Faculty of Technology & Engineering

Chandubhai S. Patel Institute of Technology (CSPIT)
/
Devang Patel Institute of Technology and Research (DEPSTAR)

ACADEMIC REGULATIONS & SYLLABUS

(Choice Based Credit System)

Bachelor of Technology Programme

(First Year B. Tech Programme CE/CSE/IT/EC)

Education Campus – Changa, (ECC), hitherto a conglomerate of institutes of professional education in Engineering, Pharmacy, Computer Applications, Management, Applied Sciences, Physiotherapy and Nursing, is one of the choicest destinations by students. It has been transformed into **Charotar University of Science and Technology (CHARUSAT)** through an Act by Government of Gujarat. CHARUSAT is permitted to grant degrees under Section-22 of UGC- Govt. of India.

The journey of CHARUSAT started in the year 2000, with only 240 Students, 4 Programmes, one Institute and an investment of about Rs. 3 Crores (INR 30 million). At present there are seven different institutes falling under ambit of six different faculties. The programmes offered by these faculties range from undergraduate (UG) to Ph.D degrees including M.Phil. These faculties, in all offer 23 different programmes. A quick glimpse in as under:

Faculty	Institute	Programmes Offered
Faculty of Technology & Engineering	Charotar Institute of Technology	B. Tech M. Tech Ph. D
	Devang Patel Institute of Technology and Research	B.Tech (CE/IT) CSE
Faculty of Pharmacy	Ramanbhai Patel College of Pharmacy	B. Pharm M. Pharm Ph. D PGDCT/ PGDPT
Faculty of Management Studies	Indukaka Ipcowala Institute of Management	M.B.A PGDM Ph.D Dual Degree BBA+MBA
Faculty of Computer Applications	Smt. Chandaben Mohanbhai Patel Institute of Computer Applications	M.C.A/MCA (Lateral) M.Sc IT Ph. D

		Dual Degree BCA+MCA
Faculty of Applied Sciences	P.D.Patel Institute of Applied Sciences	M.Sc M.Phil Ph.D Dual Degree B.Sc+M.Sc
Faculty of Medical Sciences	Ashok and Rita Institute of Physiotherapy Manikaka Topawala Institute of Nursing Charotar Institute of Paramedical Sciences	B.PT M.PT Ph.D B.Sc (Nursing) M.Sc GNM Ph.D PGDHA

The development and growth of the institutes have already led to an investment of over Rs.63 Crores (INR 630 Million). The future outlay is planned with an estimate of Rs. 250 Crores (INR 2500 Million).

The University is characterized by state-of-the-art infrastructural facilities, innovative teaching methods and highly learned faculty members. The University Campus sprawls over 100 acres of land and is Wi-Fi enabled. It is also recognized as the Greenest Campus of Gujarat.

CHARUSAT is privileged to have 350 core faculty members, educated and trained in Stanford, IITs, IIMs and leading Indian Universities, and with long exposure to industry. It is also proud of its past students who are employed in prestigious national and multinational corporations.

From one college to the level of a forward-looking University, **CHARUSAT** has the vision of entering the club of premier Universities initially in the country and then globally. **High Moral Values like Honesty, Integrity and Transparency** which has been the foundation of ECC continues to anchor the functioning of **CHARUSAT**. Banking on the world class infrastructure and highly qualified and competent faculty, the University is expected to be catapulted into top 20 Universities in the coming five years. In order to align with the global requirements, the University has collaborated with internationally reputed organizations

like Pennsylvania State University – USA, University at Alabama at Birmingham – USA, Northwick Park Institute –UK, ISRO, BARC, etc.

CHARUSAT has designed curricula for all its programmes in line with the current international practices and emerging requirements. Industrial Visits, Study Tours, Expert Lectures and Interactive IT enabled Teaching Practice form an integral part of the unique **CHARUSAT** pedagogy.

The programmes are credit-based and have continuous evaluation as an important feature. The pedagogy is student-centred, augurs well for self-learning and motivation for enquiry and research, and contains innumerable unique features like:

- Participatory and interactive discussion-based classes.
- Sessions by visiting faculty members drawn from leading academic institutions and industry.
- Regular weekly seminars.
- Distinguished lecture series.
- Practical, field-based projects and assignments.
- Summer training in leading organizations under faculty supervision in relevant programmes.
- Industrial tours and visits.
- Extensive use of technology for learning.
- Final Placement through campus interviews.

Exploration in the field of knowledge through research and development and comprehensive industrial linkages will be a hallmark of the University, which will mould the students for global assignments through technology-based knowledge and critical skills.

The evaluation of the student is based on grading system. A student has to pursue his/her programme with diligence for scoring a good Cumulative Grade Point Average (CGPA) and for succeeding in the chosen profession and life.

CHARUSAT welcomes you for a Bright Future

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

Faculty of Technology and Engineering

ACADEMIC REGULATIONS

Bachelor of Technology (CE/CSE/IT/EC) Programme

(Choice Based Credit System)

Charotar University of Science and Technology (CHARUSAT)
CHARUSAT Campus, At Post: Changa – 388421, Taluka: Petlad, District: Anand
Phone: 02697-247500, Fax: 02697-247100, Email: info@charusat.ac.in
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Year – 2017-2018

FACULTY OF TECHNOLOGY AND ENGINEERING
ACADEMIC REGULATIONS
Bachelor of Technology Programmes
Choice Based Credit System

To ensure uniform system of education, duration of undergraduate and post graduate programmes, eligibility criteria for and mode of admission, credit load requirement and its distribution between course and system of examination and other related aspects, following academic rules and regulations are recommended.

1. System of Education

Choice based Credit System with Semester pattern of education shall be followed across The Charotar University of Science and Technology (CHARUSAT) both at Undergraduate and Master's levels. Each semester will be at least 90 working day duration. Every enrolled student will be required to take a course works in the chosen subject of specialization and also complete a project/dissertation if any. Apart from the Programme Core courses, provision for choosing University level electives and Programme/Institutional level electives are available under the Choice based credit system.

2. Duration of Programme

(i)	Undergraduate programme	(B.Tech)
	Minimum	8 semesters (4 academic years)
	Maximum	16 semesters (8 academic years)

3. Eligibility for admissions

As enacted by Govt. of Gujarat from time to time.

4. Mode of admissions

As enacted by Govt. of Gujarat from time to time.

5. Attendance

5.1 All activities prescribed under these regulations and listed by the course faculty members in their respective course outlines are compulsory for all students pursuing the courses. No exemption will be given to any student from attendance except on account of serious personal illness or accident or family calamity that may genuinely prevent a student from attending a particular session or a few sessions. However, such

unexpected absence from classes and other activities will be required to be condoned by the Dean/Principal.

5.2 Student attendance in a course should be 80%.

6 Course Evaluation

6.1 The performance of every student in each course will be evaluated as follows:

6.1.1 Internal evaluation by the course faculty member(s) based on continuous assessment, for 30% of the marks for the course; and

6.1.2 Final examination by the University through written paper or practical test or oral test or presentation by the student or a combination of any two or more of these, for 70% of the marks for the course.

6.2 Internal Evaluation

6.2.1 A student shall be evaluated through Continuous Evaluation and Semester End Examination.

6.2.2 The weight of continuous assessment and End-semester examination shall be varying from UG to PG and from Faculty to Faculty as approved by Academic Council.

6.2.3 During the semester, a student shall be going through continuous assessment. The continuous assessment will be conducted by the respective Department / Institute. At the end of semester a student shall be evaluated through semester end examination comprising of theory and/or practical, viva-voce, term work components as decided by Academic Council.

6.2.4 The performance of candidate in continuous assessment and in end-semester examination together shall be considered for deciding the final grade in a course.

6.3 University Examination

6.3.1 The final examination by the University for 70% of the evaluation for the course will be through written paper and 100% for practical test or oral test or presentation by the student or a combination of any two or more of these.

6.3.2 **In order to earn the credit in a course a student has to obtain grade other than FF.**

6.4 Performance at Internal & University Examination

6.4.1 Minimum performance with respect to internal marks as well as university examination will be an important consideration for passing a course. Details of minimum percentage of marks to be obtained in the examinations (internal/external) are as follows

Minimum marks in University Exam per subject	Minimum marks Overall per subject
30%	35%

6.4.2 A student failing to score 35% of the final examination will get a FF grade.

6.4.3 If a candidate obtains minimum required marks per subject but fails to obtain minimum required overall marks, he/she has to repeat the university examination till the minimum required overall marks are obtained.

7 Grading

7.1 Performance of the student in all the components shall be graded using relative grading system

7.1.1 At the end of a semester, a histogram shall be prepared for results of each course. A committee mentioned hereunder shall finalize the histogram based on which results will be prepared.

7.1.2 Result Preparation committee: A committee chaired by Provost and comprising of Dean of Faculty, One Dean other than the faculty and one teacher having expertise of relative grading shall deliberate upon different scenarios of results based on histograms of all the courses. Thereafter, the committee shall finalize the results.

7.1.3 The histogram shall be prepared for each course. After the finalization by the committee, the results shall be declared within 3 weeks duration.

7.1.4 Post Result Mechanism: The Dean shall discuss the result of each course with the convener and the teacher who has taught the course along with the statistical distribution evident from histogram so as to bring out any anomalies, skewness, left-out topics etc. Its only after this discussion is over the results shall be declared.

7.2 A grade point system, as given in the following table, shall be followed for evaluating a candidate in every course:

Table: Grading Scheme (UG)

Letter Grade	AA	AB	BB	BC	CC	CD	DD	FF
Grade Point	10	9	8	7	6	5	4	0

7.3 As a general guideline, a class average of around 6.50 for theory component & around 8.00 for practical component may be maintained while applying relative grading.

7.4 The student's performance in any semester will be assessed by the Semester Grade Point Average (SGPA). Similarly, his performance at the end of two or more consecutive semesters will be denoted by the Cumulative Grade Point Average (CGPA). The SGPA and CGPA are calculated as follows:

(i) SGPA = $\Sigma C_i G_i / \Sigma C_i$ where C_i is the number of credits of course i
G_i is the Grade Point for the course i
and i = 1 to n, n = number of courses in the semester

(ii) CGPA = $\Sigma C_i G_i / \Sigma C_i$ where C_i is the number of credits of course i
G_i is the Grade Point for the course i
and i = 1 to n, n = number of courses of all semesters up to which CGPA is computed.

(iii) No student will be allowed to move further if CGPA is less than 3 at the end of every academic year.
(iv) A student will not be allowed to move to third year if he/she has not cleared all the courses of first year.
(v) A student will not be allowed to move to fourth year if he/she has not cleared all the courses of second year.

9. Awards of Degree

9.1 Every student of the programme who fulfils the following criteria will be eligible for the award of the degree:
9.1.1 He should have earned at least minimum required credits as prescribed in course structure; and
9.1.2 He should have cleared all internal and external evaluation components in every course; and
9.1.3 He should have secured a minimum CGPA of 5.0 at the end of the programme;
9.1.4 **In addition to above, the student has to complete the required formalities as per the regulatory bodies, if any.**

9.2 The student who fails to satisfy minimum requirement of CGPA at the end of program will be allowed to improve the grades so as to secure a minimum CGPA for award of degree. Only latest grade will be considered.

10. Award of Class

The class awarded to a student in the programme is decided by the final CGPA as per the following scheme:

Distinction:	CGPA ≥ 7.5
First class:	7.50>CGPA≥ 6.0
Second Class:	6.50>CGPA≥ 5.5
Pass Class:	5.50>CGPA≥ 4.0

Indicative percentage of marks equivalent to Cumulative Grade Point Average (CGPA) shall be calculated as (CGPA – 0.5) X 10.

11. Transcript

The transcript issued to the student at the time of leaving the University will contain a consolidated record of all the courses taken, credits earned, grades obtained, SGPA,CGPA, class obtained, etc.

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
(CHARUSAT)

FACULTY OF TECHNOLOGY & ENGINEERING (FTE)

CHOICE BASED CREDIT SYSTEM

FOR

BACHELOR OF TECHNOLOGY & ENGINEERING

A. Choice Based Credit System:

With the aim of incorporating the various guidelines initiated by the University Grants Commission (UGC) to bring equality, efficiency and excellence in the Higher Education System, Choice Based Credit System (CBCS) has been adopted. CBCS offers wide range of choices to students in all semesters to choose the courses based on their aptitude and career objectives. It accelerates the teaching-learning process and provides flexibility to students to opt for the courses of their choice and / or undergo additional courses to strengthen their Knowledge, Skills and Attitude.

1. CBCS – Conceptual Definitions / Key Terms (Terminologies)

1.1. Core Courses

1.1.1 University Core (UC)

University Core Courses are those courses which all students of the University of a Particular Level (PG/UG) will study irrespective of their Programme/specialisation.

1.1.2 Programme Core (PC)

A 'Core Course' is a course which acts as a fundamental or conceptual base for Chosen Specialisation of Engineering. It is mandatory for all students of a particular Programme and will not have any other choice for the same.

1.2 Elective Course (EC)

An 'Elective Course' is a course in which options / choices for course will be offered. It can either be for a Functional Course / Area or Streams of Specialization / Concentration which is / are offered or decided or declared by the University/Institute/Department (as the case may be) from time to time.

1.2.1 Institute Elective Course (IE)

Institute Courses are those courses which any students of the University/Institute of a Particular Level (PG/UG) will choose as offered or decided by the University/Institute from time-to-time irrespective of their Programme /Specialisation

1.2.2 Programme Elective Course (PE):

A 'Programme Elective Course' is a course for the specific programme in which students will opt for specific course(s) from the given set of functional course/ Area or Streams of Specialization options as offered or decided by the department from time-to-time

1.2.3 Cluster Elective Course (CE):

An 'Elective Course' is a course which students can choose from the given set of functional course/ Area or Streams of Specialization options (eg.

Common Courses to EC/CE/IT/EE) as offered or decided by the Institute from time-to-time.

1.3 Non Credit Course (NC) - AUDIT Course

A 'Non Credit Course' is a course where students will receive Participation or Course Completion certificate. This will not be reflected in Student's Grade Sheet. Attendance and Course Assessment is compulsory for Non Credit Courses

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY												
TEACHING & EXAMINATION SCHEME FOR B TECH PROGRAMME IN CE/CSE/IT/EC ENGINEERING												
CHOICE BASED CREDIT SYSTEM												
Sem	Course Code	Course Title	Teaching Scheme					Examination Scheme				
			Contact Hours				Credit	Theory		Practical		Total
			Theory	Practical	Tutorial	Total		Internal	External	Internal	External	
'First Year Sem 1	MA141	Engineering Mathematics-I	4	0	1	5	4	30	70	0	0	100
	CE141	Computer Concepts & Programming	4	4	0	8	6	30	70	50	50	200
	EE141	Basics of Electronics & Electrical Engineering	4	2	0	6	5	30	70	25	25	150
	CL142	Environmental Sciences	2	0	0	2	2	30	70	0	0	100
	HS101 A-HS106 A	A Course from Liberal Arts	2			2	2	0	0	50	50	100
	IT142	ICT Workshop	0	4	0	4	2	0	0	50	50	100
		Assignment Practices /Student counselling /Remedial classes / Library/ Sports/ Extracurricular &co-curricular				9						
			14	**12**	**1**	**36**	**21**	**120**	**280**	**175**	**175**	**750**
First Year Sem 2	MA142	Engineering Mathematics-II	4	0	1	5	4	30	70	0	0	100
	CE142	Object Oriented Programming with C++	4	4	0	8	6	30	70	50	50	200
	ME144	Elements of Engineering	4	2	1	7	5	30	70	25	25	150
	PY141	Engineering Physics	3	2	0	5	4	30	70	25	25	150
	HS121 A	Study of English Language & Literature	2			2	2	25	25	25	25	100
		Assignment Practices /Student counselling /Remedial classes / Library/ Sports/ Extracurricular &co-curricular				9						
			16	**9**	**2**	**36**	**21**	**145**	**305**	**125**	**125**	**700**

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B. Tech. (CE/CSE/IT/EC) Programme

SYLLABI

(Semester – 1)

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF MATHEMATICAL SCIENCES

MA141: ENGINEERING MATHEMATICS – I

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	0	1	5	4
Marks	100	0	-	100	

A. Objective of the Course:

A good Engineer has to have an excellent background of Mathematics. Engineering Mathematics is one of the essential tools for learning Technology, Engineering and Sciences. This course lays the foundation for engineering Mathematics in subsequent semesters, so that students get a sound knowledge and important aspects of the course. The objectives of the course are to:

1. Understand applications of differentiation in respective Engineering Branch
2. Understand basics of Matrix Algebra and methods to solve problems
3. Understand complex numbers, their properties and applications to Engineering problems
4. Understand solution to algebraic equations
5. Understand the sequence and series, conditions for convergence and divergence

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Higher order derivatives and applications	09
2.	Partial differentiation	10
3.	Applications of Partial differentiation	09
4.	Matrix Algebra -I	10
5.	Algebra of Complex numbers and Roots of polynomial Equations	12
6.	Infinite Series	10

Total hours (Theory): 60

Total hours (Lab): 00

Total hours (Tutorial): 15

Total hours: 75

C. Detailed Syllabus:

1	**Higher order derivatives and applications**	**09 Hours**	**15%**
1.1	Set theory and Function		
1.2	Limit, Continuity, Differentiability for function of single variable and its uses.		
1.3	Successive differentiation: n^{th} derivative of elementary functions viz., rational, logarithmic, trigonometric, exponential and hyperbolic etc.		
1.4	Leibnitz rule for the n^{th} order derivatives of product of two functions		
1.5	Expansion of Functions: Maclaurin's & Taylor's series expansion		
1.6	L'Hospital's rule and related applications, Indeterminate forms.		
2	**Partial differentiation**	**10 Hours**	**17%**
2.1	Partial derivative and geometrical interpretation		
2.2	Euler's theorem with corollaries and their applications		
2.3	Chain rule		
2.4	Implicit differentiation		
2.5	Total differentials.		
3.	**Applications of Partial differentiation**	**09 Hours**	**15%**
3.1	Tangent plane and normal line to a surface		
3.2	Maxima and Minima		
3.3	Langrage's method of multiplier		
3.4	Jacobian		
3.5	Errors and approximations		
4.	**Matrix Algebra- I:**	**10 Hours**	**17%**
4.1	Definition of Matrix, types of matrices and their properties		
4.2	Determinant and their properties		
4.3	Rank and nullity of a matrix		

4.4	Determination of rank		
4.5	Gauss Jordan method for computing inverse, Triangularization of Matrices by Gauss Elimination Process		
4.6	Solution of system of linear equations		
5	**Algebra of Complex numbers and Roots of polynomial Equations**	**12 Hours**	**19%**
5.1	Complex numbers & their geometric representation		
5.2	Complex numbers in polar and exponential forms		
5.3	Demoirve's theorem and its applications		
5.4	Exponential, Logarithmic, Trigonometric and hyperbolic functions.		
5.5	Statement of fundamental theorem of Algebra, Analytical solution of cubic equation by Cardan's method		
5.6	Analytic solution of Biquadratic equations by Ferrari's method with their applications.		
6.	**Infinite Series**	**10 Hours**	**17%**
6.1	Introduction to sequence and series		
6.2	convergence and divergence of infinite series		
6.3	necessary condition for convergence		
6.4	Geometric series		
6.5	Tests of convergence viz., comparison test, p-series test, ratio test, n^{th} root test, Leibnitz test, integral test and power series.		
6.6	Convergence of Taylor's and Maclaurian Series		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures/laboratory which carries a 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.

- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weighting of 5%.
- Two Quizzes (surprise test) will be conducted which carries 5% component of the overall evaluation.

E. Student Learning Outcomes:

1. At the end of the course the students will be able to understand the basic concepts of Engineering Mathematics.
2. Student will be able apply concepts of these course to learn MA 142: Engineering Mathematics-II and may be some courses other then Mathematics.
3. Students will be able to apply the mathematical concepts in other engineering courses.

F. Recommended Study Material:

❖ **Text Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Ed., Jhon Wiley & Sons, India, 1999

❖ **Reference Books:**

1. M.D. Wier, et. al., Thomas' Calculus, 11th Ed., Pearson Education, 2008
2. Stewart James, Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. Wylie & Barrett, Advanced Engineering Mathematics, Mc graw Hill pub.
4. Greenberg, M.D., Advanced Engineering Mathematics, 2nd ed., Pearson

❖ **Web Materials:**

1. http://mathworld.wolfram.com/
2. http://en.wikipedia.org/wiki/Math

FACULTY OF TECHNOLOGY & ENGINEERING
U & P U. PATEL DEPARTMENT OF COMPUTER ENGINEERING

CE141: COMPUTER CONCEPTS & PROGRAMMING

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	4	-	8	6
Marks	100	100	-	200	

A. Objective of the Course:

The main objectives for offering the course computer concepts and programming are:

1. To create students' interest for programming related subjects and to make them aware of how to communicate with computers by writing a program.
2. To foster the ability of solving various analytical and mathematical problems with algorithms within students.
3. To make them learn regarding different data structures and memory management in the programming language.
4. To promote skills like Development of logic and implementation of basic mathematical and other problems at individual level.
5. To make them learn and understand coding standards, norms, variable naming conventions, commenting adequately and how to form layout of efficient program.
6. To explain them concepts of pointer & file management concepts.

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to Computation	03
2.	Algorithms and Flowcharts	03
3.	Introduction to Programming	01
4.	Introduction to 'C'	01
5.	Constants, Variables & Data Types in 'C'	03
6.	Operators and Expression in 'C'	03
7.	Managing Input & Output Operations	03
8.	Conditional Statements & Branching	04
9	Looping	05

10	Arrays	04
11.	Character Arrays	05
12.	User-Defined Function in 'C'	06
13.	Structures	05
14.	Pointers	06
15.	File Management in 'C'	05
16.	Dynamic Memory Allocation	03

Total hours (Theory): 60

Total hours (Lab): 60

Total hours: 120

C. Detailed Syllabus:

1.	**Introduction to Computation**	**03Hours**	**05%**
1.1	Program, Software, Instruction, data, debug, test, file, directory, linking, loading, libraries, compilation, execution.		
1.2	Introduction, and Block diagram and functions of various components of computer, Concepts of Hardware and Software, Types of software.		
2.	**Algorithms and Flowcharts**	**03 Hours**	**05%**
2.1	Algorithms, Flow-charts		
3	**Introduction to Programming**	**01 Hours**	**02%**
3.1	Program & Programming, Programming Languages, Types of Languages, Compiler and Interpreter.		
3.2	Procedure Oriented Language and Object Oriented Language.		
4.	**Introduction to 'C' language**	**01 Hours**	**02%**
4.1	History of C, Characteristics of C, Basic structure, Compiling process of C Program.		
5.	**Constants, Variables & Data Types in 'C'**	**03 Hours**	**05%**
5.1	Character set, C tokens.		
5.2	Data types – classes of data type, declaration & initialization, User-defined type declaration - typedef, enum, Basic input-output operations, Symbolic constant (#define).		
6.	**Operators and Expression in 'C'**	**03 Hours**	**05%**
6.1	Classification of operators: Arithmetic, Relational, Logical,		

	Assignment, Increment / Decrement, Bitwise, Special Operators. Unary, Binary and Ternary Operators, Shorthand Operators.		
6.2	Arithmetic expression, Evaluation, Type conversion: Implicit &Explicit, Precedence and Associativity.		
7	**Managing Input & Output Operations**	**03 Hours**	**05%**
7.1	Input a character, Introduction to ASCII code, Various library functions from ctype.h.		
7.2	Formatted input using scanf ( ), Formatted output of integer and real data using printf ( ).		
8	**Conditional Statements & Branching**	**04 Hours**	**07%**
8.1	Decision making using if, if...else statement, nesting of if...else, else...if Ladder.		
8.2	Switch, use of if...else instead of conditional operator, goto statement.		
9	**Looping**	**05 Hours**	**08%**
9.1	Need of looping, (pre-test) entry-controlled loop: while, for, (post-test) exit-controlled loop: do...while, difference, Use of sentinel values.		
9.2	Nesting of looping statements, use of break & continue, use of if...else in loop, infinite loop.		
10	**Arrays**	**04 Hours**	**07%**
10.1	Need of array, Declaration & Initialization 1D array, Programs of 1D.		
10.2	2D array, Memory allocation of 1D and 2D array, 2D array basic programs.		
11	**Character Arrays**	**05 Hours**	**08%**
11.1	Difference of character array with numeric array and importance of NULL character.		
11.2	Declaration, Initialization and various input and output methods of string, formatted output of string, arithmetic operations on characters.		
11.3	Various functions of string.h: strlen, strcat, strcmp, strcpy, strrev, strstr, etc.		
11.4	Two dimensional character array (table of strings).		
12	**User-Defined Function in 'C'**	**06 Hours**	**10%**

12.1	Need of modularization, advantages, Introduction to user-defined function, Function Prototype, Function Call, Function Body.		
12.2	Call by value, Actual &Formal Arguments, return value, Categories of functions, Nesting of Functions, Recursion.		
12.3	Array as Function arguments, Storage Classes: Scope, Life of a variable in 'C'.		
13	**Structures**	**05 Hours**	**07%**
13.1	Need of user-defined data type, Structure definition, Declaration and Initialization of variables, Array as member, Array of structure variables.		
13.2	Structure within structure, Structure as function arguments, Union, Bit fields.		
14	**Pointers**	**06 Hour**	**11%**
14.1	Introduction to pointer, declaration & initialization, access value using pointer, indirection (*) operator.		
14.2	Pointers in expressions, scale factor, 1D-array and pointer, pointer with strings, Array of pointers.		
14.3	Pointer as arguments in function, Call by address, Functions returning pointers, Pointers with structures, Pointer to pointer.		
15	**File Management in 'C'**	**05 Hours**	**08%**
15.1	Introduction, need, create and close file, modes of file, read &7 write single character and integer to file, use of fprintf and fscanf functions.		
15.2	Error handling functions, random access of files using ftell, rewind, fseek, command line argument.		
16	**Dynamic Memory Allocation**	**03 Hours**	**05%**
16.1	Introduction, memory allocation process		
16.2	Usle of functions: malloc ( ), calloc ( ), realloc ( ) and free ( ).		
16.3	Allocation of memory for array & structure.		

D. Instructional Method and Pedagogy:

- At the beginning, the course delivery pattern, prerequisite of the subject will be discussed.

- Lectures will be conducted with the aids like multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory
- The course includes a laboratory, where students have the opportunity to build appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcomes:

After completing this course, the student should demonstrate the knowledge and ability to:

1. Implementation of code for numerical calculations
2. Efficient programming related to scientific simulation in their projects.
3. Demonstrate a range of basic programming and IT skills
4. Design programs involving decision structures, loops and functions.
5. Gain the complete knowledge on arrays, structure, functions, union, pointers and files.

F. Recommended Study Material:

❖ **Text Books:**

1. Programming in ANSI C, 6th Edition by E Balagurusamy, MGrawHill
2. Let us C, 13th Edition by Yashwant Kanetkar, BPB Publication
3. C Programming Language (ANSI C Version), 2/e by Brian Kernighan, Dennis Ritchie

❖ **Reference Books:**

1. Head First C by David Griffiths & Dawn Griffiths.
2. C How to program, 7/E by Deitel&Deitel, Prentice Hall
3. C: The Complete Reference by Herbert Schildt
4. Practical C Programming (Third Edition) by Steve Oualline

❖ **Web Materials:**

1. www.tutorials4u.com/c/
2. www.cprogramming.com/tutorial.html
3. www.howstuffworks.com/c.htm
4. http://www.programmingtutorials.com/c.aspx
5. http://www.physics.drexel.edu/courses/Comp_Phys/General/C_basics/

FACULTY OF TECHNOLOGY & ENGINEERING
M & V PATEL DEPARTMENT OF ELECTRICAL ENGINEERING

EE141: BASICS OF ELECTRONICS & ELECTRICAL ENGINEERING

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	0	6	5
Marks	100	50	0	150	

A. Objective of the Course:

This course covers the basic principles and laws of electrical and electronics engineering with emphasis on the analysis and application to simple practical engineering problems.

The course objectives (CO) are to:

1. Introduce basic terms and units related to electrical engineering
2. Understand the basic concepts in the field of electrical and electronics engineering
3. Focus on the fundamentals of electrostatic and electromagnetism
4. Analyze the series and parallel AC systems
5. Solve single phase and polyphase circuits
6. Comprehend electronic devices, digital numbers, logic gates and communication systems.

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Basic Electrical Terms and Units	06
2	Electrical Circuit Analysis	08
3	Electrostatic	08
4	Electromagnetism	08
5	AC and DC Fundamentals	06
6	Single Phase AC Series and Parallel Circuits	07
7	Polyphase Circuits	05
8	Basics of Electronics	12

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

C. Detailed Syllabus:

1	**Basic Electrical Terms and Units**	**06 Hours**	**10%**
1.1	Basic terms related to electrical engineering, their definition, units and symbols, equations		
1.2	Ohm's law, resistor and its coding, properties, temperature co-efficient of resistance, resistance variation with temperature, examples		
2	**Electrical Circuit Analysis**	**08 Hours**	**13%**
2.1	Kirchoff's current and voltage law, mesh and nodal analysis, Examples		
2.2	Series-parallel network, Star-Delta transformations, potential divider		
3	**Electrostatic**	**08 Hours**	**13%**
3.1	Capacitors, charge and voltage, capacitance, electric fields, electric field strength and electric flux density, relative permittivity, dielectric strength, Examples		
3.2	Capacitors in parallel and series, Calculation of capacitance of parallel plate and multi plate capacitor, examples		
3.3	Energy stored in capacitors, types of capacitor, charging and discharging of capacitors on DC, examples		
4	**Electromagnetism**	**08 Hours**	**13%**
4.1	Magnetic field, its direction and characteristics, magnetic flux and flux density, magneto motive force and magnetic field strength, examples		
4.2	Faraday's law of electromagnetic induction, Fleming's left hand and right hand rule, Lenz law, force on a current carrying conductor, examples		
4.3	Self and mutual inductance, coefficient of coupling, series and parallel combination of inductances, rise and decay of current in an inductive circuit in DC, examples		
4.4	Comparison between electrical & magnetic circuits		
5	**AC and DC Fundamentals**	**06 Hours**	**10%**

5.1	Generation of AC and DC voltage, Waveform and definition of its terms, relation between speed, frequency and pole		
5.2	Average and RMS value and its determination for sinusoidal and non-sinusoidal wave shapes, examples		
5.3	Phasor representation of alternating quantities		
6	**Single Phase AC Series and Parallel Circuits**	**07 Hours**	**13%**
6.1	R –L and R-C series circuit, power in ac circuits, examples		
6.2	R-L-C series circuit, resonance in R-L-C series and parallel circuit, Q – factor and bandwidth, examples		
6.3	Solution of series and parallel circuits, phasor method, admittance method, complex algebra method, examples.		
7	**Polyphase Circuits**	**05 Hours**	**08%**
7.1	Generation of three phase emf, phase sequence, Definitions		
7.2	Star and delta connection of three phase system, voltage and current relations in star and delta connected system, Examples		
8	**Basics of Electronics**	**12 Hours**	**20%**
8.1	Electronic Systems: Basic amplifier, voltage, current and power gain, Basic attenuators, CRO		
8.2	Transmission and Signals: Analog and digital signals, bandwidth, modulation and demodulation, Filters		
8.3	Forward and reverse bias of PN junction diode, zener diode, Rectifiers: Half wave, full wave – bridge and centre tap, L and C filters for smoothing		
8.4	Transistor: Bipolar junction transistor, construction and biasing, configuration, transistor as a switch and amplifier		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.

- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcomes:

On the completion of the course one should be able to:

1. Identify resistors, capacitors and inductors reading.
2. Understand the basic electrical laws and apply these laws to solve electrical network
3. Identify the property of magnetic materials and understand the laws of emf generation
4. Solve the series and parallel AC and DC circuits for single and polyphase networks.
5. Define different terms of alternating quantities
6. Design AC-DC rectification circuits, operate basic electrical and electronics instruments
7. Operate the circuits with logical gates and transistors

F. Recommended Study Material:

❖ **Text Books:**

1. Elements of Electrical Engineering and Electronics by U.A. Patel and R.P. Ajwalia
2. A Text Book of Electrical Technology by B. L. Thareja, S. Chand
3. Principles of Electrical Engineering and Electronics by V.K. Mehta, S. Chand

❖ **Reference Books:**

1. Hughes, Electrical Technology, Pearson Education
2. Electrical Engineering by Del Toro

❖ **Web Materials:**

1. Exploring Electrical Engineering

http://www.facstaff.bucknell.edu/mastascu/eLessonsHTML/EEIndex.html

2. Video lectures by Prof. Umanand, IISc Banglore on Basic Electrical Technology
   http://nptel.iitm.ac.in/syllabus/syllabus.php?subjectId=108105053

FACULTY OF TECHNOLOGY & ENGINEERING
MANUBHAI SHIVABHAI PATEL DEPARTMENT OF CIVIL ENGINEERING

CL142: ENVERIONMENTAL SCIENCES

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	0	-	2	2
Marks	100	0	-	100	

A. Objective of the Course:

1. To impart basic knowledge about environment and thereby developing an attitude of concern towards environment.
2. To inculcate alertness towards environment.
3. To make awareness on delineating on various environmental pollution and their effects on environment.
4. To deliver a comprehensive insight into natural resources, ecosystem and biodiversity.
5. To develop the curiosity and visionary of student in relation to environment.

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Introduction	05
2	Environmental Pollution	12
3	Ecology & Ecosystems	10
4	Natural Resources	03

Total hours (Theory): 30

Total hours (Lab): 00

Total hours: 30

C. Detailed Syllabus:

1	**Introduction**	**05 Hours**	**24%**
1.1	Basic definitions		
1.2	Objectives and guiding principles of environmental studies		
1.3	Components of environment		
1.4	Structures of atmosphere		
1.5	Man-Environment relationship		
1.6	Impact of technology on the environment		
2	**Environmental Pollution**	**12 Hours**	**33%**
2.1	Environmental degradation		
2.2	Pollution, sources of pollution, types of environmental pollution		
2.3	Air pollution: Definition, sources of air pollution, pollutants, classifications of air pollutants (common like SO_X & NO_X), sources & effects of common air pollutants		
2.4	Water pollution: Definition, sources water pollution, pollutants & classification of water pollutants, effects of water pollution, eutrophication		
2.5	Noise pollution: Sources of noise pollution, effects of noise pollution		
2.6	Ill Effects of Fireworks: Severity of toxicity, environmental effects and health hazards.		
2.7	Current environmental global issues, global warming & green houses, effects, acid rain, depletion of Ozone layer		
3	**Ecology & Ecosystems**	**10 Hours**	**33%**
3.1	Ecology: Objectives and classification		
3.2	Concept of an ecosystem: Structure & function		
3.3	Components of ecosystem: Producers, consumers, decomposers		
3.4	Bio-Geo-Chemical cycles & its environmental significance		
3.5	Energy flow in ecosystem		
3.6	Food Chains: Types & food webs		
3.7	Ecological pyramids		
3.8	Major ecosystems		
4	**Natural Resources**	**03 Hours**	**10%**

4.1 Natural ressources: Renewable resources, non-renewable resources, destruction versus conservation

4.2 Energy resources: Conventional energy sources & its problems, non-conventional energy sources-advantages & its limitations , problems due to overexploitation of energy resources

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures which carries 10 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignment/Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.

E. Student Learning Outcomes:

On the successful completion of the course the students will be able

1. To perceive the elementary knowledge about natural environment and its relation with science.
2. To identify and analyze human impacts on the environment.
3. To understand the facts and concepts of natural and energy resources thereby applying them to lessen the environmental degradation.
4. To communicate on recent environmental problems thereby creating awareness among society

F. Recommended Study Material:

❖ **Text Books:**

1. Varandani, N.S., Basics of Environmental Studies
2. Sharma, J. P., Basics of Environmental Studies

❖ **Reference Books:**

1. Shah Shefali & Goyal Rupali, Basics of Environmental Studies

2. Agrawal, K.C., Environmental Pollution : Causes, Effects & Control
3. Dameja, S. K., Environmental Engineering & Management
4. Rajagopalan, R., Environmental Studies, Oxford University Press
5. Wright Richard T. & Nebel Bernard J., Environmental Science
6. Botkin Daniel B. & Edward A. Keller, Environmental Science
7. Shah, S.G., Shah, S.G. & Shah, G. N., Basics of Environmental Studies, Superior Publications, Vadodara

❖ **Reference Books:**

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-Delhi/Environmental%20Air%20Pollution/index.htm
2. http://nptel.iitm.ac.in/video.php?subjectId=105104099
3. http://apollo.lsc.vsc.edu/classes/met130/notes/chapter1/vert_temp_all.html
4. http://www.epa.gov
5. http://www.globalwarming.org.in
6. http://nopr.niscair.res.in
7. http://www.indiaenvironmentportal.org.in

FACULTY OF MANAGEMENT STUDIES
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

HS101A - HS106A: A COURSE FROM LIBERAL ARTS

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	2
Marks	-	100	-	100	

A. Objective of the Course:

To help learners to

1. Recognize the nature of aesthetic values and explore elements of arts and aesthetics with reference to personal, cultural and civic sphere
2. Connect art and aesthetics with Science and Technology to understand and extend research and innovation for a society

B. Courses:

Students may select any one course from the following:

Sr. No.	Title of the unit	Credits
1	Painting	02
2	Photography	
3	Sculpting	
4	Music	
5	Drama and Dramatics	
6	Yoga	
7	Dance	
8	Pottery and Ceramic Art	
9	Media and Graphics Design	

Total hours (Theory): 00

Total hours (Lab): 30

Total hours: 30

C. Instructional Method and Pedagogy:

- Teaching will be practical based on the hands on experiences, live and interactive Participation sessions. It may also run in the workshop mode.

D. Evaluation:

- The students will be evaluated continuously in the form of their consistent performance throughout the semester. There is no theoretical evaluation. There is just practical evaluation. The evaluation (practical) is schemed as 50 marks for internal evaluation and 50 marks for external evaluation.

Internal Evaluation

- Students' performance in the course will be evaluated on a continuous basis through the following components:

Sr No.	Component	Number	Marks Per Incidence	Total Marks
1		-	10	10
2	Performance/ Activities	-	10	10
3	Project	-	25	25
4	Attendance	-	05	05
			Total	50

External Evaluation

- University Practical examination will be for 50 marks and will test the performance, activities and creative presentations of the students with reference to the course selected:

Sr. No.	Component	Number	Marks Per Incidence	Total Marks
1	Viva/Practical	-	50	50
			Total	50

E. Student Learning Outcomes:

At the end of the course, students will have developed the ability to enjoy, interact with and perform arts and aesthetics; and will have developed the ability and creativity to transfer sense of design and innovation in science and technology.

FACULTY OF TECHNOLOGY & ENGINEERING
DEPARTMENT OF INFORMATION TECHNOLOGY

IT142: ICT WORKSHOP

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	0	4	-	4	2
Marks	0	100	-	100	

A. Objective of the Course:

The main objectives for offering the course ICT Workshop are:

1. To explain the fundamentals of computers and peripherals.
2. To introduce hardware and software computers basics.
3. To deliver concept and methodology of different parts of computer and their assembling.
4. To brief the students regarding various operating systems installation, commands and scripting in OS.
5. To introduce the basic concepts of batch file programming and its uses.

B. Outline of the Course

Sr. No.	Title of the Unit	Minimum Number of Hours
1	Introduction to computer hardware	4
2	PC troubleshooting	4
3	Display unit, Keyboard , Mouse and Touch Pad, Printer	4
4	Power supply & Storage Devices, Assembling the computer system	8
5	Installation of various Operating Systems, DOS Commands	8
6	LINUX commands and scripting	12
7	Professional Document writing using Word Processing Tool, Data Processing using Spread Sheet, Creating Dynamic and Informative Slide Show using Presentation Software	12
8	Batch File Commands & Programming in Windows	8

Total Hours (Lab): 60

Total Hours: 60

C. Detailed Syllabus:

Following contents will be delivered to the students during laboratory sessions.

1. **Introduction to computer hardware** — **4 Hours**

   Definition of computer, Computer hardware, software and firmware, history of computer, classification of computer, basic parts of digital computer

2. **PC troubleshooting** — **4 Hours**

   Hardware troubleshooting and repairing, Software troubleshooting and repairing

3. **Display unit** — **4 Hours**

   Types of monitor: CRT, LCD, LED, Plasma, OLED, Faults of monitor, Display card

   Keyboard , Mouse and Touch Pad (Track Pad)

   Types of keyboard: Wired and Wireless

   Wired: Din type, PS/2, USB, Wireless: Bluetooth, Infrared(IR), RF

   Types of mouse: Wired and Wireless

   Wired: Serial port, PS/2, USB, Wireless: Bluetooth, Infrared(IR), RF

   Types of Track pad and Touch pad

   Printer

   General features of printer, Classification of printer, Impact printer: Dot matrix, Line printer, Non-impact: Thermal

4. **Power supply& Storage Devices** — **8 Hours**

   SMPS: Working, output connectors, UPS, Stabilizer

   Types of Memory: Primary storage: Registers, Cache, RAM

   Other Storage Devices: Floppy, Hard Disk, CD, DVD, Flash

   Motherboard

   Types of motherboard, Functional block diagram of motherboard, CPU and supporting chips, introduction of CPU architectures, BIOS, CMOS setup, Faults of motherboard

   Assembling the computer system

   Study of configuration of computer system, introduction of computer

assembling, Different types of cables, Assembling and Disassembling

5. **Installation of various Operating Systems** **8 Hours**

Different types of Operating System, Installation of OS on a single machine (Dual Boot)

DOS Commands:

Internal Commands: CLS, DATE, VER, VOL, DIR, COPY CON, TYPE, MKDIR, CHDIR (CD), RMDIR, RENAME, DEL, MOVE, COPY, PROMPT, DOSKEY, PATHExternal Commands: ATTRIB, FORMAT, CHKDSK, SCANDISK, TREE, XCOPY. Use of commands with Wild Card Characters:? (Question Mark) and *(Asterisk)

6. **LINUX Commands and scripting:** **12 Hours**

Introduction to basics of Linux OS and its variants, what is shell, Commands:clear, man, who, date, who am i, cal, echo, ls, mkdir, cd, cd.., rmdir, pwd, cat, rm, cp, mv, chmod, umask, grep, ps

Prepare scripts using control structures and loops for various actions to perform.

7. **Professional Document writing using Word Processing Tool** **12 Hours**

Microsoft Word: Basic menu introduction, Page layout-Margin-Header Footer, Page break, Insert symbols and Equations, Mail Merge, Preparation of Index, Automatic Index generation, Two columns research paper format-Footnote-Cross reference.

Data Processing using Spread Sheet

Microsoft Excel: Cell Address, Row, Column, Header and Footer, Fill handle and drag-&-drop, Format cells, Conditional formatting, Formulas and Functions, Validation, Chart with various options, Filter, Sort.

Creating Dynamic and Informative Slide Show using Presentation Software

Microsoft PowerPoint: Slide layout, Slide design (Proper selection based on audience), Header and Footer in slides, Slide transition, Slide Master, Insert Picture-Smart Art, Insert animations to different objects, Hide Slide, Rehearse Timings, Record slide show. How to prepare professional presentation

8. **Batch File Commands & Programming in Windows** **8 Hours**

Batch file commands: CLS, %1, ECHO, SET, CALL, :LABEL, EXIT, GOTO, IF, FOR, REM, etc.

Create batch files for various purposes and execute it, study of AUTOEXEC.BAT file

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Laboratories will be conducted with the aid of multi-media projector, white board, computers, OHP etc.
- Attendance is compulsory in laboratory. This, including assignments/tests/quizzes carries 10 marks in overall evaluation.

E. Student Learning Outcomes:

By taking this course,

1. A student will be having the basic knowledge of computer architecture, peripherals and all the hardware and software basics.
2. A student will be able to understand hardware requirement for operating system and able to install it on a machine.
3. A student will become familiar with command line interface of Windows and Linux.

   A student will be able to use different word processing and data processing tools for analysis and presentation.

F. Recommended Study Material:

❖ **Reference Books:**

1. The Complete PC Upgrade and Maintenance Guide, 16th Edition, Mark Minasi, Quentin Docter, Faithe Wempen, SYBEX publication
2. IBMPC And Clones Govindarajulu, Tata McGraw Hill

❖ **Web Materials:**

1. http://www.technologystudent.com/elec1/resist1.htm
2. http://www.electronics-tutorials.ws/capacitor/cap_1.html
3. http://en.wikipedia.org/wiki/Inductor

4. http://www.radio-electronics.com/info/formulae/inductance/inductor-inductive-reactance-formulae-calculations.php
5. http://alternatezone.com/electronics/files/PCBDesignTutorialRevA.pdf
6. http://www.scribd.com/doc/39508404/CRO-Manual
7. http://www.computerhope.com/issues/ch001676.htm

B. Tech. (CE/CSE/IT/EC) Programme

SYLLABI

(Semester – 2)

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF MATHEMATICAL SCIENCES

MA142: ENGINEERING MATHEMATICS –II

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	-	1	5	4
Marks	100	-	-	100	

A. Objective of the Course:

To study the fundamental concepts of Engineering Mathematics, so that students get a sound knowledge and important aspects of the subject. The objectives of the course are to:

1. Understand differential equations, partial differential equations and its solutions
2. Understand Multiple Integration and solution techniques.
3. Understand different types of Special Functions and its use in Engineering problems

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Ordinary Differential Equations	09
2	Linear Differential Equations	10
3	Partial Differential Equations	11
4	Applications of Ordinary Differential Equations and Partial Differential Equations	10
5	Multiple Integrals	10
6	Special Functions	10

Total hours (Theory): 60

Total hours (Lab): 00

Total hours (Tutorial): 15

Total hours: 75

C. Detailed Syllabus:

1.	**First order and First degree Ordinary Differential Equations**	**09 Hours**	**14%**
1.1	Modelling of real world problems in terms of first order ODE		
1.2	Initial Value problems		
1.3	Concept of general and particular solutions		
1.4	Existence and Uniqueness solutions by illustrations		
1.5	linear, Bernoulli and Exact differential equations		
1.6	Solutions of First order First degree Differential Equations		
2.	**Higher Order Ordinary Linear Differential Equations**	**11 Hours**	**18%**
2.1	Model of real world problems of higher order LDE		
2.2	General Solution of Higher Order Ordinary Linear Differential Equations with Constant coefficients		
2.3	Methods for finding particular integrals viz. variation of parameters and undetermined coefficients		
2.4	LDE of higher order with variable coefficients viz Cauchy-Euler and Legendre's Equations		
2.5	System of Simultaneous first order linear differential equations		
3	**Partial Differential Equations**	**10 Hours**	**17%**
3.1	Modeling of real world problem in terms of first order PDE		
3.2	Initial and Boundary valued conditions		
3.3	Methods of solutions of first order PDE viz.		
3.4	Langrange's Linear Partial Differential Equations		
3.5	Special types of Nonlinear PDE of the first order		
4	**Applications of Differential Equations**	**10 Hours**	**17%**
4.1	Applications of ODE: Orthogonal Trajectories, Mechanical vibration system, Electrical circuit system, deflection of beams.		
4.2	Application of PDE: Heat, wave, Laplace equations and their solution by method of separation of variables and Fourier series.		
5	**Multiple Integrals**	**10 Hours**	**17%**
5.1	Evaluation of double and triple integrals		
5.2	Change of order of integration		
5.3	Transformation to polar, spherical and cylindrical coordinates		

5.4 applications of double and triple integrals: area, volume and mass

6. Special Functions **10 Hours 17%**

6.1 Improper integrals and their convergence

6.2 Definitions, properties and examples of Beta, Gamma and error functions

6.3 Bessel functions and their Properties

6.4 Legendre's polynomials and their Properties

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures/laboratory which carries a 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weighting of 5%.
- Two Quizzes (surprise test) will be conducted which carries 5% component of the overall evaluation.

E. Student Learning Outcomes:

1. At the end of the course the students will be able to understand the fundamental concepts of Engineering Mathematics. Students will be able to apply these concepts to Mathematics for higher semesters in courses other than Mathematics.

F. Recommended Study Material:

❖ **Text Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Ed., Jhon Wiley & Sons, India, 1999.

❖ **Reference Books:**

1. M.D. Weir, et. al., Thomas' Calculus, 11th Ed., Pearson Education, 2008

2. Stewart James, Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. Wylie & Barrett, Advanced Engineering Mathematics, Mc graw Hill pub.
4. Greenberg, M. D., Advanced Engineering Mathematics, 2nd ed., Pearson

❖ **Web Materials:**

1. http://mathworld.wolfram.com/
2. http://en.wikipedia.org/wiki/Math

FACULTY OF TECHNOLOGY & ENGINEERING
U & P U. PATEL DEPARTMENT OF COMPUTER ENGINEERING

CE142: OBJECT ORIENTED PROGRAMMING WITH C++

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	4	-	8	6
Marks	100	100	-	200	

A. Objective of the Course:

The main objectives for offering the course Object Oriented programming with C++ are:

1. To introduce students with object-oriented programming in C++ language.
2. To display how the object oriented approach differs from procedural approach.
3. To promote skills like Development of logic and implementation of basic mathematical and other problems by using Object oriented concepts.
4. To explain them concepts of encapsulation, class, objects, Operator Overloading, function overloading and inheritance.
5. Take a problem and develop the structure to represent objects and the algorithms to perform operations.

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Introduction to Object Oriented concepts and Design	3
2	Principles of object-oriented Programming	3
3	Introduction of C++	3
4	Tokens and Expressions & Control Structure	4
5	Functions	5
6	Classes and objects'	8
7	Constructor and Destructors	5
8	Operator Overloading	5
9	Inheritance	8
10	Pointers and Virtual Functions	6
11	Managing Console I/O Operations	4
12	Working with Files	6

Total hours (Theory): 60

Total hours (Lab): 60

Total hours: 120

C. Detailed Syllabus:

1	**Introduction to Object Oriented concepts and Design**	**03 Hours**	**5%**
1.1	What is object oriented (OO), history, Object Concepts, OO methodology, OO themes, Introductions to OO Models.		
2	**Principles of object-oriented Programming**	**03 Hours**	**5%**
2.1	Basic concept of object-oriented Programming , Benefits of OOP		
2.2	Difference between object oriented language and procedure oriented language		
3	**Introduction of C++**	**03 Hours**	**3%**
3.1	What is C++, Simple C++ Program, Applications of C++		
3.2	Introduction to class, object and creating simple program using class, Structure of C++ program		
4	**Tokens and Expressions & Control Structure**	**04 Hours**	**4%**
4.1	Tokens, Keywords, identifiers and constants, Basic Data Types and user defined data types and derived data types, symbolic constants		
4.2	Type compatibility, Declaration of variables, Dynamic initialization,		
4.3	Reference variables Scope Resolution Operator, Memory Management Operator,		
4.4	Manipulators, Type cast operator Expressions and their types, implicit Conversion Operator Precedence and Control Structure		
5	**Functions**	**05 Hours**	**8%**
5.1	The main function, simple functions, call by reference, return by reference, inline functions, overloaded functions, default arguments		
6	**Classes and objects**	**08 Hours**	**15%**
6.1	Limitation of C structure, Declaring class and defining member function, making outside function inline , Nesting member function, Private member function arrays within a class, memory allocation of		

	objects, Static data members and Member functions.		
6.2	Arrays of Objects, Object as a function argument, Friend functions, Returning objects, constMember functions.		
7	**Constructor and Destructors**	**05 Hours**	**8%**
7.1	Introduction to Constructors, Parameterized Constructors, Multiple Constructors in class, Constructors with default argument, Dynamic initialization of Constructors, Dynamic Initialization of objects, Copy Constructor, Dynamic Constructor		
7.2	Destructors		
8	**Operator Overloading**	**05 Hours**	**10%**
8.1	Introduction, Defining Operator overloading, overloading unary and binary operators, overloading binary operator using friend function, rules for overloading operators		
8.2	Type Conversion		
9	**Inheritance**	**08 Hours**	**12%**
9.1	Introduction, Defining a derived class, Example of Single Inheritance,		
9.2	Public and private inheritance.		
9.3	Multilevel, multiple and hierarchical Inheritance, Hybrid Inheritance Virtual Base Class, abstract class nesting of classes, constructors in derived classes		
10	**Pointers and Virtual Functions**	**06 Hours**	**15%**
10.1	Introduction, pointer to object, this pointer, pointer to derived class		
10.2	Virtual functions, pure virtual functions		
11	**Managing Console I/O Operations**	**04 Hours**	**5%**
11.1	Introduction, C++ stream, C++ stream classes		
11.2	Unformatted and for matted console I/O Operations		
12	**Working with Files**	**06 Hours**	**10%**
12.1	Introduction, Classes for file stream operations, Opening and closing a file, Detecting End of File		
12.2	File modes, file pointers and their manipulations, Sequential I/O operations		
12.3	Error Handling during File operations, Command-line arguments		

D. Instructional Method and Pedagogy:

- At the beginning, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aids like multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage respectively.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have the opportunity to build appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcomes:

After completing this course, the student should demonstrate the knowledge and ability to:

1. Understand object-oriented approach with C++ language.
2. Able to differentiate object oriented approach and procedural approach.
3. Understand the concepts of encapsulation, class, objects, Operator Overloading, function overloading and inheritance.
4. Explain the benefits of object oriented design and understand when it is an appropriate methodology to use.
5. Design object oriented solutions for small systems involving multiple objects.

F. Recommended Study Material:

❖ **Text Books:**

1. Programming with C++ by E.Balagurusami(TMH-)
2. Object Oriented Programming in Turbo C++ by Robert Lafore (Galgotia-)

❖ **Reference Books:**

1. Let us C++, 3rd Edition by Yashwant Kanetkar, BPB Publication
2. C++ How to program, 8/E by Deitel & Deitel, Prentice Hall
3. C++ Programming Bible, 1st Edition by Al Stevens and Clayton Walnum, Prentice Hall
4. The Complete Reference, 4th Edition by Herbert Schildt, Tata McGraw Hill

❖ **Web Materials:**

1. http://www.cplusplus.com/doc/tutorial/
2. http://www.learncpp.com/
3. http://www.cprogramming.com/tutorial/c++-tutorial.html
4. http://www.tutorialspoint.com/cplusplus/index.htm
5. http://www.dre.vanderbilt.edu/~schmidt/C++/

FACULTY OF TECHNOLOGY & ENGINEERING
CHAMOS MATRUSANSTHA DEPARTMENT OF MECHANICAL ENGINEERING

ME144: ELEMENTS OF ENGINEERING

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	1	7	5
Marks	100	50	0	150	

A. Objective of the Course:

This course covers the basics of mechanical and civil engineering. The principles and application of the two core branches of engineering is covered along with the fundamentals of engineering drawing. The objectives of the course are to:

1. Introduce the universal language and tool of communication for engineers and understand the concepts, elements & grammar of engineering drawing.
2. Introduce the important aspects and applications of mechanical engineering and explain the working of different mechanical systems.
3. Understand the scope and basic elements of civil engineering.

B. Outline of the course:

Sr. No.	Title of the Unit	Minimum number of hours
Part: A		
1.	Fundamentals of Engineering Graphics	08
2.	Projections & Section of Solid	06
3.	Orthographic Projection	06
4.	Isometric Projections	06
5.	Computer Aided Drafting & Modeling	04
Part: B		
6.	Introduction of Mechanical Engineering	05
7.	Steam and Steam Generator	04
8.	Internal Combustion Engines	03
9.	Refrigeration and Air Conditioning Systems	03

Part: C		
10.	Scope of Civil Engineering	02
11.	Introduction to Surveying	06
12.	Elements of building Construction	07

Total hours (Theory): 60

Total hours (Lab): 30

Total hours (Tutorial): 15

Total hours: 105

C. Detailed Syllabus:

Part: A

1	**Fundamentals of Engineering Drawing**	**08 Hours**	**12%**
1.1	Importance of engineering drawing, drawing instruments and materials, BIS and ISO		
1.2	Different types of lines used in engineering practice, methods of projections as per SP 46-1988.		
1.3	Engineering Scale.		
1.4	Engineering Curve.		
2	**Projections & Section of Solid**	**06 Hours**	**10%**
2.1	Projection of solids		
2.2	Sectional view		
2.3	True shape of Sections		
2.4	Auxiliary Inclined Plane (AIP), Auxiliary Vertical Plane (AVP)		
3	**Orthographic Projection**	**06 Hours**	**10%**
3.1	Principle projection		
3.2	Methods of first and third angle projection with examples / problems		
4	**Isometric Projections**	**06 Hours**	**10%**
4.1	Terminology, Isometric scale		
4.2	Isometric view and Isometric projection with examples / problems		
5	**Computer Aided Drafting & Modeling**	**04 Hours**	**08%**
5.1	Introduction to 2D drafting facilities in CAD software		

Part: B

6	**Introduction of Mechanical Engineering**	**05 Hours**	**08%**
6.1	Prime movers and its types, Sources of energy		
6.2	Basic terminology: Force and mass, Pressure, Work, Power, Energy, Heat, Temperature, Units of heat, Specific heat capacity, Interchange of heat, Change of state, Internal energy, Enthalpy, Entropy, Efficiency		
6.3	Zeroth Law and First Law of Thermodynamic, Boyle's law, Charle's law and Combined gas law, Relation between Cp and Cv		
7	**Steam and Steam Generator**	**04 Hours**	**07%**
7.1	Introduction to steam formation and its types		
7.2	Introduction to steam table		
7.3	Boiler definition and its classification		
7.4	Cochran boiler.		
8	**Internal Combustion Engines**	**03 Hours**	**05%**
8.1	Introduction		
8.2	Basic terminology of I.C. engine		
8.3	Types of I. C. Engines		
9.	**Refrigeration and Air Conditioning Systems**	**03 Hours**	**05%**
9.1	Introduction to refrigeration and air conditioning		
9.2	Basic terminology, Principal and application of refrigeration		
9.3	Vapour compression refrigeration system,		
9.4	Window and split air conditioning systems		

Part: C

10.	**Scope of Civil Engineering**	**02 Hours**	**04%**
10.1	Scope of Civil Engineering,		
10.2	Branches of civil engineering,		
10.3	Role of civil engineer		
11.	**Introduction to Surveying**	**06 Hours**	**10%**
11.1	Definition of surveying,		
11.2	Objects of surveying, Uses of surveying,		
11.3	Primary divisions of surveying, Principles of surveying,		
11.4	List of classification of surveying, Definition: Plan and Map, Scales : Plain scale and Diagonal scale, Conventional Symbols		
11.5	Introduction to linear and angular measurements, Concepts of land		

profiling

12. Elements of building Construction **07 Hours 11%**

12.1 Types of building, Design loads,

12.2 Building components (super structure and substructure),

12.3 Principles of Planning,

12.4 Basics Requirements of a building Planning,

12.5 Types of Residential Building,

D. Instructional Method and Pedagogy:

- At the starting of the course, delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of Multi-Media projector, Black Board, OHP etc.
- Attendance is compulsory in lectures and laboratory.
- Internal exams/Unit tests/Surprise tests/Quizzes/Seminar/Assignments etc. will be conducted as a part of continuous internal theory evaluation.
- The course includes a laboratory, where students will get opportunities to build appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.
- In the lectures and laboratory discipline and behavior will be observed strictly.

E. Student Learning Outcomes:

On the completion of the course one should be able to:

1. Understand and interpret various engineering drawing.
2. Learn the concepts and be able to draw engineering scale, engineering curve, projection & section of solid, orthographic and isometric drawing.
3. Understand the overview of computer aided drafting.
4. Understand fundamental principles, theory and applications of mechanical engineering which plays an important role in industries.
5. Learn the formation of different types of steam and utilize it for the boiler.
6. Understand the basics of internal combustion engine, refrigeration and air conditioning system.
7. Understand importance and application of civil engineering.

8. Understand the fundamentals of surveying and be able to carry out simple survey exercise.
9. Learn about different building components, building planning and design of residential building.

