SCHEME OF EXAMINATION

and SYLLABI

For

B.E. (Information Technology)

3^{rd} – 8^{th} semester

For

Academic Session

2019-20

Vision of Department of Information Technology:

The Department of Information technology aims to develop information technology engineers who work professionally and creatively for the advancement of technology and betterment of society.

Mission of Department of Information Technology:

- To impart quality education by developing information technology facilities, faculty and resources that generates professionals who are leaders for a dynamic information society.
- To develop a collaborative culture, so as to nurture an environment of increased research amongst the students and faculty.
- To encourage hands-on learning by fostering industrial partnerships to create real world solutions through innovation, product development, entrepreneurship and consultancy services.
- To enhance human potential by encouraging transparency and accountability amongst all stakeholders, in order to nurture ethical values in students.

Programme Educational Objectives (PEOs)

- **PEO 1**: Graduates are prepared to be employable in industry and possess knowledge of engineering & IT concepts, practices and tools to support design, development, application and maintenance of IT enabled products and projects.
- **PEO 2*:*** Graduates are prepared to pursue higher education in their area of interest.
- **PEO 3*:*** Graduates are prepared to possess professional skills like team work, ethics, competence in written & oral communication.

Program Outcomes:

a) An ability to apply the knowledge of mathematics, science, engineering fundamentals, and computing to the solution of complex engineering problems.
b) An ability to identify, formulate, review research literature, and analyze complex engineering problems using first principles of mathematics, natural sciences, and engineering sciences.
c) An ability to design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
d) An ability to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

e) An ability to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

f) An ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

g) To understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

h) An ability to apply ethical principles and commit to professional ethics and responsibilities and norms.

i) An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

j) An ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, etc.

k) An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

l) An ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

EXAMINATION NOTE:

The Semester question paper of a subject will be of 50 marks having 7 questions of equal marks. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.

2.0 Credit System 2.1 All B.E / integrated B.E-M.B.A programmes are organized around semester-based credit system of study. The credit system is based on continuous evaluation of a student's performance/progress and includes flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation. 2.2 Performance/progress of a student is measured by the number of credits that he/she has earned (completed satisfactorily). Based on the course credits and grades obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the programme. Also a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. 2.3 Course Credit Assignment: Each course has a certain number of credits assigned to it depending on the associated number of lecture, tutorials and laboratory contact hours in a week. A few courses are without credit and are referred to as non-credit (NC) courses. Lectures and Tutorials: One lecture hour or one tutorial hour per week per semester is assigned one credit. Practical / Laboratory Work: One laboratory hour per week per semester is assigned half credit. The credits are rounded off to the nearest whole number. For each lecture or tutorial the self study component is 1 hour/week. 2.4 Earning Credits : At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade (at least 'D' grade), the student accumulates the course credits as earned credits. Performance of a student is measured by the number of credits that he/she has earned and by the weighted grade point	2.0 Credit System 2.1 All B.E / integrated B.E-M.B.A programmes are organized around semester-based credit system of study. The credit system is based on continuous evaluation of a student's performance/progress and includes flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation. 2.2 Performance/progress of a student is measured by the number of credits that he/she has earned (completed satisfactorily). Based on the course credits and grades obtained by the student, grade point average is calculated, subject to his qualification of minimum grade in each subject. 2.3Course Credit Assignment: Each course has a certain number of credits assigned to it depending on the associated number of lecture, tutorials and laboratory contact hours in a week. A few courses are without credit and are referred to as non-credit (NC) courses. Lectures and Tutorials: One lecture hour or one tutorial hour per week per semester is assigned one credit. Practical / Laboratory Work: One laboratory hour per week per semester is assigned half credit. The credits are rounded off to the nearest whole number. For each lecture or tutorial the self study component is 1 hour/week 2.4 Earning Credits : At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade (at least 'D' grade), the student accumulates the course credits as earned credits. Performance of a student is measured by the number of credits that he/she has earned and by the weighted grade point average. Grades obtained in audit courses are not counted towards the calculation of grade point average. However, a pass grade ('D' grade) is essential for earning credits from an audit course.

average. A student has the option of auditing some courses. Grades obtained in these audit courses are not counted towards the calculation of grade point average. However, a pass grade ('D'grade) is essential for earning credits from an audit course.

3.0 Grading System

3.1 Relative standing of the student in the class shall be clearly indicated by his/her grades. The process of awarding grades shall be based upon fitting performance of the class to a defined statistical model.

3.2 The grades and their respective description , along with grade points are listed in the table given below in Table-1

Table-1

Grade	Grade Point	Description
A+	**10**	**Outstanding**
A	**9**	**Excellent**
B+	**8**	**Very Good**
B	**7**	**Good**
C+	**6**	**Average**
C	**5**	**Below average**
D	**4**	**Marginal**
E	**2**	**Poor**
F	**0**	**Very Poor**
I	**-**	**Incomplete**
NP	**-**	**Audit Pass**
NF	**-**	**Audit Fail**
W	**-**	**Withdrawal**
X	**-**	**Unsatisfactory**
S	**-**	**Satisfactory Completion**
Z	**-**	**Course continuation**

4.0 Evaluation System

4.1 Continuous Assessment **:**

There shall be continuous evaluation of the student during the semester. For evaluation purpose, total marks assigned to each subject shall be distributed as :
Two Mid semester Examination (Minor-1 and Minor-2) with 30 % of total marks assigned to the subject.

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Two Mid semester Examination (Minor-1 and Minor-2) with 30 % of total marks assigned to the subject. Best Marks of one of these two will be considered for award of sessional.

Assignments/Class projects/ short class tests/MCQ based quizzes/projects/presentations/group discussions/ Attendance with 20 % of total marks assigned to the subject.
One End Semester Examination (Major

Assignments/Class projects/ short class tests/MCQ based quizzes/projects/presentations/group discussions with 20 % of total marks assigned to the subject.

One End Semester Examination (Major Examination) with 50 % of total marks assigned to the subject.
Total score on a scale of 100 i.e. in % obtained by a student in a subject shall be hence forth referred as raw score in that subject.
Following the concept of relative grading, before assigning the letter grades, scientific normalization method shall be used to standardize the raw score.

4.2 Statistical Method for the Award of Grades:

For the award of grades in a course, all component wise evaluation shall be done in terms of marks. The components include: Midterm-1 and Midterm-2 examinations, Assignments/projects/class presentations/Attendance, and End semester examination as per regulation 4.1. After converting the marks obtained in percentage , the grades will be assigned as per the guidelines given below :

4.2.1 For less than 15 students in a course, the grades shall be awarded on the basis of cutoff in the absolute marks as shown in Table-2.

Table-2

Absolute marks in %	**Grade**	**Absolute marks in %**
91	**< A+ <**	**100**
82	**< A <**	**90**
73	**< B+ <**	**81**
64	**< B <**	**72**
55	**< C+ <**	**63**
46	**< C <**	**54**
40	**< D <**	**45**
35	**< E <**	**39**
	F <	**35**

4.2.2 For more than 30 students in a course, the statistical method shall be used for the award of grades. After expressing the score obtained by the students in a course in percentage (X), the class mean ($\bar{X}$) and class standard deviation (S) of the marks shall be calculated and grades

Examination) with 50 % of total marks assigned to the subject. It is compulsory to appear in End Semester Examination and secure at least 20% marks of total End semester exam marks.
If a candidate secures less than 20% marks of total End semester exam marks, he/she will be awarded F grade.

4.2 Method for the Award of Grades:

For the award of grades in a course, all component wise evaluation shall be done in terms of marks. The components include: Midterm-1 and Midterm-2 examinations, Assignments/projects/class presentations/Attendance, and End semester examination as per regulation 4.1. After converting the marks obtained in percentage , the grades will be assigned as per the guidelines given below :

Table-2

Sr. No.	**Marks**	**Grade**	**Grade Point**
1.	**≥ 90**	**A+**	**10**
2.	**≥80 &< 90**	**A**	**9**
3.	**≥70 &< 80**	**B+**	**8**
4.	**≥60 &< 70**	**B**	**7**
5.	**≥50 &< 60**	**C+**	**6**
6.	**≥45 &< 50**	**C**	**5**
7.	**≥40 &< 45**	**D**	**4**
8.	**<40**	**F**	**0**

4.2.2 NOT REQUIRED

shall be awarded to a student as shown in Table-3 If X is the raw score in % ; $\bar{X}\bar{X}$ is class mean in % and S is class standard deviation in % (based on raw score) , N is the number of students in a course , then for the course :

$$\bar{X} = \frac{Sum\ of\ all\ scores}{Number\ of\ Scores} = \frac{\sum_1^N X_i}{N}$$

$$S = \sqrt{\frac{\sum_1^N (X_i - \bar{X})^2}{N}}$$

Table-3

Lower Range of Marks(%)	Grade Assigned	Upper Range of Marks (%)
$\bar{X} + 2S$	≤≤ **A+**	
$\bar{X} + 1.5S$	≤≤ **A** <	$\bar{X} + 2S$
$\bar{X} + 1S$	≤≤ **B+** <	$\bar{X} + 1.5S$
$\bar{X} + 0.5S$	≤≤ **B** <	$\bar{X} + 1S$
$\bar{X}$	≤ **C+** <	$\bar{X} + 0.5S$
$\bar{X} - 0.5S$	≤ **C** <	$\bar{X}$
$\bar{X} - 1S$	≤ **D** <	$\bar{X} - 0.5S$
$\bar{X} - 1.5S$	≤ **E** <	$\bar{X} - 1S$
	< **F** <	$\bar{X} - 1.5S$

4.2.3 In case, class student strength in a course lies between 15 and 30, any of the above methods (given in 4.2.1 and 4.2.2) may be used for the award of grades.

4.3 Finalization of Grades

Finalization of the grades shall be done by the Board of Control of the department/ institute or appropriate body/committee approved by the university for the purpose.
In order to maintain a normal distribution in grades, following recommendations of UGC shall be kept in view and considered as broad guidelines by the Board of Control of the department/ institute or appropriate body/committee approved by the university for the purpose.

4.2.3 NOT REQUIRED

4.3 NOT REQUIRED

Grade	% of Population	Remarks
A	7	Includes A+ and A
B	24	Includes B+ and B
C	38	Includes C+ and C
D	24	
F	7	

* Note: In case Board of Control of the department/ institute or appropriate body/committee approved by the university for the purpose, is convinced on broad variations in grade distribution in a class for a particular subject, B.O.C may make some minor variations in S while maintaining the grade distribution as recommended by the UGC.

