: INTRODUCTION TO MANAGEMENT: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

UNIT-II: OPERATIONS MANAGEMENT: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT-III: FUNCTIONAL MANAGEMENT: Concept of HRM, HRD and PMIR-Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

UNIT-IV: PROJECT MANAGEMENT: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

UNIT-V: STRATEGIC MANAGEMENT: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies

UNIT-VI: CONTEMPORARY MANAGEMENT PRACTICE: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

TEXT BOOKS

1. Dr. P. Vijaya Kumar & Dr. N. AppaRao, *'Management Science'* Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science'* TMH 2011.

REFERENCES

1. Koontz &Weihrich: 'Essentials *of management'* TMH 2011
2. Seth &Rastogi: Global Management Systems, Cengagelearning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. KanishkaBedi: Production & Operations Management, Oxford Publications, 2011
5. Philip Kotler& Armstrong: Principles of Marketing, Pearson publications
6. BiswajitPatnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
8. PremChadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
9. Anil Bhat&AryaKumar : Principles of Management, Oxford University Press, New Delhi, 2015.

COURSE OUTCOMES:

CS422.1	Demonstrate various approaches to management
CS422.2	Learn the principles and practices of operations management
CS422.3	Describe the dynamics of individual and interpersonal behavior in organizational setting through human resource management
CS422.4	Learn how to develop networks for better project management
CS422.5	Creating a better strategic management for organizational effectivenes
CS422.6	Gain the knowledge of contemporary management practices

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS422.1	2	1						2		
CS422.2	2	1	2	1		1			2	
CS422.3	2			2			2	2		2
CS422.4	1				2		3	2	1	1
CS422.5		2			1	2			2	
CS422.6	2	1	1	2						2

IV B. Tech. II Semester
CS423 MACHINE LEARNING

COURSE OBJECTIVES:

1) To learn well-known machine learning algorithms
2) To evaluate and compare the performance of various machine learning algorithms
3) Able to differentiate regression models and distance based models and ANNS.

SYLLABUS:

UNIT I: INTRODUCTION: Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT II: LINEAR REGRESSION & LOGISTIC REGRESSION: PREDICTING NUMERIC VALUES: REGRESSION - Finding the best fit lines with linear regression, locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff. **LOGISTIC REGRESSION:** Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients.

UNIT III: ARTIFICIAL NEURAL NETWORKS: Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks

UNIT IV:EVALUATION HYPOTHESES: Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT V: SUPPORT VECTOR MACHINES: Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full platt SMO, Using Kernels for more Complex data.

UNIT VI: DIMENSIONALITY REDUCTION TECHNIQUES: Principal Component analysis, Example. **INSTANCE-BASED LEARNING**- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

TEXT BOOKS:

1. Machine Learning ,Tom M. Mitchell, MGH
2. Machine Learning in Action, Peter Harington, 2012, Cengage.`

REFERENCE BOOKS:

1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004
2. A course in Machine Learning , Hall Daum'e III

COURSE OUTCOMES:

CS423.1	Recognize the characteristics of machine learning algorithms and their applications to real world problems	
23.2	Able to differentiate linear and logistic regressions	
23.3	Able to write and evaluate hypothesis	
23.4	Acquire the concepts of artificial neural networks	
23.5	Apply kernel methods to solve real world problems.	
23.6	Analyze **Learn** eager and lazy learners	

IV B. Tech. II Semester
CS424E1 CONCURRENT AND PARALLEL PROGRAMMING
(Elective-III)

OBJECTIVES:
1. Improvement of students comprehension of CPP, new programming concepts, paradigms and idioms
2. Change of 'mood' regarding Concurrency counter-intuitiveness
3. Proactive attitude: theoretical teaching shouldn't be so dull
4. Multipath, individually paced, stop–and–replay, personalized learning process
5. Frequent assessment of learning advances on the subject

SYLLABUS:

UNIT-I Concurrent versus sequential programming. Concurrent programming constructs and race condition. Synchronization primitives.

UNIT-II Processes and threads. Interprocess communication. Livelock and deadlocks, starvation, and deadlock prevention. Issues and challenges in concurrent programming paradigm and current trends.