F. Recommended Study Material:

- **Text Books:**
  1. N. D. Bhatt & V. M. Panchal, "Engineering Drawing", Charotar Publishing House Pvt. Ltd.
  2. P. J. Shah, "Engineering Graphics", S. Chand Publishing & Co.
  3. P.S.Desai, S.B.Soni, "Elements of Mechanical Engineering", Atul Prakashan, Ahmedabad
  4. S.M.Bhatt, H.G.Katariya, J.P.Hadiya, "Elements of Mechanical Engineering", Books India Publication, Ahmedabad.
  5. Khasia R.B. and Shukla R.N., "Elements of Civil Engineering", Mahajan Publication.
  6. Punamia B.C., "Surveying", Vol. I & II.
- **Reference Books:**
  1. P.B. Patel & P.D. Patel, "Engineering Graphics", Mahajan Publishing House.
  2. Arunoday Kumar, "Engineering Graphics", Tech-Max Publication.
  3. M.L. Agrawal & R.K. Garg, "Engineering Drawing", Vol. I, Dhanpatrai & Co.
  4. Dr. Sadhu Singh, "Elements of Mechanical Engineering", S.CHAND Publication, New Delhi
  5. V.K.Manglik, "Elements of Mechanical Engineering", PHI Learning, Delhi.
  6. Kandya Anurag, "Elements of Civil Engineering", Charotar Publishing House Pvt. Ltd.
  7. Kanetkar T.P. & Kulkarni S.V., "Surveying and Levelling", Vol. I & II.
- **Web Materials:**
  1. http://nptel.ac.in/courses/112103019/
  2. http://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
  3. http://www.engineering108.com/pages/Engineering_graphics/Engineering_graphics_tutorials_
  4. free_download.html

5. https://law.resource.org/pub/in/bis/S01/is.sp.46.2003.pdf
6. http://nptel.ac.in/downloads/112105125/
7. http://www.slideshare.net/allsaintsscience/7th-grade-ch-2-sec-3-behavior-of-gases?qid=75b08741-fb53-4413-b434-5982afe602bf&v=&b=&from_search=12
8. http://www.slideshare.net/Arjun_Dedaniya/properties-of-steam-62226458?qid=fa8777fd-b543-4128-813c-cf3af3b86579&v=&b=&from_search=2
9. http://www.slideshare.net/shanus1/i-c-engines-a-study?qid=69826356-b9ed-4618-9c77-b2d5a3eac2e3&v=&b=&from_search=8
10. http://nptel.ac.in/syllabus/syllabus.php?subjectId=105104101
11. http://nptel.ac.in/courses/105107122/

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF PHYSICS

PY141: ENGINEERING PHYSICS

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	0	5	4
Marks	100	50	0	150	

A. Objective of the Course:

The main objectives of the subject are

1. To study the basic concepts of physics and engineering applications of physics.
2. To develop physical intuition, mathematical reasoning, and problem solving skills.
3. To prepare students for the necessarily rigorous sequence in physics and engineering.
4. To develop an ability to identify, formulate and solve physics and engineering problems through numerical analysis and laboratory methods.

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Error Analysis	04
2	Wave Motion and Sound	08
3	Modern Optics	09
4	Solid State Physics	10
5	Structure of Materials	07
6	Nano science	07

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

C. Detailed Syllabus:

1	**Error Analysis**	**04 Hours**	**09%**
1.1	Introduction and Basic definitions		
1.2	Average error, r.m.s. error, probable error and error propagation		
1.3	Significant digit and figures		
1.4	Numericals		
2	**Wave Motion and Sound**	**08 Hours**	**18%**
2.1	Propagation of waves, longitudinal and transverse waves, mechanical and non-mechanical waves		
2.2	Sound waves, architectural acoustics, classification of sound		
2.3	Loudness, Weber-Fechner law, Bel and Decibel		
2.4	Absorption coefficient, reverberation, Sabine's formula		
2.5	Factors affecting acoustics of buildings and their remedies		
2.6	Ultrasonic properties, Production, piezoelectric and magnetostriction method, applications		
2.7	Numericals		
3	**Modern Optics**	**09 Hours**	**20%**
3.1	Lasers and its properties, spontaneous and stimulated emission, population Inversion		
3.2	Einstein coefficients		
3.3	Gas laser (Co_2 Laser), Solid (Nd – YaG) Laser		
3.4	Hologram- Introduction, construction and reconstruction process		
3.5	Applications of Lasers		
3.6	General ides of optical fibre		
3.7	NA of fibre, step index and graded index fibre		
3.8	multi-mode and single mode fibre – applications of optical fibre		
4	**Solid State Physics**	**10 Hours**	**22%**
4.1	Introduction: Conductors and Semiconductors: Band theory of solids		
4.2	Energy gap, Fermi energy, electrical conductivity and mobility		
4.3	Hall effect		
4.4	X-Ray: Properties		

4.5	Applications of X-Rays		
4.6	Super conducting materials: Properties		
4.7	Types of super conductors		
4.8	Josephson effects		
4.9	Applications of Super conductors		
4.10	Numericals		
5	**Structure of Material**	**07 Hours**	**16%**
5.1	Introduction: Atomic and molecular structure		
5.2	Crystal structure, crystalline and non-crystalline materials		
5.3	Space lattices and Miller indices		
5.4	Relation between interplanner distance and cubic edge		
5.5	Numericals		
6	**Nano science**	**07 Hours**	**15%**
6.1	Introduction		
6.2	Structure of nanomaterials, examples of nanomaterials		
6.3	Synthesis (qualitative idea only)		
6.4	Properties and applications nanostructured materials		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 10 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignment/Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcomes:

On the successful completion of the course:

1. The student would be able to apply the concepts of physics in various branches of engineering.
2. An ability to identify, formulate and solve engineering problems.
3. An ability to use the techniques, skills and modern tools of physics necessary for engineering applications.
4. An ability to design and conduct experiments, analyze and interpret data.

F. Recommended Study Material:

❖ **Text Books:**

1. Vijayakumari, G., Engg. Physics, Vikas Publishing house Pvt. Ltd.
2. Rajagopal, K., Engg. Physics, Prentice Hall of India Pvt. Ltd.
3. Avadhalula, M. N. & Kshirsagar, P. G., A text book of Engg. Physics, S. Chand Pub.

❖ **Reference Books:**

1. Nayak Abhijit, Engg. Physics, S. K. Kataria and Sons Pub.
2. Topping, J., Errors of Observations and their Treatment, 3rd Ed. Chapman and Hall ltd. London
3. Kittle, C., Solid State Physics
4. Resnick and Haliday, Physics Part-I & II, Wiley Eastern publication
5. Beiser Arthur, Concept of Modern Physics
6. Ghatak, Optics, Tata McGraw Hill, 3rd Edition
7. Pillai, S.O., Solid State Physics, Wiley Eastern Ltd.

❖ **Web Materials:**

1. http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/engg_physics/index_cont.htm
2. http://ncert.nic.in/html/learning_basket.htm
3. http://science.howstuffworks.com/laser1.htm
4. http://physics-animations.com/Physics/English/optics.htm
5. http://physics-animations.com/Physics/English/waves.htm
6. http://www.epsrc.ac.uk
7. http://www.pitt.edu/~poole/physics.html#light
8. http://de.physnet.net/PhysNet/optics.html

FACULTY OF MANAGEMENT STUDIES
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

HS121 A: STUDY OF ENGLISH LANGUAGE & LITERATURE

Credits and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	2		2	2
Marks	50	50	100	

A. Objective of the Course:

To help learners to

1. Develop familiarity with and proficiency in English language
2. Learn the use of language at personal, academic and professional fronts
3. Become accomplished, active readers who appreciate ambiguity and complexity, and who can articulate their own interpretations with an awareness and curiosity for other perspectives.
4. Gain a knowledge of the major traditions of literatures, and an appreciation for the diversity of literary, cultural and social voices within

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Communicative English • Introduction to Communicative Grammar and Usage • Parts of Speech • Tenses and Moods • Reading Literature for English Language	08
2	Functional English • Introduction to Functional English • English for Personal and Social Use • English for Career and Professional Use	08
3	Literature Text and Appreciation • Introduction to Literature and Appreciation • Appreciation of Prose or Fiction	08

	• Appreciation of Poetry	
4	Language, Literature and Contemporary Issues • Language, Culture and Society • Literature and contemporary issues	06

Total hours: 30

C. Instructional Method and Pedagogy:

Teaching will be facilitated by reading material, discussion, task-based learning, projects, assignments and various interpersonal activities like case studies, critical reading, group work, independent and collaborative research, presentations, etc.

- Out of 100 marks, 50 marks are for internal evaluation and 50 marks would be external evaluation.

D. Evaluation:

Internal Evaluation

The students' performance in the course will be evaluated (25 marks for theory and 25 marks for practical) on a continuous basis through the following components:

Theory

Sr. No.	Component	Number	Marks per Incidence	Total Marks
1	Assignment	02	10	20
2			Attendance	5
			Total	25

Practical

Sr. No.	Component	Number	Marks per Incidence	Total Marks
1	Project	01	10	20
2	Term-work	-	10	10
			Attendance	5
			Total	25

External Evaluation

The University examination will be for 50 marks (25 marks for theory and 25 marks for practical). The examination will avoid, as far as possible, direct questions on usage, grammar, errors, etc. and will focus on applications.

Theory

Sr. No.	Component	Number	Marks per Incidence	Total Marks
1	Theory Paper	01	25	25
			Total	25

Practical

Sr. No.	Component	Number	Marks per Incidence	Total Marks
1	Viva	01	25	25
			Total	25

E. Student Learning Outcomes:

At the end of the course, the students should have developed the ability to communicate effectively, they should be able to communicate message accurately, handle intercultural situation that require thoughtful communication, to use appropriate words and tones and so on. They should be able to understand and demonstrate communicative and functional use of English language. They should be able to appreciate literature and understand socio-cultural context.

F. Recommended Study Material:

- **Reference Books:**
  1. Hurd Stella (2005), Success with Languages , Routledge
  2. John Eastwood (2002) Oxford Practice Grammar, Oxford
  3. Loiuse Mullany & Peter Stockwell (2010),Introduction to English Language, Routledge
  4. Peter Brooker, Raman Saledan& Peter Widowson (2005), Reader's Guide to Contemporary literary theory, Pearson
- **Web Materials:**
  1. http://www.ocr.org.uk/Images/72885-level-2-functional-skills-english-underpinning-skills-support-material-for-learners.pd

CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACADEMIC REGULATIONS & SYLLABUS

Faculty of Technology & Engineering

Bachelor of Technology Programme
(Information Technology)

Education Campus – Changa, (ECC), hitherto a conglomerate of institutes of professional education in Engineering, Pharmacy, Computer Applications, Management, Applied Sciences, Physiotherapy and Nursing, is one of the choicest destinations by students. It has been transformed into **Charotar University of Science and Technology (CHARUSAT)** through an Act by Government of Gujarat. CHARUSAT is permitted to grant degrees under Section-22 of UGC- Govt. of India.

The journey of CHARUSAT started in the year 2000, with only 240 Students, 4 Programmes, one Institute and an investment of about Rs.3 Crores (INR 30 million). At present there are seven different institutes falling under ambit of six different faculties. The programmes offered by these faculties range from undergraduate (UG) to Ph.D. degrees. These faculties, in all offer 64 different programmes. A quick glimpse in as under:

Faculty	Institute	Programmes Offered
Faculty of Technology & Engineering	Charotar Institute of Technology	B. Tech M. Tech MTM Ph. D
Faculty of Pharmacy	Ramanbhai Patel College of Pharmacy	B. Pharm M. Pharm MPM PGDCT/ PGDPT Ph. D
Faculty of Management Studies	IndukakaIpcowala Institute of Management	M.B.A PGDM Dual Degree BBA+MBA Ph.D
Faculty of Computer Applications	Smt. ChandabenMohanbhai Patel Institute of Computer Applications	M.C.A/MCAL M.Sc (IT) Dual Degree BCA+MCA Ph. D

Faculty of Applied Sciences	P.D.Patel Institute of Applied Sciences	M.Sc Dual Degree B.Sc+M.Sc Ph.D
Faculty of Medical Sciences	Ashok and Rita Institute of Physiotherapy ManikakaTopawala Institute of Nursing Charotar Institute of Paramedical Sciences	B.PT M.PT Ph.D B.Sc (Nursing) M.Sc PGDHA PGDMLT GNM Ph.D

The development and growth of the institutes have already led to an investment of over Rs.125 Crores (INR 1250 Million). The future outlay is planned with an estimate of Rs.250 Crores (INR 2500 Million).

The University is characterized by state-of-the-art infrastructural facilities, innovative teaching methods and highly learned faculty members. The University Campus sprawls over 105 acres of land and is Wi-Fi enabled. It is also recognized as the Greenest Campus of Gujarat.

CHARUSAT is privileged to have 360 core faculty members, educated and trained in IITs, IIMs and leading Indian Universities, and with long exposure to industry. It is also proud of its past students who are employed in prestigious national and multinational corporations.

From one college to the level of a forward-looking University, **CHARUSAT** has the vision of entering the club of premier Universities initially in the country and then globally. **High Moral Values like Honesty, Integrity and Transparency** which has been the foundation of ECC continues to anchor the functioning of **CHARUSAT**. Banking on the world class infrastructure and highly qualified and competent faculty, the University is expected to be catapulted into top 20 Universities in the coming five years. In order to align with the global requirements, the University has collaborated with internationally reputed organizations like Pennsylvania State University – USA, University at Alabama at Birmingham – USA, Northwick Park Institute –UK, ISRO, BARC, etc.

CHARUSAT has designed curricula for all its programmes in line with the current international practices and emerging requirements. Industrial Visits, Study Tours, Expert

Lectures and Interactive IT enabled Teaching Practice form an integral part of the unique **CHARUSAT** pedagogy.

The programmes are credit-based and have continuous evaluation as an important feature. The pedagogy is student-centred, augurs well for self-learning and motivation for enquiry and research, and contains innumerable unique features like:

- Participatory and interactive discussion-based classes.
- Sessions by visiting faculty members drawn from leading academic institutions and industry.
- Regular weekly seminars.
- Distinguished lecture series.
- Practical, field-based projects and assignments.
- Summer training in leading organizations under faculty supervision in relevant programmes.
- Industrial tours and visits.
- Extensive use of technology for learning.
- Final Placement through campus interviews.

Exploration in the field of knowledge through research and development and comprehensive industrial linkages will be a hallmark of the University, which will mould the students for global assignments through technology-based knowledge and critical skills.

The evaluation of the student is based on grading system. A student has to pursue his/her programme with diligence for scoring a good Cumulative Grade Point Average (CGPA) and for succeeding in the chosen profession and life.

CHARUSAT welcomes you for a Bright Future

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Faculty of Technology and Engineering

ACADEMIC REGULATIONS

Bachelor of Technology (Information Technology) Programme

Charotar University of Science and Technology (CHARUSAT)
CHARUSAT Campus, At Post: Changa – 388421, Taluka: Petlad, District: Anand
Phone: 02697-247500, Fax: 02697-247100, Email: info@charusat.ac.in
www.charusat.ac.in

Year – 2017-2018

CHARUSAT

FACULTY OF TECHNOLOGY AND ENGINEERING
ACADEMIC REGULATIONS
Bachelor of Technology Programmes

To ensure uniform system of education, duration of undergraduate and post graduate programmes, eligibility criteria for and mode of admission, credit load requirement and its distribution between course and system of examination and other related aspects, following academic rules and regulations are recommended.

1. System of Education

The Semester system of education should be followed across The Charotar University of Science and Technology (CHARUSAT) both at Undergraduate and Master's levels. Each semester will be at least 90 working day duration. Every enrolled student will be required to take a specified load of course work in the chosen subject of specialization and also complete a project/dissertation if any.

2. Duration of Programme

Undergraduate programme (B. Tech.)

Minimum	8 semesters (4 academic years)
Maximum	12 semesters (6 academic years)

3. Eligibility for admissions

As enacted by Govt. of Gujarat from time to time.

4. Mode of admissions

As enacted by Govt. of Gujarat from time to time.

5. Programme structure and Credits

As per annexure – I attached

6. Attendance

All activities prescribed under these regulations and enlisted by the course faculty members in their respective course outlines are compulsory for all students pursuing the courses. No exemption will be given to any student regarding attendance except on account of serious personal illness or accident or family calamity that may genuinely prevent a student from attending a particular session or a few sessions. However, such unexpected absence from classes and other activities will be required to be condoned by the Principal.

Student's attendance in a course should be 80%.

7 Course Evaluation

7.1 The performance of every student in each course will be evaluated as follows:

7.1.1. Internal evaluation by the course faculty member(s) based on continuous assessment, for 30% of the marks for the course; and

7.1.2 Final examination by the University through modes such as; written paper or practical test or oral test or presentation by the student or a combination of any two or more of these, is set to 70% of the marks for each the course.

7.2 Internal Evaluation

As per Annexure – I attached

7.3 University Examination

The final examination by the University for 70% of the evaluation for the course will be through written paper or practical test or oral test or presentation by the student or a combination of any two or more of these.

7.4 In order to earn the credit in a course a student has to obtain grade other than FF.

7.5 Performance at Internal & University Examination

7.5.1 Minimum performance with respect to internal marks as well as university examination will be an important consideration for passing a course.

Details of minimum percentage of marks to be obtained in the examinations (internal/external) are as follows

Minimum marks in University Exam per course	Minimum marks Overall per course
40%	45%

7.5.2 A student failing to score 40% in the final examination will get an FF grade.

7.5.3 If a candidate obtains minimum required marks in each course but fails to obtain minimum required overall marks, he/she has to repeat the university examination till the minimum required overall marks are obtained.

8 Grading

8.1 The total of the internal evaluation marks and final University examination marks in each course will be converted to a letter grade on a ten-point scale as per the following scheme:

Table: Grading Scheme (UG)

Range of Marks (%)	≥80	<80 ≥73	<73 ≥66	<66 ≥60	<60 ≥55	<55 ≥50	<50 ≥45	<45
Corresponding Letter Grade	AA	AB	BB	BC	CC	CD	DD	FF
Numerical point (Grade Point) corresponding to the letter grade	10	9	8	7	6	5	4	0

8.2 The student's performance in any semester will be assessed by the Semester Grade Point Average (SGPA). Similarly, his/her performance at the end of two or more consecutive semesters will be denoted by the Cumulative Grade Point Average (CGPA). The SGPA and CGPA are calculated as follows:

(i) SGPA = $\Sigma C_i G_i / \Sigma C_i$ where C_i is the number of credits of course i
G_i is the Grade Point for the course i
and i = 1 to n, n = number of courses in the semester

(ii) CGPA = $\Sigma C_i G_i / \Sigma C_i$ where C_i is the number of credits of course i
G_i is the Grade Point for the course i
and i = 1 to n, n = number of courses of all semesters up to which CGPA is computed.

(iii) No student will be allowed to move further in next semester if CGPA is less than 3 at the end of an academic year.

(iv) A student will not be allowed to move to third year if he/she has not cleared all the courses of first year.

(v) A student will not be allowed to move to fourth year if he/she has not cleared all the courses of second year.

9. Award of Degree

9.1 Every student of the programme who fulfils the following criteria will be eligible for the award of the degree:

9.1.1 He/She should have earned minimum required credits as prescribed in course structure; and

9.1.2 He/She should have cleared all internal and external evaluation components in every course; and

9.1.3 He/She should have secured a minimum CGPA of 4.5 at the end of the programme;

9.2 The student who fails to satisfy minimum requirement of CGPA at the end of program will be allowed to improve the grades so as to secure a minimum CGPA for award of degree. Only latest grade will be considered.

10 *Award of Class:*

The class awarded to a student in the programme is decided by the final CGPA as per the following scheme:

Distinction:	CGPA ≥ 7.5
First class:	CGPA ≥ 6.0
Second Class:	CGPA ≥ 5.0

11 *Transcript:*

The transcript issued to the student at the time of leaving the University will contain a consolidated record of all the courses taken, credits earned, grades obtained, SGPA,CGPA, class obtained, etc.

The ProgrammeEducationalObjectives(PEOs)

Program Objective 1

To provide students with Core Competence in mathematical, scientific and basic engineering fundamentals necessary to formulate, analyze and solve hardware/software engineering problems and/or also to pursue advanced study and research.

Program Objective 2

To train students with good breadth of knowledge in core areas of Information Technology and related engineering so as to comprehend engineering trade-offs, analyze, design, and synthesize data and technical concepts to create novel products and solutions for the real life problems.

Program Objective 3

To inculcate in students to maintain high professionalism and ethical standards, effective oral and written communication skills, to work as part of teams on multidisciplinary projects and diverse professional environments, and relate engineering issues to the society, global economy and to emerging technologies.

Program Objective 4

To provide our graduates with learning environment awareness of the life-long learning needed for a successful professional career and to introduce them to ethical codes and guidelines, leadership and demonstrate good citizenship.

The Course Outcome (COs)

1. An ability to apply knowledge of mathematics, probability & statistics, computer science, and engineering as it applies to the fields of computer software and hardware.
2. An ability to design and construct a hardware and software system, component, or process to meet desired needs, within realistic constraints such as economic, environmental, social, political, ethical, health & safety, manufacturability, and sustainability.
3. Graduates will be able to demonstrate the team work with an ability to design, develop, test and debug the project by developing professional interaction with each other that can lead to successful completion of project.
4. Graduates will possess leadership and managerial skills with best professional ethical practices and social concern.
5. Analyzing the requirement from the client, participating in preparing test plans, preparing test scenarios, preparing test cases for module, analyzing test cases, executing test cases, defect tracking.

The Programme Outcomes (Pos)

1. The graduates will become familiar with fundamentals of various science and technology subjects and thus acquire the capability to applying them.

2. The graduates will be able to apply engineering knowledge and skills to problem and challenges in the area of information technology and to use system or to implement system, information technologies and modern engineering tools for designing, developing high quality technology based solutions.

3. Students will be able to effectively design various engineering components and make process plan to successful completion of project.

4. The graduates will demonstrate effective English language communication skills.

5. The graduates will develop capacity to understand professional and ethical responsibility and will display skills required for continuous and lifelong learning and up gradation.

6. Students will be able to analyze the local and global impact of computing on individuals, organizations, and society.

7. The graduates will recognize the need for an ability to engage in continuing professional development.

Charotar University of Science & Technology

Chandubhai S Patel Institute of Technology

Department of Information Technology

Vision

To inculcate excellent education to enhance professional behavior, strong ethical values, innovative research capabilities and leadership abilities in the young minds so as to work with a commitment to the progress of the country.

Mission

To impart quality education in both the theoretical and applied foundations of IT and educate students to effectively apply this education to solve real-world problems thus strengthening their lifelong high-quality careers in global work environment of the 21st century.

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY (CHARUSAT)

TEACHING & EXAMINATION SCHEME FOR B TECH PROGRAMME IN IT

Sem	Course Code	Course Title	Teaching Scheme						Examination Scheme				
			Contact Hours					Credit	Theory		Practical/Project		Total
			Theory	Practical	Tutorial	Project	Total		Internal	External	Internal	External	
SY Sem-3	MA242	Discrete Mathematics	4	0	0	0	4	4	30	70	0	0	100
	IT241	Digital Electronics	4	2	0	0	6	5	30	70	25	25	150
	IT242	Java Programming	4	4	0	0	8	6	30	70	50	50	200
	XXXXX	University Elective- I	2	0	0	0	2	2	30	70	0	0	100
	IT243	Data Communication	4	2	0	0	6	5	30	70	25	25	150
	HS122A	Values and Ethics	2	0	0	0	2	2	30	70	0	0	100
	IT244	Software Group Project-I	0	0	0	4	4	2	0	0	50	50	100
		Assignment Practices/Student Counseling/Remedial Classes	0	6	0	0	4	0	0	0	0	0	0
			20	**14**	**0**	**4**	**36**	**26**	**180**	**420**	**150**	**150**	**900**
SY Sem-4	MA244	Statistical And Numerical Techniques	4	0	0	0	4	4	30	70	0	0	100
	IT245	Computer Organization & Microprocessor Interfacing	4	2	0	0	6	5	30	70	25	25	150
	IT246	Web Engineering	2	4	0	0	6	4	30	70	50	50	200
	IT247	Data Structures & Algorithms	4	2	0	0	6	5	30	70	25	25	150
	IT248	Database Management System	4	2	0	0	6	5	30	70	25	25	150
	HS123	Critical Thinking and Logic	2	0	0	0	2	2	50	50	0	0	100
	XXXXX	University Elective- II	2	0	0	0	2	2	30	70	0	0	100
		Assignment Practices/ Student Counseling/ Remedial Classes	0	6	0	0	4	0	0	0	0	0	0
			22	**16**	**0**	**0**	**36**	**27**	**230**	**470**	**125**	**125**	**950**

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY (CHARUSAT)

TEACHING & EXAMINATION SCHEME FOR B TECH PROGRAMME IN IT

Sem	Course Code	Course Title	Teaching Scheme					Examination Scheme				
			Contact Hours				Credit	Theory		Practical		Total
			Theory	Practical	Tutorial	Total		Internal	External	Internal	External	
TY Sem-5	IT302.02	Design & Analysis of Algorithm	4	2	0	6	5	30	70	25	25	150
	MA301.01	Modeling Simulation & Operation Research	3	0	1	4	3	30	70	0	0	100
	IT314	Operating System Fundamentals	4	4	0	8	6	30	70	50	50	200
	IT303.02	Advanced Database Management System	3	2	1	6	4	30	70	25	25	150
	HS124 A	Professional Communication	0	2	0	2	2	0	0	30	70	100
		Elective I	2	4	0	6	4	30	70	50	50	200
	IT318	Software Group Project - III	0	2	0	2	1	0	0	25	25	50
		Assignment Practices/Student Counseling/Remedial Classes	0	2	0	2	0	0	0	0	0	0
			16	**18**	**2**	**36**	**25**	**150**	**350**	**205**	**245**	**950**
TY Sem-6	IT315	Computer Networking	4	2	0	6	5	30	70	25	25	150
	IT319	Capstone Course	4	0	1	5	4	30	70	0	0	100
	IT306.02	Cryptography & Network Security	4	4	0	8	6	30	70	50	50	200
	IT307.02	Software Engineering	3	2	1	6	4	30	70	25	25	150
		Elective II	3	2	0	5	4	30	70	25	25	150
	IT322	Software Group Project - IV	0	2	0	2	1	0	0	25	25	50
	HS125 A	Society, Governance and International Studies	2	2	0	4	2	25	25	25	25	100
		Assignment Practices/Student Counseling/Remedial Classes	0	2	0	2	0	0	0	0	0	0
			18	**16**	**2**	**36**	**26**	**175**	**375**	**175**	**175**	**900**

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY (CHARUSAT)

TEACHING & EXAMINATION SCHEME FOR B TECH PROGRAMME IN IT

Sem	Course Code	Course Title	Teaching Scheme					Examination Scheme				
			Contact Hours				Credit	Theory		Practical		Total
			Theory	Practical	Tutorial	Total		Internal	External	Internal	External	
Final Year Sem-7	IT415	Data Warehousing & Data Mining	4	2	0	6	5	30	70	25	25	150
	IT409	High Performance Computer Architecture	3	2	1	6	4	30	70	25	25	150
	IT402.01	Wireless Communication & Mobile Computing	4	4	1	9	6	30	70	50	50	200
	IT410	Enterprise Resource Planning & E-Commerce	3	0	0	3	3	30	70	00	00	100
		Elective III	4	2	0	6	5	30	70	25	25	150
	IT414	Software Group Project - V	0	2	0	2	1	0	0	25	25	50
		Assignment Practices/Student Counseling/Remedial Classes	0	2	0	2	0	0	0	0	0	0
			18	**14**	**2**	**34**	**24**	**150**	**350**	**200**	**200**	**800**
Final Year Sem-8	IT407	Software Project Major	0	36	0	36	20	0	0	250	350	600
			0	**36**	**0**	**36**	**20**	**0**	**0**	**250**	**350**	**600**

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY (CHARUSAT)

LIST OF ELECTIVE SUBJECTS FOR B TECH PROGRAMME IN IT

	Code	Elective - I	Code	Elective - II	Code	Elective - III
ELECTIVES	IT316	Advanced Java programming	IT320	Service Oriented Architecture	IT405.01	Advanced Computing
	IT317	Advanced Programming using .NET Framework	IT321	Intelligent System	IT412	Image Processing & Multimedia System
	IT313.01	Embedded Systems	IT323	Advanced Operating System	IT404.01	Language Processor

Code	University Elective - I (UE - I) (3rd Sem)
EC281	Introduction to MATLAB Programming
CE281	Art of Programming
CL281	Environmental Sustainability and Climate Change
EE281	Electrical Engineering Materials
IT281	ICT Resources and Multimedia
ME281	Engineering Drawing
PH233	Fundamentals of Packaging
PD260	Basic Laboratory Techniques
NR251	First Aid & Life Support
PT191	Health Promotion and Fitness
CA224	Introduction to Web Designing
BM231	Banking and Insurance

Code	University Elective - II (UE - II) (4th Sem)
EC282	Prototyping Electronics with Arduino
CE282	Web Designing
CL282	Basics of Environmental Impact Assessment
EE282	Electrical Power Utilization
IT282	Internet Technology and Web Design
ME282	Material Science
PH238	Cosmetics in daily life
NR261	Life Style Diseases & Management
PT192	Occupational Health & Ergonomics
CA225	Programming the Internet
BM241	Health Care Management

B. Tech. (Information Technology) Programme

SYLLABI

(Semester – 3)

CHAROTARUNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF MATHEMATICAL SCIENCES

MA242: DISCRETE MATHEMATICS

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	0	0	4	4
Marks	100	0	-	100	

A. Objective of the Course:

This course is an important course to understand the courses viz. (i) Theory of Computation (ii) Artificial intelligence (iii) Data structure and algorithm (iv) Compiler constructions (v) Algorithm analysis and design (vi) Digital electronics etc. and related subjects of the higher semester of B. Tech. (IT/CE).