5.0 Evaluation of Performance

5.1 The performance of a student shall be evaluated in terms of two indices, viz. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA).
SGPA is the grade point average for the semester, and CGPA is the cumulative grade point average for all the completed semesters at any point in time.
The earned credits (E.C) are defined as the sum of course credits for course in which A+ to D grade has been obtained. For U.G students (B.E) , credits from courses in which NP or S grade has been obtained are also added.
Points earned in a semester =

$$\sum(\text{Course Credits x Grade Points}) \text{ for courses in which A+ to D grade has been obtained}$$

The SGPA is calculated on the basis of grades obtained in all courses, except audit courses and courses in which S/Z grade is awarded, registered for the particular semester.

$$SGPA = \frac{\sum_{\text{Semester}}(\text{Course Credits} \times \text{Grade Points}) \text{ for all courses except audit and S/Z grade Courses}}{\sum_{\text{Semester}}(\text{Course Credits}) \text{ except audit and S/Z grade Courses}}$$

$$SGPA = \frac{\text{Points Secured in the Semester}}{\text{Credits Registered the Semester, excluding audit and } S/Z \text{ grade courses}}$$

The CGPA is calculated on the basis of all pass grades, except audit courses and courses in which S/Z grade is awarded, obtained in all completed semesters.

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The CGPA is calculated as given below :

$$CGPA = \frac{\sum_{\text{All Semester}}(\text{Course Credits} \times \text{Grade Points}) \text{ for all courses with pass grade except audit and S/Z grade Courses}}{\sum_{\text{All Semester}}(\text{Course Credits earned}) \text{ except audit and S/Z grade Courses}}$$

SCHEME OF EXAMINATION AND SYLLABI FOR
B.E. (Information Technology)

Teaching Scheme for B.E. Second Year for AS 2019-2020

Second Year- Third Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		Practical *
		L-T-P	Contact hrs/week	Credits	category	Internal Ass.	Univ. Exam	
MATHS 303	Linear Algebra and Probability Theory	4-1-0	5	4	BSC-G	50	50	-
IT302	Data Structures	4-0-3	7	4+1	PC-G	50	50	50
IT303	Digital Electronics	3-1-3	7	4+1	ESC-G	50	50	50
IT304	Computer Architecture and Organization	3-1-0	4	4	PC-G	50	50	-
IT305	Cyber Laws & IPR	3-0-0	3	3	HSMC	50	50	-
Total		**17-3-6**	**26**	**21**		**250**	**250**	**100**

Total Marks: 600 **Total Credits: 21**

S.NO	TYPE	Credits
1.	BSC(Basic Science Course)	**4**
2.	ESC (Engineering Science Course)	**5**
3.	HSMC(Humanities and Social Sciences including Management courses)	**3**
4.	PC (Professional Course)	**9**

Second Year- Fourth Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		Practical *
		L-T-P	Contact hrs./week	Credits	Category	Internal Ass.	Univ. Exam	
HSS-401	Elective- I (from Humanities and Social Sciences)	3-0-0	3	3	HSMC	50	50	-
MATHS - 403	Discrete Structures	4-1-0	5	4	BSC-G	50	50	
IT401	Microprocessor & Assembly Language Programming	3-1-3	7	4+1	PC	50	50	50
IT402	Computer Networks	3-1-0	4	4	PC-G	50	50	-
IT403	Operating System	3-1-3	7	4+1	PC-G	50	50	50
IT404	Web and Open Source Technologies	0-0-3	3	1	PC	-	-	50
IT405	Educational Tour	-	-	-		-	-	-
Total		**16-4-9**	**29**	**22**		**250**	**250**	**150**

Total Marks: 650 **Total Credits: 22**

S.NO	TYPE	Credits
1.	BSC (Basic Science Course)	**4**
2.	HSMC (Humanities and Social Sciences including Management courses)	**3**
3.	PC (Professional Course)	**15**

Elective-I (from Humanities and Social Sciences**)**

- HSS-401a Economics
- HSS-401b Introduction to Psychology
- HSS-401c Sociology
- HSS-401d Russian Language

Teaching Scheme for B.E. Third Year

Third Year - Fifth Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		Practical *
		L-T-P	Contact hrs./week	Credits	category	Internal Ass.	Univ. Exam	
IT501	Database Management System	3-1-3	7	4+1	PC-G	50	50	50
IT502	Wireless Communication Technologies	3-1-3	7	4+1	PC	50	50	50
IT503	Network Security and Cryptography	3-1-0	4	4	PC-G	50	50	-
IT504	Design and Analysis of Algorithms	3-1-3	7	4+1	PC-G	50	50	50
IT505a, IT505b, IT505c	Professional Elective-I	4-0-3	7	4+1	PEC	50	50	50
IT506	Industrial Training(after 4th semester)	0-0-0	0	2	PSI	-	-	50
Total		**16-4-12**	**32**	**26**		**250**	**250**	**250**

Total Marks: 750 **Total Credits: 26**

S.NO	TYPE	Credit
1.	**PC (Professional Course)**	**19**
2.	**PEC(Professional Elective Course)**	**5**
3.	**PSI(Project/Seminar/Internship)**	**2**

Professional Elective-I *(Choose any one from the following)*		
Sr No.	**Subject**	**Subject Code**
1	Java Programming/Technologies	IT505a
2	UNIX Network Programming	IT505b
3	Python Programming	IT505c

Third Year - Sixth Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		Practical *
		L-T-P	Contact hrs./week	Credits	Category	Internal Ass.	Univ. Exam	
IT601	Data Warehouse and Data Mining	4-0-3	7	4+1	PC	50	50	50
IT602	Agile Software Development	4-0-3	7	4+1	PC	50	50	50
IT603	Theory of Computation	3-1-0	4	4	PC-G	50	50	-
IT604	Artificial Intelligence	3-1-3	7	4+1	PC	50	50	50
IT605a IT605b IT605c IT605d	Professional Elective – II	4-0-0	4	4	PEC	50	50	-
Total		**18-2-9**	**29**	**23**		**250**	**250**	**150**

Total Marks: 650 **Total Credits: 23**

S.NO	TYPE	Credits
1.	**PC(Professional Course)**	**19**
2.	**PEC (Professional Elective Course)**	**4**

Professional Elective Course-II
(Choose any one from the following :)

Sr No.	Subject	Subject Code
1	Advanced Computer Network	IT605a
2	Computer Graphics	IT605b
3	Advanced Cryptography	IT605c
4	Software Engineering	IT605d

Teaching Scheme for B.E. Fourth Year

Fourth Year - Seventh Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		Practical *
		L-T-P	Contact hrs./week	Credits	Category	Internal Ass.	Univ. Exam	
ITE741	Digital Signal Processing	3-1-3	7	4+1	PC	50	50	50
ITE742	Agile Software Development	4-0-3	7	4+1	PC	50	50	50
ITE746	Compiler Design	4-0-0	4	4	PC	50	50	-
ITE744 ITE745 ITE748	Elective-II	4-0-0	4	4	EC	50	50	-
ITE795	Project-I	0-0-4	4	2	PSI	-	-	100
ITE796	Industrial Training (after 6th Semester)	0-0-0	0	1	PSI	-	-	50

Total Marks: 650 **Total Credits: 21**

S.NO	TYPE	Credits
1.	**PC(Professional Course)**	**14**
2.	**EC Elective Course)**	**4**
3.	**PSI(Project/Seminar/Internship)**	**3**

Elective Course-II *(Choose any one from the following :)*		
Sr No.	**Subject**	**Subject Code**
1	Cloud Computing	ITE744
2	Artificial Intelligence	ITE745
3	Principle of Telecommunication	ITE748

Fourth Year - Eighth Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		Practical *
		L-T-P	Contact hrs./week	Credits	Type	Internal Ass.	Univ. Exam	
ITE841	Digital Image Processing	3-1-3	7	4+1	PC	50	50	50
ITE842	Embedded System Design	3-1-3	7	4+1	PC	50	50	50
ITE843	Java Technologies	4-0-3	7	4+1	PC	50	50	50
ITE844 ITE845 ITE847	Elective-III	3-1-0	4	4	EC	50	50	-
ITE897	Seminar	0-0-2	2	1	PSI	-	-	50
ITE898	Project II	0-0-4	4	2	PSI	-	-	100
	Total Marks:700			**Total Credits: 22**				
	OR OPTION – 2							
Sub Code	**Sub Name**	**Duration**	**Credits**		**Int. Ass.**	**Marks**	**Grand Total**	
ITE899	Industrial Training	6 months	**22**		300	400	700	

OPTION-1

S.NO	TYPE	Credits
1.	**PC(Professional Course)**	**15**
2.	**EC Elective Course)**	**4**
3.	**PSI(Project/Seminar/Internship)**	**3**

Elective Course-III *(Choose any one from the following :)*		
Sr No.	**Subject**	**Subject Code**
1	Theory of Computation	ITE 844
2	Soft Computing	ITE845
3	Natural Language Processing	ITE847

Student can exercise **option 1 or option 2** according to the following:

A student may opt for one semester training in lieu of subjects of 8th Semester. The marks for six months training will be equal to the total marks of 8th Semester study. A student can opt for six month semester training under following conditions:-

a. The student having any pending reappears in any subject (theory as well as practical) will not be allowed to go for training.

b. The students scoring less than 6.5 CGPA upto 6th semesters will not be allowed to go for training. However, if a student has been placed through campus placement, he/she may be allowed to go for training at that respective company subject to the condition that his/her CGPA is above 6.0.
c. The students will only be allowed to pursue training in a company in which he/she is placed or company is offering stipend/MNC/Govt. Organization including R&D institutions/PSUs (Not Pvt. Ltd.)
d. For pursuing this training, student needs the prior approval from the Co-ordinator/Chairperson of the respective branch/department.