UNIT-III Parallel algorithms – sorting, ranking, searching, traversals, prefix sum etc.,

UNIT- IV Parallel programming paradigms – Data parallel, Task parallel, Shared memory and message passing, Parallel Architectures, GPGPU, pthreads, STM,

UNIT-V OpenMP, OpenCL, Cilk++, Intel TBB, CUDA

UNIT-VI Heterogeneous Computing: C++AMP, OpenCL

TEXT BOOKS:
1. Mordechai Ben-Ari. Principles of Concurrent and Distributed Programming, Prentice-Hall International.
2. Greg Andrews. Concurrent Programming: Principles and Practice, Addison Wesley.
3. GadiTaubenfeld. Synchronization Algorithms and Concurrent Programming, Pearson.
4. M. Ben-Ari. Principles of Concurrent Programming, Prentice Hall.
5. Fred B. Schneider. On Concurrent Programming, Springer.
6. Brinch Hansen. The Origins of Concurrent Programming: From Semaphor

COURSE OUTCOMES:

CS424E1.1	Acquire improvement of CPP concepts presented
CS424E1.2	Explore the number of reinforcement–exercises assigned
CS424E1.3	Distinguish the time required for the resolution of exercises
CS424E1.4	DistinguishCompliance level with the new model of theoretical teaching
CS424E1.5	Classify Multipath, individually paced, stop–and–replay, personalized learning process

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS424E1.1	2	2	1		2			1	1	
CS424E1.2		2		2						
CS424E1.3	3	2	1					1		
CS424E1.4	2	2	1			2			1	
CS424E1.5	2	2		1						

IV B. Tech. II Semester
CS424E2 SOFTWARE PROJECT MANAGEMENT
(Elective-III)

OBJECTIVES:
- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals

SYLLABUS:
UNIT-I: 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.

UNIT-II: THE OLD WAY AND THE NEW: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process. **LIFE CYCLE PHASES:** Engineering and production stages, inception, Elaboration, construction, transition phases. **ARTIFACTS OF THE PROCESS:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT- III: MODEL BASED SOFTWARE ARCHITECTURES: A Management perspective and technical perspective. **WORK FLOWS OF THE PROCESS:** Software process workflows, Iteration workflows. **CHECKPOINTS OF THE PROCESS: Major** mile stones, Minor Milestones, Periodic status assessments.

UNIT- IV: ITERATIVE PROCESS PLANNING: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. **PROJECT ORGANIZATIONS AND RESPONSIBILITIES:** Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT-V: PROCESS AUTOMATION: 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.

UNIT VI: PROJECT ESTIMATION AND MANAGEMENT: COCOMO model, Critical Path Analysis, PERT technique, Monte Carlo approach (Text book 2)

TEXTBOOKS:

1. Software Project Management, Walker Royce, PEA, 2005.
2. Software Project Management, Bob Hughes,3/e, Mike Cotterell, TMH

REFERENCE BOOKS:

1. Software Project Management, Joel Henry, PEA
2. Software Project Management in practice, Pankaj Jalote, PEA, 2005,
3. Effective Software Project Management, Robert K.Wysocki, Wiley,2006
4. Project Management in IT, Kathy Schwalbe, Cengage
5. Quality Software Project Management, Futrell,Donald F. Shafer, Donald I. Shafer, PEA

COURSE OUTCOMES:

CS424E2.1	Demonstrate the Information System of Problem Solving and Critical Thinking (PS&CT)
CS424E2.2	Elaborate Communication and Interpersonal Skills (C&IS), Ethical and Professional Responsibilities (E&PR)
CS424E2.3	Analyze Critical Thinking and Problem Solving, Communication, Values and Ethics.
CS424E2.4	Acquire a basics of the important theoretical concepts and practical skills related to modern deep learning techniques

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
COS424E2.1	3	2	1			1				
COS424E2.2	2	2					2	1	2	3
COS424E2.3	2	3	3	2	1		2		2	1
COS424E2.4	2	2	1	1		1				

IV B. Tech. II Semester
CS424E3 OPERATINS RESEARCH
(Elective-III)

SYLLABUS:

UNIT–I: DEVELOPMENT: Definition, Characteristics and Phrases, scientific method. Types of models, general methods for solving, operations research modes. **ALLOCATION:** introduction linear programming formulation, graphical solution, simplex methods, artificial variable technique, duality principle.

UNIT-II: TRANSPORTATION PROBLEM: Formulation, optimal solution, unbalanced transportation, degeneracy. **ASSIGNMENT PROBLEM:** formulation, optimal solution, variations problem, restrictions, travelling salesman problem. **SEQUENCING:** Introduction, optimal solution for processing each of n jobs through three machines, shortest acyclic route models.