The objectives of the course are to:

- revise the elementary concepts of Set Theory
- Understand appropriate algorithms of Discrete Mathematics and Graph Theory as applicable to digital computers.
- understand the concepts of Group theory and Graph Theory

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Set Theory and Predicate calculus	08
2.	Relations, Lattices and Boolean algebra	14
3.	Abstract Algebra	10
4.	Graphs and Graph Algorithms	12
5.	Matrix Algebra- II	10
6.	Fundamentals of Finite State Machine and Recurrence	06

Total hours (Theory): 60

Total hours (Lab): 00

Total hours: 60

C. Detailed Syllabus:

1	**Set Theory and Predicate Calculus**	**08 hours**	**14%**
	1.1. Proposition, Types of Proposition, Tautology, Contradictions, Connectives, Types of connectives		
	1.2. Logical equivalence, Verification using truth table		
	1.3. Converse, Inverse and Contrapositive, Normal forms		
	1.4. Introduction to predicates and quantifiers		
	1.5. Predicate calculus using rules of inferences		
	1.6. Logic in proof, Methods of Proof,		
	1.7. Mathematical Inductions (First Principle)		
	1.8. Properties of set operations with Predicate logic.		
	1.9. Cardinality of sets, Cartesian product of sets		
2	**Relations, Lattice and Boolean Algebra**	**14 hours**	**22%**
	2.1. Relations on sets, Types of Relations in a set		
	2.2. Properties of Relations		
	2.3. Representations of Relations		
	2.4. Equivalence relation, Covering of a set, Partition of a set		
	2.5. Partially ordered relations, Partially ordered sets, Lattice, Sub lattices		
	2.6. Properties of lattice		
	2.7. Some Special Lattices		
	2.8. Finite Boolean Algebra, atoms, anti - Atoms,		
	2.9. Sub - Boolean algebra, Boolean Expression		
	2.10. Boolean Functions,		
	2.11. Canonical Forms, Karnaugh map representation, Quine Mckausky's Algorithm		
3	**Abstract Algebra**	**10 hours**	**16%**
	3.1. Groupoid, Semi group, Monoid, Group		
	3.2. Order of group, order of an element, Lagrange's theorem		
	3.3. Subgroup, Cyclic subgroup, Permutation Group		
	3.4. Introduction to Ring Theory		
	3.5. Sub ring, Ring Homomorphism,		
	3.6. Ideals		

4 Graphs and Graph Algorithms **12 hours** **20%**

4.1. Basic terminologies, Simple graph, Types of graphs

4.2. Degree of a vertex

4.3. Sub graphs, Spanning Sub-graphs, Isomorphic graphs

4.4. Path and connectivity

4.5. Eulerian and Hamiltonian graph

4.6. Matrix Representation of graph

4.7. Planar Graphs

4.8. Introduction to tree, Directed tree, Forest

4.9. Types of trees, Spanning Tree, Minimal Spanning Tree

4.10. Algorithm to find minimal spanning tree, Prim's, Krushkal's and Dijkstra's Algorithm

5 Matrix Algebra -II **10 hours** **16%**

5.1. Revision of Determinant and Matrix

5.2. Eigen values and Eigen vectors of Matrices

5.3. Eigen values and Eigen vectors of Special Matrices

5.4. Applications of Cayley - Hamilton Theorem

6 Basics of Finite State Machine and Recurrence Relation **06 hours** **12%**

6.1. Introduction to Strings, Languages,

6.2. Regular expression, Grammars

6.3. Introduction to Recurrence relation,

6.4. Generating function

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures/laboratory which carries a 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.

- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
- Two Quizzes (surprise tests) will be conducted which carries 5% component of the overall evaluation.

E. Student Learning Outcomes:

- At the end of the course the students will be able to frame the fundamental algorithms of Discrete Mathematics/Graph theory and their applications in computer engineering.

F. Recommended Study Material:

❖ **Reference Books:**

1. Rosen, Kenneth H., and Kamala Krithivasan. Discrete mathematics and its applications. Vol. 6. New York: McGraw-Hill, 1995.
2. Tremblay, Jean-Paul, and Rampurkar Manohar. Discrete mathematical structures with applications to computer science. New York: McGraw-Hill, 1975.
3. McAllister, D. F., and D. F. Stanat. "Discrete Mathematics in Computer Science." 1977 Prentice-Hall, Inc
4. Deo, Narsingh. Graph theory with applications to engineering and computer science. Courier Dover Publications, 2016.
5. B. Kolman and R. C. Busby, Discrete Mathematical Structures for Computer Science, 2nd edition, Prentice-Hall, Englewood Cliffs, New Jersey (1987).
6. Malik, D. S., and Mridul K. Sen. Discrete mathematical structures: theory and applications. Course Technology, 2004.
7. Thomas H.. Cormen, Leiserson, C. E., Rivest, R. L., & Stein, C. Introduction to algorithms (Vol. 6). Cambridge: MIT press,2001
8. Anton, Howard. Elementary linear algebra. John Wiley & Sons, 2010.
9. Gallian, Joseph. Contemporary abstract algebra. Cengage Learning, 2016

❖ **Web Materials:**

1. http://mathworld.wolfram.com/
2. http://en.wikipedia.org/wiki/Math

IT241: DIGITAL ELECTRONICS

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	0	6	5
Marks	100	50	**0**	150	

A. Objective of the Course:

This course will introduce the students about fundamentals of digital electronics including number systems, Boolean algebra and logic gates, combinational logic, designing of combinational and sequential circuits. This course aims to make the students familiar with the fundamental concepts and understandings of the digital applications such as clocks, sign boards, crossing signals, railways, airports, television, monitoring devices, security systems etc.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Number Systems	05
2.	Boolean Algebra and Logic Gates	06
3.	Simplification of Boolean Functions	07
4.	Combinational Logic	08
5.	Combinational Logic With MSI AND LSI	10
6.	Sequential Logic	10
7.	Registers, Counters and the Memory Unit	10
8.	Introduction to Verilog	04

Total hours (Theory): 60
Total hours (Lab): 30
Total hours: 90

C. Detailed Syllabus:

1.	**Number Systems** Digital Computer and Digital Systems, Binary Number, Number Base, Conversion Octal And Hexadecimal Number, Complements, Binary Codes, Binary Storage And Register, Binary Logic, Integrated Circuit	**05Hrs**	**8%**
2.	**Boolean Algebra And Logic Gates** Basic Definition, Axiomatic Definition of Boolean Algebra, Minterm And Maxterms, Basic Theorem And Properties of Boolean Algebra, Logic Operations, IC Digital Logic Families, Propagation delay, Fan in, Fan out	**06Hrs**	**10%**
3.	**Simplification of Boolean Functions** Two-Three Variable K-Map, Four- Five Variable K-Map, Product of Sum Simplification, NAND or NOR Implementation, Don't Care Condition, Tabulation Method	**07Hrs**	**12%**
4.	**Combinational Logic** Introduction, Design Procedure, Hazards, Adder, Sub tractor, Code Conversion, Universal Gate, Exclusive OR & Equivalence Functions	**08Hrs**	**14%**
5.	**Combinational Logic With MSI And LSI** Introduction, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoder, Multiplexer, ROM, PLA, PAL	**10Hrs**	**17%**
6.	**Sequential Logic** Introduction, RS,JK,D,T Flip-Flops, Triggering of Flip-Flops, Flip-Flop Excitation Tables, Analysis of Clocked Sequential Circuits, State Reduction And Assignment Design Procedure, Design of Counters, Design With State Equations	**10Hrs**	**17%**
7.	**Registers, Counters And The Memory Unit** Introduction, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences, Memory Unit, Johnson Counter	**10Hrs**	**17%**
8.	**Introduction to Verilog** Overview of Digital Design with Verilog HDL, Basic operations, Design of Fundamental digital blocks using various modeling styles.	**04Hrs**	**5%**

D. Instructional Method and Pedagogy:

- In the very beginning, the course delivery pattern, prerequisites of the subject will be discussed.
- Multimedia and overhead Projectors, Chalk - Board and White - Board will be used for Class room and laboratory teaching.
- Chapter / unit wise practice assignments will be given and student-wise evaluation will be done to strengthen the subject knowledge.
- Quiz / Q-A session will be conducted by the concerned faculty / lab in-charge both for the theory and experiments. It carries a weightage of 5%.
- Audio Visual Presentations through electronic means and related software, and on-line demonstrations from the authentic web sites of the other premium institutes.
- Internal tests (*as per the directions from the head and dean*) will be conducted as a part of the regular curriculum.
- Seminars on advanced topics related to this subject will be key features.
- On-hand practices for the experiments will be given to each student.
- Student wise Viva-Voce will be conducted for each experiment to evaluate the student's depth of learning.
- Academic counselling will reduce the formal distance between / amongst the students and faculty every fortnight.
- Technical events will be organized to motivate and prepare the students for the real industry applications.
- Students will be provided the latest updates such as technical articles, e-resources, printed materials and projects from magazines and journals.
- Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
- **Laboratory Manual:**

  It contains the objective / aim, list of equipment, procedures and steps, sample observations, sample results, conclusion, future perspectives and figures for each experiment.
- **Lesson Plan:**

  Lecture wise and faculty wise syllabus delivery plan for theory is provided to the students well in advance in the beginning of the semester. This consists of details of the faculty, course, no. of lectures, internal exam and assignment plans, names of the books, authors, publications etc...
- **Laboratory Plan**

  Laboratory wise and faculty wise syllabus delivery plan for lab is provided to the students well in advance in the beginning of the semester. This consists of details of the faculty, course, no. of experiments etc....
- **Hand Outs:**

  Printed and handwritten study materials consisting of lecture notes, assignments, questions, solutions of typical questions from GATE, UPSC and other competitive exams as well.

- **Assignments:**

  It has a weightage of about 5% in the practical exams as an integrated component. About five / seven questions at the end of each chapter is given to the students and they are asked to submit the solutions / answers in writing within a stipulated time duration. The assignments are displayed on the notice board through the head of the department. The concerned faculty member evaluates the assignments, the results are submitted to the head of the department and the students are informed.

- **Question Bank:**

  At the end of the chapter, the concerned faculty(ies) discuss the questions asked in previous year exams. Also the hints, solutions and other variations of the questions are discussed in the class, in the faculty staff rooms and even through the e-mail facility. List of questions shorted out from the respective subject is circulated to the students at the end of the teaching term

E. Student Learning Outcome:

- Students will be able to design combinational circuits on bread board
- The development and formulation of different flip-flops will be a part of design.
- Students will learn the technical issues related to simulations for various types of digital circuits using VHDL software.
- Functioning and trouble shooting of the registers and other memory units through trainer-kits and on-hand practices.
- The real digital world technical issues related to design, analysis, simulation and applications will be the major attractions of this course.

F. Recommended Study Material:

Reference Books:

1. Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog by M. Morris R. Mano (5th Edition) PEARSON Pub.
2. Digital Principles and Application by Malvino & Leach, THI-1999
3. Fundamental of Digital Electronics by A. Anandkumar
4. Modern Digital Electronics by R.P.Jain

Web Materials:

1. http://nptel.ac.in/courses/117106086/1
2. http://uotechnology.edu.iq/appsciences/Laser/Lacture_laser/four_class/digital_electronics/digital_electronics.pdf
3. http://www.32x8.com/
4. http://nptel.ac.in/courses/106105083/

IT242: JAVA PROGRAMMING

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	4	-	8	6
Marks	100	100	-	200	

A. Objective of the Course:

This subject introduces OOP using Java as the implementation language. It emphasizes proper formulation and abstraction of the problem domain in the programming process in order to build programs that are robust, secure, and portable.
The objective of course is,

- To teach the model of object oriented programming concepts like abstract data types, encapsulation, inheritance and polymorphism.
- To deliver the knowledge about fundamental features of core Java like object classes and interfaces, exceptions, libraries of object collections ,GUI and Lambda Expression.
- To teach how to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
- To demonstrate how to test and prepare a real time application using java.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Fundamental of Object Oriented Programming	04
2.	Class Fundamentals	10
3.	Array & String Handling	06
4.	Inheritance, Interfaces & Packages	08
5.	Exceptions Handling	04
6.	A Quick start to Lambdas and Streams	08
7.	GUI Programming ,Applets, JFC	08
8.	Multithreaded Programming	08
9.	Java Collection Framework	04

Total hours (Theory): 60
Total hours (Lab): 60
Total hours: 120

C. Detailed Syllabus:

1. **Fundamental of Object Oriented Programming** **04 hours** **06 %**
   History of Java, Basic overview of java, Bytecode, JVM, Buzz-words, Application and applets, Constants, Variables & Data Types, Comments, Operators, Control Flow
2. **Class Fundamentals** **10 hours** **20 %**
   General form of class, Creating class Overloading methods, Constructor, Declaring Object, Returning objects, using objects as parameters, Assigning object reference variables, Introducing Access control , Understanding static, Introducing final, The finalize ( ) method, The this keyword, Garbage collection
3. **Array & String Handling** **06 hours** **10 %**
   Array basics, String Array, String class, StringBuffer class, String Tokenizer Class and Object Class
4. **Inheritance, Interfaces & Packages** **08 hours** **13 %**
   Inheritance: Using super creating multilevel Hierarchy, method overriding, Dynamic method dispatch, abstract classes, Using final with Inheritance, Using Package: Defining package, Finding package and CLASSPATH, Access protection, Importing package, Interface: Defining Interface, Implementing Interface, Variables in Interface
5. **Exceptions Handling** **04 hours** **06 %**
   Exception types, Try ...Catch...Finally, Throw, Throws, creating your own exception subclasses
6. **A Quick start to Lambdas and Streams** **08 hours** **13 %**
   Introduction to Annotation, Byte streams and character streams, Wrapper classes , Why Lambda Expression, Lambda Expression Syntax, Where to use lambda expression, Adopting Patterns like matching, finding and filtering,
7. **GUI Programming ,Applets, JFC** **08 hours** **13 %**
   - AWT Classes, Window Fundamentals (Component, Container, Panel, Window, Frame, Canvas)
   - Working with Frame , Windows, Creating a Frame window in an Applet
   - Working with Graphics(Drawing Lines, Rectangles, Ellipses, Circles, Arcs, Polygons, Sizing Graphics)
   - Working with Color, Working with Fonts,
   - Understanding layout managers, Labels, Button, Checkbox, Choice Controls, Text Field, Text Area, Menu Bars, Dialog Boxes, File Dialog
   - Delegation event model (Event, Event Source, Listener), Event Classes, Sources of events ,Event Listener Interfaces
   - Adapter classes, Inner classes and anonymous inner class
   - Applet Class, Applet Architecture, Life cycle of applet, Simple Applet Display methods
   - Designing a Web page using Applet Tags, Running the Applet, Passing Parameter to Applet, More about HTML tags
   - Swing overview ,Swing component classes: AbstractButton, ButtonGroup, ImageIcon, JApplet,Jbutton, JcheckBox, JcomboBox, Jlabel, JradioButton, JscrollPane, JtabbedPane, Jtable, JtextField,Jtree

8.	**Multithreaded Programming** Life cycle of thread, thread methods, thread priority, thread exceptions, Implementing Runnable interface, Synchronization	**08 hours**	**13 %**
9.	**Java Collection Framework** Collection, Array List, Date	**04 hours**	**06 %**

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
- Faculty deals with concept test as it implies focus on one key concept of learning
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
- Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Minimum 10 experiments are suggested in the laboratory related to course content.

E. Student Learning Outcome:

By taking this course Programming in Java,

- Students will be able to use APIs through Javadoc.
- Student will be able to implement standalone application, GUI based application as well as multithreaded programming for real life projects using core features of Java.
- Students will be able to design and develop projects in higher semesters using Object oriented design approach and java programming language.

F. Recommended Study Material:

Text Books:

1. HeadFirst Java Programming – O'relly publication
2. Thinking inJava - Bruce Eckel, Prentice Hall
3. SCJP Java Programming-Khalid A. Mughal

Reference Books:

1. Teach yourself Java - by Joseph O'neil, TMH publication
2. Java Concurrency in Practice – Brian Goetz, Pearson Publication
3. The Complete Reference Java 2 ,Herbert Schildt ,TMH publication

Web Materials:

1. www.java.sun.com,
2. www.javaarchives.com,
3. www.docs.oracle.com/javase/tutorial/

IT243: DATA COMMUNICATION

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	0	6	5
Marks	100	50		150	

A. Objective of the Course:

The principles of data communications are carefully and thoroughly explored which can be applied to the complex systems found in communication networks and computer-communication architectures.

The main objective to give the course is

- To familiarize students with the concepts of circuits, signals, amplifier, oscillator and modulation.
- To be able to apply the concepts of data communication system theoretically and practically as well.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to Data Communications	08
2.	Analog and Digital Signals	10
3.	Communication Channel Characteristics	06
4.	Transmission Media	06
5.	Modulation	12
6.	Analog Communication and Multiplexing	12
7.	Interface Standard	06

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

C. Detailed Syllabus:

1. **Introduction to Data Communications** **08 hours** **13%**

   Data Communication, Networks, Protocols and Standards, OSI Model, Internet Model, Network Topologies

2. **Analog and Digital Signals** **10 hours** **17%**

   Analog and Digital Data, Analog and Digital Signals, Periodic and Aperiodic Signals

   – Analog Signals: Sine wave, Examples of Sine Waves, Time and Frequency domains, Bandwidth

   – Digital Signals: Bit Interval and Bit Rate, Low pass versus Band-pass, Digital Transmission, Analog Transmission, Throughput, Propagation Speed, Propagation Time, Wavelength

3. **Communication Channel Characteristics** **06 hours** **10%**

   Electromagnetic waves, Frequency and Wavelength, Bandwidth and Channel Capacity, Bandwidth and Distance

4. **Transmission Media** **06 hours** **10%**

   Guided Media: Twisted - Pair Cable, Coaxial Cable, Fiber - Optic Cable, Unguided media: Radio Waves, Microwave and Infrared

5. **Modulation** **12 hours** **20%**

   Modulation and Demodulation, Fourier analysis, Types of Modulation, Amplitude Modulation, Frequency Modulation, Phase Modulation, Analog versus Digital Modulation, Synchronous and Asynchronous Modulation

6. **Analog Communication and Multiplexing** **12 hours** **20%**

   Functions within Analog Communication System, Multiplexing, Space-Division Multiplexing, Frequency-Division Multiplexing, Time-Division Multiplexing, Combined Modulation Systems, Shortcomings of analog communication and Multiplexing

7. **Interface Standard** **06 hours** **10%**

   Introduction to RS - 232, RS - 232 voltages, Data Bits, RS-232 Signals

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Faculty would use campus based learning as it uses campus environment itself as a teaching tool. Also use of teaching with visualization is done as it helps students to see how real network systems work.
- Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.

- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
- Surprise tests/Quizzes/Seminar/Tutorials will be conducted which carries 5% component of the overall evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Minimum 10 experiments are suggested in the laboratory related to course content.

E. Student Learning Outcome:

By taking this course,

- Students will be able to apply the concept of amplifier and circuits.
- Students are able to perform various electronic circuits' related exercise.

F. Recommended Study Material:

Text Books:

1. Data Communication By William Schweber, McGraw Hill Publication
2. Data Communication and Networking, BehrouzForouzan, McGraw Hill Publication

Reference Books:

1. Electronic Communications, Kennedy McGraw Hill Publication.

Web Materials:

1. www.wikipedia.org

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HS122A: VALUES AND ETHICS

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	-	-	2	2
Marks	100	-	-	100	

A. Objective of the Course:

To facilitate learners to:

- Develop a familiarity with the mechanics of values and ethics
- Understand basic concepts of values and ethics
- Explore andunderstand values, ethics in context of professional, social and personal spectrum
- Explore andunderstand values, ethics in context of globalization and global issues
- Explore an application of values and ethics in personal, social, academic, global and profession life.
- Facilitate the learners to understand harmony at all the levels of human living, and live accordingly.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1	**Introduction to Values and Ethics** • Need, Relevance and Significance of Values and Ethics : General • Concept and Meaning of Values and Ethics	06
2	**Elements and Principles of Values** • Universal & Personal Values • Social, Civic & Democratic Values • Adaptation Models & Methods of Values	08
3	**Applied Ethics** • Universal Code of Ethics • Professional Ethics • Organizational Ethics • Ethical Leadership • Domain Specific Ethics	08
4	**Value, Ethics & Global Issues** • Cross-Cultural Issues • Role of Ethics & Values in Sustainability • Case Studies	08
	Total	30

C. Instruction Methods and Pedagogy

The course is based on practical learning. Teaching will be facilitated by reading material, discussion, task-based learning, projects, assignments and various interpersonal activities like case studies, critical reading, group work, independent and collaborative research, presentations etc.

A. Evaluation:

The students will be evaluated continuously in the form of internal as well as external examinations. The evaluation (Theory) is schemed as 30 marks for internal evaluation and 70 marks for external evaluation in the form of University examination.

Internal Evaluation

The students' performance in the course will be evaluated on a continuous basis through the following components:

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Assignment / Project Work	2	25	25
2	Attendance and Class Participation			05
			Total	**30**

External Evaluation

The University Theory examination will be of 70 marks and will test the reasoning, logic and critical thinking skills of the students by asking them theoretical as well as application based questions. The examination will avoid, as far as possible, grammatical errors and will focus on applications. There will be at least one question on case analysis relevant to the components of the course.

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Theory Paper	01	70	70
			Total	70

B. Learning Outcomes

At the end of the course, learners will be able to:

- Understandthe concepts and mechanics of values and ethics.
- Understand the significance of value and ethical inputs in and get motivated to apply them in their life and profession.
- Understand the significance of value and ethical inputs in and get motivated to apply them in social, global and civic issues.

C. Reference Books / Reading

- Human Values and Ethics in Workplace, United Nations Settlement Program, 2006.(http://www.unwac.org/new_unwac/pdf/HVWSHE/Human%20Values%20&%20Ethics%20-%20Individual%20Guide.pdf).
- Ethics for Everyone, Arthur Dorbin, 2009.(http://arthurdobrin.files.wordpress.com/2008/08/ethics-for-everyone.pdf).
- Values and Ethics for 21st Century, BBVA. (https://www.bbvaopenmind.com/wp-content/uploads/2013/10/Values-and-Ethics-for-the-21st-Century_BBVA.pdf)
- www.ethics.org

IT244: SOFTWARE GROUP PROJECT- I

Credit and Hours:

Teaching Scheme	Theory	Project	Total	Credit
Hours/week	`	4	4	2
Marks	`	50	50	

A. Objective of the Course:

The main objectives for offering the course software project are:

- To provide additional technical skill useful for the project work
- To develop and test one's ability to learn independently
- To provide exposure in the field of Software development
- To provide a deep understanding of various domains of software projects.
- To provide an innovative ability to solve practical/utility problems
- To provide a capacity to learn continually and interact with multidisciplinary groups

B. Outline of the Course:

- Student at the beginning of a semester may be advised by his/her supervisor (s) for recommended courses.
- Students are required to get approval of project definition from the department.
- After approval of project definition students are required to report their project work on weekly basis to the respective internal guide.
- Project will be evaluated at least once per week in laboratory hours during the semester and final submission will be taken at the end of the semester as a part of continuous evaluation.
- Project work should include whole SDLC of development of software / hardware system as a solution of particular problem by applying principles of Software Engineering.
- Students have to submit project with following listed documents at the time of final submission.
    a. Project Synopsis
    b. Software Requirement Specification

c. SPMP

d. Final Project Report

e. Project Setup file with Source code

f. Project Presentation (PPT)

- A student has to produce some useful outcome by conducting experiments or project work.

Total hours (Theory): 00

Total hours (Lab): 60

Total hours: 60

C. Instructional Method and Pedagogy:

1. Project Groups would be form of maximum two students.
2. Inter batch group formation is not permitted due to difficulties in progress tracking.
3. Students are advised to choose innovative and challenging definitions.
4. Batch wise project definitions must be unique.
5. Any kind of management system would not be encouraged.
6. Tools like GitHub would be used to track the progress of project development by the concern faculty. Concerned guide will demonstrate the working of GitHub Tool.
7. Student has to prepare report at end of semester as part of submission.
8. Report structure is finalized for semester end submission.
9. To have a better outcome as well as progress tracking at the end of semester, it is decided that students have to appear for two internal reviews, which will help them to get more insight in the project.

D. Student Learning Outcome:

After the completion of the course students will able to

- Explore the new ideas & the possible areas to work ahead.
- Use the various methodologies useful for doing project work.
- Investigate the chosen topic in depth. This implies collecting and reviewing literature and understanding and interpreting the most up-to-date concepts and theories of your chosen academic field and/or project topic.

- Apply the concepts and theories learnt in previous years of study and work placements

E. Recommended Study Material:

1. Reading Materials, web materials, Project reports with full citations
2. Books, magazines & Journals of related topics
3. Various software tools and programming languages compiler related to topic

URL Links:

1. www.ieeexplore.ieee.org
2. www.sciencedirect.com
3. www.elsevier.com
4. http://spie.org/x576.xml

B. Tech. (Information Technology) Programme

SYLLABI

(Semester – 4)

CHAROTARUNIVERSITY OF SCIENCE AND TECHNOLOGY

MA244: STATISTICAL AND NUMERICAL TECHNIQUES

Credits and Hours:

Teaching Scheme	Theory	Tutorial	Total	Credit
Hours/week	4	0	4	4
Marks	100	-	100	

A. Objective of the Course:

This course is the foundation of the course of higher semester courses of B. Tech. (IT) viz. (i) Data-mining (ii) Artificial Intelligence (iii) Image Processing and related courses.

The objectives of the course are to:

1. develop motivation towards Statistical and Numerical techniques
2. understand basics of Statistical Methods
3. understand the concepts of Probability and its use
4. understand Computing Probabilities of various random events
5. understand concept of Statistical Hypothesis Test

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Basic Statistics and Introduction to Probability	09
2.	Random variables and Probability distributions	12
3.	Regression and Correlation	09
4.	Interpolation, Curve fitting	15
5.	Numerical Integration, solution of equations	15

Total hours: 60

C. Detailed Syllabus:

1.	**Basic Statistics and Introduction to Probability**	**09 Hours**	**16%**
1.1	Descriptive Statistics and Exploratory Analysis		
1.2	Methods of Enumeration: Permutations and Combinations		
1.3	Introduction to Probability and Properties of Probability		
1.4	Conditional Probability		

1.5	Independent Events		
1.6	Baye's Theorem		
2.	**Random variables and Probability distributions**	**12 Hours**	**18%**
2.1	Discrete and continuous random variable, expected values and variance of random variable, Probability mass function, Probability density function and Cumulative distribution functions,		
2.2	Probability distributions of discrete random variable: Bernoulli, Binomial, Poisson and Geometric		
2.3	Probability distributions of continuous random variable: Uniform, Normal, and Exponential		
2.4	Introduction to Statistical Inference: Point Estimation and Interval Estimation, Test of Statistical Hypothesis		
3.	**Regression and Correlation**	**09 Hours**	**16%**
3.1	Measure of association between two variables. Types of correlation, Karl Pearson's Coefficient of correlation and its mathematical properties.		
3.2	Spearman's Rank correlation and its interpretations.		
3.3	Regression Analysis: Concept and difference between correlation and regression, linear regression equations, properties of regression coefficients		
4	**Numerical methods, Interpolation, Curve fitting**	**15 Hours**	**25%**
4.1	Introduction, Errors in numerical methods, Finite differences and associated operators		
4.2	Interpolation, Newton's forward interpolation formula, Newton's backward interpolation formula, Extrapolation		
4.3	Lagrange's interpolation formula and Newton's divided difference formula		
4.4	Least squares curve fitting methods, linear and nonlinear curve fitting.		
5.	**Numerical Integration and Numerical solution of Equations**	**15 Hours**	**25%**
5.1	Numerical Integration: Newton's quadrature formula, Composite rules: Trapezoidal rule and Simpson's rules		
5.2	Solution of linear system: Gauss Jordan Method and Gauss Seidel Method		
5.3	Numerical Solution of Non-linear Equations: Newton-Raphson, False position (Regula Falsi) and Bisection method		
5.4	Numerical Solution of Ordinary Differential Equations: Taylor's series, Euler's, and Runge- Kutta (4^{th} order) methods.		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures/laboratory which carries a 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.

- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
- Two Quizzes (surprise tests) will be conducted which carries 5% component of the overall evaluation.

E. Student Learning Outcomes:

- At the end of course students will able to grasp, analyze, formulate and solve mathematical/statistical problems related to Information Technology.
- At the end of the course the students will be able to frame the fundamental algorithms/programming of Numerical analysis.

F. Recommended Study Material:

❖ **Reference Books:**

1. Johnson, Richard A. Miller and Freund" s Probability and Statistics for Engineers. Prentice Hall, 1994.
2. Hogg, Robert V., Elliot Tanis, and Dale Zimmerman. Probability and statistical inference. Pearson Higher Ed, 2014.
3. Sheldon, Ross. A first course in probability. Pearson Education India, 2002
4. Trivedi, Kishor S. Probability & statistics with reliability, queuing and computer science applications. John Wiley & Sons, 2008.
5. Chapra, Steven C., and Raymond P. Canale. Numerical methods for engineers. Vol. 2. New York: McGraw-Hill, 2012.
6. Sastry, Shankar S. Introductory methods of numerical analysis. PHI Learning Pvt. Ltd., 2012.
7. Rajaraman, Vaidyeswaran. Computer oriented numerical methods. PHI Learning Pvt. Ltd., 1993.