SYLLABUS FOR B.E. (I.T.) THIRD SEMESTER

COURSE INFORMATION SHEET

Course Code	**MATHS-303**
Course Title	**Linear Algebra and Probability Theory**
Type of Course	**Core**
L T P	**4 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Nil
Course Objectives	1. To introduce the concept of Linear Equations and vector spaces. 2. To introduces the use of Eigen vectors and linear transformations. 3. To introduce random variables and Probability theory. 4. To introduce the use of 2-D random Variables.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the use of Linear algebra and linear transformations. 2. Design solutions using matrices and Eigen Vectors. 3. Apply probability theory in different Engineering problems. 4. Understand the use of random variables.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Systems of Linear equations Introduction, Linear equations, solutions, Linear equations in two unknowns, Systems of linear equations, equivalent systems, Elementary operations, Systems in Triangular and echelon form, Reduction Algorithm, Matrices, Row equivalence and elementary row operations, Systems of Linear equations and matrices, Homogeneous systems of Linear equations. (Scope as in Chapter 1, Sections 1.1-1.10 of Reference 1).	**(05)**
Vector Spaces Introduction, Vector spaces, examples of vector spaces, subspaces, Linear combinations,Linear spans, Linear dependence and Independence, Basis and Dimension, Linear equationsand vector spaces. (Scope as in Chapter 5, Sections 5.1-5.8 of Reference1).	**(05)**

Eigen values and Eigenvectors, Diagonalization Introduction, Polynomials in matrices, Characteristic polynomial, Cayley-Hamilton theorem,Eigen-values and Eigen-vectors, computing Eigen-values and Eigen-vectors, Diagonalizing matrices. (Scope as in Chapter 8, Sections 8.1-8.5 of Reference 1).	**(04)**
Linear Transformations Introduction, Mappings, Linear mappings, Kernel and image of a linear mapping, Rank-Nullity theorem (without proof), singular and non-singular linear mappings, isomorphisms.(Scope as in Chapter 9, Sections 9.1-9.5 of Reference 1).	**(05)**
Matrices and Linear transformations Introduction, Matrix representation of a linear operator, Change of basis and Linear operators. (Scope as in Chapter 10, Sections 10.1-10.3 of Reference 1).	**(05)**
SECTION-B	
Probability Sample Space and Events, the Axioms of probability, some elementary theorems,Conditional probability, Baye's Theorem, Random Variables-Discrete and Continuous, Independent random variables, Expectation, Variance and Covariance, Means and variances of linear combinations of random variables, Chebyshev's inequality.	**(07)**
Probability Distributions Joint Probability distributions, Marginal and Conditional distributions, Binomial, Poisson, Uniform and Normal distributions, Normal and Poisson approximations to Binomial, Moments, Moment generating function.	**(07)**
Two Dimensional Random Variables Joint distributions – Marginal and conditional distributions – Covariance – Correlation andRegression – function of a random variable-Transformation of random variables - Central limit theorem.	**(07)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Shaum's Outline of Theory and Problems of Linear Algebra.	Seymour Lipschutz	McGraw- Hill
2	Linear Algebra.	VivekSahai, VikasBist	Narosa Publishing House
3	Introductory Probability and Statistical Applications.	P.L.Meyer	Addison-WesleyPublishing Company
4	Schaum's Outline Series of Theory And Problems Of Probability And Statistics.	Murray R. Spiegel	McGraw- Hill
5	Introduction to Probability and Statistics.	J. S. Milton and J.C. Arnold.	McGraw Hill
6	Probability and Statistics for Engineers.	R.A. Johnson and C.B. Gupta	Pearson Education
7	Fundamentals of Mathematical Statistics.	S. C. Gupta and V.K. Kapoor	Sultan Chand and Sons

COURSE INFORMATION SHEET

Course Code	**IT302**
Course Title	**Data Structures (Theory)**
Type of Course	**Core**
L T P	**4 0 3**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Object Oriented Programming using C++
Course Objectives	1. To provide a knowledge regarding an efficient storage of data for an easy access. 2. How to represent the inherent relationship of the data in the real world for efficient processing of data and management. 3. To teach students various data structures and to explain the algorithms for performing various operations on these data structures. 4. To introduce the fundamentals of Data Structures, abstract concepts and how these concepts are useful in problem solving.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand and compute the time and space Complexity of algorithms. 2. Learn and implement different abstract data types. 3. Implement and analyze different searching and Sorting algorithms. 4. Apply data structures concepts to solve real life Problems.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction Introduction to data structures; Introduction to Algorithms Complexity	**(01)**
Arrays, Stacks & Queues Concepts; Basic operations & their algorithms: Transverse, Insert, Delete, Sorting of data in these data structures; Prefix, Infix, Postfix Notations;	**(08)**

Lists Concepts of Link List and their representation; Two way lists; Circular link list; Basic operations & their algorithms: Transverse, Insert, Delete, Searching and Sorting of data in List; Storage Allocation & Garbage Collection; Linked stack and queues; Generalized List; sparse matrix representation using generalized list structure;	**(10)**
SECTION-B	
Trees Binary Trees and their representation using arrays and linked lists; Trees and their applications; Binary tree transversal; Inserting, deleting and searching in binary trees; Heap & Heap Sort; General Trees; Thread binary tree; Height balance Tree (AVL); B-Tree.	**(08)**
Graphs and their applications Graphs; Linked Representation of Graphs; Graph Traversal and spanning forests; Depth first search; Breadth first search.	**(08)**
Sorting & Searching Insertion sort; Selection sort; Merging; Merge sort; Radix sort; Sequential & Binary Search; Indexed Search; Hashing schemes; Binary search Tree.	**(10)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Data Structure Using C and C++.	A. Tanenbaum, Y. Langsam, M. J. Augenstein.	Prentice Hall of India.
2	Theory and problems of Data Structures.	Seymour Lipschutz.	McGraw Hill.
3	Data Structures & Program Design.	Robert L. Kruse.	Prentice Hall of India.

COURSE INFORMATION SHEET

Course Code	**IT302**
Course Title	**Data Structures (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Object Oriented Programming using C++
Course Objectives	1. To impart knowledge about developing recursive as well as non-recursive algorithms and to gain the knowledge of different data structures. 2. To be able to Choose the appropriate data structure and algorithm design method for a specified application and to develop skills to design and analyze simple linear and non linear data structures, 3. To strengthen the ability to identify and apply the suitable data structure for the given real world problem and to gain knowledge in practical applications of data structures.

SYLLABUS

List of Programs:

1. **Implementation of Array Operation:** Traversal, Insertion & Deletion at and from a given location; Sparse Matrices; Multiplication, addition.
2. **Stacks**: Implementation of Push, Pop; Conversion of Infix expression to Postfix, Evaluation of Postfix Expressions.
3. **Queues**: Adding, Deleting Elements; Circular Queue: Adding and Deleting elements.
4. **Implementation of Linked Lists**: Inserting, deleting, inverting a linked list. Implementation of stacks and queues using linked lists; Polynomial addition, Polynomial multiplication.
5. **Trees**: Implementation of Binary & Binary Search Trees, Recursive and Non-Recursive traversal of Tress.
6. **Graphs:** BFS & DFS
7. Implementation of sorting and searching algorithms.
8. **Hash Tables Implementation:** Searching, inserting and deleting, searching & sorting techniques.

COURSE INFORMATION SHEET

Course Code	**IT303**
Course Title	**Digital Electronics (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Basics of Electronics Communication
Course Objectives	The objective of this course is that students are able to understand, analyze and design combinational and sequential circuits by applying the concepts of digital electronics.
Course Outcomes	After completion of this course, the students will be able to: 1. Apply the concepts of digital electronics like Boolean algebra, Logic gates, K-Maps, Flip flops, Multiplexers; and be able to Convert among various Number systems. 2. Analyze and design Combinational and Sequential circuits. 3. Understand the concepts of Data converters; Memories and their types. 4. Learn the characteristics of Digital Logic Families and be able to design various gates using them.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction Representation of Logic, Logic Variables, Boolean Algebra, Boolean Expressions and minimization of Boolean expression using K-Map, Review of Logic Gates & Flip-flops, design & Implementation of Adder, Subtractor, Multiplexer, DeMultiplexer, Encoder, Decoder, ROM, Digital Comparators, Code Converters	**(10)**
Number Systems and Codes Decimal, Binary, Hexadecimal, Octal's complement, 2's complement, addition and subtraction, weighted binary codes, Error detecting codes, Error correcting codes, Alphanumeric codes.	**(07)**
Counters & Shift Registers	**(07)**

Ripple Counters, Design of Modulo-N ripple counter, Up-Down counter, design of synchronous counters with and without lockout conditions, design of shift registers with shift-left, shift-right & parallel load facilities, Universal shift Registers.	
SECTION-B	
Data Converters Sample & Hold switch, D/A converters: weighted type, R-2R Ladder type; A/D Converters: Counter-Ramp type, Dual Slope Type, Successive approximation type, flash type; Specifications of ADC & DAC	**(07)**
Digital Logic families Characteristics of digital circuits: fan in, fan-out, power dissipation, propagation delay, noise margin; Transistor-transistor Logic(TTL), TTL NAND Gate with active pull up, its input and output Characteristics, MOS and CMOS. Comparison of Characteristics of TTL, ECL, MOS & CMOS logic circuits	**(06)**
Semiconductor Memories & Programmable Logic ROM, PROM, EPROM, EEPROM; RAM: Static RAM, Memory Organization, Reading, & Writing Operation in RAM, PLA, PAL & FPGA.	**(04)**
Synchronous sequential logic Sequential circuits, State Reduction and Assignment, Design Procedure.	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Digital Electronics – An introduction to theory and practice, 2nd Edition.	William H. Gothmann	Prentice Hall of India
2	Modern Digital Electronics.	R.P.Jain	Tata McGraw-Hill
3	Digital Integrated Electronics.	Herbert Taub& Donald Schilling	Tata McGraw-Hill
4	Integrated Electronics.	Millman&Halkias	Tata McGraw-Hill
5	Digital System Principles & Applications.	R J Tocci	Prentice Hall of India
6	Digital Logic Design.	Morris Mano	Pearson Education

COURSE INFORMATION SHEET

Course Code	**IT303**
Course Title	**Digital Electronics (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Basics of Electronics Communication
Course Objectives	The aim of this course is to provide an understanding of the fundamentals of digital logic design to the students through practical training. The student is given hands-on-experience on the usage of ICs and design of circuits using gates, flip-flops, multiplexers so as to enhance the theoretical study of the subject.