UNIT-III: REPLACEMENT: Introduction, replacement of items that deteriorate when money value is not counted, and replacement of items that fail completely, group replacements. **WAITING LINES:** Introduction, single channel, poisson arrivals, exponential service time infinite population and unrestricted queue.

UNIT-VI: INVENTORY: Introduction, single item, deterministic models, production is instantaneous or at a constant rate , shortages are allowed or not allowed and with drawls from stock is continuous, purchase inventory model with one price break ,shortages are not allowed, instantaneous production demand production or purchase cost is relevant, stochastic models, simple problems.

UNIT–V: THEORY OF GAMES: Introduction, minmax (maximum), criterion and optimal strategy solution of games with saddle points, rectangular without saddle points. Dynamic programming: Introduction, Bellman's Principle of optimality, solutions for simple problems.

UNIT-VI: PROJECT MANAGEMENT: PERT and CPM , difference between PERT and CPM, PERT/CPM network components and precedence relations, Time Estimates for activities.

TEXTBOOKS:

1. Operations Research, S.D.Sharma, Ramnath, & Kedarnath co, Meerut.
2. Operations Research, An introduction , 8/e, Taha, Pearson.

REFERENCES:

1. Operations Research, P.K.Gupta, D.S. Hira, S.Chand.
2. Operations Research, R.D.Asrhedkar, R.V.Kulkarni.
3. Operations Research, Problems & sollutons, 3/e, JKSharma, Macmillan.
4. Operations Research, 8/e, Hillier, Liberman, TMH.
5. Operations Research, 2/e, Panneerselvam.

COURSE OUTCOMES:

CS424E3.1	Formulate and solve mathematical model (linear programming problem) for a physical situation like production, distribution of goods and economics.
CS424E3.2	Apply the concept of simplex method and its extensions to dual simplex algorithm
CS424E3.3	Solve the problem of transporting the products from origins to destinations with least transportation cost.
CS424E3.4	Convert and solve the practical situations into non-linear programming problem.
CS424E3.5	Identify the resources required for a project and generate a plan and work schedule.

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	**2=MODERATE**		**3=HIGH**						
CS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CS424E3.1		1	2						1	
CS424E3.2	2	1								
CS424E3.3			2	1						
CS424E3.4		2		1		1				
CS424E3.5	2		2				1			

IV B. Tech. II Semester
CS424E4 DEEP LEARNING FOR VISUAL COMPUTING
(MOOCS-SWAYAM/NPTEL)
(Elective - III)

Course Duration: 12 weeks **Credits: 3**

This Course is offered aiming to enhance the self and lifelong learning capabilities of student

Tentative Syllabus:

- Introduction to Visual Computing and Neural Networks
- Multilayer Perceptron to Deep Neural Networks with Autoencoders
- Autoencoders for Representation Learning and MLP Initialization
- Stacked, Sparse, Denoising Autoencoders and Ladder Training
- Cost functions, Learning Rate Dynamics and Optimization
- Introduction to Convolutional Neural Networks (CNN) and LeNet
- Convolutional Autoencoders and Deep CNN (AlexNet, VGGNet)
- Very Deep CNN for Classification (GoogLeNet, ResNet, DenseNet)
- Computational Complexity and Transfer Learning of a Network
- Object Localization (RCNN) and Semantic Segmentation
- Generative Models with Adversarial Learning
- Recurrent Neural Networks (RNN) for Video Classification

REFERENCE:
https://onlinecourses.nptel.ac.in/noc18_ee08/course

COURSE OUTCOMES:

CS424E4.1	Acquire a basic understanding of the important theoretical concepts and practicalskills related to modern deep learning techniques
CS424E4.2	**i**mplement and apply deep learning techniques
CS424E4.3	Demonstrate problems from the domains of computer vision, speech and text analysis, and graph processing
CS424E4.4	Classify the limitations of deep learning techniques and to compare, characterize and quantitatively evaluate different approaches for practical problems

CO-PO Mapping:

	Correlation Levels as:									
	1=LOW	2=MODERATE		3=HIGH						
CS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CS424E4.1	3	1	1			1			2	1
CS424E4.2	2	2	2					1		
CS424E4.3	2	1	3	2	1		2		1	
CS424E4.4	2	2	1			1				