URL Links:

1. http://numericalmethods.eng.usf.edu
2. http://mathworld.wolfram.com/
3. http://en.wikipedia.org/wiki/Math

IT245: COMPUTER ORGANIZATION & MICROPROCESSOR INTERFACING

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	-	6	5
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Computer Organization & Microprocessor are:

- To explore the basic concepts of computer organization & computer architecture design, Computer System Components: Processor, Memory, and I/O Devices, Performance evaluation
- To provide insight details in Processor Components : Control Unit, Registers, Caches Memory, ALU, Instruction Execution Unit
- To provide introduction to Instruction Set Architecture and Practical exposure through simulation tools/Microprocessor Kits

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to Computer Architecture	05
2.	Instruction Set Architecture	12
3.	Computer Architecture Space	04
4.	Performance Measures	04
5.	Basics of Arithmetic Logic Unit	12
6.	Processor Design	12
7.	Pipelined Processor	05
8.	Memory Hierarchy	06

Total hours (Theory): 60
Total hours (Lab): 30
Total hours: 90

C. Detailed Syllabus:

1. **Introduction to Computing Systems** **05 Hours** **8%**
   What is Computer Architecture,
   Abstraction :Software & Hardware,
   Architecture Levels, Embedded Computers, Different types of processors, Five generation computers, Growth in DRAM Capacity,
   Early Computer Inventions: UNIVAC,360 CDC6600,ILLIAC IV,PDP 8 HP 2115,
   Recursive Programs: Activation Record, Calls, Returns(after instruction set architecture)
   Looking into future: Grid Computing, Nano Computing, DNA Computing, Quantum Computing
2. **Instruction Set Architecture** **12 Hours** **20%**
   Instruction for arithmetic, Instructions to move data, Instruction for decision making, Handling Constant Operands, Implementing loops, pointers Vs Index, Switch Statement, Addresses in MIPS Instructions, Procedural abstractions, Requirements, Sorting example, Register use conventions.
3. **Computer Architecture Space** **04 Hours** **7%**
   Architecture Space: MIPS ISA Features, Alternative Architectures
   Architecture Examples: RISC and CISC, PowerPC, VAX,SPARC, Intel x86
4. **Performance Measures** **04 Hours** **7%**
   Performance and Cost, Purchasing perspective, Design perspective
   Notions of Performance: Latency and throughput, Performance and time, computer clocks, Computing CPU time and cycles, Improving Performance, Linking instruction, cycles and time, CIPS and MIPS examples, Computer Benchmarks,
   Sources of Benchmark: SPEC 89 and SPEC 95,
   Amdahl's law, Estimating performance improvements, poor performance metrics
5. **Basics of Arithmetic Logic Unit** **12 Hours** **20%**
   Binary Arithmetic, ALU Design, Signed Operations and Overflow, Multiplier Design, Divider Design, Fast Addition, Multiplication, Floating Point representation and operations, Floating Point Unit Design, Floating Point Arithmetic
6. **Processor Design** **12 Hours** **20%**
   Introduction, Simple Design Multi cycle approach, control for multi cycle, Micro-programmed Control, Exception Handling
7. **Pipelined Processor** **05 Hours** **8%**
   Basic Design Idea, Data path and Control, Handling Data Hazards, handling Control Hazards

8. **Memory Hierarchy** **06 Hours** **10%**

Basic Idea: Memory construction, size, speed,cost and data unit. Tradeoffs between them.PROM, EEPROM, DRAM, SRAM ,Memory Technologies, Hierarchical organization, principle of locality, Simple Cache organization, Miss rate, block size, cache policies

Cache Organization: Mapping alternatives- direct, associative and set associative, processor performance with cache, memory organization and miss penalty, Policies for read, load, fetch, replacement and write, How Caches work, Size of tags, Performance analysis examples

Virtual Memory: Similarities and differences of Virtual Memory and Cache, Mapping Virtual address to physical address, Page tables, TLB, Virtually addressed cache, Memory Protection

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 10 Marks weight.
- Assignments/ Surprise tests/Quizzes/Seminar based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

By taking this course Computer Organization and Microprocessor

- Students will able to understand the concepts of Computer Organization.
- Students will use knowledge of internal architecture of the system to develop an assembly language programs

F. Recommended Study Material:

Text Books:

1. John L. Hennesy & David A. Patterson, "Computer Organization & Design : The Hardware / Software Interface", Morgan Kaufmann Publishers, 2004.
2. R. E. Bryant and D. R. O'Hallaron, Computer Systems: A Programmer's Perspective, Prentice Hall
3. Computer Organization & Architecture-Designing for Performance, William Stalling, Pearson Prentice Hall(8th Edition).

Reference Books:

4. Introduction to Computing Systems: From Bits and Gates to C and Beyond, Yale N. Patt,Sanjay J. Patel, 2nd Edition, Tata McGraw-Hill Publication,2005.
5. Structured Computer Organization, A. S. Tananbum , Pearson Education

6. The Essentials of Computer Organization And Architecture, Linda Null, Julia Lobur, Jones & Bartlett Learning, 2006
7. Computer Architecture & Organization, John P Hayes, McGraw-Hill
8. Computer System Architecture, Morris Mano (3rd Edition) Prentice Hall.

Web Materials:

1. http://nptel.ac.in/courses/106102062/37
2. http://highered.mcgraw-hill.com/sites/0072467509/

IT246: WEB ENGINEERING

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	4	-	6	4
Marks	100	100	-	200	

A. Objective of the Course:

The main objectives for offering the course Web Technology are:

- To introduce various Web Server Protocol and Web Architecture.
- To have hands on experience for HTML and DHTML using CSS, PHP this will help them to prepare website and web base applications.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to WWW	02
2.	Web server , Access and security, Web Protocol(HTTP/1.1)	02
3.	HTML 4.0/5.0	04
4.	Cascaded Style Sheet (CSS2.0/3.0)	05
5.	Client side Scripting Language(JavaScript)	08
6.	DOM (Document Object Model)	01
7.	Server Side Language (PHP)	03
8.	MySQL and PHP Database	05

Total hours (Theory): 30
Total hours (Lab): 60
Total hours: 90

C. Detailed Syllabus:

1.	**Introduction to WWW**	**02 hours**	**07 %**

Web Related browser functions, Browser Configuration, Browser Security Issues, Cookies, Spider, Intelligent Agents and special purpose browsers

2.	**Web server , Access and security, Web Protocol(HTTP/1.1)**	**02 hours**	**07 %**

Introduction WAMP, IIS7.0/7.5, Overview Of HTTP, HTTP Language Elements, HTTP Extensibility, SSL and Security, Evolution of HTTP/1.1 Protocol, Methods-Headers and Response codes in 1.0 /1.1, Caching, Bandwidth Optimization, Connection Management

3.	**HTML4.0/5.0**	**04 hours**	**14 %**

HTML Headings, HTML Paragraphs, HTML Formatting, HTML Fonts, HTML Styles, HTML Links, HTML Images, HTML Tables, HTML Lists, HTML Forms
HTML Frames, HTML iframes

4.	**Cascaded Style Sheet (CSS2.0/3.0)**	**05 hours**	**16 %**

CSS Introduction, CSS Syntax, CSS Id & Class, CSS Box Model(CSS Border, CSS Outline, CSS Margin, CSS Padding), CSS Styling(Backgrounds, Text, Fonts, Links, Lists, Tables).
Advance CSS: Grouping/Nesting, Dimension, Display, Positioning, Floating, Align, Pseudo-class, Pseudo-element, Navigation Bar, Image Gallery, Image Opacity, Image Sprites, Media Types, Attribute Selectors.
CSS3 Introduction CSS3 Borders, CSS3 Backgrounds, CSS3 Text Effects, CSS3 Fonts, CSS3 2D Transforms, CSS3 3D Transforms, CSS3 Transitions, CSS3 Animations, CSS3 Multiple Columns, CSS3 User Interface.

5.	**Client side Scripting Language(JavaScript)**	**08 hours**	**26 %**

Introduction to JavaScript: What Is JavaScript, What Can JavaScript Do for Me?
Linking to an External JavaScript File, Advantages of Using an External File
Types of Data in JavaScript: Numerical Data, Text Data, Boolean Data
Variables: Creating Variables and Giving Them Values, Assigning Variables with the Value of Other Variables, Calculations and Basic String Manipulation: Numerical Calculations, Basic String Operations, Mixing Numbers and Strings
Data Type Conversion: Dealing with Strings That Won't Convert
Decisions, Loops, and Functions: if...else, for loop for...in Loop, switch...case, while Loop, do...while loop, break and continue Statements, Creating function with and without arguments.
Error Handling: Preventing Errors, The try ... catch Statements
Interactive HTML Form and Validation: Button Elements, Text Elements,

The textarea Element, Check Boxes and Radio Buttons, Selection Boxes,validation. JavaScript object: String, Array, Regular Expression

6. **DOM (Document Object Model)** **01 hours** **03 %**

   Introduction to Document Object Model, HTML DOM, Java Script DOM

7. **Server Side Language (PHP)** **03 hours** **11 %**

   Introduction to server side language, PHP Syntax, Operator and Control statements, PHP Loops, function, PHP String manipulation, Arrays-Enumerated Arrays, Associative array, array iteration, Multi-dimensional array, Array functions.Date and Time & String functions.

8. **MySQL and PHP Database** **05 hours** **16 %**

   PHP session and cookies management, PHP File handling, Introduction and Configuration of MySql, MySQL Database operation-Connect, Create, Insert, Select, Where, Order By, Update, Delete

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

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

- Students will able to develop static and dynamic website and web base software applications.
- Students will use knowledge of the subject in higher semester for subjects like Advance Java Technology and .Net Web technology and also for Project development.

F. Recommended Study Material:

Text Books:

1. Learning JQuery Third Edition, Jonathan ChafferKarlSwedberg, Packt Publishing
2. HTML 4 , Bryan Pfaffenberge, Bible
3. Beginning JavaScript –4th Edition by Paul Wilton, Jeremy McPeak - Wrox Publication
4. Beginning PHP 5.3 - WroxByMatt Doyle.
5. HTML 5 and CSS 3.0 to the Real World by Alexis Goldstein - Sitepoint publication

Reference Books:

1. JavaScript Bible- Gold Edition by Danny Goodman
2. CSS Cook book By Christopher Schmitt -O'Reilly publication
3. jQuery Cookbook - O'Reilly Media by Cody Lindley

Web Materials:

1. www.w3schools.com
2. www.tutorialspoint.com

IT247: DATA STRUCTURES AND ALGORITHMS

Credit and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	4	2	6	5
Marks	100	50	150	

A. Objective of the Course:

This course will introduce some of the most fundamental concepts in Computer Science like how data is represented and manipulated in computer systems in the form of stacks, queues, linked lists, tree, graph etc. To provide an in-depth knowledge in problem solving techniques and data structures.

The main objective to give the course is:

- To familiarize students with basic data structures and their use in fundamental algorithms.
- To teach the students how to select and design data structures and algorithms for a specified problem.
- To teach the students how data will be stored efficiently within computer memory.
- To select appropriate data structure and algorithm for a specified application.

B. Outline of the Course:

Sr No.	Title of the unit	Minimum number of hours
1.	Introduction to Data Structure.	04
2.	Linear Data Structure	20
3.	Non Linear Data Structure	15
4.	Searching and Sorting	15
5.	Hashing	06

Total hours (Theory): 60
Total hours (Lab): 30
Total hours: 90

C. Detailed Syllabus:

1.	**INTRODUCTION TO DATA STRUCTURE**	**04 hours**	**07 %**
1.1	**Introduction** Introduction to Data, Information, Data Type Different types of Data Type : Built-In and Abstract Data Type		
1.2	**Algorithm and Data Structure** Algorithm, Program Introduction to Data Structure Needs for Data Structure Different types of Data Structure		
2.	**LINEAR DATA STRUCTURE**	**20 hours**	**33 %**
2.1	**Array** Notations : one dimension, two dimension and multi dimension Memory Representation of Array : Row Order and Column Order Concept of Sparse Matrices		
2.2	**Stack** Memory Representation of Stack Operations : push, pop, peep, change Applications of Stack: Recursion : Recursive Function Tracing, Tower of Hanoi Conversion : Infix to Postfix Evaluation : Prefix and Postfix expression		
2.3	Queue Memory Representation of queue Simple Queue : Insert and Delete operation Circular Queue : Insert and Delete operation Concepts of : Priority Queue, Double-ended Queue Applications of Queue		
2.4	Linked List Memory Representation of LL Singly Linked List: Insert at First, Insert at End, Insert according to Sorted order, Delete the specified node. Doubly Linked List : Insert and Delete operation Concept of Circular Linked List Applications of Link List		
3.	**NON LINEAR DATA STRUCTURE**	**15 hours**	**25 %**
3.1	Tree Tree Concepts (Tree, Binary, Full Binary, Complete Binary) Memory Representation of Tree Tree Traversal Techniques : Pre-order, Post-order and In-order (Recursive and Iterative) Binary Search Tree: Iterative and Recursive: Insert and Delete Operations with all options. Concept of Threaded Binary Tree, B- Tree General Tree to Binary Tree Conversion		

Height-Balance Tree(AVL Tree) : Insert and Delete Operations
2-3 Tree : Insert and Delete Operations
Applications of Tree : Manipulation of Arithmetic Expression, Decision Tree, Hierarchical Tree(Family Tree), Directory structure of File system

3.2 **Graph**
Graph concepts (undirected, directed, simple, multi, weighted, null, mixed, cycle, path, forest)
Memory Representation of Graph
BFS and DFS
Applications of Graph

4.	**SEARCHING AND SORTING**	**15 hours**	**25 %**

4.1 Searching
Sequential Search ,Binary Search : Iterative and Recursive

4.2 Complexity :
Time Complexity and Space Complexity
Big-oh Notation

4.3 Sorting
Different Sorting Techniques
Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort, Heap Sort

5.	**HASHING**	**06 hours**	**10 %**

5.1 **Hashing**
Collision-Resolution Techniques : rehashing and chaining
Different Hashing Functions: Division, Mid-square, Folding, Length-dependent, Digit Analysis, Multiplicative
Applications of Hashing

D. Revised Bloom's Taxonomy

The below specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary from the below table.

Level					
Remembrance	**Understanding**	**Application**	**Analyze**	**Evaluate**	**Create**
20	20	10	20	20	10

E. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.

- Faculty would use coached problem solving method as it is class format in which faculty provide a structured, guided context for students working collaboratively to solve problems.
- Attendance is compulsory in lectures and laboratory which carries 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weight age of 5%.
- Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Minimum 10 experiments are suggested in the laboratory related to course content.

F. Student Learning Outcome:

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

- Students will able to select and use appropriate data structures that efficiently address program requirements.
- Students will be able to identify and implement the algorithm, (basic operations) for manipulating each type of data structure.
- Student will be able to synthesize efficient algorithms in common engineering design situations.

G. Recommended Study Material:

Text Books:

1. An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Paul G. Sorenson, McGraw-hill.

Reference Books:

1. Classic Data structures, D.Samanta, Prentice-Hall International.
2. Data Structures using C & C++, Ten Baum, Prentice-Hall International.
3. Data Structures Using C, Oxford Higher Education, Reema Thareja
4. Data Structures: A Pseudo-code approach with C, Gilberg & Forouzan, Thomson Learning.
5. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, W. H. Freeman.
6. Data Structure through C (A Practical Approach) , Dhanpat Rai & Co., G. S. Baluja

Web Materials:

1. http://www.itl.nist.gov/div897/sqg/dads
2. http://www.leda-tutorial.org/en/official/ch02s02s03.html
3. http://www.leda-tutorial.org/en/official/ch02s02s03.html
4. http://www.softpanorama.org/Algorithms/sorting.shtml

IT248: DATABASE MANAGEMENT SYSTEM

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	0	6	5
Marks	100	50	-	150	

A. Objective of the Course:

Databases are store house or repository for organizational information. Storing and efficient usage of information is crucial for any system. All organizations, large and small, must rely on data management in all aspects of business operations and management information systems.

The main objectives for offering the course Database Management System are:

- To understand the overall structure and design of DBMS software.
- To cover three major aspects of data: concurrency, integrity, and recovery.
- To give the motivations behind development of DBMS and Structured Query Language used with relational databases.
- To make students familiar with the concepts of database in computerized application.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introductory concepts of DBMS	05
2.	Entity-Relationship model	07
3.	Formal Relational Query Languages	06
4.	Relational Database Design	14
5.	Transactions	11
6.	Concurrency Control	11
7.	Recovery System	06

Total hours (Theory): 60
Total hours (Lab): 30
Total hours: 90

C. Detailed Syllabus:

1.	**Introductory concepts of DBMS**	**05 hours**	**10 %**
	Introduction and applications of DBMS, Purpose of database, Data Independence, Database System architecture- levels, Mappings, Database users and DBA		
2.	**Entity-Relationship model**	**07 hours**	**12 %**
	Basic concepts, Design process, Constraints, Keys, Design issues, E-R diagrams, Weak Entity Sets, Extended E-R features- Generalization, Specialization, Aggregation, Reduction to E-R database schema		
3.	**Formal Relational Query Languages**	**06 hours**	**10 %**
	Structure of Relational Databases, Domains, Relations, Relational Algebra fundamental Operators and Syntax, Relational algebra queries		
4.	**Relational Database design**	**14 hours**	**22 %**
	Functional Dependency–definition, Trivial and Non-Trivial FD, Closure of FD set, Closure of attributes, Irreducible set of FD, Normalization – 1NF,2NF,3NF, Decomposition using FD- Dependency Preservation, Multi-valued dependency& 4NF, Join Dependency &5NF		
5.	**Transactions**	**11 hours**	**18%**
	Transaction concepts, A Simple Transaction Model, Properties of Transactions, Serializability of transactions, Testing for Serializability		
6.	**Concurrency Control**	**11 hours**	**18%**
	Lock-Based Protocol, Timestamp-Based Protocol, Multiple Granularity, Deadlock Handling		
7.	**Recovery System**	**06 hours**	**10%**
	Failure Classification, Recovery and Atomicity, Log-based recovery, Transaction rollback and checkpoints, System recovery		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc. Faculty would use the approach teaching with data as it would help to find and integrate real data sets into their classes.
- Attendance is compulsory in lectures.
- Internal exams/Unit tests/Surprise tests/Quizzes/Seminar/Assignments etc. will be conducted as a part of continuous internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Minimum 10 experiments are suggested in the laboratory related to course content.

E. Student Learning Outcome:

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

- Students will able to translate written business requirements into conceptual entity-relationship data models.
- Students will able to analyze business requirements and produce a viable model
- Students will able to convert conceptual data models into relational database schemas using the SQL Data Definition Language (DDL).
- Student will able to utilize database design and development skills for development of software projects.
- Students will able to utilize memory efficiently by appropriate database design.

F. Recommended Study Material:

Text Books:

1. Database System Concepts, Abraham Silberschatz, Henry F. Korth& S. Sudarshan, McGraw Hill.
2. An introduction to Database Systems, C J Date, Addition-Wesley

Reference Books:

7. "Fundamentals of Database Systems",R. Elmasri and S.B. Navathe, The Benjamin / Cumming Pub. Co
8. SQL,PL/SQL the Programming Language of Oracle,IvanBayross, BPB Publications
9. Oracle: The Complete Reference, George Koch, Kevin Loney, Oracle Press.

Web Materials:

1. http://www.sql.org
2. http://www.w3schools.com
3. http://www.sqlcourse.com

HS123: CRITICAL THINKING AND LOGIC

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	-	-	2	2
Marks	100	-	-	100	

A. Objective of the Course:

To facilitate learners to:

- Develop a familiarity with the mechanics of critical thinking and logic
- Understand basic concepts of critical thinking and logic
- Explore and understand critical thinking and logic in context of professional, social and personal spectrum
- Explore an application critical thinking and logic in personal, social, academic, global and profession life.

B. Course Outline:

Sr. No.	Title/Topic	Minimum number of hours
1	**Introduction to Critical Thinking and Logic** • Need, Relevance and Significance of Critical Thinking and Logic • Concept and Meaning of Critical Thinking and Logic	06
2	**Elements and Principles of Critical Thinking** • Models of Critical Thinking • Critical Thinking and Higher Order Thinking Skill	06
3	**Logic & Arguments** • Nature & Significance of Logical Arguments • Structure and Types of Logical Arguments • Application of Logical Arguments	06
4	**Applied Critical Thinking & Logic** • Critical Thinking, Logic in Problem Solving & Decision-Making • Critical Thinking & Creativity • Moral Reasoning	06
5	**Practicing Critical Thinking & Logic** • Case Study • Tasks • Quiz	06
	Total	30

C. Instruction Methods and Pedagogy

The course is based on practical learning. Teaching will be facilitated by reading material, discussion, task-based learning, projects, assignments and various interpersonal activities like case studies, critical reading, group work, independent and collaborative research, presentations etc.

D. Evaluation:

The students will be evaluated continuously in the form of internal as well as external examinations. The evaluation (Theory) is schemed as 50 marks for internal evaluation and 50 marks for external evaluation in the form of University examination.

Internal Evaluation

The students' performance in the course will be evaluated on a continuous basis through the following components:

Sr. No.	Component	Number	Marks per incidence	Total Marks
1	Assignment / Project Work	2	20	40
2	Attendance and Class Participation			10
			Total	**50**

External Evaluation

The University Theory examination will be of 70 marks and will test the reasoning, logic and critical thinking skills of the students by asking them theoretical as well as application based questions. The examination will avoid, as far as possible, grammatical errors and will focus on applications. There will be at least one question on case analysis relevant to the components of the course.

Sr. No.	Component	Number	Marks per incidence	Total Marks
1	Theory Paper	01	50	50
			Total	50

E. Learning Outcomes

At the end of the course, learners will be able to:

- Understand the mechanics and concept of critical thinking and logic.
- Understand the application of critical thinking and logic in context of creativity, logical arguments, moral reasoning and creativity

- Understand the application of critical thinking and logic in personal, social, academic, global and profession life.

F. Reference Books / Reading

1. Introduction to Logic and Critical Thinking, Marrilee Salmon, 6th Ed. Wadsworth Ceneage Learning 2013.
   (http://www.cengagebrain.com.au/content/9781133966982.pdf)
2. http://www.arn.org/realscience/kog1asample/kog-ct-chem-1a-sample.pdf
3. http://cw.routledge.com/textbooks/mcadoo/
4. www.criticalthinking.org

B. Tech. (Information Technology) Programme

SYLLABI

(Semester – 5)

CHAROTARUNIVERSITY OF SCIENCE AND TECHNOLOGY

IT302.02: DESIGN & ANALYSIS OF ALGORITHM

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	-	6	5
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Design and Analysis of Algorithm are

- To explain the fundamentals of computer algorithm and create analytical skills, enable students to design algorithms for various applications, and analyze the algorithms.
- To introduce mathematical aspects and analysis of algorithms, sorting and searching algorithms, algorithmic techniques and algorithmic design methods which help in development of software.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Basics of Algorithm and Mathematics	04
2.	Analysis of Algorithm	12
3.	Divide and Conquer Algorithm	10
4.	Greedy Algorithm	08
5.	Dynamic Programming	10
6.	Exploring Graphs	08
7.	String Matching and NP Completeness	08

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

C. Detailed Syllabus:

1.	**Basics of Algorithm and Mathematics**	**04 hours**	**07%**
1.1	What is an algorithm?		
1.2	Mathematics for Algorithm		
1.3	Performance Analysis, Model for Analysis - Random Access Machine (RAM), Primitive Operations		
1.4	Time Complexity and Space Complexity		
2.	**Analysis of Algorithm**	**12 hours**	**20%**
2.1	The efficiency of algorithm, Best, Average and Worst case Analysis		
2.2	Asymptotic Notation		
2.3	Solving Recurrence Equation		
2.4	Sorting Algorithm		
3.	**Divide and Conquer Algorithm**	**08 hours**	**13%**
3.1	Basic of Recursion and its complexity		
3.1	The general template for Divide and Conquer Problem		
3.2	Problem solving using divide and conquer algorithm – Binary Search, Sorting - Merge Sort and Quick Sort		
3.3	Strassen'sMatrix Multiplication		
4.	**Greedy Algorithm**	**10 hours**	**17%**
4.1	General Characteristics of greedy algorithms		
4.2	Problem solving using Greedy Algorithm: Making change problem		
4.3	The Knapsack Problem, Job Scheduling Problem		
4.4	Minimum Spanning Trees (Kruskal's Algorithm, Prim's Algorithm)		
4.5	Dijkstra Algorithm		
5.	**Dynamic Programming**	**10 hours**	**17%**
5.1	Introduction, The Principle of Optimality		
5.2	Problem Solving using Dynamic Programming – Calculating the Binomial Coefficient		
5.3	Making Change Problem, Assembly Line Scheduling		

5.4 Knapsack Problem, All pair Shortest Path

5.5 Matrix Chain Multiplication

5.6 Longest Common Subsequence

6. Exploring Graphs and Backtracking **08 hours** **13%**

6.1 An introduction to Graph, Basic Definitions

6.2 Traversing Graphs – Depth First Search, Breadth First Search, Topological Sort

6.3 Backtracking – The Eight Queen Problem

6.4 **The Knapsack Problem**

6.5 Branch and Bound – The Assignment Problem

7. String Matching and NP Completeness **08 hours** **13%**

7.1 Introduction

7.2 The naïve string matching algorithm

7.3 The Rabin-Karp algorithm

7.4 Introduction to NP Complete Theory

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

After completion of the course students will be able to

- Develop efficient and effective computer algorithm. This will help for development of efficient and optimized software and problem solving approach.
- Apply their theoretical knowledge in practice (via the practical component of the course).
- Accustom to the description of algorithms in both functional and procedural styles
- Analyze algorithms and estimate their worst-case and average-case behavior

F. Recommended Study Material:

Text Books:

1. Gills Brassard, Paul Brately, Fundamental of Algorithms, Prentice Hall of India

Reference Books:

2. Thomas H. Coreman, Charles E. Leiserson, Ronald Rivest and Clifford Stein, Introduction to Algorithms, MIT Press
3. Ellis Horowitz, SartazSahni and SanguthevarRajasekarn Fundamental of Computer Algorithms, Computer Science Press

URL Links:

1. http://www.itl.nist.gov/div897/sqg/dads
2. http://www.stanford.edu/class/cs161
3. http://highered.mcgraw-hill.com/sites/0073523402

MA301.01: MODELING SIMULATION & OPERATIONAL RESEARCH

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	0	1	4	3
Marks	100	00	00	100	

A. Objective of the Course:

The main objectives for offering the course Modeling Simulation and Operational Research are:

- To impart some modeling techniques and to offer basic operational research tools & techniques are used for decision making.
- To provide an understanding of Operational Research models
- To emphasis on the application and computational aspects of Operational Research and simulation models.

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to OR	03
2.	Linear Programming (LP)	13
3.	Transportation & Assignment problems	10
4.	Network Analysis	07
5.	Queuing Models	06
6.	Computer Modeling & Simulation	06

Total hours (Theory): 45
Total hours (Lab): 00
Total hours: 45

C. **Detailed Syllabus:**

1.	**Introduction to OR**	**03 hours**	**10%**
1.1	Concepts and genesis		
1.2	Components of model	1½	
1.3	Types of OR models		
1.4	Effect of data availability on modeling Computations in OR	1½	
1.5	Art of modeling. Phases of OR study		
2.	**Linear Programming (LP)**	**13 hours**	**25%**
2.1	Transactions Concepts, Formulation of model	2	
2.2	Graphical solution	2	
2.3	Maximizations/ Minimizations – Simplex Algorithm	3	
2.4	Use of slack / surplus / artificial variables	3	
2.5	BigM method – Nature & type of solutions		
2.6	Interpretation of optimal solution	1½	
2.7	Dual problem – relation between primal and dual	1½	
2.8	Introduction to Integer programming		
3.	**Transportation & Assignment problems**	**10 hours**	**17%**
3.1	Concepts	1	
3.2	Formulations of models, Solution procedures	2	
3.3	Optimality checks	1	
3.4	Balanced/Unbalanced	2	
3.5	Maximum/Minimum problems	2	
3.6	Prohibited case - degeneracy	2	
4.	**Network Analysis**	**07 hours**	**15%**
4.1	Network Definition, Introduction of Minimum Spanning Tree	1	
4.2	Shortest route problem Dijkstra's, Floyd's	2	
4.3	Maximal flow problem concepts and solution algorithm as applied to problems	1	
4.4	Project planning and control by CPM network	2	
4.5	Probability assessment in PERT network	1	
5.	**Queuing Models**	**06 hours**	**22%**
5.1	Concepts relating to Queuing systems	1½	
5.2	Types of queuing system (use of six character code)	1½	

5.3	Basic elements of Queuing Model,		
5.4	Role of Poison & Exponential Distribution		
5.5	Concepts of Birth and Death process	1	
5.6	Steady state measures of performance		
5.7	M/M/1 model with and without limitation of q-size M/G/1	1	
5.8	single channel with Poisson arrival rate and general service time	1	
6.	**Computer Modeling & Simulation**	**06 hours**	**11%**
6.1	Use of Computer in modeling real life situations	1	
6.2	Distribution functions	1	
6.3	Random number generation	1	
6.4	Design of simulation models	1	
6.5	output analysis variance reduction techniques	1	
6.6	Introduction to simulation languages Programming tools for developing simulation models	1	

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks Weightage
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

- After completion of the course students will able to
- Design of sampling schemes, including simple random sampling, stratified and cluster sampling, sample size determination

- survey data, including point estimate and variance estimation methods
- Report and presentation of results, confidential data

F. Recommended Study Material:

Text Books:

1. ND Vora, Quantitative Techniques in management, Tata McGraw Hill
2. Hamdy A Taha, Operations Research – An Introduction, - Prentice Hall of India,
3. Wagner, H.M. Principles of Operations Research: With Applications to Management Decisions, Prentice-Hall of India

Reference Books:

1. Hillier, F.S. and Lieberman G.J., Operations Research, Holden Day Inc. Philip Allan, Operational Research Techniques and examples, Oxford, The English Universities Press Ltd.

Web Links:

1. http://www.me.utexas.edu/-jensen/ORMM/models/index.html

IT314: OPERATING SYSTEM FUNDAMENTALS

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	4	0	8	6
Marks	100	100	-	200	

A. Objective of the Course:

The operating system provides an established, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. In particular, the course will cover processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems.