SYLLABUS

List of Experiments:

- To verify truth tables of various gates: AND, OR, NOR, NAND, NOT and XORusing their respective ICs.
- To design and implement various gates using NAND as Universal Gate
- To design and implement various gates using NOR as Universal Gate
- To design and test the truth table of Half adder and Full adder.
- To design and test the truth table of Half Subtractor and Full Subtractor
- To design and test circuit which converts binary number to its gray code (and vice versa).
- To Verify the truth tables of various flip flops: RS, D, JK and T Flip Flops
- Design & implement circuits using Multiplexers.
- To verify the truth table of Multiplexers/ Demultiplexers using ICs.
- To Design & implementation of Asynchronous counter.
- To Design & implementation of synchronous counter.
- To Design and implement shift register.
- To design and implement circuit for given state diagram using various flip flops

COURSE INFORMATION SHEET

Course Code	**IT304**
Course Title	**Computer Architecture & Organization (Theory)**
Type of Course	**Core**
L T P	**3 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Introduction to Information Technology, Basics of Electronics Communication
Course Objectives	1. To understand instruction execution through instruction cycles, basic concept and implementation of interrupts, I/O control and data transfers, functioning of ALU and control unit. 2. To understand instruction set design, pipelining, RISC architecture and superscalar architecture as well as different mechanisms used for read/ write operations in the memory design.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the basics of major components of a computer including CPU, memory, I/O, and parallel processing. 2. Analyze the concepts of I/O organization, CPU instruction set and addressing modes. 3. Understand the concepts of computer arithmetic & control design. 4. Analyze the design concepts of control unit,accumulator logic etc.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Design Methodology System design, Design levels- Gate level, Register level, Processor level.	**(04)**
Basic Computer Organization & Design Instruction codes, common bus system, computer instruction, Design of basic computer, Design of accumulator logic.	**(08)**
Control Design Basic concepts, Hardwired control, Micro programmed control, Design of control unit.	**(08)**
Central Processing Unit Introduction, General reg. Organization, Inst. Formats Addressing modes, Data transfer & manipulation, RISC & CISC Characteristics.	**(08)**
SECTION-B	
Input-Output Organization I/O interface, Modes of transfer, Priority interrupts, DMA, I/O processor.	**(06)**
Memory Organization Memory hierarchy, Main memory, Auxiliary memory, Associative memory. Cache memory, virtual memory, Memory management H/W.	**(06)**
Parallel Processing Introduction, Multiprocessors, Interconnection structure.	**(05)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Computer Architecture & Organization.	J.P Hayes	Tata McGraw Hill
2	Computer System Architecture.	Morris Mano	PHI
3	Advanced Computer Architecture.	Kai Hwang	Tata McGraw Hill
4	Computer Organization and. Architecture.	William Stallings	PHI

COURSE INFORMATION SHEET

Course Code	**IT305**
Course Title	**Cyber Laws & IPR (Theory)**
Type of Course	**Core**
L T P	**3 0 0**
Credits	**03**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Nil
Course Objectives	1. To familiarize students with the dynamics of Cyber Law with a focus on new forms of cybercrime. 2. To establish a basic knowledge on the technical side of Cyber Law. 3. To give an update of recent Cyber Laws developments and case law make students conversant with the social and intellectual property issues emerging from 'Cyberspace. 4. Explore the legal and policy developments in various countries to regulate Cyberspace. 5. Develop the understanding of relationship between commerce and cyberspace; and give students in depth knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security and Data Protection.
Course Outcomes	The students should be able to: 1. Describe the need for cyber law. Get familiarize with the dynamics of Cyber Law with a focus on new forms of cybercrime. 2. Get established a basic knowledge on the technical side of Cyber Law. 3. Have an update of recent Cyber Laws.developments and case law. 4. Get engaged with today's Cyber Laws reality and debates. 5. Work on tools for further study of Cyber Law.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Basics of Computer & Internet Technology Internet, ISP & domain name; Network Security; Encryption Techniques and Algorithms; Digital Signatures.	**(08)**
Introduction to Cyber World Introduction to Cyberspace and Cyber Law; Different Components of cyber Laws; Cyber Law and Netizens.	**(03)**
E-Commerce Introduction to E-Commerce; Different E-Commerce Models; E-Commerce Trends and Prospects; E-Commerce and Taxation; Legal Aspects of E-Commerce.	**(08)**
SECTION-B	
Intellectual Property Rights IPR, Copyright and Patents, International Treaties and Conventions, Business Software Patents, Domain Name Disputes and Resolution.	**(11)**
IT Act, 2000 Reasons, Aims, Objectives and Applications, Regulators under IT Act, Role of Certifying Authority, Digital Signature Certificates, Duties of the Subscribers, Cyber Crimes-Offences and Contraventions, Grey Areas of IT Act.	**(11)**
Project Work Candidates will be required to work on a project. At the end of the course, students will make a presentation and submit the project report.	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	A Guide to Cyber Laws & IT Act 2000 with Rules & Notification	NandanKamath	Universal Law Publishing
2	Cyber Cops, Cyber Criminals & Internet	Keith Merill&Deepti Chopra	IK International
3	Handbook of Cyber Laws	Vakul Sharma	McMillian

SYLLABUS FOR B.E. (I.T.) FOURTH SEMESTER

COURSE INFORMATION SHEET

Course Code	**HSS-401a**
Course Title	**Economics (Theory)**
Type of Course	**Elective**
L T P	**3 0 0**
Credits	**03**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Nil
Course Objectives	1. To make students understand how society manages its scarce resources for achieving maximum satisfaction. 2. To make students learn about economic aspects related to a consumer, firm, market and economy.
Course Outcomes	After completion of this course, the students will be able to: 1. Apply engineering knowledge to maximize profit, satisfaction and welfare. 2. Identify the forces that affect the economy. 3. Learn entrepreneurial skills and analyze the concepts of demand and supply. 4. Develop analytical skills in students to understand different markets.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction to Economics Nature of Economics, Economic Thoughts, Economic Activities, Relationship of Economics with other Social Sciences and Engineering	**(06)**
Theory of Consumer Behaviour Demand: Types, Law of Demand, Determinants of Demand and Change in Demand Elasticity of Demand: Nature, Degrees, Types, Measurement and Factors Affecting Elasticity of Demand and its Application Laws of Consumption: Concept and Applicability of Law of Diminishing Marginal Utility and Law of Equi-Marginal Utility	**(12)**
Theory of Production and Cost Cost: Types of Costs, Production: Law of Variable Proportion, Returns to Factor and Returns to Scale, Economies and Diseconomies of Scale	**(06)**

SECTION-B	
Theory of Market Nature and Relevance of Perfect Competition, Monopoly and Monopolistic Competition.	**(08)**
Basic Concepts of Macro Economics National Income: Concept and Measurement, Determination of Equilibrium of Income Inflation: Concept, Causes and Effect of Inflation, Measures to Control Inflation	**(09)**
Project Presentations	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Modern Economics	H. L. Ahuja	S. Chand & Co. Ltd
2	Economics For Engineers	M.L. Gupta. & S.P. Gupta	ESS PEE Publications
3	Business Economics	H.L. Ahuja	S. Chand & Co. Ltd
4	Macro Economic Theory	M.L. Jhingan	Konark Publisher Pvt. Ltd
5	Principles of Microeconomics	J. Stiglitz& Carl E Walsh	W.W. Norton & Company
6	Principles of Economics	Mankiw N Gregory	Cengage Learning
7	Course in Micro Economics Theory	A. Kreps	Prentice Hall
8	Economics	Samuelson A. Paul &Nordhaus D William	Tata McGraw Hill
9	Microeconomics	H. Gravelle& R. Reiss	Pearson Education
10	Macro Economics: Theory and Practice	H. L. Ahuja	S. Chand & Co. Ltd.
11	Economics for engineers	T.R Jain, M.L Grover & V.K Ohei	V.K Publications

COURSE INFORMATION SHEET

Course Code	**HSS-401b**
Course Title	**Introduction to Psychology (Theory)**
Type of Course	**Elective**
L T P	**3 0 0**
Credits	**03**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Nil
Course Objectives	1. To provide knowledge and understanding about important concepts in Psychology. 2. To make students learn the application of principles of psychology in working life.
Course Outcomes	After completion of this course, the students will be able to: 1. Learn the causes and dynamics of human behavior. 2. Apply psychological principles to enhance their personal and professional life. 3. Develop leadership and managerial qualities into the students. 4. Understand the importance of work life balance and workplace spirituality.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Understanding Human Behaviour: Definition, methods, branches and application of psychology for engineers	**(05)**
Measuring Human abilities Intelligence, theories and assessment	**(06)**
The individual working life Personality, approaches and trait theories	**(06)**
Psychological problems of everyday life Stress and coping	**(06)**
SECTION-B	
Work and mental health, workplace spirituality	**(05)**

Motivation the concept and theoretical framework, motivating people at work	**(05)**
Group dynamics, Intergroup relations, conflict and negotiation	**(07)**
Leadership and Management	**(05)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	G.E. Psychology 2007 Edition	Ciccarelli, S.K., & Meyer	Pearson
2	OrganisationalBehaviour 2010 Edition	M. Parikh & R. Gupta	Tata McGraw Hill Education
3	Introduction to Psychology 1986 Edition	C.T. Morgan, R.A. King, J.R.Weiss& J. Schopler	McGraw-Hill
4	Organizational Behavior 2003 Edition	S.P. Robbins	Prentice Hall of India
5	Organizational Behavior 2010 Edition	F. Luthans	McGraw Hill

COURSE INFORMATION SHEET

Course Code	**HSS-401c**
Course Title	**Sociology (Theory)**
Type of Course	**Elective**
L T P	**3 0 0**
Credits	**03**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Nil
Course Objectives	1. To make the students understand the role of theory in social sciences. 2. To explain students how social problems interact and react with the larger society. 3. To make students learn whether the problem is evaluated on the macro or micro perspective and their cause and effect patterns.
Course Outcomes	After completion of this course, the students will be able to: 1. Identify the function and application of sociology theory in social sciences. 2. Understand how social class affects individual life chances. 3. Learn about social structure and how it shapes and influences social interactions. 4. Appraise about social problems and how to deal with the same.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Sociology – The Discipline Sociology as a Science, Impact of Industrial and French Revolution on the Emergence of Sociology, Relevance of Sociology for Engineering	**(03)**
Basic Concepts Society, Association, Institution, Culture Relativism, Social Structure, Social System, Socialisation, Competition, Conflict, Accommodation, Social Mobility	**(04)**
Pioneering Contributions to Sociology Seminal Views of Karl Marx, Emile Durkheim, Max Weber, AlwinToeffler	**(04)**
Evolution of Society	**(05)**

Primitive, Agrarian, Industrial and Post-Industrial, Features of Industrial and Post-Industrial Society, Impact of Automation and Industrialization on Society	
Economy and Society Economic Systems of Simple and Complex Societies, Sociological Dimensions of Economic Life, Market (free) Economy and Controlled (planned) Economy	**(05)**
SECTION-B	
Industrial Sociology Nature and Scope of Industrial Sociology, Pre-Conditions and Consequences of Industrialization	**(04)**
Science and Technology Ethos of Science and Social Responsibility of Science	**(04)**
Social Change Theories of Change, Factors of Change, Directed Social Change, Social Policy and Social Development, Social Cost Benefit Analysis, Role of Engineers in Development	**(05)**
Understanding Indian Society Traditional Hindu Social Organization, Caste System, Agrarian Society in India, Social Consequences of Land Reforms and Green Revolution, Working of the Democratic Political System in a Traditional Society, Problem of Education in India, Gender Discrimination, Economic Reforms: Liberalization, Privatization and Globalization, Strategies for Development in India	**(07)**
Social Problems AIDS, Alcoholism, Drug Addiction, Corruption	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Sociology	RanjayVardhan and s. Kapila	New Academic Publishing
2	Sociology: Themes and Perspective	M. Haralambos	Collins Educational Publications
3	Sociology of Indian Society	C.N. Rao Shankar	Sultan Chand and Co.
4	Introduction to Sociology	VidyaBhushan and D.R. Sachdeva	KitabMahal Publications
5	Sociological Thought	Francis Abraham and J.H. Morgan	Macmillan India Ltd.
6	Social Problems	EtzioniAmitai	Prentice Hall
7	Industrial Sociology	Scheneider	Tata McGraw Hill
8	Society in India	David Mandilbaum	Popular Publications
9	Sociology	L. Broom , P. Selznick and D. Dorrock	Harper International Publishing House

COURSE INFORMATION SHEET

Course Code	**HSS-401(d)**
Course Title	**Russian Language**
Type of Course	**Elective**
L T P	**3 0 0**
Credits	**3**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 **50** **50**
Course Prerequisites	Nil
Course Objectives	The main objective of the course is to create and develop the students' practical Russian language skills (speaking, listening, reading and writing).
Course Outcome	1. To be able to read Russian Language. 2. To be able to speak in Russian language. 3. To be able to write in Russian Language.

SYLLABUS

Note: The Semester question paper of a subject be of 50 Marks having 7 questions of equal marks. First question, covering the whole syllabus and having questions of conceptual nature, be compulsory. Rest of the paper will be divided into two sections having three questions each and the candidate is required to attempt at least two questions from each section.

Section-A	**Hours**
The Russian Alphabet, consonants, vowel, words, stress, sentence patterns.	**(04)**
Grammar: Noun, gender, personal pronoun, the conjunction conjugation of verbs, number (singular-plural), possessive pronoun, adverbs, translation (Russian to English & vice-versa)	**(05)**
Section-B	
Irregular plurals, Imperative mood, demonstrative pronoun, declaration of noun (nominative case, prepositioned case, the past tense, reflexive verbs, adjectives. Translation (Russian in to English & Vice-versa.)	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	"Russian"	Wagner (Part-A-Lesson 1 to n10 and Part-B Lesson 11 to 15)	

COURSE INFROMATION SHEET

Course Code	**MATHS-403**
Course Title	**Discrete Structures (Theory)**
Type of Course	**Core**
L T P	**4 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Nil
Course Objectives	1. To get familiar and understand the fundamental notions in discrete mathematics. 2. To introduce the knowledge of core mathematical foundation of computer science. 3. Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups. 4. Be aware of the counting principles. 5. To introduce the basic properties of graphs and trees and model simple applications.
Course Outcomes	After completion of this course, the students will be able to: 1. Get familiar and understand the fundamental notions in discrete mathematics. 2. Acquire the knowledge of core mathematical foundation of computer science. 3. Aware of the counting principles, basic properties of graph, trees and model simple applications. 4. Exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Sets, Relations and Functions Definition of sets, product sets and partitions, Relations and digraphs, matrix of a relation, paths in relations and digraphs, equivalence relations and partitions, operations on relations, transitive closure and warshall's algorithm.(Scope as in Chapter 4, Sections 4.1 – 4.7 of Reference 2). Functions, One-to-one and onto functions, Special functions. The pigeon hole principle. Function composition and inverse functions (Scope as in Chapter 5, Sections 5.1 – 5.6 of Reference 1). Partially ordered sets; Extremal elements of Partially ordered sets, Lattices, Linearly ordered sets. (Scope as in Chapter 6, Sections 6.1 – 6.3 of Reference 1).	**(14)**
Fundamentals of Logic Basic connectives and truth tables, Logical equivalence, The laws of logic, Logical implication, Rules of Inference, Use of Quantifiers, Definitions and Proofs of Theorems (Scope as in Chapter 2, Sections 2.1 – 2.5 of Reference 1).	**(08)**
SECTION-B	
Principles of Counting Rule of Sum and Product, Permutations, Combinations, Combinations with repetition (Scope as in Chapter 1, Sections 1.1 – 1.4 of Reference 1). The principle of Inclusion and Exclusion, Generalizations, Derangements (Scope as in Chapter 8, Sections 8.1 – 8.3 of Reference 1). Generating Functions: Definitions and Examples: Calculation Techniques, Partitions of Integers, The exponential generating function, The summation operator (Scope as in Chapter 9, Sections 9.1 – 9.5 of Reference 1). Recurrence relations: The first order linear recurrence relation, The second order linear homogeneous recurrence relation with constant coefficients, The non homogeneous recurrence relation, The method of generating functions (Scope as in Chapter 10, Sections 10.1 – 10.4 of Reference 1).	**(09)**
Graph Theory Definitions and examples, Subgraphs, Complements and Graph Isomorphism, Vertex degree: Euler trails and circuits, Planar Graphs, Hamilton Paths and Cycles, Graph colouring and Chromatic polynomials (Scope as in Chapter 11, Sections 11.1 – 11.6 of Reference 1).	**(05)**
Groups Theory Definition and elementary properties of groups, subgroups, Homomorphism, Isomorphism and Cyclic groups, Cosets and Lagrange's Theorem (Scope as in Chapter 16, Sections 16.1 – 16.3 of Reference 1). Introduction to Rings and Fields (definitions, examples and basic properties) (Scope as in Chapter 14, Sections 14.1-14.2 of Reference 1)	**(09)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Discrete and Combinatorial Mathematics	Ralph P. Grimaldi	Pearson Education, 4th Edition
2	Discrete Mathematical Structures	B. Kolman, R. C. Busby and S. C. Ross	Pearson Education, 5th Edition
3	Elements of Discrete Mathematics	C.L.Liu, D P Mohapatra	Tata McGraw Hill
4	Discrete Mathematics for Computer Scientists and Mathematicians	J. L. Mott, A. Kandel, T. P. Baker.	Prentice-Hall of India, 2nd Edition
5	Discrete Mathematics and applications	K.H.Rosen	Tata McGraw Hill
6	Discrete Mathematics	S. Lipschutz, M. Lipson	Schaum's Outlines, Tata McGraw-Hill, 2nd Edition

COURSE INFORMATION SHEET

Course Code	**IT401**
Course Title	**Microprocessor & Assembly Language Programming (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Digital Electronics, Computer Architecture and Organization
Course Objectives	To understand and apply the concepts of 8085 Microprocessor so as to prepare the graduates to write assembly language programs for solving various problems.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the architecture of 8085 and its interfacing with Memory and peripheral I/O devices. 2. Apply the concepts of microprocessor to write assembly language programs using 8085 programming instructions. 3. Analyze the operation and time delays caused by loop counters. 4. Understand and apply the concept of stacks, subroutine, interrupts and various Programmable Peripheral devices.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Microprocessor Architecture and Microcomputer Systems Microprocessor Architecture, The 8085 MPU: Block Diagram, Pin Diagram, Address/Data Buses, Concept of de-multiplexing of Buses, Control and status signals, Registers, Ports, Flags, Instruction Decoding and Execution, memory Interfacing..	**(06)**
Interfacing I/O Devices Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Devices, Memory- Mapped I/O	**(06)**

Programming the 8085 Introduction to 8085 Assembly Language Programming, The 8085 Programming Model, Instruction Classification, Instruction Format. Data Transfer (Copy) Operations, Arithmetic Operations, Logic Operations, Branch Operations, Writing Assembly Language Programs.	**(07)**
Programming Techniques with Additional Instructions Programming Techniques Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Operations Related to Memory, Logic Operations.	**(06)**
SECTION-B	
Counters and Time Delays Counters and Time Delays, Hexadecimal Counter, Modulo Ten, Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs.	**(06)**
Stack and Subroutines Stack, Subroutine, Conditional Call and Return Instructions	**(04)**
Interrupts The 8085 Interrupt, 8085 Vectored interrupts.	**(03)**
General –Purpose Programmable Peripheral Devices Block Diagram, Working and Control word of: The 8255A Programmable Peripheral Interface, The 8259 A Programmable Interrupt Controller, Programmable communications interface 8251.	**(07)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S.Gaonkar	PHI
2	Advanced Microprocessors & Interfacing	Badri Ram	Tata McGraw Hill
3	Microprocessor Principles and Applications	Charles M.Gilmore	Tata McGraw Hill
4	Microprocessors and Interfacing programming and Hardware	Douglas V. Hall	Tata McGraw Hill

COURSE INFORMATION SHEET

Course Code	**IT401**
Course Title	**Microprocessor & Assembly Language Programming (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Digital Electronics, Computer Architecture and Organization
Course Objectives	To develop, key-in, test and troubleshoot the assembly language program and machine level program on 8085 kits.

SYLLABUS

- Familiarization of 8085 kits.
- Application of assembly language using 8085 instructions set to develop various programs.