The main objective of the course is,

- To give the fundamental knowledge of how operating system manages the applications that are running. Set a suitable environment for applications to run.
- To understand process management, memory management including virtual memory, protection and security management

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction	03
2.	System Structures	03
3.	Process Management	06
4.	Process scheduling	06
5.	Process Coordination	06
6.	Deadlocks	06
7.	Memory Management	15
8.	File System	06
9.	Secondary Storage Structure & I/O systems	06
10.	System Security	03

Total hours (Theory): 60

Total hours (Lab): 60

Total hours: 120

C. Detailed Syllabus:

1.	**Introduction** What is Operating System & evolution of OS, Computer-System Organization & Architecture, OS Structure & Operations, Special purpose Systems, Open source OS	**03 hours**	**05 %**
2.	**System Structures** OS Services, System calls, Types of system calls, OS Structure: Layered, Microkernel, Operating system Generation, Booting	**03 hours**	**05 %**
3.	**Process Management** Process, Process Control Block, Process States, Scheduling concepts, Process creation Threads, Types of Threads, Multithreading, Issues & termination	**06 hours**	**10 %**
4.	**Process scheduling** Concept, Scheduler, Preemptive Scheduling, Criteria, Scheduling Algorithms: FCFS, SJF, RR, Priority, Multi-queue	**06 Hours**	**10 %**
5.	**Process Coordination** Race Conditions, Critical Section, Peterson's Solution, Hardware Solution, Strict Alternation, Semaphores Classical IPC Problems: The Bounded-Buffer (Producer Consumer) Problem, Reader's & Writer Problem, Dinning Philosopher Problem, Monitors	**06 hours**	**10 %**
6.	**Deadlocks** Deadlock Problem, Deadlock Characterization, Resource-allocation graph, Deadlock Prevention, Deadlock avoidance: RAG & Banker's algorithm for single & multiple resources, Deadlock Detection, Recovery	**06 hours**	**10 %**
7.	**Memory Management** Address binding, Address space, Swapping, Contiguous Memory allocation Paging, Page table: Hierarchical, Hashed, Inverted Segmentation Virtual-Memory: Demand Paging, Page Replacement algorithms: FIFO, Optimal, LRU, Second chance, LFU & MFU, Working set model, Thrashing, Frame Allocation	**15 hours**	**25 %**
8.	**File System** File concept, Access methods, Directory & Disk Structure, File protection: Type, access control File System Structure, Implementation, Directory Implementation, Allocation Methods, Free space management,	**06 hours**	**10 %**
9.	**Secondary Storage Structure & I/O systems** Disk: structure, Arm scheduling: FCFS, SSTF, SCAN, LOOK, Formatting & Boot block, RAID Structure & levels I/O Hardware, Interrupt, DMA, Block & Character devices, Network devices, Transforming I/O request to Hardware operations	**06 hours**	**10 %**
10.	**System Security** Goals of protection, domain of protection, Trojan Horse, Viruses, Worms	**03 hours**	**05 %**

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

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

- Students will able to exhibit familiarity with the fundamental concepts of operating systems
- Students will able to exhibit competence in recognizing operating systems features and issues
- Students will able to apply a mature understanding of operating system designed how it impacts application systems design and performance.

F. Recommended Study Material:

Text Books:

1. Operating System Concepts, 9th Edition by AviSilberschatz, Peter Baer Galvin, Greg Gagne, Wiley Publication.

Reference Books:

1. Modern Operating Systems, 3rd Edition By Andrew S. Tanenbaum, PHI
2. Operating System – Internals & Design Principles, William Stallings, PHI
3. Operating Systems, D.M.Dhamdhare, TMH
4. Unix System Concepts & Applications, 4E, Sumitabha Das, TMH
5. Unix Shell Programming, YashwantKanitkar, BPB Publications

Practical List Guidelines:

- Practical should be performed on Open source operation system: Linux
- Commands and Scripting on Linux OS.
- Installation from Central repository of Linux and different packages for different softwares.
- Kernel compilation and minor modification.

IT303.02: ADVANCED DATABASE MANAGEMENT SYSTEM

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	1	6	4
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the courseAdvance Database Management System are:

- To provide an understanding of new developments and trends such as advanced indexing methods, parallel and distributed database systems, next-generation data models and data mining on large databases, data on the web, and data security and privacy.
- To explain issues of backup and recovery, concurrency control, database security and data connectivity in the field of DBMS.

B. Outline of the Course:

Sr No.	Title of the unit	Minimum number of hours
1.	Database-System Architecture	05
2.	Indexing and Hashing	10
3.	Parallel Databases	09
4.	Distributed Databases	08
5.	Advance Transaction Processing	07
6.	Database Security	06

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

C. Detailed Syllabus:

1	**Database-System Architectures**	**05 hours**	**11%**
1.1	Centralized and Client–Server Architectures		
1.2	Server System Architectures		
1.3	Parallel Systems		
2	**Indexing and Hashing**	**10 hours**	**22%**
2.1	Basic Concepts(Types of Indices)		
2.2	Ordered Indices, B+-Tree Index Files, B+-Tree Extensions		
2.3	Multiple-Key Access, Static Hashing, Dynamic Hashing		
2.4	Index Definition in SQL		
3	**Parallel Databases**	**09 hours**	**20%**
3.1	Introduction		
3.2	I/O Parallelism		
3.3	Interquery Parallelism		
3.4	Intraquery Parallelism		
3.5	Intra-operation Parallelism		
3.6	Interoperation Parallelism		
3.7	Query Optimization		
4.	**Distributed Databases**	**08 hours**	**18%**
4.1	Homogeneous and Heterogeneous Databases		
4.2	Distributed Data Storage, Distributed Transactions, Commit Protocols		
4.3	Concurrency Control in Distributed Databases, Availability		
5	**Advanced Transaction Processing**	**07 hours**	**16%**
5.1	Transaction-Processing Monitors		
5.2	Transactional Workflows		
5.3	Main-Memory Databases		
5.4	Real-Time Transaction Systems		
5.5	Long-Duration Transactions		
6	**Database Security**	**06 hours**	**13%**
6.1	Views - What are views for? , View retrievals, View updates, Snapshots (a digression), Materialized view.		
6.2	Security – Security and Authentication, authorization in SQL,		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

After completion of the course students will be able to

- Analyze and Design a data model for academic projects
- Apply the techniques learned to design databases to practical problems and to use SQL for data manipulation.
- Understand database performance issues and the basics of data management and administration
- Work as a valuable member of a database design and implementation team.
- Have an understanding of different DBMS architectures including parallel databases and distributed databases.
- Students can enhance their skills by gaining in-depth knowledge of PL\SQL stored program units such as procedures, functions, packages, and database triggers.

- Students will be able to understand database performance issues and the basics of data management and administration.

F. Recommended Study Material:

Text Books:

1. AviSilberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw-Hill Education
2. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems,Addison Wesley.
3. Ivan Bay Ross, Introduction to SQL/PL-SQL, PHI

Reference Books:

1. Rob and Coronel, Database Systems: Design, Implementation and Management, Web CT
2. C. J. Date, Introduction to Database Systems, Addition Wesley
3. Thomas Connolly-Carolyn Begg, Data Base systems, Pearson Education
4. Hector Garcia Molina, Database System Implementation, Pearson Eduction
5. RamakrishnamGehrke, Database management system, McGraw Hill
6. Gary W Hansey, Database Management & Design, PHI

Web Materials:

i. http://www.roseindia.net/answers/viewqa/SQL/17707-Advanced-DBMS-questions.html
2. http://en.wikipedia.org/wiki/Database
3. http://www.quackit.com/database/tutorial
4. http://www.visualbuilder.com/database/tutorial/

PRACTICAL LIST GUIDELINES

Topics covered in Lab

- Revision of SQL concepts
- Pl/SQL cursor and loop concept(2 Practical)
- Locking
- Exception Handling
- Procedure and Functions
- Package
- Trigger concept

HS124A: PROFESSIONAL COMMUNICATION

I. Credits and Schemes

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
V	HS124 A/B/C/D/E/F	Professional Communication	02	02	--	--	30	70	100

II. Course Objectives

- To hone and sharpen Professional Communication Skills of students
- To prepare globally and multi-culturally competent communicators and professionally compatible cadre of future professionals
- To equip and empower students to qualify and successfully clear all the phases of selection procedure for on and off campus interviews

III. Course Outline

Module No.	Title/Topic	Classroom Contact Sessions
1	**An Introduction Professional Communication** • *Concept & Applications of Professional Communication* • *Rhetoric in Professional Communication* • *Importance of Ethos, Logos, and Pathos in Professional Communication*	03
2	**Cross-cultural Communication and Globalization** • *Basic Concepts: Culture, Globalization andCross-cultural Communication* • *Social and People Skills* • *Communicating with People of Different Cultures* • *Conflicts in Cross-cultural Communication and Tactics / techniques to resolve them*	08
3	**Group Discussion and Personal Interviews** • *Cover Letters and Resume* • *Styles, Formats and Content of Cover Letters* • *Types of Resume* • *Concept and Rationale of Group Discussion* • *Skills and Aspects assessed in Group Discussion*	10

	• *Concept and Rationale of Personal Interview* • *Types of Personal Interview*	
4	**Group Dynamics and Leadership** • *An Introduction to Group Dynamics and Leadership* • *Groups and their Structures* • *Roles and Functions of Members in Groups* • *Leading a Group* • *Types of Leadership/Leaders* • *Roles and Functions of a Leader* • *Characteristics of an effective Leader*	**05**
5	**Statement of Purpose (SOP)** • Concept and Rationale of Statement of Purpose • Statement of Purpose as a part of Selection Process • Types, Format and Nature of Statement of Purpose • Content and Process of Statement of Purpose	**04**
	Total	**30**

IV. Pedagogy

Teaching will be facilitated by reading material, discussions, task-based learning, projects, assignments and interpersonal activities like group work, independent and collaborative study projects and presentations, etc.

V. Evaluation

Internal Evaluation

Students' performance in the course will be evaluatedon a continuous basis through the following components:

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Assignment	02	05	10
2	Project	01	15	15
3			Attendance	05

Total	30

External Evaluation

University Practical Examination will be for 70 marks to be conducted at the end of the semester. Details are:

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Practical / Viva	01	70	70
			Total	70

VI. Learning Outcomes

After successfully passing through this course, the students would have –

- Gained thorough understanding and proficiency in various Professional Communication Skills.
- Developed awareness and competence in cross-cultural communication in their personal, academic and professional environments.
- Been empowered and confident to prepare impressive RESUMEs, and crack further phases of interview successfully.

VII. Reference Books

- Koneru, A. *Professional Communication*, Tata McGrow Hill Education Private Limited
- Disanza, J.R. &Legge, N. *Business and Professional Communication,* Pearson Education
- Anandamurugan, A. *Placement Interviews – Skills for Success,* Tata McGrow Hill Education Private Limited
- Raman, M & Singh, P. *Business Communication,* Oxford University Press
- Adair, J. *Adair on Leadership*, CREST Publishing House.

IT316: ADVANCED JAVA PROGRAMMING (ELECTIVE I)

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	4	-	6	4
Marks	100	100	-	200	

A. Objective of the Course:

The main objectives for offering the course Advanced Java Programmingare:

- To explain the key components of a J2EE system and understand how they interact.
- To develop an understanding of the various configurations and proper techniques for constructing Servlets, JSP and EJB applications

B. Outline of the Course:

Sr No.	Title of the unit	Minimum Number of Hours
1	RMI Programming	04
2	JDBC SQL Programming	04
3	Java mail API	02
5	Java Security	02
6	Servlet	06
7	JSP	06
8	Java Media Framework	06

Total hours (Theory): 30

Total hours (Lab): 60

Total hours: 90

C. Detailed Syllabus:

1	**RMI Programming**	**04 hours**	**13%**
1.1	Introduction to RMI, Serializable Classes, Remote Classes and Interfaces, Programming a Client, Programming a Server, Starting the Server, Running a Client, Security		
2	**JDBC SQL Programming**	**04 hours**	**13%**
2.1	The JDBC Connectivity Model		
2.2	Database Programming: Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data		
2.3	Error Checking and the SQLException Class, The SQLWarning Class		
2.4	The Statement Interface, The ResultSet Interface, Updatable Result Sets		
2.5	JDBC Types,		
2.6	Executing SQL Queries, ResultSetMetaData, Executing SQL Updates, Transaction Management		
3.	**Java mail API**	**02 hours**	**07%**
3.1	JavaMail (Version 1.2), Java Activation Framework (JAF), Send a Simple Email, Send an HTML Email, Send Attachment in Email, Deleting Email, Forwarding Email, JavaMail – GMail via SSL, JavaMail – GMail via TLS		
4.	**Java Security**	**02 hours**	**07%**
4.1	J2EE security concepts, JVM Security		
4.2	Security management, java API security, browser security		
4.3	Web services security classification, security within a web services tier, programmatic security		
5	**Servlet**	**06 hours**	**20%**
5.1	Overview of Servlet Architecture		
5.2	The Servlet Model and HttpServlets, HTTP and Server Programs		
5.3	Handling Exceptions, Session Management, Filters		
6	**JSP**	**06 hours**	**20%**

6.1	Introduction to JSP, Writing JSP Pages, Translation and Compilation, , ,		
6.2	Errors and Exceptions Handling		
6.3	Including and Forwarding from JSP Pages, Expression Language, Custom Actions and Tag Libraries		
6.4	JavaServer Pages Standard Tag Library(JSTL)		
7	**JAVA Media Framework**	**06hours**	**20%**
7.1	Introduction to Framework		
7.2	3D Graphics		
7.3	Internationalization		
7.4	Case Study: Deploying n-tier Application		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

After completion of the course students will be able to

- Design, create, test, and maintain J2EE components.

- Apply object oriented analysis and design techniques during development of an application.
- Use the various components like Servlets, JSPs, EJBs, involved in developing J2EE applications along with some advanced features like JMS, JNDI, JavaMail API etc.
- Design application based on MVC architecture and its usage.
- Create various xml files used for server configuration, application configuration, etc.
- Package and deploy a J2EE application. Students will have thorough understanding of JAR, WAR and EAR files.

F. Recommended Study Material:

Text Books:

1. James Keogh, The Complete Reference,TATA McGraw-Hill.
2. James L. Weaver, Kevin Mukhar, and Jim Crume, Beginning J2EE 1.4: From Novice to Professional, Wrox
3. Bryan Basham, Kathy Sierra, and Bert Bates, Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam, O'Reilly Media

Reference Books:

1. Kathy Sierra and Bert Bates, Head First EJB, O'Reilly Media
2. Richard Monson-Haefel, J2EE Web Services: XML SOAP WSDL UDDI WS-I JAX-RPC JAXR SAAJ JAXP,Addison-Wesley Professional

Web Materials:

1. http://www.service-architecture.com/application-servers/articles/j2ee_web_site_architecture.html
2. http://www.oracle.com/technetwork/java/javaee/overview/index.html
3. http://www.roseindia.net/struts/hibernatespring/index.shtml
4. http://www.roseindia.net/jsf/

IT317: ADVANCED PROGRAMMING USING .NET FRAMEWORK(ELECTIVE I)

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	4	-	6	4
Marks	100	100	-	200	

A. Objective of the Course:

The main objectives for offering the course are

- To explain with the Windows and Web Based Development using Microsoft Visual Studio.
- To use and create various tool using .net technology for creating new software product.
- To impart the knowledge of latest technologies and software tools and having ability to use this tools for developing software application in specialize area.

B. Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1	Introduction to .NET Framework	02
2	C# - The Basics, Console Applications in C#	04
3	C#.NET	04
4	ADO.NET	04
5	Windows Forms and Controls in detail	06
6	ASP.NET	04
7	Themes and Master Pages	02
8	Creating and Consuming Web Services ,Managing State,	03
9	Advanced in .NET	01

Total hours (Theory): 30

Total hours (Lab): 60

Total hours: 90

C. Detailed Syllabus:

1	**Introduction to .NET Framework**	**02 Hours**	**06%**
1.1	NET framework, MSIL, CLR, CLS, CTS, Namespaces, Assemblies The Common Language Implementation		
1.2	Assemblies		
1.3	Garbage Collection		
1.4	The End to DLL Hell - Managed Execution		
2	**C# - The Basics and Console Applications in C#**	**04 Hours**	**14%**
2.1	Name Spaces - Constructor and Destructors		
2.2	Function Overloading & Inheritance, Operator Overloading		
2.3	Modifiers - Property and Indexers		
2.4	Attributes & Reflection API.		
2.5	When to use Console Applications - Generating Console Output		
2.6	Processing Console Input		
3	**C#.NET**	**04 Hours**	**13%**
3.1	Language Features and Creating .NET Projects		
3.2	Namespaces Classes and Inheritance -		
3.3	Structured Error Handling		
3.4	Exploring the Base Class Library -		
3.5	Debugging and Error Handling -		
3.6	Data Types -		
3.7	Exploring Assemblies and Namespaces		
3.8	String Manipulation ,Files and I/O ,Collections		
4	**ADO.NET**	**04 Hours**	**13%**
4.1	Benefits of ADO.NET		
4.2	ADO.NET compared to classic ADO -		
4.3	DataSets		
4.4	Managed Providers -		
4.5	Data Binding: Introducing Data Source Controls -		
4.6	Reading and Write Data Using the SqlDataSource Control		
5	**Windows Forms and Controls in details**	**06 Hours**	**20%**
5.1	The Windows Forms Model		

5.2	Creating Windows Forms Windows Forms Properties and Events		
5.3	Windows Form Controls		
5.4	Menus - Dialogs – ToolTips		
	Visual Inheritance in C#.NET		
5.5	Apply Inheritance techniques to Forms		
5.6	Creating Base Forms -		
5.7	Programming Derived Forms		
	Mastering Windows Forms		
5.8	Printing - Handling Multiple Events		
5.9	Creating Windows Forms Controls		
6	**ASP.NET**	**04 Hours**	**13%**
6.1	Introduction to ASP.NET, Working with Web and HTML Controls		
6.2	Using Rich Server Controls, Login controls, Overview of ASP.NET Validation Controls		
6.3	Using the Simple Validations -		
6.4	Using the Complex Validators Accessing Data using ADO.NET		
6.5	Using the Complex Validators Accessing Data using ADO.NET		
6.6	Configuration Overview		
7	**Themes and Master Pages**	**02 Hours**	**7%**
7.1	Creating a Consistent Web Site		
7.2	ASP.NET Themes - Master Pages		
7.3	Displaying Data with the GridView Control Introducing the GridView Control		
7.4	Filter Data in the GridView Control		
7.5	Allow Users to Select from a DropDownList in the Grid		
7.6	Add a Hyperlink to the Grid		
7.7	Deleting a Row and Handling Errors		
8	**Creating and Consuming Web Services ,Managing State**	**03 Hours**	**10%**
8.1	The Motivation for XML Web Services		
8.2	Creating an XML Web Service with Visual Studio -		
8.3	Designing XML Web Services -		

8.4	Creating Web Service Consumers -		
8.5	Discovering Web Services Using UDDI		
8.6	Preserving State in Web Applications and Page-LevelState		
8.7	Using Cookies to PreserveState		
8.8	ASP.NET SessionState ,Storing Objects in SessionState , Configuring SessionState		
8.9	Setting Up an Out-of-ProcessState Server -		
9	**Advanced in .NET**	**01 Hours**	**04%**
9.1	Introduction to Windows Presentation Foundation (WPF)		
9.2	Window Communication Foundation and its Application.		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
    - Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

After completion of the course students will be able to

- Aware of various .Net frameworks and able to develop various applications using visual studio IDE.
- Develop desktop based solutions by using windows application, GDI and visual inheritance.
- Effectively design the website and build their carrier in web designing and development.
- Use advanced concepts related to Web Services, WCF, and WPF in project development.

F. Recommended Study Material:

Text Books:

1. Christian Nagel, Professional C# .Net, Wrox Publication
2. Vijay Mukhi, C# The Basics, BPB Publications
3. Matthew Macdonald and Robert Standefer, ASP.NET Complete Reference, TMH

Reference Books:

1. Asp.Net 4.0: Covers C# 2010 & VB 2010 Codes, Black Book

Web Materials:

1. www.c-sharpcorner.com
2. www.csharp-station.com/Tutorial.aspx

IT313.01: EMBEDDED SYSTEMS (ELECTIVE I)

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	4	-	6	4
Marks	100	100	-	200	

A. Objective of the Course:

The main objectives for offering the course Embedded Systems are:

- To have a basic proficiency in a traditional embedded C language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of embedded software development and associated hardware.
- To have a basic understanding of some of the more advanced topics of embedded systems.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum Number of hours
1.	Introduction to Embedded System.	04
2.	Embedded Software.	07
3.	Embedded System Development.	06
4.	Real Time Operating System.	06
5.	Real Time Programming Issues.	05
6.	Case Study of embedded and real-time operating systems, real time applications	02

Total hours (Theory):30

Total hours (Lab): 60

Total hours: 90

C. Detailed Syllabus:

1. **Introduction to Embedded System.** **04 hours 13%**
   - 1.1 Characteristics of Embedded System.
   - 1.2 Types of Embedded Systems.
   - 1.3 Examples of Embedded Systems.

2. **Embedded Software.** **07 hours 25%**
   - 2.1 Embedded Programming in C and C++
   - 2.2 Source Code Engineering Tools for Embedded C/C++
   - 2.3 Program Modeling Concepts in Single and Multiprocessor Systems
   - 2.4 Software Development Process
   - 2.5 Software Engineering Practices in the Embedded Software Development

3. **Embedded System Development.** **06 hours19%**
   - 3.1 Embedded software development tools – Emulators and debuggers.
   - 3.2 Design issues and techniques
   - 3.3 Case studies
   - 3.4 Complete design of example embedded systems

4. **Real Time Operating System.** **06 hours20%**
   - 4.1 Typical OS structure.
   - 4.2 RTOS structure.
   - 4.3 The context of its use.
   - 4.4 Schedule management for multiple tasks.
   - 4.5 Scheduling in real time.
   - 4.6 Interrupt routines in RTOS environment.
   - 4.7 RTOS task scheduling models.
   - 4.8 List of basic actions in pre-emptive scheduler and expected time taken.

5 **Real Time Programming Issues.** **05 hours17%**
   - 5.1 Real time programming issues during software development process
   - 5.2 Distinction between functions, ISR and tasks.
   - 5.3 Problems of sharing data in RTOS.
   - 5.4 Inter-process communication in RTOS.
   - 5.5 Interrupt servicing mechanism.
   - 5.6 Context and periods for context switching.
   - 5.7 Deadline and Interrupt latency.

6 **Case Study of embedded and real-time operating systems, real time applications.** **02 hours 06%**
   - 6.1 Case study of RTOS using MUCOS.
   - 6.2 Case study for RTOS based programming.
   - 6.3 Coding for Automatic Chocolate vending machine using MUCOS.

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

Upon completion of this course, students will be able:

- To solve difficult and complex problem of computer science using Embedded Systems
- To select any R&D field related to application of Embedded Systems in PG courses.
- To develop hardware based solutions to industry problems
- To develop software solution as per need of today's IT edge which requires high automation and less human intervention.

F. Recommended Study Material:

Text Books

1. Rajkamal, "Embedded System: Architecture, Programming and Design" Tata McGraw-Hill, 2003.
2. WayneWolf, "Computers as Components: Principles of Embedded Computer SystemDesign",Elsevier,2006.

Reference Books

1. SriramIyer and Pankaj Gupta, "Embedded Real Time Systems Programming", Tata McGraw-Hill, 2004.
2. F. Vahid, T. Givargis, Embedded System Design, John Wiley and Sons, 2002
3. Code generation for Embedded Processors by Peter Marwedel, G. Goosens, KlunerAcademic Pub. 1993.

IT318: SOFTWARE GROUP PROJECT - III

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	0	2	-	2	1
Marks	0	50	-	50	

A. Objective of the Course:

The main objective of the course is:

- To increase awareness and enhance knowledge of students in developing software projects compatible with industry standard, technology and latest development in field of Computer and IT.
- To apply various tools in software development life cycle.

B. Outline of the Course:

Sr. No.	Title	Minimum Number of Hours
1	Software Project Planning and Tracking tools	10
2	Software Designing Tools	10
3	Software Testing Tools	10

Total hours (Theory): 00
Total hours (Lab): 30
Total hours: 30

C. Detailed Syllabus:

1.	**Software Project Planning and Tracking Tools**	**10 Hours**
1.1	Pert Chart, Gantt Chart, MS Project and Visio	
1.2	Primavera for project tracking	
2	**Software Project Designing Tools**	**10 Hours**
2.1	MS Visio, Rational Rose, Edraw Max	
3	**Software Testing Tools**	**10 Hours**
3.1	Win runner, HP Load Runner	

D. Instructional Method and Pedagogy:

1. Project Groups would be form of maximum two students.
2. Inter batch group formation is not permitted due to difficulties in progress tracking.
3. Students are advised to choose innovative and challenging definitions.
4. Batch wise project definitions must be unique.
5. Any management system as project topic would be preferable in this semester.
6. Tools like GitHub would be used to track the progress of project development by the concern faculty. Concerned guide will demonstrate the working of GitHub Tool.
7. Student has to prepare report at end of semester as part of submission.
8. Report structure is finalized for semester end submission.
9. To have a better outcome as well as progress tracking at the end of semester, it is decided that students have to appear for two internal reviews, which will help them to get more insight in the project.

E. Student Learning Outcome:

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

- At the end of this practical session student will do certain hand on experience on software project phase tools.
- Students will able to apply software project management concepts in software engineering subject.

B. Tech. (Information Technology) Programme

SYLLABI

(Semester – 6)

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

IT315: COMPUTER NETWORKING

Credit Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	-	6	5
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Computer Network are:

- To learn the basics of data communications technologies.
- To build knowledge on various OSI and TCP/IP.
- To study the working principles of LAN and its standards.
- To build skills in working with Ethernet Protocols to develop simulated environment.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Computer Networks and the Internet	05
2.	Application Layer	13
3.	Transport Layer	18
4.	The Network Layer	13
5.	The Link Layer: Links, Access Networks, and LANs	07
6.	Network Management	04

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

C. Detailed Syllabus:

1.	**Computer Networks and the Internet**	**05 hours**	**08 %**
1.1	What Is a Protocol?		
1.2	Access Networks		
1.3	Physical Media		
1.4	Packet Switching & Circuit Switching		
1.5	Delay, Loss, and Throughput in Packet-Switched Networks		
2.	**Application Layer**	**13 hours**	**22 %**
2.1	Principles of Network Applications		
2.2	The Web and HTTP		
2.3	File Transfer: FTP		
2.4	SMTP		
3.	**Transport Layer**	**18 hours**	**30 %**
3.1	Introduction and Transport-Layer Services		
3.2	Multiplexing and DE multiplexing		
3.3	Connectionless Transport: UDP		
3.4	Principles of Reliable Data Transfer		
3.5	Connection-Oriented Transport: TCP		
3.6	Principles of Congestion Control		
4.	**The Network Layer**	**13 hours**	**22 %**
4.1	Introduction		
4.2	Virtual Circuit and Datagram Networks		
4.3	What's Inside a Router?		
4.4	The Internet Protocol (IP): Forwarding and Addressing in the Internet		
4.5	Routing Algorithms		
5.	**The Link Layer: Links, Access Networks, and LANs**	**07 hours**	**12 %**
5.1	Introduction to the Link Layer		
5.2	Error-Detection and -Correction Techniques		
5.3	Multiple Access Links and Protocols		
5.4	Switched Local Area Networks		
6	**Network Management**	**04 hours**	**07 %**
6.1	What Is Network Management?		

6.2 The Infrastructure for Network Management

6.3 The Internet-Standard Management Framework

7 Self-Study Topics

Data Centre Networking, Socket Programming with UDP,

Socket Programming with TCP

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

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

- Students will learn the fundamentals of Computer Networking & its applications.
- Students will develop "state of the art application" with the use of theoretical and practical knowledge gained in the semester.

F. Recommended Study Material:

Text Book

1. Computer Networking: A Top-Down Approach James F. Kurose, University of Massachusetts, Amherst Keith W. Ross, Polytechnic University, Brooklyn

Reference Materials:

1. Computer Networks by Andrew S Tanenbaum.
2. Data Communication And Networking by BehrouzForouzan

Web Materials:

1. www.ietf.org – For drafts
2. www.ieee.org – For standards and technical research papers
3. http://nptel.iitm.ac.in/courses.php?disciplineId=117

IT319 CAPSTONE COURSE

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	0	1	5	4
Marks	100	–		100	

A.Objective of the Course:

The main objectives for offering the Capstone Course are:

- To provide an understanding and learn basic concepts of core subjects which will help students in placement technical knowledge and clearing graduate exams.
- By studying capstone course students will able to apply for higher studies in reputed institutes.

B. Syllabus

Digital Logic

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Computer Organization and Architecture

Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Programming and Data Structures

Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Algorithms

Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, and shortest paths.

Operating System

Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

Databases

ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

C. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 20 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the student'sin-between each core subject and students need to submit unsolved questions related to core subject.

IT306.02 CRYPTOGRAPHY & NETWORK SECURITY

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	4	-	8	6
Marks	100	100	-	200	

A. Objective of the Course:

The main objectives for offering the course Cryptography and Network Security are:

- To introduce cryptography theories, algorithms and systems. Necessary approaches and techniques to build protection mechanisms in order to secure computer networks
- To explain the basics of modern cryptography including symmetric key cryptography, public key cryptography, secure hash and digital signature.
- To explore issues surrounding secure key management, random number generation, and the incorporation of cryptography into legacy applications.
- To analyze performance of various cryptographic and cryptanalytic algorithms.