COURSE INFORMATION SHEET

Course Code	**IT402**
Course Title	**Computer Networks (Theory)**
Type of Course	**Core**
L T P	**3 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Introduction to Information Technology, Basics of Electronics Communication
Course Objectives	This course is to provide students with an overview of the concepts of data communication and computer networks. The main course objectives are: 1. Familiarize the student with the basic taxonomy, terminology and functioning of computer networks. 2. Building an understanding of various existing protocols for data communication in computer networks.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand basic concepts of computer network including various, reference models and protocols, propagation media 2. Apply the knowledge of different techniques of flow control and error control during data transmission and illustrate various protocols of data link layer and MAC sub-layer. 3. Learn the functioning of network and transport layer. 4. Analyze the functioning of application layer protocols.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction Basic concepts of computer networks,; Network Hardware: LAN, MAN, WAN, Wireless networks, Internet; Network Software: Layer, Protocols, interfaces and services; Reference Model: OSI/TCP/IP and their comparison.	**(08)**

Physical Layer Multiplexing, Line coding techniques, Transmission media: Magnetic, Twisted pair, coaxial cable, fiber optics, wireless transmission (radio, microwave, infrared, light wave). Switching: Circuit Switching & Packet Switching. Cellular radio and communication satellites.	**(08)**
Data Link Layer Framing, Error control: Error correction & Detection, sliding window protocols (one bit, Go back n, selective repeat), Medium Access Sub layer: Channel Allocation, MAC protocols -ALOHA, CSMA protocols, Collision free protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.	**(09)**
SECTION-B	
Network Layer Design issues, routing algorithms (shortest path, flooding, flow based, distance vector, hierarchical, broadcast, multicast). Congestion control algorithms (Leaky bucket, Token bucket, Choke, Packet, Load shedding), IPV4, IP addressing, IPV6.	**(09)**
Transport Layer Addressing, establishing and releasing connection, flow control & buffering, multiplexing, crash recovery, Internet Transport protocol (TCP and UDP).	**(06)**
Application Layer Network Security; Domain Name System; Simple Network Management Protocol; Electronic Mail.	**(05)**

RECOMMENDED BOOKS

S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Computer Networks, 4th Edition	Andrew S. Tanenbaum	Prentice Hall of India
2	Data and Computer Communications	William Stallings	Prentice Hall of India
3	Data Communication and Networking	Behrouz A Forouzan	Tata McGraw Hill
4	Design & Analysis of Computer Communication Networks	Vijay Ahuja	McGraw Hill
5	Data Communications and Networks	Douglas E. Coomer	Prentice Hall of India

COURSE INFORMATION SHEET

Course Code	**IT403**
Course Title	**Operating System (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Introduction to Information Technology
Course Objectives	1. To study and understand main components of operating system, their working, and operations performed by operating system. 2. To provide students knowledge on: resource management provided by operating systems, concepts and theories of operating systems, implementation issues of operating systems. 3. To be able to understand description of multiprocessor and distributed operating system and different operating system and compare their features.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the design of operating systems and its services. 2. Learn the concepts of process management by understanding scheduling and synchronization 3. Illustrate different approaches to memory management and the concept of data input/output, file management and learn how to use the disc space efficiently for data storage. 4. Analyze the services provided by distributed operating system and compare various Operating systems like UNIX,WINDOWS, and SOLARIS etc.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Basic Functions and Concepts of Operating Systems Concept of an operating systems, batch system, Multi-programmed, Time sharing,	**(05)**

Personal Computer System, Parallel system, Real time system, General system Architecture.	
Features and Objectives of Operating Systems System components, operating system services, System calls, System Programs, System Structure, System design and implementation. Concept of process, process states, process state transition, process control block, operations of processes, concurrent processes, deadlocks, scheduling algorithms, scheduling criteria, Process Synchronization.	**(11)**
Memory Management Logical and physical address space, storage allocation and management techniques, swapping, concepts of multi programming, paging, segmentation, virtual storage management strategies, Demand Paging, Page Replacement Algorithms, and Thrashing.	**(06)**
SECTION-B	
Information Management File concept, Access method, Directory structure, Protection File system structure, Allocation methods, Free space management, Directory implementation, Disk structure, Disk Scheduling, Disk management, Swap space management.	**(06)**
Distributed-System Structures Network operating system, Distributed operating systems, Remote services, Robustness, Design Issues.	**(06)**
Distributed file systems and Distributed Coordination Naming and Transparency, Remote file Access, Stateful versus stateless service, File replication, Event ordering, Mutual Exclusion, Atomicity, Concurrency control, Deadlock Handling, Election Algorithms, Reaching Agreement.	**(06)**
Case Studies: Unix O.S. Architecture, Operating system services, user perspective, representation of files in Unix system processes and their structure, Input-output system, Memory management, Unix shell, history and evolution of Unix system.	**(05)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Operating Systems, 5th Edition	Galvin &Silberschatz	Addison Wesley Publishing Ltd
2	An Introduction to Operating System, 3rd Edition	Harvey M. Deitel	Narosa Publishing House
3	Operating Systems: Design and implementation, 3rd Edition	Andrew S. Tanenbaum	PHI
4	Operating system, 5th Edition	Millan Milankovic	McGraw Hill

COURSE INFORMATION SHEET

Course Code	**IT403**
Course Title	**Operating System (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Programming Fundamental. Object Oriented Programming using C++
Course Objectives	1. To teach students about various operating systems including Windows, and UNIX. 2. To be able to students learn about systems configuration and administration. Students learn, explore and practice technologies related to UNIX.

SYLLABUS

List of Practicals:

1. Implement various CPU scheduling algorithms.
2. Write program to implement banker's algorithm for deadlock prevention.
3. Write programs to implement Page replacement algorithms.
4. Write an algorithm and program to implement Disc scheduling.
5. Installation of the Linux operating system
6. Using basic commands-man, who, more, pipe, finger, cat, redirect, ls, cp, mv, rm.Working with directory and plain files-pwd, cd, mkdir, rmdir, lp, wc, date, cal, sort, diff, uniq and grep commands.
7. Using miscellaneous commands-head, tail, cut, copy, paste, spell, find and bc.
8. Working with shell scripts under Korn Shell and using shell variables, print, chmod and calendar commands.
9. Using quotes, relational operators, command substitution, arithmetic functions, shell control statements such as for-in, if-then-elseif-else, while,case,date and script.
10. Working under the Bourne shell-shell scripts, control statements such as test, for, for in, if-then-else-fi, -if-then-elif-fi, while,until, case, relational operators and expressions.

COURSE INFORMATION SHEET

Course Code	**IT404**
Course Title	**Web and Open Source Technologies (Practical)**
Type of Course	**Core**
L T P	**0 0 3**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Programming Fundamental, Object Oriented Programming using C++
Course Objectives	To enable students to get practical knowledge about various web and open source technologies like HTML, JavaScript, PHP, etc.

List of Practical

1. Introduction to HTML and its structure
2. To study various text formatting tags and attributes in HTML
3. To study various types of linking of documents in HTML
4. To study image maps in HTML
5. To study frames in HTML
6. To study various types of lists in HTML
7. To study table tag and its attributes in HTML
8. To study HTML Form element and its methods and attributes
9. Introduction about style sheets and its types along with implementation
10. To study dialog boxes in JavaScript
11. To study and implementation of cookies in JavaScript
12. Introduction to browser objects in JavaScript
13. Building of web forms using HTML elements, JavaScript and CSS
14. Introduction to PHP, its installation and configuration
15. To study data types, variables and operators in PHP
16. To study loops and control structures in PHP
17. To study arrays, its types and array sorting in PHP
18. To study file handling in PHP
19. To study working of cookies and sessions in PHP
20. To design and build web forms using HTML elements, JavaScript and CSS in PHP

COURSE INFORMATION SHEET

Course Code	**IT405**
Course Title	**Educational Tour**
Type of Course	**Core**
L T P	**0 0 0**
Credits	**Non- Credit**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment	 **00** **00**
Course Prerequisites	Nil
Course Objectives	1. To enable students to get insight regarding the internal working environment of a company and functionality of company. 2. To provide students with an opportunity to learn practically through interaction, working methods and employment practices.
Course Outcomes	After completion of this course, the students will be able to: 1. Motivate and help to take full advantage of all learning opportunities presented. 2. Bring a dimension to education, which cannot be gained in the classroom. 3. Make connections between the different aspects of their educational experience.

SYLLABUS FOR B.E. (I.T.) FIFTH SEMESTER

COURSE INFORMATION SHEET

Course Code	**IT501**
Course Title	**Database Management Systems (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Introduction to Information Technology
Course Objectives	This course offers a good understanding of database systems concepts and prepares the student to be in a position to use and design databases for different applications. 1. The objective of this course is to provide students with the background to design manipulate and manage databases. 2. The students are exposed to the various forms, types and models of database systems to enable them to make suitable choices from alternatives. 3. The concepts of managing data are thoroughly examined and students are taught implementation using SQL and PL/SQL.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the basic concepts of a database management system and its components. 2. Understand the relational data model, entity- relationship model and process of relational database design. 3. Design entity-relationship diagrams to represent simple database application scenarios and apply the principles of good relational database design. 4. Understand the concept of a transaction and different techniques for concurrency control. 5. Construct simple and moderately advanced database queries using Structured Query Language (SQL) and Procedural SQL (PL/SQL).

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from

Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Database Systems File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence	**(06)**
Physical Data Organization File Organization and Indexing, Index Data Structures, Hashing, B-trees, Clustered Index, Sparse Index, Dense Index, Fixed length and Variable Length Records.	**(07)**
Data Models Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Database Design with the ER Model, Comparison of Models.	**(05)**
The Relational Model Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus, Querying Relational Data.	**(05)**
SECTION-B	
SQL Basic SQL Query, Creating Table and Views, SQL as DML, DDL and DCL, SQL Algebraic Operations, Nested Queries, Aggregate Operations, Cursors, Dynamic SQL, Integrity Constraints in SQL, Triggers and Active Database, Relational Completeness, Basic Query Optimization Strategies, Algebraic Manipulation and Equivalences.	**(07)**
Database Design Design: Functional Dependencies, Reasoning about Functional Dependencies, Normal Forms, Schema Refinement, First, Second and Third Normal Forms, BCNF, Multi-valued Dependency, Join Dependency, Fourth and Fifth Normal Forms, Domain Key Normal Forms, Decompositions.	**(08)**
Transaction Management ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read Problem, Read-Write Locks, Deadlocks Handling, 2PL protocol.	**(07)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	An Introduction to Database Systems, 8th Edition	C.J. Date	Pearson
2	Schaum's Outlines Fundamentals of Relational Databases, 3rd Edition	Toledo	Tata McGraw Hill
3	Database Management Systems, 2nd Edition	James Martin	PHI
4	Data Base Management Systems, 3rd Edition	Raghu Ramakrishnan and Johannes Gehrke	McGraw Hill
5	Introduction to Data Base Systems, 3rd Edition	Bipin C Desai	Galgotia Publications

COURSE INFORMATION SHEET

Course Code	**IT501**
Course Title	**Database Management Systems (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **00** **50**
Course Prerequisites	Introduction to Information Technology
Course Objectives	1. To use the Oracle and SQL database systems along with hands on experience on DDL, DML as well as DCL Commands. 2. To make students able to implement nested queries and various functions based on programming assignments.

SYLLABUS

List of Practicals:

1. Introduction to SQL and installation of SQL Server / Oracle.
2. Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
3. Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements. 4. Set Operators, Nested Queries, Joins, Sequences.
5. Views, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
6. PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
7. Stored Procedures and Exception Handling.
8. Triggers and Cursor Management in PL/SQL.

COURSE INFORMATION SHEET

Course Code	**IT502**
Course Title	**Wireless Communication Technologies (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Basics of Electronics Communication
Course Objectives	To understand the terminology, fundamental concepts, issues and design approaches of wireless communication systems.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the basics of wireless communication systems. 2. Analyze the design fundamentals of wireless cellular systems. 3. Explain and experiment with the wireless communication technologies and choose propagation models. 4. Interpret the working of emerging wireless systems.

SYLLABUS

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each. Candidate is required to attempt at least two questions from each part.

SECTION-A	**Hours**
Introduction to Wireless Communication Wireless Communication-Features, Issues and Applications. Types of Wireless Communication Systems, Evolution of communication systems 1G, 2G, 2.5G, 3G, 4G, Comparison of common wireless communication systems.	**(6)**
The Cellular Concept-System Design Fundamentals Frequency reuse, Channel assignment strategies, Handoff strategies, Interference, Improving Coverage and Capacity in cellular systems: Cell splitting, Cell sectoring and Microcell zone concept.	**(8)**
GSM and CDMA Wireless Cellular Systems GSM-Architecture, Identifiers, Authentication and Security, Control Channels, Services. IS-95 Architecture, Forward and Reverse channels, Soft handoff, Near-Far Effect, Cell Breathing, Mobile data over CDMA, CDMA-2000, Comparison of CDMA and GSM.	**(08)**

SECTION-B	
The Propagation Models Propagation criteria, Free space propagation model, Mobile point to point propagation model, Outdoor propagation path loss models, Indoor propagation path loss models, Signal attenuation due to Foliage, Long distance propagation.	**(09)**
Wireless Technologies Bluetooth, WiFi networks and WLAN IEEE 802.11 standards, ZigBee Radios and IEEE 802.15.4, RFID systems and EPC Global UHF Class 1 Generation 2,WiMax, LTE, LTE-A.	**(08)**
Emerging Wireless Systems Ad-hoc/Mesh wireless networks, Sensor networks, Ultra wideband systems, Distributed control networks, Cognitive radios, Biomedical networks and In-body networks, Internet of Things.	**(06)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Wireless Communications: Principles and Practice, Latest Edition	Theodore S. Rappaport	Prentice Hall India
2	Wireless and Cellular Communication, Latest Edition	Sanjay Sharma	S. K. Kataria & Sons
3	Wireless Communications, Latest Edition	T. L. Singal	McGraw Hill Education

COURSE INFORMATION SHEET

Course Code	**IT502**
Course Title	**Wireless Communication Technologies (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Basics of Electronics Communication
Course Objectives	To familiarize students with the Wireless Communication Technology (Satellite, Cellular and Bluetooth etc.)
SYLLABUS **Practical based on theory.**	

COURSE INFORMATION SHEET

Course Code	**IT503**
Course Title	**Network Security and Cryptography (Theory)**
Type of Course	**Core**
L T P	**3 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Computer Networks
Course Objectives	1. To understand and apply the principles of encryption algorithms, conventional and public key cryptography. 2. To gain knowledge about authentication, hash functions and application level security mechanisms.
Course Outcomes	After completion of this course, the students will be able to: 1. Identify the security threats and apply relevant cryptographic techniques on data. 2. Compare the different techniques of public key cryptography and key exchange. 3. Apply the basic concepts of digital signatures and hash algorithms. 4. Outline the basics of network and web security services and mechanisms.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Basic Encryption and Decryption Threats and Types of attacks, Challenges for Information Security, Classical Cryptographic Algorithms: Monoalphabetic Substitutions such as Caesar Cipher, Cryptanalysis of Monoalphabetic ciphers; Polyalphabetic Ciphers such as Vigenere, Vernam Cipher; Transposition Cipher.	**(06)**
Stream and Block Ciphers Rotor Based System and Shift Register Based System. Block cipher: principles, modes	**(07)**

of operations. Data Encryption Standard (DES), Analyzing and Strengthening of DES, Introduction to Advance Encryption Standard (AES)	
Number Theory and Basic Algebra Modular Arithmetic, Euclidean algorithm, Random number generation	**(04)**
Key Management Protocols: Solving Key Distribution Problem, Diffie-Hellman Algorithm, Key Exchange with Public Key Cryptography.	**(05)**
SECTION-B	
Public Key Encryption Systems Concept and Characteristics of Public Key Encryption system, Rivets-Shamir-Adleman (RSA) Encryption, Digital Signature Algorithms and authentication protocols, Digital Signature Standard (DSA).	**(06)**
Hash Algorithms Hash concept, description of Hash Algorithms, Message Digest Algorithms such as MD4 and MD5, Secure Hash Algorithms such as SH1 and SHA2	**(05)**
Network Security Kerberos, IP security: Architecture, Authentication Header, Encapsulating Security Payload	**(04)**
Web Security Web security consideration, Secure Socket Layer Protocol, Transport Layer Security, Secure Electronic Transaction Protocol	**(04)**
Firewalls Firewall Design principles, Trusted Systems, Virtual Private Networks.	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Principles of Cryptography, 4th Edition	William Stallings	Pearson Education
2	Security in Computing, 2nd Edition	Charles P.Pfleeger	Prentice Hall International
3	Cryptography & Network Security, 2nd Edition	Atul Kahate	TMH
4	Applied Cryptography: Protocols, Algorithms, and Source Code in C, 2nd Edition	Bruce Schneier	John Wiley and Sons
5	Firewalls and Internet Security, 2nd Edition	Bill Cheswick and Steve Bellovin	Addison-Wesley
6	Security Technologies for the world wide web, 2nd Edition	Rolf Oppliger	Artech House, Inc

COURSE INFORMATION SHEET

Course Code	**IT504**
Course Title	**Design and Analysis of Algorithms(Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Programming Fundamental, Data Structures
Course Objectives	The objective of this course is to familiarize with the algorithm analysis techniques and various strategies of algorithm design. The course covers asymptotic analysis and algorithm design strategies illustrated on different problem domains.
Course Outcomes	After completion of this course, the students will be able to: 1. Analyze the asymptotic performance of algorithms. 2. Compare the performance of different algorithms in terms of time and space complexity. 3. Understand various algorithm design strategies and its application in problem solving. 4. Design efficient algorithms for the real world problems.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Analysis of algorithm Role of Algorithms in Computing; Growth of functions: Asymptotic Notation, Standard notation, Performance measurements Introduction to Recurrences: substitution method, recursion-tree method, master method; Algorithms;	**(09)**
Divide and Conquer Method General Method, Binary Search, Matrix Multiplication, Merge Sort, Quick Sort and their performance analysis	**(07)**

Greedy Approach Elements of Greedy strategy, Knapsack problem, Single source Shortest paths problem, Minimum Spanning tree problem and analysis of these problems.	**(07)**
SECTION-B	
Dynamic Programming General Method, Multistage Graph , All Pairs Shortest Path Algorithm , 0/1 Knapsack Problem, Traveling Salesman Problem	**(09)**
Backtracking The General Method , 8-Queens Problem- Sum of Subsets ,Knapsack	**(07)**
P and NP Problems Polynomial time, Nondeterministic Algorithms and NP, Reducibility and NP completeness, NP complete Problems	**(06)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Fundamentals of Computer Algorithms	Ellis Horowitz, SartajSahni	Galgotia
2	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest	Prentice Hall
3	The Design and Analysis of Computer Algorithms	Aho A.V., Hopcroft J.E., Ullman J.D.	Pearson Education
4	Fundamentals of Algorithms	Gilles Brassard & Paul Bratley	Prentice Hall

COURSE INFORMATION SHEET

Course Code	**IT504**
Course Title	**Design and Analysis of Algorithms (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Programming Fundamental, Data Structures
Course Objectives	1. To understand and implement different algorithm design techniques. 2. To design algorithms based on the strategies learned and apply the same to solve different problems.
SYLLABUS **Practical based on theory**	

Professional Elective-I

COURSE INFORMATION SHEET

Course Code	**IT505a**
Course Title	**Java programming/Technologies (Theory)**
Type of Course	**Professional Elective-I**
L T P	**4 0 3**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Programming Fundamental, Object Oriented Programming using C++
Course Objectives	The objective of the course is to learn the object oriented concepts from the perspective of Java programming language and UML so as to apply the same to solve various engineering problems. This course covers a practical approach to object-oriented analysis, design and programming using UML and Java.
Course Outcomes	After completion of the course, students will be able to 1. Learn the fundamental concepts of Java programming language such as encapsulation, inheritance, exception handling and multithreading. 2. Understand the Java I/O stream classes. 3. Design graphical user interface using standard java libraries for implementing event driven applications. 4. Examine the enterprise components including Enterprise JavaBeans (EJB) technology, servlets, and Java Server Pages (JSP) technology, JDBC.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Java Methods, Classes and Inheritance Introduction; classes; methods; constructors; overloading methods; arrays; recursion; passing arrays and objects to methods; Inheritance; method overriding; abstract classes; using final; packages; interfaces.	**(8)**
Exceptional Handling and Multithreaded Programming Exception handling fundamentals; exception types; uncaught exceptions; try and catch; creating exception classes; throwing exceptions; Java thread model; thread priorities; creating a thread; interthread communication; thread synchronization; suspending, resuming and stopping threads.	**(8)**
I/O, Applets and Graphics I/O basics; stream classes; byte and character streams; reading and writing files; Applet fundamentals; Applet class; Applet initialization and termination; event handling; keyboard and mouse events; AWT class; Layout managers; panels; canvases; Frame windows; drawing lines, rectangles, ellipses.	**(8)**
SECTION-B	
Overview of J2EE and working with JDBC What is J2EE, component based architecture of J2EE: Web, Business and Application component, commonly used classes and interfaces of java.sql package, connecting java application to a database, prepared statements.	**(7)**
Servlets and JSP Java Servlets, compilation, deployment, and testing a servlet, session management, request dispatching, Java Server Pages, deploying and testing a JSP, using java beans in JSP.	**(7)**
Enterprise Java Beans(EJB) Architecture of EJB, creating a stateless-session EJB, statefull-session bean, Life Cycle of session beans, Entity beans, life cycle of entity beans.	**(7)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Java: How to Program, 6th Edition	Deitel and Deitel	Pearson Education
2	The Complete Reference Java2	Herbert Schildt	TMH
3	J2EE: The Complete Reference	James Edward Keogh, Jim Keogh	McGraw-Hill

COURSE INFORMATION SHEET

Course Code	**IT505a**
Course Title	**Java Programming/Technologies (Practical)**
Type of Course	**Professional Elective-I**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Object Oriented Programming using C++
Course Objectives	To be able to learn the concepts of and practical approaches to object-oriented analysis, design and programming using UML and Java.
SYLLABUS **Practical based on theory.**	