B. Outline of the Course:

Sr No.	Title of the unit	Minimum number of hours
1.	Introduction and Mathematical Foundations	09
2.	Symmetric Key Ciphers	15
3.	Public Key Cryptography	09
4.	Message Authentication and HashFunction	09
5.	Network Security	12
6.	System Security	06

Total hours (Theory): 60

Total hours (Lab): 60

Total hours: 120

C. Detailed Syllabus:

1.	**Introduction and Mathematical Foundations**	**09 hours**	**15 %**
1.1	Security trends – Attacks, Services and Mechanism		
1.2	Conventional Encryption Model, Classical Encryption Techniques, Different types of ciphers, Steganography		
1.3	Basic Number theory—Prime And Relative Prime Numbers, Modular Arithmetic, Congruence ,Fermat and Euler's theorem, Euclid's Algorithm, Chinese Remainder theorem, LFSR sequences , Finite fields.		
2.	**Symmetric Key Ciphers**	**15 hours**	**25 %**
2.1	Simplified Data Encryption Standard, DES, Triple DES		
2.2	Block Cipher Principles,Characteristics Of Advanced Symmetric Block Cipher, Differential And Linear cryptanalysis, Block Cipher Design Principles		
2.3	Advanced Encryption Standard Algorithm,RC4 and RC5		
2.4	Modes of Operation		
2.5	Pseudorandom Number generator and function, Key Distribution		
3.	**Public Key Cryptography**	**09 hours**	**15%**
3.1	Principles Of Public-Key Cryptography		
3.2	RSA Algorithm		
3.3	Key Management		
3.4	ElGamal Algorithm		
3.5	Diffie-Hellman Key Exchange		
4.	**Message Authentication and Hash Function**	**09 hours**	**15 %**
4.1	Authentication Requirement		
4.2	Hash Functions ,Message Authentication Code, Security Of Hash Functions And MAC		
4.3	MD5 Message Digest Algorithm, Secure Hash Algorithm, HMAC		
4.4	Authentication protocols ,Digital Signatures, DSS,		
5.	**Network Security**	**12 hours**	**20%**
5.1	AuthenticationApplications—Kerberos, X.509 Directory		

Authentication Service,

5.2 Electronic Mail Security—PGP ,S/MIME

5.3 IP security —Overview, ESP, AH, Transport and Tunnel mode in IP Sec

5.4 Web Security— Web Security Requirement, SSL, TLS,SET

6. System Security **06 hours** **10%**

6.1 Intruders, Viruses and Related Threats

6.2 Firewall Design Principles

6.3 Trusted Systems

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

After completion of the course students will be able to

- Know the importance of security and to apply the concepts of techniques and methods to implement security mechanism.
- Implements the aspects of integrity and authentication, like digital signature and message digest, and map them with practical use of it.

- Come up with new techniques and methods which can be considered as algorithm of cryptography and eventually can be deployed as independent technique.
- Apply the technique to make legacy system more secure by adapting latest methods.

F. Recommended Study Material:

Text Books:

1. William Stallings, Cryptography And Network Principles And Practice,Prentice Hall, Pearson Education Asia

Reference Books:

1. Behrouz A. Forouzan, Cryptography and Network Security, McGraw-Hill Companies
2. AtulKahate, Cryptography & Network Security, The McGraw-Hill Companies
3. William Stallings Network Security Essentials: Applications And Standards, Prentice Hall, Pearson Education

Reference Links/ e-content:

1. http://people.csail.mit.edu/rivest/crypto-security.html
2. http://www.cryptix.org/
3. http://www.cryptocd.org/
4. http://www.cryptopp.com/

IT307.02: SOFTWARE ENGINEERING

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	1	6	4
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Software Engineering are:

- To describe the concepts of Software requirements gathering and analyzing, Software design techniques, implementation guidelines,
- To explain CASE tools, design concepts,automated Software Testing, Documentation and Maintenance.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum Number of Hours
1	Introduction to Software and Software Engineering	05
2	Agile Development	04
3	Managing Software Project	07
4	Requirement Analysis and Specification	04
5	Software Design	06
6	Software Coding &Testing	07
7	Quality Assurance and Management	04
8	Software Maintenance and Configuration Management	05
9	Advanced Topics in Software Engineering	03

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

C. Detailed Syllabus:

1	**Introduction to Software and Software Engineering**	**05 hours**	**11%**
1.1	The Evolving Role of Software		
1.2	Software: A Crisis on the Horizon and Software Myths		
1.3	Software Engineering: A Layered Technology		
1.4	Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Process Models, Spiral Model, Agile Process Model		
1.5	Component-Based Development, Process, Product and Process		
2.	**Agile Development**	**04 hours**	**9%**
2.1	Agility and Agile Process model		
2.2	Extreme Programming		
2.3	Other process models of Agile Development and Tools		
3	**Managing Software Project**	**07 hours**	**16%**
3.1	Software Metrics (Process, Product and Project Metrics)		
3.2	Software Project Estimations		
3.3	Software Project Planning (MS Project & Visio Tool)		
3.4	Project Scheduling & Tracking(Earn Value Analysis)		
3.5	Risk Analysis & Management(Risk Identification, Risk Projection, Risk Refinement ,Risk Mitigation)		
4	**Requirement Analysis and Specification**	**04 hours**	**9%**
4.1	Understanding the Requirement		
4.2	Requirement Modeling		
4.3	Requirement Specification (SRS)		
4.4	Requirement Analysis and Requirement Elicitation		
4.5	Requirement Engineering		
5	**Software Design**	**06 hours**	**13%**
5.1	Design Concepts and Design Principal		
5.2	Architectural Design		
5.3	Component Level Design (Function Oriented Design, Object Oriented Design) (MS Visio Tool)		
5.4	User Interface Design		
6.	**Software Coding & Testing**	**07 hours**	**16%**
6.1	Coding Standard and coding Guidelines		

6.2	Code Review		
6.3	Software Documentation		
6.4	Testing Strategies		
6.5	Testing Techniques and Test Case, Test Suites Design		
6.6	Testing Conventional Applications		
6.7	Testing Object Oriented Applications		
6.8	Testing Web and Mobile Applications, Testing Tools (Win runner, Load runner)		
7	**Quality Assurance and Management**	**04 hours**	**9%**
7.1	Quality Concepts and Software Quality Assurance		
7.2	Software Reviews (Formal Technical Reviews)		
7.3	Software Reliability		
7.4	The Quality Standards: ISO 9000, CMM, Six Sigma for SE.		
7.5	SQA Plan		
8	**Software Maintenance and Configuration Management**	**05 hours**	**11%**
8.1	Types of Software Maintenance, Re-Engineering, Reverse Engineering, Forward Engineering		
8.1	The SCM Process, Identification of Objects in the Software Configuration		
8.2	Version Control and Change Control		
9	**Advanced Topics in Software Engineering**	**03 hours**	**6%**
9.1	Component-Based Software Engineering, Client/Server Software Engineering, Web Engineering, Reengineering, Computer-Aided Software Engineering		
9.2	Software Process Improvement		
9.3	Emerging Trends in software Engineering		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.
- Students have to under gone MOOCS Classes by Armando Fox and David Patterson

E. Student Learning Outcome:

After completion of the course students will be able to

- Prepare SRS (Software Requirement Specification) document and SPMP (Software Project Management Plan) document.
- Apply the concept of Functional Oriented and Object Oriented Approach for Software Design.
- Recognize how to ensure the quality of software product, different quality standards and software review techniques.
- Apply various testing techniques and test plan in.
- Able to understand modern Agile Development and Service Oriented Architecture Concept of Industry.

F. Recommended Study Material:

Text Books:

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Editions

Reference Books:

1. Engineering Software as a Service An Agile Software Approach,Armando Fox and David Patterson
2. Ian Sommerville, Software engineering, Pearson education Asia
3. PankajJalote, An Integrated Approach to Software Engineering by, Springer
4. Rajib Mall, Fundamentals of software Engineering,Prentice Hall of India.
5. John M Nicolas, Project Management for Business, Engineering and Technology,Elsevier

Web Materials:

1. www.en.wikipedia.org/wiki/Software_engineering
2. www.win.tue.nl
3. www.rspa.com/spi
4. www.onesmartclick.com/engsineering/software-engineering.html
5. www.sei.cmu.edus
6. https://www.edx.org/school/uc-berkeleyx

IT320: SERVICE ORIENTED ARCHITECTURE [ELECTIVE-II]

Credit Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	-	5	4
Marks	100	50	-	150	

A. Objective of the Course:

- The primary objective of this subject to close the gap between the high-level concept of Service-Oriented Architecture
- Gain a comprehensive understanding of the philosophy and architecture of Web services and Service Oriented Architecture
- Understand the principle of Web services security and implement authentication on both the server and client

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Roots of SOA	03
2.	Webservice Basics	16
3.	Service Oriented Analysis	02
4.	SOA Platform Basics	12
5.	WS-BPEL basics	12

Total hours (Theory): 45 Hrs.

Total hours (Lab): 30Hrs.

Total hours: 75Hrs.

C. Detailed Syllabus:

1.	**Roots of SOA** Introduction, Comparing SOA to different architecture, Anatomy of SOA How Components in SOA interrelate, Principles of SOA	**03Hrs**	**08%**
2.	**Web Service Basics** Service Description, Messaging with SOAP, Message Exchange pattern, Coordination, Transaction, Business Activities, Orchestration, Choreography, Task centric business service design	**16Hrs**	**36%**
3.	**Service Oriented Analysis** Business centric SOA, WSDL Basics, SOAP Basics, Service Layer Abstraction Application Server Design	**02Hrs**	**04%**
4.	**SOA Platform Basics** SOA supports in J2EE, Java API for XML based web service (JAX-WS) Java architecture for XML Registries (JAXR), JAX-RPC, SOA supports in .NET ASP.NET web service, Web service Enhancement (WSE)	**12Hrs**	**26%**
5.	**WS-BPEL** Introduction, WS-Coordination overview, WS-Choreography WS-Policy, WS-Security	**12Hrs**	**26%**

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Faculty would use **coached** problem solving method as it is class format in which faculty provide a structured, guided context for students working collaboratively to solve problems.
- Attendance is compulsory in lectures and laboratory which carries 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weight age of 5%.
- Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.

- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Minimum 10 experiments are suggested in the laboratory related to course content.

E. Student Learning Outcome:

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

- Dissect the unique characteristics of web services; be able to distinguish web services from web-based applications and other middleware technologies
- Demonstrate an in-depth knowledge of key standards and platforms that enable the realization of web services, including SOAP, WSDL, UDDI and XML
- Articulate the architectural principles of SOA; be able to demonstrate and critically appraise the role of SOA within the framework of business process management and enterprise system integration
- Deploy, use, and publish web services based on SOA principles and service oriented development methodology

F. Recommended Study Material:

Text Books:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education
2. SOA Using Java™ Web Services by Mark D. Hansen

Reference Books:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education.
2. Service-Oriented Computing: Semantics, Processes, Agents, Munindar P. Singh and Michael N Huhns, John Wiley & Sons, Ltd., 2005
3. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education.
4. SandeepChatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education.
5. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation" O'REILL

IT321: INTELLIGENT SYSTEM [ELECTIVE-II]

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	-	5	4
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Artificial Intelligence are:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.
- Students will explore this through problem-solving paradigms, logic and theorem proving, language and image understanding, search and control methods and learning.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to Intelligent System(IS)	02
2.	Problem Solving	12
3.	Knowledge and Reasoning	10
4.	Adversarial Search: Game Plying	06
5.	Uncertain Knowledge and Reasoning	06
6.	Machine Learning	05
7.	NLP and ES	04

Total hours (Theory): 45
Total hours (Lab): 30
Total hours: 75

C. Detailed Syllabus:

1.	**Introduction to Intelligent System(IS)**		
1.1	Introduction to IS, Characteristics, Advantages and its Application		
1.2	Defining the Problems as a State Space Search, Production System Characteristics, and Issues in the design of Search Programs	**02 Hours**	**04%**
1.3	Additional Problems		
2.	**Problem Solving**		
2.1	Solving Problems by Searching		
2.2	Uninformed Search Strategies	**12 Hours**	**27%**
2.3	Heuristic Search Techniques		
2.4	Constraint Satisfaction Problems, Mean Ends Analysis		
3	**Knowledge and Reasoning**		
3.1	Logic, Building a Knowledge Base: Propositional logic, First order logic		
3.2	Theorem Proving in First Order Logic, Inference in FOL, Procedural Versus Declarative Knowledge, Forward Versus Backward Reasoning, Resolution, Knowledge Representation, Fuzzy Logic	**10 Hours**	**23%**
4	**Adversarial Search: Game Plying**		
4.1	Optimal Decision in Game	**06 Hours**	**14%**
4.2	Minimax Algorithm, Alpha-Beta Pruning		
5	**Uncertain Knowledge and Reasoning**		
5.1	Uncertainty, Probabilities, Bayesian Networks.	**06 Hours**	**14%**
5.2	Planning, Planning Problem: The Blocks World, partial order planning		
6	**Machine Learning**		
6.1	Introduction to Machine Learning		
6.2	Examples of Machine Learning Applications		
6.3	Learning Associations, Classification, Regression, Supervised and Unsupervised Learning, Reinforcement Learning	**05 Hours**	**10%**
6.4	Machine Learning Algorithms: Artificial Neural Networks, Support Vector Machine, Bayesian Decision Theory, Reinforcement learning		
7	**NLP and ES**		
7.1	Introduction to NLP	**04 Hours**	**08%**
7.2	Syntactic Processing, Semantic Analysis, Discourse And Pragmatic		

Processing

7.3 Introduction to Expert System

7.4 Expert System Developments Process, Knowledge Acquisition

D. Instructional Method and Pedagogy:

At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

Upon completion of this course, students will be able:

- To solve difficult and complex problem of computer science using AI techniques.
- To select any R&D field related to application of AI in PG courses.
- To understand soft computing and machine learning courses at PG level.
- To develop software solution as per need of today's IT edge which requires high automation and less human intervention.
- To demonstrate working knowledge in Python in order to write and explore more sophisticated Python programs
- To apply knowledge representation, reasoning, and machine learning techniques to real-world problems

F. Recommended Study Material:

Text Books:

1. Elaine Rich and Kevin Knight, Artificial Intelligence, Tata Mcgraw-Hill
2. Nils J Nilson, Artificial intelligence: A new synthesis, Morgan Kaufmann Publishers.
3. Carl Townsend, Introduction to Prolog Programming, Sybex Inc
4. Machine Learning for Hackers Paperback –by Conway (Author)

Reference Books:

1. D.W.Rolston, Artificial Intelligence And Expert System Development, Mcgraw-Hill International Edition
2. D.W.Patterson, Artificial Intelligence And Expert Systems,Prentice hall of India
3. Ivan Bratko, PROLOG Programming For Artificial Intelligence, Addison-Wesley

Web Materials:

1. http://en.wikipedia.org/wiki/Artificial_intelligence
2. http://nptel.iitm.ac.in/video.php?courseId=1041
3. http://www-formal.stanford.edu/jmc/whatisai/whatisai.html
4. http://www.webopedia.com/TERM/A/artificial_intelligence.html

IT323: ADVANCED OPERATING SYSTEM [ELECTIVE-II]

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	-	5	4
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Advanced Operating System are:

- To expose the classic and current operating systems literature.
- To gain experience of conducting research in the area of operating system.
- To acquire and pursue deeper knowledge in the field of operating system.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Basics of operating system	05
2.	The Process and The kernel	08
3.	Threads and Lightweight Processes	08
4.	The Buffer Cache	06
5.	System Calls for the file system	10
6.	**Signal and Session Management**	04
7.	Case Study: Multiprocessor Systems, Distributed Unix Systems	04

Total hours (Theory): 45
Total hours (Lab): 30
Total hours: 75

C. Detailed Syllabus:

1. Basics of operating system **05 hours** **11%**

Introduction to an operating system, history of an Operating system, computer hardware review, Operating system Concepts, System Calls

2. The Process and The kernel **08 hours** **18%**

Introduction, architecture of Unix operating system, Mode space and context, The process abstraction, kernel data structure, Executing in kernel mode, System administrator

3. Threads and Lightweight Processes **08 hours** **18%**

Introduction, Fundamental Abstractions, Lightweight Process design, User-level thread libraries, Scheduler Activations, Multithreading in Solaris and SVR4, Threads in Mach, Digital Unix, Mach 3.0 continuations

4. The Buffer Cache **06hours** **13%**

Buffer headers, Structure of the buffer pool, Scenario for retrieval of a buffer, Reading and writing disk blocks, Advantages and disadvantages of duffer cache.

5. System Calls for the file system **08 hours** **22%**

Open, read , write , file and record locking, adjusting the position of File I/O - Iseek , close, file creation, creation of special file, change directory and change root, change owner and change mode, STATE and FSTATE, Pipes, Dup, mounting and unmounting file systems, link and unlink, file system abstractions and maintenance

6. Signal and Session Management **04 hours** **9%**

Single generation and handling, Unreliable single, Reliable single, Singles in SVR4, Signals implementations, Exceptions, Mach exception handling, Process groups and Terminal Management, The SVR4 sessions architecture

7. Case Study: Multiprocessor Systems, Distributed Unix Systems **04 hours** **9%**

overview, Solutions with master and slave processors, solutions with semaphore, performance limitation, Satellite Processors, The Newcastle connection, transparent distributed file systems

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc. Faculty would use the approach teaching with data as it would help to find and integrate real data sets into their classes.
- Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
- Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Minimum 10 experiments are suggested in the laboratory related to course content.

E. Student Learning Outcome:

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

- Be familiar with the modules of kernel and data structure used for kernel management
- Be familiar with memory management schemes in detail and internal data structures used for memory management
- Be exposed to practical knowledge of thread, signal and system calls for file system at system level
- Be exposed to the various types of operating system at the end
- Be exposed to the basic concepts of data consistency and data consistency models.

F. Recommended Study Material:

Text Books:

1. Maurice J. Bach ,"*The Design of the Unix Operating System*", by Tata McGraw Hill
2. UreshVahalia, "*UNIX Internals*", Prentice Hall Press

Reference Books:

1. MukeshSinghal and NiranjanShivaratri, "*Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating System*", Tata McGraw Hill Publisher.
2. Silberschatz and Galvin, "*Operating Systems Concepts*"
3. Maekawa, Oldehoeft , "*OS: Advanced Concepts*", Addison-Wesley.
4. SapeMullender ,"*Distributed Systems*", Addison-Wesley.
5. Bil Lewis, Daniel J. Berg, "*Multithreaded Programming with Pthreads*"
6. Andrew Tanenbaum and Maarten van Steen, "*Distributed Operating System*" , PHI Publisher

IT322: SOFTWARE GROUP PROJECT - IV

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	0	2	-	2	1
Marks	0	50	-	50	

A. Objective of the Course:

The main objective of the course is:

- To increase awareness and enhance knowledge of students in developing software projects compatible with industry standard, technology and latest development in field of Computer and IT.
- To apply various tools in software development life cycle.

B. Outline of the Course:

Sr. No.	Title	Minimum Number of Hours
1	Software Project Planning and Tracking tools	10
2	Software Designing Tools	10
3	Software Testing Tools	10

Total hours (Theory): 00
Total hours (Lab): 30
Total hours: 30

C. Detailed Syllabus:

1.	**Software Project Planning and Tracking Tools**	**10 Hours**
1.1	Pert Chart, Gantt Chart, MS Project and Visio	
1.2	Primavera for project tracking	
2	**Software Project Designing Tools**	**10 Hours**
2.1	MS Visio, Rational Rose, Edraw Max	
3	**Software Testing Tools**	**10 Hours**
3.1	Win runner, HP Load Runner	

D. Instructional Method and Pedagogy:

1. Project Groups would be form of maximum two students.
2. Inter batch group formation is not permitted due to difficulties in progress tracking.
3. Students are advised to choose innovative and challenging definitions.
4. Batch wise project definitions must be unique.
5. Project based on Web development, E-commerce etc. are restricted. As they would be covered as part of curriculum in other courses.
6. Tools like GitHub would be used to track the progress of project development by the concern faculty. Concerned guide will demonstrate the working of GitHub Tool.
7. Student has to prepare report at end of semester as part of submission.
8. Report structure is finalized for semester end submission.
9. To have a better outcome as well as progress tracking at the end of semester, it is decided that students have to appear for two internal reviews, which will help them to get more insight in the project.

E. Student Learning Outcome:

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

- At the end of this practical session student will do certain hand on experience on software project phase tools.
- Students will able to apply software project management concepts in software engineering subject.

HS125 A: SOCIETY, GOVERNANCE AND INTERNATIONAL STUDIES

I. Credits and Schemes:

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
VI	HS125 A/B/C/D/E/F/G	Society, Governance and International Studies	02	02	25	25	25	25	100

II. Course Objectives

To facilitate learners to:

- develop a familiarity with the mechanics of critical thinking and logic
- understand basic concepts of critical thinking and logic
- explore and understand critical thinking and logic in context of professional, social and personal spectrum
- explore an application critical thinking and logic in personal, social, academic, global and profession life.

III. Course Outline

Module No.	Title/Topic	Classroom Contact Hours
1	**Fundamental Concepts** • *Civil Society* • *Governance* • *Democracy* • *Citizenship* • *Globalization* • *International Studies*	**04**
2	**Self, Citizenship, and Social Responsibility** • *Aspects of Self & Citizenship* • *Aspects of Self, Citizenship and Social Responsibility*	**06**
3	**Governance & Society** • *Concept of Governance and Government : the Relationship* • *Role of Civil Society in Effective Governance* • *The System of Democratic Governance: the features of Effective Democratic Governance*	**06**
4	**International Studies** • *Study of International Organizations* • *International Laws*	**08**

	• *Concept of Human Rights* • *Concept of Multiculturalism* • *Globalization and Communication* • *Concept and Methods of International Relationship*	
5	**Society, Governance and International Studies & Contemporary Issues** • *Sustainable Living* • *Peace & Conflict* • *Contemporary Global Trends* • *Contribution and Creativity* • *Case Studies*	**06**
	Total	**30**

IV. Instruction Methods and Pedagogy

The course is based on practical learning. Teaching will be facilitated by reading material, discussion, task-based learning, projects, assignments and various interpersonal activities like case studies, critical reading, group work, independent and collaborative research, presentations etc.

V. Evaluation

Internal Evaluation

The students' performance in the course will be evaluated (25 marks for theory and 25 marks for practical) on a continuous basis through the following components:

Theory

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Assignment	02	10	20
2			Attendance	5
			Total	25

Practical

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Project	01	10	10
2	Term-Work	-	10	10
			Attendance	5
			Total	25

External Evaluation

The University examination will be for 50 marks (25 marks for theory and 25 marks for practical). The examination will avoid, as far as possible, direct questions on usage, grammar, errors, etc. and will focus on applications.

Theory

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Theory Paper	01	25	25
			Total	25

Practical

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Viva	01	25	25
			Total	25

VI. Learning Outcomes

At the end of the course, learners will be able to:

- understand the concept of society, governance and international studies.
- understand the application of citizenship, governance, international principles and trends
- understand the application of society, governance and international studies in personal, social, academic, global and profession life.

VII. Reference Books / Reading

- Theories of InternationalRelations, Scott Burshilet. al. Palgrave Macmillan, 2005. (http://psi505.cankaya.edu.tr/uploads/files/Theories%20of%20IR.pdf)
- http://cmsdata.iucn.org/downloads/eplp_70_governance_for_sustainability.pdf
- www.uno.org
- www.unesco.org

SYLLABI

(Semester – 7)

CHAROTARUNIVERSITY OF SCIENCE AND TECHNOLOGY

IT415: DATA WAREHOUSING & DATA MINING

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	-	6	5
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Data Warehousing and Data Mining are:

- To introduce students to basic applications, concepts, and techniques of data Warehousing & mining
- Understand the fundamental processes, concepts and techniques of data mining and develop an appreciation for the inherent complexity of the data-mining task
- To develop skills for using recent data mining software to solve practical problems in a variety of disciplines.
- To gain experience doing independent study and research.

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B. Outline of the Course:

Sr No.	Title of the unit	Minimum number of hours
1.	Introduction	08
2.	Data Pre-processing	12
3.	Data Warehouse and OLAP Technology	10
4.	Mining Frequent Patterns, Associations, and Correlations	10
5.	Classification and Prediction	14
6.	Mining Complex Types of Data	06

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

C. Detailed Syllabus:

1.	**Introduction**	08 hours	13.33 %
1.1	Motivation for Data Mining, Importance of Data Mining		
1.2	Data Mining—On What Kind of Data		
1.3	Data Mining Functionalities		
1.4	Classification of Data Mining Systems		
1.5	Data Mining Task Primitives		
1.6	Major Issues in Data Mining.		
2.	**Data Pre-processing**	12 hours	20 %
2.1	Importance of Pre-processing the Data		
2.2	Data Cleaning		
2.3	Data Integration and Transformation		
2.4	Data Reduction		
2.5	Data Discretization and Concept Hierarchy Generation		
3.	**Data Warehouse and OLAP Technology**	10 hours	16.64 %
3.1	Introduction to Data Warehouse		
3.2	A Multidimensional Data Model		
3.3	Data Warehouse Architecture		
3.4	From Data Warehousing to Data Mining		
4.	**Mining Frequent Patterns, Associations, and Correlations**	10 hours	16.64 %
4.1	Basic Concepts and a Road Map		
4.2	Efficient and Scalable Frequent Item-set Mining Methods		
4.3	Mining Various Kinds of Association Rules		
4.4	From Association Mining to Correlation Analysis		
5.	**Classification and Prediction**	14 hours	23.33 %
5.1	Issues Regarding Classification and Prediction		
5.2	Classification by Decision Tree Induction		

5.3	Bayesian Classification		
5.4	Rule-Based Classification		
5.5	Lazy Learners		
5.6	Other Classification Methods		
5.7	Prediction		
5.8	Evaluating the Accuracy of a Classifier		
5.9	Introduction to Clustering		
6.	**Mining Complex Types of Data**	06 hours	10 %
6.1	Mining Unstructured Data		
6.2	Mining Data Streams		
6.3	Web Mining		
6.4	Model for Recommendation System		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

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

- Students will able to understand important of data mining and its various concepts like data preprocessing, various classification algorithms etc.
- Student will be able to develop a reasonably sophisticated data mining application.
- Student is able to select methods and techniques appropriate for the task
- Student is able to develop the methods and tools for the given task

F. Recommended Study Material:

Text Books:

1. J. Han, M. Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann
2. PaulrajPonnian, "Data Warehousing Fundamentals", John Willey.

Reference Books:

1.M. Kantardzic, "Data mining: Concepts, models, methods and algorithms, John Wiley &Sons Inc.
2. M. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
3. Pieter Adriaans, DolfZantinge , "Data Mining", Pearson Education Asia

Web Links:

1. http://www.dataminingblog.com
2. http://www.kdnuggest.com

IT402.01: WIRELESS COMMUNICATION & MOBILE COMPUTING

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	4	1	9	6
Marks	100	100	-	200	

A. Objective of the Course:

The main objectives for offering the course Wireless Communication & Mobile Computing are:

- To learn the basics of Wireless voice and data communications technologies.
- To build knowledge on various Mobile Computing algorithms.
- To study the working principles of wireless LAN and its standards.
- To build skills in working with Wireless application Protocols to develop mobile content applications.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Wireless Communication Fundamentals	06
2.	Telecommunication Network	13
3.	Wireless LAN	18
4.	Mobile Network Layer	13
5.	Transport and Application Layer	10

Total hours (Theory): 60

Total hours (Lab): 60

Total hours: 120

C. Detailed Syllabus:

1.	**Wireless Communication Fundamentals**	**06 hours**	**10 %**
1.1	Introduction		
1.2	Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation		
1.3	Multiplexing – Modulations – Spread spectrum		
1.4	MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks		
2.	**Telecommunication Network**	**13 hours**	**25 %**
2.1	Telecommunication systems Overview – GSM – GPRS – DECT – UMTS – Satellite Networks		
2.2	GSM		
2.3	GPRS		
2.4	CDMA		
3.	**Wireless LAN**	**18 hours**	**30 %**
3.1	Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer		
3.2	IEEE 802.11a - 802.11b – 802.11n standards		
3.3	Bluetooth		
3.4	Hyperlan, Wi-Fi, WiMax - Overview		
4.	**Mobile Network Layer**	**13 hours**	**20 %**
4.1	Mobile IP		
4.2	Dynamic Host Configuration Protocol		
4.3	Routing Protocols – DSDV – DSR – Alternative Metrics.		
5.	**Transport and Application Layer**	**10 hours**	**12 %**
5.1	Traditional TCP		
5.2	Classical TCP improvements – WAP, WAP 2.0		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

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

- Students will learn the fundamentals of Wireless communication and WLAN standards.
- Students will develop "state of the art application" with the use of theoretical and practical knowledge gained in the semester.

F. Recommended Study Material:

Text Books:

1. "Mobile Computing: Technology, Applications and Service Creation" by Asoke K Talukder and Roopa R Yavagal, TMH,ISBM: 0-07-058807-4

Reference Materials:

1. Jochen Schiller, "Mobile Communications", PHI/Pearson Education, Second Edition, 2003.
2. William Stallings, "Wireless Communications and Networks", PHI/Pearson Education, 2002.

3. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.
4. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, New York, 2003.
5. Hazysztof Wesolowshi, “Mobile CommunicationSystems”, John Wiley and Sons Ltd, 2002
6. Research papers from IEEE, Springer etc.

Web links:

1. www.ietf.org – For drafts
2. www.ieee.org – For standards and technical research papers

IT409: High Performance Computer Architecture

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	03	02	01	06	04
Marks	100	50	00	150	

A. Objectives of the Course:

Objectivesofintroducingthissubjectare:

- The course objective is to gain the knowledge required to design and analyze high performance computer systems.
- To understand and overcome the challenges in the design of next-generation memory systems for large-scale high performance computer systems.
- To Build Application to and optimize it to run on high performance computer systems.

B. Outline of the Course:

Sr.No.	TitleoftheUnit	Minimum NumberofHours
1	Review of Basic Organization and Architectural	07
2	Instruction Level Parallelism	08
3	Memory Hierarchies	10
4	Thread Level Parallelism	08
5	Process Level Parallelism	07
6	Peripheral Devices	05

Total Hours (Theory): 45

Total Hours (Lab): 30

Total Hours: 75.

C. DetailedSyllabus:

1	**Review of Basic Organization and Architectural Techniques**	**07 Hrs.**	**16 %**
1.1	RISC processors and Characteristics of RISC processors		
1.2	RISC Vs CISC		
1.3	Classification of Instruction Set Architectures		
1.4	Review of performance		
1.5	Measurements Basic parallel processing techniques: instruction level, thread level and process level		
1.5	Classification of parallel architectures		
2	**Instruction Level Parallelism**	**08 Hrs.**	**17 %**
2.1	Basic concepts of pipelining		
2.2	Pipelining Hazards and Solutions		
2.3	Instruction-level parallelism using software approaches		
2.4	Superscalar techniques		
2.5	Speculative execution		
2.6	Review of modern processors /*The objective is to explain how ILP techniques have been deployed in modern processors*/ i. Pentium Processor: IA 32 and P6 microarchitectures ii. ARM Processor		
3	**Memory Hierarchies**	**10 Hrs.**	**22 %**
3.1	Basic concept of hierarchical memory organization: Main memory, Cache memory and Optimization, Virtual memory.		
3.2	Memory protection and Evaluating memory hierarchy		
3.3	RAID		
4	**Thread Level Parallelism**	**08 Hrs.**	**17 %**
4.1	Centralized vs. distributed shared memory		
4.2	Interconnection topologies		
4.3	Synchronization and Memory consistency		
4.4	Review of modern multiprocessors		
5	**Process Level Parallelism**	**07 Hrs.**	**16 %**
5.1	Distributed Computing		

5.2	Grid		
5.3	Cluster		
5.4	Mainframe Computers		
6	**Peripheral Devices**	**05 Hrs.**	**12 %**
6.1	Bus structures and standards		
6.2	Types and uses of storage devices		
6.3	I/O system design and Interfacing I/O to the rest of the system		
6.4	Reliability and availability		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 10 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignment/Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a design laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Design of major problems/Tutorials related to course content will be carried out in the laboratory.
- In the lectures and laboratory discipline and behavior will be observed strictly.

E. StudentLearningOutcomes:

- This course will provide fundamental knowledge of memory architecture of high performance computer systems.
- At the end of this course students will be able to understand challenge issues while designing programs for high performance computer systems.
- At the end of this course students will be able to write programs for high performance computer systems.

F. RecommendedStudyMaterial:

TextBooks:

1. Hennessey and Patterson, "Computer Architecture: A quantitative Approach", Morgan Kaufman.
2. RajkumarBuyya “High PerformanceClusterComputing:ArchitecturesandSystems”

Reference Books:

1. JacekRadajewski and Dr. Douglas Eadline“HOW TO build a *Beowulf Cluster”*
2. *“SCL Cluster Cookbook”* from the Scalable Computing Laboratory at Ames.

WebMaterials:

1. SIMA, “Advanced Computer Architectures”, Addison-Wesley.
2. http://www.buyya.com/cluster/v1toc.pdf
3. http://nptel.ac.in/syllabus/106105033/

IT410: Enterprise Resource Planning & E-Commerce

Credit and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	3	0	3	3
Marks	100	0	100	

A. Objective of the Course:

The main objectives for offering the course E-Business and ERP are

- To make them learn how to develop work plans for an ERP implementation, provide conceptual understanding of E-Business and components of E-Business and its architecture; provide experience of SAP software system through computer-based training materials and hands on experience.

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to ERP	2
2.	ERP and Related Technologies	6
3.	ERP Modules	7
4.	Benefits of ERP	4
5.	ERP Implementation Lifecycle	6
6.	ERP Vendors, Consultants, and Employees	5
7	E-Business and E-Commerce	6
8	ERP Case studies	7
9	ERP Present and Future	2

Total hours (Theory): 45

Total hours (Lab): 00

Total hours: 45

C. Detailed Syllabus:

1	**Introduction to ERP**	**02 Hours**	**05%**
1.1	Enterprise – An Overview		
1.2	Integrated Management Information,		
1.3	Business Modeling, Integrated Data Model		
2	**ERP and Related Technologies**	**06 Hours**	**13%**
2.1	Business Processing Reengineering (BPR)		
2.2	Data Warehousing		
2.3	Data Mining		
2.4	On-line Analytical Processing (OLAP)		
2.5	Supply Chain Management (SCM)		
2.6	Customer Relationship Management (CRM)		
3	**ERP Modules**	**07 Hours**	**15%**
3.1	Introduction of ERP modules		
3.2	Finance Module : General Ledger, Accounts Receivable/ Payable, Special Ledgers, Fixed Asset Accounting, Legal Consolidation		
3.3	Manufacturing Module : Material and Capacity Planning, Shop Floor Control, Just in Time Manufacturing		
3.4	HR Module: Personnel Management, Personnel Administration, Recruitment Management, Payroll Accounting, Time Management, Shift Planning, Employee Development, Event Management, Marketing		
3.5	Sales and Distribution: Marketing Resource Management, Campaign Management, E-Mail Marketing, Promotion Management, Lead Management, Market Analytics, Order Management, Warehouse Management, Shipping and Billing Management		
4	**Benefits of ERP**	**04 Hours**	**9%**
4.1	Reduction of Lead-Time		
4.2	On-time Shipment		
4.3	Reduction in Cycle Time		
4.4	Improved Resource Utilization		

4.5	Better Customer Satisfaction		
4.6	Improved Supplier Performance		
4.7	Increased Flexibility		
4.8	Reduced Quality Costs		
4.9	Improved Information Accuracy and Design-making Capability		
5	**ERP Implementation Lifecycle**	**06 Hours**	**13%**
5.1	Pre-evaluation Screening		
5.2	Package Evaluation		
5.3	Project Planning Phase		
5.4	Gap Analysis		
5.5	Reengineering		
5.6	Configuration		
5.7	Implementation Team Training		
5.8	Testing		
5.8	Going Live		
5.9	End-user Training		
5.10	Post-implementation (Maintenance mode)		
6	**ERP Vendors, Consultants, and Employees**	**05 Hours**	**11%**
6.1	Vendors- Role of the Vendor		
6.2	Consultants: Types of consultants, Role of a Consultant		
6.3	Employees : Role of employees		
6.4	Resistance by employees		
6.5	Dealing with employee resistance		
7	**E-Business and E- Commerce**	**6 Hours**	**14%**
7.1	Importance of E-Business		
7.2	E-Business Vs E- Commerce		
7.3	Cross Functional Integrated Apps		
7.4	Integrating Application Clusters into an e-business architecture		
7.5	Aligning the e-business design with application integration		
7.6	Constructing an e-business design		
7.7	Challenges of e-business strategy creation		
8	**ERP Case studies**	**07 Hours**	**15%**

8.1 SAP at Tata Steel

8.2 EPICOR at SKF Automotive Bearings Co Ltd

8.3 Matrix ERP at Mani Group

8.4 JD Edwards at Hindustan Petroleum and ORACLE at Qualcomm CDMA Technologies

8.5 Industry Visit with report submission

9 Future Directions in ERP **02 Hours 05%**

9.1 New Trends in ERP

9.2 ERP to ERP II-Implementation of Organization-Wide ERP

9.3 Development of New Markets and Channels

9.4 Latest ERP Implementation Methodologies

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.

E. Student Learning Outcome:

After completion of the course student will be able to

- Describe the role information plays in enterprise resource planning systems
- Identify the primary forces driving the explosive Identify the primary forces driving the explosive growth of enterprise resource planning systems
- Explain the business value of integrating supply chain management, customer relationship management, and enterprise resource planning systems

- Apply knowledge for developing any enterprise application software; students can apply knowledge of this subject in higher semester project work.

F. Recommended Study Material:

Text Books:

1. Dr. Ravi Kalakota and Marcia Robinson, E-Business Roadmap for Success, Addison Wesley (Pearson Education)
2. Alexix Leon, Enterprise Resource Planning - Demystified, Tata McGraw Hill

Reference Books:

1. Ravi Shankar &S.Jaiswal, Enterprise Resource Planning, Galgotia
2. AnnettaClewwto and Dane Franklin, Network Resource planning using SAP R/3 Baan and Peoplesoft : A Practical Guide to Planning ERP Application, McGRaw-Hill
3. Jose Antonio, The SAP R/3 Handbook, McGraw Hill

URL Links:

1. http://www.eresourceerp.com/
2. http://www.open-sourCEerp-site.com/erp-modules.html

IT404.01: LANGUAGE PROCESSOR (ELECTIVE III)

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	-	6	**5**
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Language Processor are:

- To study Language processor and language processing activities.
- To explore design and implement lexical analyzer and parser.
- To explore, design code generation schemes.
- To explore optimization of codes and runtime environment

B. Outline of the Course:

Sr No.	Title of the unit	Minimum number of hours
1.	Language Processors	05
2.	Assemblers	08
3.	Introduction To Compilers	10
4.	Syntax Analysis And Syntax-Directed Translation	12
5.	Dynamic Memory Allocation And Memory Management	05
6.	Intermediate Code Generation	05
7.	Code Optimization And Code Generation	10
8.	Linker And Loader	05

Total hours (Theory): 60 Hrs.

Total hours (Lab): 30 Hrs.

Total hours: 90 Hrs.

C. Detailed Syllabus:

1.	**LANGUAGE PROCESSORS**	**05 Hours**	**08 %**
1.1	Introduction		
1.2	Language processing activities		
1.3	Fundamental of language processing		
1.4	Fundamental of language Specification		
2.	**ASSEMBLERS**	**08 hours**	**13 %**
2.1	Elements of assembly language programming		
2.2	Overview of the assembly process		
2.3	A simple Assembly Scheme		
2.4	Design of two pass assembler		
3.	**INTRODUCTION TO COMPILERS**	**10 hours**	**16 %**
3.1	Analysis of the source program		
3.2	Phases of compiler		
3.3	Compiler construction tools		
3.4	Lexical analysis		
3.5	Role of the lexical analyzer		
3.6	Specification of tokens		
3.7	Recognition of tokens		
3.8	Lexical analyzer generators.		
4.	**SYNTAX ANALYSIS AND SYNTAX-DIRECTED TRANSLATION**	**12 hours**	**20 %**
4.1	Role of the parser		
4.2	Context free grammars		
4.3	Top-down parsing, Bottom- up parsing		
4.4	LR parsers (SLR, Canonical LR, LALR)		
4.5	Syntax-Directed Definitions		
4.6	Bottom-Up Evaluation of S-Attributed Definitions and L-Attributed Definitions		
4.7	Top Down Translation and Bottom-Up Evaluation of Inherited Attributes		
4.8	Type Systems and Specification of a Simple Type Checker		
4.9	Equivalence of Type Expressions, Type Conversions		
5.	**DYNAMIC MEMORY ALLOCATION & MEMORY MANAGEMENT**	**05 hours**	**08 %**

5.1	Source Language Issues		
5.2	Storage Organization		
5.3	Storage-Allocation Strategies, and Access to Non local Names		
5.4	Parameter Passing		
5.5	Symbol Tables, and Language Facilities for Dynamic Storage Allocation		
5.6	Dynamic Storage Allocation Techniques		
6.	**INTERMEDIATE CODE GENERATION**	**05 hours**	**08 %**
6.1	Intermediate Languages, Declarations, Assignment Statements		
6.2	Boolean Expressions, Case Statements		
6.3	Back patching, Procedure Calls		
7.	**CODE OPTIMIZATION AND CODE GENERATION**	**10 hours**	**16 %**
7.1	The Principal Sources of Optimization		
7.2	Loops in Flow Graphs, Introduction to Global Data-Flow Analysis, Iterative Solution of Data-Flow Equations		
7.3	Data-Flow Analysis of Structured Flow Graphs		
7.4	Issues in the Design of a Code Generator		
7.5	The Target Machine		
7.6	A Simple Code Generator, Register Allocation and Assignment		
7.7	The DAG Representation of Basic Blocks, Peephole Optimization, Generating Code from DAGs		
7.8	Dynamic Programming Code-Generation Algorithm, Code-Generator Generators.		
8.	**LINKER AND LOADER**	**05 hours**	**08 %**
8.1	Relocation and linking concepts		
8.2	Design of a linker		
8.3	Self-relocating programs		
8.4	Loaders		

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

By taking this course Language Processor,

- Students will be able to simulate Compilation process by using tools such as LEX and YACC tool.
- Students will be able to analyze and generate the different parsing techniques.
- Students will be able to perform optimization at different level of program.

F. Recommended Study Material:

Text Books:

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and- Tools", Pearson Education Asia.
2. D. M. Dhamdhere, "System Programming and Operating Systems", Tata McGraw-Hill.

Reference Books:

1. Allen I. Holub "Compiler Design in C", Prentice Hall of India.
2. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings.
3. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill

4. HenkAlblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI.
5. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thompson Learning.
6. Compiler Construction by Kenneth. C. Louden, Vikas Pub.

Web Links:

1. http://compilers.iecc.com/crenshaw
2. http://www.compilerconnection.com
3. http://dinosaur.compilertools.net
4. http://pltplp.net/lex-yacc

IT405.01: ADVANCED COMPUTING (ELECTIVE III)

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	-	6	5
Marks	100	50	-	150	

A. Objective of the Course:

The main objectives for offering the course Advanced Computing are:

- To provide an overview of the basic concepts of cluster computing, grid computing and cloud computing.
- To highlight the advantage of deploying grid computing and cluster computing.
- To illustrate the practical adoption of a grid and cluster deployment through real life case studies.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Cluster Computing at Glance	08
2.	Cluster Setup and Administration	06
3.	Constructing Scalable Services	06
4.	Introduction to Grid and its Evaluation	06
5.	Implementing Production Grid	06
6.	Anatomy of Grid	08
7.	Introduction to Cloud Computing	05
8.	Nature of Cloud	09
9.	Cloud Elements	06

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

C. Detailed Syllabus:

1.	**Cluster Computing at Glance**	**08 hours**	**13 %**
1.1	Ease of Computing		
1.2	Scalable Parallel Computer Architecture		
1.3	Towards Low Cost Parallel Computing and Motivation		
1.4	Windows of Opportunity		
1.5	A Cluster Computer and its Architecture		
1.6	Cluster Classifications		
1.7	Commodity Components for Clusters		
1.8	Network Services/Communication SW		
1.9	Cluster Middleware and Single System Image		
1.10	Resource Management and Scheduling		
1.11	Programming Environments and Tools		
1.12	Cluster Applications		
1.13	Representative Cluster System		
1.14	Cluster of SMPs		
2.	**Cluster Setup and its Administration**	**06 hours**	**10 %**
2.1	Introduction		
2.2	Setting up the Cluster		
2.3	Security		
2.4	System Monitoring		
2.5	System Tuning		
3.	**Constructing Scalable Services**	**06 hours**	**10 %**
3.1	Introduction		
3.2	Environment		
3.3	Resource Sharing		
3.4	Resource Sharing Enhanced Locality		
3.5	Prototype Implementation and Extension		
3.6	Conclusion and Future Study		
4.	**Introduction to Grid and its Evolution**	**06 hours**	**10 %**
4.1	Beginning of the Grid		
4.2	Building blocks of Grid		
4.3	Grid Application and Grid Middleware		

4.4	Evolution of the Grid: First, Second & Third Generation		
5.	**Implementing Production Grid**	**06 hours**	**10 %**
5.1	Grid Context		
5.2	Grid Support for Collaboration		
5.3	Building an initial multisite		
5.4	Computational and Data Grid		
5.4	Cross Site Trust Management		
5.5	Transition to a prototype production grid		
6.	**Anatomy of Grid**	**08 hours**	**13 %**
6.1	Virtual Organization		
6.2	Nature of Grid Architecture		
6.3	Grid Architecture Description and Practice		
6.4	Intergrid Protocols		
6.5	Relation to other technologies		
6.6	Other perspective on grids		
7.	**Introduction to Cloud Computing**	**05 hours**	**09%**
7.1	Defining Cloud		
7.2	Cloud Providers		
7.3	Consuming Cloud Services		
7.4	Cloud Models – IaaS, PaaS, SaaS		
7.5	Inside the cloud		
7.6	Administering cloud services		
7.7	Technical interface		
7.8	Cloud Resources		
8.	**Nature of Cloud**	**09 hours**	**15%**
8.1	TraditionDataCenter		
8.2	Cost of CloudDataCenter		
8.3	Scaling computer system		
8.4	Economics		
8.5	Cloud work load		
8.6	Managing Data on Clouds		
8.7	Public, Private and Hybrid Clouds		
9.	**Cloud Elements**	**06 hours**	**10%**

9.1 Infrastructure as a service

9.2 Platform as a service

9.3 Software as a service

D. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5 Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

E. Student Learning Outcome:

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

- Understand and explain the concept of Grid, Cluster and Cloud Computing.
- Prepare for any upcoming deployments of Grid or Cluster and be able to get started with a potentially available Grid or Cluster setup.

F. Recommended Study Material:

Text Books:

1. RajkumarBuyyal, High Performance Cluster Computing Vol-1 Architecture and System, Pearson Publication.
2. Berman, Fox and Hey, Grid Computing – Making the Global Infrastructure a Reality, Wiley India.
3. Hurwitz, Bllor, Kaufman, Halper, Cloud Computing for Dummies, Wiley India.

Reference Books:

1. Ronald Krutz, Cloud Security, Wiley India.
2. Bernard Golden, Virualization for Dummies, Wiley India.

Web Links:

1. www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf

IT 412: Image Processing and Multimedia Systems [ELECTIVE III]

Credit Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	2	0	6	5
Marks	100	50	-	150	

A. Objective of the Course:

• To study

i) Image fundamentals and Formation of Digital Images

ii) Technique for Image Enhancement in Spatial Domain and Frequency Domain

iii) Image Restoration Operations and Procedures

iv) Multimedia Presentation and Format

v) Compression in Text, Image and Video

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of Hours
1.	Digital Image Fundamentals	06
2.	Spatial Domain Image Enhancement Techniques	12
3.	Frequency Domain Image Enhancement Techniques	12
4.	Image Restoration Operations	12
5.	Text Compression	14
6.	Image, Video Compression	04

Total hours (Theory): 60 Hrs.

Total hours (Lab): 30 Hrs.

Total hours: 90 Hrs.

C. Detailed Syllabus:

1. Digital Image Fundamentals **06Hrs** **10%**

Image Basics - Elements of visual perception – Human Eye Structure-Why digital images -The digital camera-Data types and 2D representation of digital

images- Application fields of Image Processing- Image Acquisition Techniques-Single Sensor-Strip-Array Sensor - Image sampling and quantization - Discrete sampling model Quantization -Noise processes-Spatial & Gray level resolution- Image attributes- Image Types- Basic relationship between pixels-Neighborhood-Adjacency- Distance measures, Color fundamentals , Color Models, HIS,YIQ,RGB,CMYK,CIE Lab, XYZ, Intensity Slicing, Gray level to Color Transform

2. Spatial Domain Image Enhancement Techniques **12 Hrs** **20%**

Intensity based transforms- PowerLaw, Log ,Image Negative, Histogram based transforms- Histogram processing, Equalization, Local Enhancement, Specification, Image Averaging, Subtraction, AND-OR-NOT Operations between images, Smoothing Filters- Linear Filters, Order Statistic Filters, Sharpening Filters-Laplacian Filter , Unsharp masking , high boost filtering

3. Frequency Domain Image Enhancement Techniques **12 Hrs** **20%**

Introduction to signal-frequency concept, Discrete Fourier Transform and Inverse Transform, properties of Fourier Transform ,1D Fourier Transform, 2D Fourier Transform, Frequency Filtering Concepts, Smoothing Filters(Low pass Filters)- Ideal low-pass, Butterworth low-pass, Gaussian low-pass filters, Sharpening Filters(High-Pass filters)- Ideal , Butterworth, Gaussian, Laplacian Filter in Frequency domain, Unsharp masking , high boost filtering ,Homomorphic Filtering , Convolution & Correlation Theorem , Fast Fourier Transform

4. Image Restoration **12 Hrs** **20%**

Image Degradation-Restoration Model, Noise Models, Noise probability density functions, Noise estimation parameters, Spatial Domain Restoration-Mean filters – Arithmetic mean, Geometric mean, Harmonic mean Order Statistics Filters-Median filter, Max & min filter, Midpoint filter, Alpha trimmed filter, Adaptive filters, Adaptive local noise filter, Adaptive median filter, Frequency Domain Restoration Techniques- Band reject filter, Band-pass filter, Notch filter, Optimum Notch filter, Estimation of Degradation function-By experiment, By Modeling , Inverse Filtering, Wiener Filtering, Constrained Least Square Filtering, Geometric Mean filter

5. Text Compression **14Hrs** **23%**

Fundamental to Data Compression, Compression Techniques: Loss less VsLossy Compression, Measures of Performance Parameters for Data Compression, Modeling and Coding of Data, Models: Physical Models, Probability Models, Markov Models, Composite Source Models, Coding: Uniquely Decodable Codes, Prefix Codes, Shannon Fano Algorithm, The Huffman coding algorithm, Minimum variance Huffman codes, Adaptive Huffman coding Update procedure, Encoding procedure Decoding procedure, Golomb codes, Rice codes, Tunstall codes, Statistical Coding: Arithmetic Coding, Coding A Sequence, Generating A Binary Code- Decoding Of Tag- Checking Uniquely Decode Tag, LZW Algorithm.

6.	**Image,Video Compression**	**04Hrs**	**07%**

Image Basics, DiscretecosineTransform,JPEG Compression -Quantization-Zigzag sequence-EntropyEncoding, MPEG -I - B - P frames.

D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations and black board – mix of both.
- Assignments based on above course content will be given to the students at the end of each chapter. Each assignment contains minimum 5 questions.
- Quizzes and Surprise tests will be conducted for testing the knowledge of students for particular topic.

E. Student Learning Outcome:

By taking this course Digital Image Processing:

- Understand the basic concepts image processing.
- Image Restoration & Enhancement techniques.
- Image Analysis and Processing
- JPEG, MPEG
- Data Compression : Lossy& Lossless Techniques

F. Recommended Study Material:

5. **Text Books:**

1. "Digital Image Processing", Rafael C Gonzalez, Richard E Woods, 2nd Edition, Pearson Education 2003.
2. Fundamentals of Multimedia, Ze-Nian Li and Mark S. Drew, 2nd Edition, Prentice-Hall, 2004

3. Introduction to Data Compression, Khalid Sayood, 3rd Edition, Morgan Kaufmann Publishers,2006

6. **Reference Books:**

1. Fundamentals of Digital Image Processing, A.K. Jain, PHI, New Delhi (1995).
2. Digital Image Processing Using MATLAB,Gonzalez/Woods/Eddins , McGrawhill Publication 2nd edition
3. Data Compression, Mark Nelson and Jean-loupGailly, 2nd Edition, M&T Books, 1995.

7. **Reference Links/ e-content:**

1. http://www.imageprocessingplace.com/
2. https://sites.google.com/a/charusat.ac.in/pnp/

IT414: SOFTWARE GROUP PROJECT - V

Credit and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	0	2	2	1
Marks	0	50	50	

A. Objective of the Course:

The main objectives for offering the course software project are:

- To provide additional technical skill useful for the project work
- To develop and test one's ability to learn independently
- To provide exposure in the field of Software development
- To provide a deep understanding of various domains of software projects.
- To provide an innovative ability to solve practical/utility problems
- To provide a capacity to learn continually and interact with multidisciplinary groups

B. Outline of the Course:

- Student at the beginning of a semester may be advised by his/her supervisor (s) for recommended courses.
- Students are required to get approval of project definition from the department.
- After approval of project definition students are required to report their project work weekly to respective internal guide.
- Project will be evaluated at least once per week in laboratory during the semester and final submission at the end of the semester as a part of continuous evaluation.
- Project work should include whole SDLC of development of software / hardware system as a solution of particular problem by applying principles of Software Engineering.
- Students have to submit project with following listed documents at the time of final submission.
    g. Project Synopsis
    h. Software Requirement Specification

i. SPMP

j. Final Project Report

k. Project Setup file with Source code

l. Project Presentation (PPT)

- A student has to produce some useful outcome by conducting experiments or project work.

Total hours (Theory): 00

Total hours (Lab): 30

Total hours: 30

C. Instructional Method and Pedagogy:

1. Project Groups would be form of maximum two students.
2. Inter batch group formation is not permitted due to difficulties in progress tracking.
3. Students are advised to choose innovative and challenging definitions.
4. Batch wise project definitions must be unique.
5. Any management system would not be encouraged.
6. Tools like GitHub would be used to track the progress of project development by the concern faculty. Concerned guide will demonstrate the working of GitHub Tool.
7. Student has to prepare report at end of semester as part of submission.
8. Report structure is finalized for semester end submission.
9. To have a better outcome as well as progress tracking at the end of semester, it is decided that students have to appear for two internal reviews, which will help them to get more insight in the project.

D. Student Learning Outcome:

After the completion of the course students will able to

- Explore the new ideas & the possible areas to work ahead.
- Use the various methodologies useful for doing project work.
- Investigate the chosen topic in depth. This implies collecting and reviewing literature and understanding and interpreting the most up-to-date concepts and theories of your chosen academic field and/or project topic.
- Apply the concepts and theories learnt in previous years of study and work placements

E. Recommended Study Material:

1. Reading Materials, web materials, Project reports with full citations
2. Books, magazines & Journals of related topics
3. Various software tools and programming languages compiler related to topic

Web Links:

1. www.ieeexplore.ieee.org
2. www.sciencedirect.com
3. www.elsevier.com

B. Tech. (Information Technology) Programme

SYLLABI

(Semester –8)

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

IT407: SOFTWARE PROJECT MAJOR

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	0	36	36	20
Marks	0	600(250+350)	600	

A. Objective of the Course:

Main objectives for offering the course are:

- To provide additional technical skill useful for the project work
- To develop and test one's ability to learn independently
- To provide exposure in the field of Software development
- To provide a deep understanding of various domains of software projects
- To provide an innovative ability to solve practical/utility problems
- To provide a capacity to learn continually and interact with multidisciplinary groups

B. Outline of the Course:

- Software Project includes course work on a specialized Subject or a Seminar.
- The course work shall be related to the area of his/her project research work.
- Students have to take 3 months training to the other software industry as the project work.
- The major project work provides students an opportunity to do something on their own and under the supervision of internal guide as well as guide from industry.
- Student at the beginning of a semester may be advised by his/her supervisor (s) for recommended courses.
- Project will be evaluated at least thrice during the semester by internal guide of the project and final submission at the end of the semester as a part of continuous evaluation.
- Project work should include whole SDLC of development of software / hardware system as solution of particular problem by applying principles of Software Engineering.

- A student has to produce some useful outcome by conducting experiments or project work.
- Student can learn all aspects & functionality of specialized software from the industry.
- Students have to submit SRS, SPMP, Design documents, Code and Test Cases in form of Project report.

C. Instructional Method and Pedagogy:

Following are the General guidelines:

1) Semester 8th, teaching scheme is Practical 36 hours, with 20 credits worth of 600 marks (Out of 600 marks, 250 marks of internal and 350 marks of external evaluation)
   Note:
   a) Each defined project definition should be from Industry/Research organization/ Govt.organization/ technical issues/Real world problems.
   b) If industry defined project then maximum 2 or 3 students are allowed per project group. If in-house project then no group is allowed.
   c) The students are required to identify their problem and they are required to follow all the rules and instructions issued by department.

Final Year Project Policy:

1. Process for NOC:
Following is the process for 8th semester project for definition and company approval:

1.Select your domain
2. Select your company
3. Approve company from HoD Sir/TPR
4. Issue recommendation letter from TPR (write company address in to, fill the details of students and bring its printed copy and submit to concern TPR.)
5. Issue confirmation letter from company with brief definition, tools & technology (submit Xerox copy to concern TPR)
6. Approve definition form HoD Sir / Sr. faulty/TPR
   a. The Process for Approval of the Project Definition:

      The students must meet and discuss the definition of their final semester project with the HoD Sir/Faculty Member-Guide and get his approval by verifying to see that the following parameters:

      1. The proposed project quality should be up to the status of a B.Tech final semester project quality.

2. The project should not be a conventional project.
3. The project should not be a purchased/3rd party developed project.
4. If the project is being carried forwarded from previous years then it must add substantial value to the previously done work on the project.
5. The project should be novel, original and having a possibility of good impact if the proposed solution get implemented.
6. Even if student claim it to be an Industry defined project, it should not be based on industry whose main objective is to make final semester project and give it to students.

7. Issue NOC from TPO (submit Xerox copy to Concern TPR)
8. In order to improve student's performance we are doing following exercise:
    1. Industrial visit
    2. Review and suggestions from internal guide
    3. Feedback from external guide

2. Process for Continuous Evaluation:
Following is the process for 8th semester project continuous evaluation:

9. Submit your project profile & synopsis to your internal Guide.
10. Report weekly to your internal guide with filled weekly report (At least 10 reporting is mandatory)
11. 2 internal presentations & 1 final presentation with project demonstration are required. Each internal presentation carries 50 Marks, 100 marks for report and 50 marks from internal guide & External presentation carries 350 marks.
    a. Observation Canvas: Observation points from survey, Users, Stockholders, Activities
    b. Ideation Canvas: People, Activities, Problem (that you are going to solve), Situation/Context/Location, Possible Solutions
    c. Project Development Canvas: Purpose, People, Product Experience, Product Functions, Product Features, Components, Customer Revalidation
    d. Business Model Canvas: Applications, Usage & Outcome
12. Submit hard binding report with CD.

3. Continuous evaluation Marks:
Project guide has to put the marks according to grade.
Range is given below:
A+ : 47-50
A : 44-46
A- : 41 - 43
B+ : 36-40
B : 31- 35

B- :26 - 30
C+ : 21-25
C : 16 - 20
C- : <=15
As per the performance of students, guide can give the marks.
For example: A+: One can give 47 - 50 as per performance.

D. Recommended Chapters/sections

1. Microscope Summery

2.Details of candidate and supervisor along with certificate of

- original work;
- Assistance, if any;
- Credits;

3. Aims and Objectives

4. Approaches to Project and Time Frame

5. Project Design Description with appendices to cover

Flow charts/Data Flow Diagram – Macro/Micro Level

Source code, If any

Hardware platform

Software Tools

Security Measures

Quality Assurance

Audit ability

6. Test Date and Result

E. Student Learning Outcome:

After the completion of the course students will able to

- Explore the new ideas & the possible areas to work ahead.
- Use the various methodologies useful for doing project work.
- Investigate the chosen topic in depth. This implies collecting and reviewing literature and understanding and interpreting the most up-to-date concepts and theories of your chosen academic field and/or project topic.
- Apply the concepts and theories learnt in previous years of study and work placements

F. Recommended Study Material:

1. Reading Materials, web materials, Project reports with full citations
2. Books, magazines & Journals of related topics
3. Various software tools and programming languages compiler related to topic

Web Link:

1. www.ieeexplore.ieee.org
2. www.sciencedirect.com
3. www.elsevier.com
4. http://spie.org/x576.xml