COURSE INFORMATION SHEET

Course Code	**IT505b**
Course Title	**Unix Networking Programming (Theory)**
Type of Course	**Professional Elective-I**
L T P	**4 0 3**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Programming Fundamental, Object Oriented Programming using C++
Course Objectives	To teach the students how to write programs that communicates with other programs across a computer network. 1. The student shall be able to write their own network programs in UNIX. 2. To provide an opportunity to do network programming using TCP sockets. 3. To provide an opportunity to do network programming using UDP sockets. 4. To provide to do IPC programs. 5. know The importance of platform independent networks
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the variety of interfaces & frameworks for writing network applications. 2. Implement interfaces, streams sockets, and remote procedure call libraries. 3. Design and implement programs based on Client-server model. 4. understand concept of I/O Multiplexing, UDP Construct programs for client manage I/O stream & implement Unix socket system calls.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
INTRODUCTION TO NETWORK PROGRAMMING: OSI model, Unix standards, TCP and UDP,TCP connection establishment and termination, Buffer sizes and limitations,Standard Internet services, Protocol usage by common internet applications.	**(8)**
SOCKETS AND APPLICATION DEVELOPMENT Introduction To Socket Programming – System Calls – Address Conversion Functions – OSIX- Signal Handling – Server With Multiple Clients – Boundary Conditions – Server Process C Rashes Server Host Crashes, Server Crashes And Reboots,Server Shutdown – I/O,Multiplexing – I/ Models -TCP Echo Client/Server with I/O Multiplexing.	**(7)**
SOCKET OPTIONS socket Options – Getsockopt And Setsockopt Functions – Generic Socket Options – IP Socket Options ICMP Socket Options – TCP Socket Options – Multiplexing TCP And UDP Sockets – SCTP Sockets – CTP Client/Server – Streaming Example – Domain Name System – Gethostbyname, Gethostbyaddr, Getservbyname And Getservbyport Functions – Protocol Independent Functions In CP Client/Server Scenario **.**	**(8)**

SECTION-B	
ADVANCED SOCKETS IPv4 And IPv6 Interoperability – Threaded Servers – Thread Creation And Termination – TCP Echo Server Using Threads – Mutex – Condition Variables – Raw Sockets – Raw Socket Creation – Raw Socket Output – Raw Socket Input – Ping Program – Traceroute Program.	**(8)**
SIMPLE NETWORK MANAGEMENT SNMP Network Management Concepts – SNMPv1 – Management Information – MIB Structure – Object Syntax – Standard MIB‟S – MIB-II Groups – SNMPv1 Protocol And Practical Issues.	**(8)**
SNMP V2, V3 AND RMO Introduction To SNMPv2 – SMI For SNMPV2 – Protocol – SNMPv3 – Architecture And Applications – Security And Access Control Model – Overview Of RMON.	**(7)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	UNIX Network Programming, Sockets API, Volume I, 3rd Edition, PHI, 2010.	W.Richard Stevens,	PHI
2	SNMP, SNMPv2, SNMPv3 And RMON 1 And 2”, Third Edition, Pearson Edition, 2009	William Stallings	PHI
3	UNIX Systems Programming using C++ 1st Edition, PHI, 2010	T. Chan	PHI

COURSE INFORMATION SHEET

Course Code	**ITE505b**
Course Title	**Unix Networking Programming (Practical)**
Type of Course	**Professional Elective -I**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Programming Fundamental, Object Oriented Programming using C++
Course Objectives	To teach the students how to write programs that communicates with other programs across a computer network.

SYLLABUS

Practical based on theory.

COURSE INFORMATION SHEET

Course Code	**IT505c**
Course Title	**Python Programming**
Type of Course	**Professional Elective-I**
L T P	**4 0 3**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Programming Concepts.
Course Objectives	The course is designed to provide Basic knowledge of Python
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the basic features of Python. 2. Understand different data structures of Python. 3. Design programs using object oriented programming and file handling. 4. Learn the concept of exception handling and database connectivity.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction to Python Installation and Working with Python, Understanding Python variables, Python basic Operators, Understanding python blocks, Basic data types of Python, Conditional blocks using if, else and elif ,Simple for loops in python, For loop using ranges, string, list and dictionaries, Use of while loops in python, Loop manipulation using pass, continue, break and else.	**(8)**
Python Functions and Data Structures Function Specifications, Global Variables, Modules, Passing parameters to Functions, Recursive functions, System functions and Parameters, importing modules, Lambda function in python, Python String, List, Tuple, Set, And Dictionary Manipulations, Programming using string, list, tuple, set and dictionary in built functions	**(9)**
File Handling Opening a file, Understanding read functions: read(), readline() and readlines(), Understanding write functions: write() and writelines(), appending data to a file, closing files, Manipulating file pointer using seek, Programming using file operations.	**(6)**

SECTION-B	
Python Object Oriented Programming Oops Concept of class, object and instances, Constructor, class attributes and destructors, Method overloading in python, Operator overloading, Inheritance.	**(8)**
Python Regular Expression and Exception Handling Special symbols and characters for Regular expressions, Pattern matching and searching, Pattern searching using regex, Validation using regular expressions, What is exception, Handling an exception, try…except…else, try-finally clause, Argument of an exception, Python standard exception, Raising an exception, User-defined exceptions	**(8)**
Python Database Connectivity Introduction, SQL Database connection using python, Creating and searching tables, Reading and storing config information on database, Programming using database connections.	**(6)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Core Python Applications Programming, Third Edition	Wesley J Chun	Pearson Publication
2.	Beginning Python: Using Python 2.6 and Python 3.1	James Payne	Wrox Publication
3	Core Python Programming	R. Nageswara Rao	Dreamtech
4	Core Python Programming	Wesley J Chun	Prentice Hall
5	Programming and Problem Solving with Python	Ashok Namdev Kamthane, Amit Ashok Kamthane	Mcgraw Hill Education

COURSE INFORMATION SHEET

Course Code	**IT505c**
Course Title	**Python Programming (Practical)**
Type of Course	**Professional Elective-I**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Programming Concepts.
Course Objectives	1. Understand and comprehend the basics of Python programming. 2. Develop real-world applications using OOPs, files, exception handling and database connectivity provided by python.
SYLLABUS **Practical based on theory**	

COURSE INFORMATION SHEET

Course Code	**IT506**
Course Title	**Industrial Training (After 4th Semester)**
Type of Course	**Core**
L T P	**0 0 0**
Credits	**2**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Nil
Course Objectives	1. To enable students to integrate theoretical knowledge with practical implementation**.** 2. To introduce students to the work culture of industry and provide opportunity to get hands-on experience to real world problems.
Course Outcomes	After completion of this course, the students will be able to: 1. Analyze practical aspects of a problem and formulate required specification. 2. Apply knowledge of recent technologies to design and implement solution for a real life problem. 3. Document and report the project undertaken during training.

SYLLABUS FOR B.E. (I.T.) SIXTH SEMESTER

COURSE INFORMATION SHEET

Course Code	**IT601**
Course Title	**Data Warehouse and Data Mining**
Type of Course	**Core**
L T P	**4 0 3**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Database Management Systems
Course Objectives	The objective of the course is to build the foundations of data warehousing and data mining concepts and techniques so as to use this knowledge to solve simple problems. This course covers the methodologies, technologies, and algorithms of data mining and data warehousing from a variety of perspectives
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the basic concepts and architecture of a data warehouse. 2. Analyze enterprise requirements and design schema for a data warehouse. 3. Understand data and apply suitable data preprocessing techniques 4. Design solutions using data mining functionalities for solving practical problems.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Data Warehousing Data Warehousing Definition and characteristics, need for data warehousing, DBMS vs. data warehouse, OLAP.	**(3)**
Data Warehousing Components Overall Architecture, Data Warehouse Database, Sourcing Acquisition, Cleanup and Transformation Tools, Metadata Access Tools, Data Marts, Data Warehouse Administration and Management, Information Delivery Systems.	**(5)**
Mapping the Data Warehouse to a Multiprocessor Architecture Relational Database Technology for Data warehouse, Database Architectures for Parallel Processing, Parallel RDBMS features, Alternative Technologies, Parallel DBMS Vendors.	**(5)**

Introduction to Data Mining Functionalities, classification data mining systems, Multidimensional data model, data cubes, Schemas for multidimensional databases, OLAP operations, Data Marts, Metadata	**(8)**
SECTION-B	
Data Preprocessing Data cleaning, integration and transformation, Data reduction, Discretization and Concept Hierarchy Generation.	**(7)**
ConceptDescription Data Mining techniques-Concept description, attribute oriented induction, analytical characterization, mining class comparisons, mining descriptive statistical measures.	**(6)**
Association Rule Mining Mining single dimension rules from transactional databases, Apriori algorithm, efficiency, mining rules without candidate generation.	**(8)**
Applications and Trends In Data Mining Commercial Importance of DW, applications of data mining, data mining in business process, Embedded data mining.	**(3)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Data Mining –Concepts & Techniques	Jiawei Han & Micheline Kamber	Morgan Kaugmann Publishers
2	Data Warehousing in the Real World	Sam Anahory & Dennis Murray	Pearson Education
3	Data Mining	Pieter Adrians, Dolf Zantinge.	Addison Wesley, 2000.
4	Data Warehousing, Data Mining and OLTP	Alex Berson	McGraw Hill.

COURSE INFORMATION SHEET

Course Code	**IT601**
Course Title	**Data Warehouse and Data Mining (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Database Management Systems
Course Objectives	The objective of the course is to build the foundations of data warehousing and data mining concepts and techniques so as to use this knowledge to solve simple problems.
SYLLABUS **Practical based on theory.**	

COURSE INFORMATION SHEET

Course Code	**IT602**
Course Title	**Agile Software Development (Theory)**
Type of Course	**core**
L T P	**4 0 3**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Introduction of Information Technology
Course Objectives	1. To understand the basic concepts of agile software process. 2. To gain knowledge in the area of various Agile Methodologies. 3. To know the principles of Agile Testing.
Course Outcomes	After completion of this course, the students will be able to: 1. Define the practices and philosophies of Agile methods. 2. Analyze the tradeoffs in selecting a software engineering method. 3. Define and extend the usage of Scrum and extreme Programming in software product development. 4. Understand about various testing methods used in Agile.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Overview of Agile Software development Introduction: What is Agile?, Goals/Manifesto and principles, Key Features, Challenges, Advantages and disadvantages, Agile usage, Agile Vs Traditional Software development (Waterfall), Agile Software Development lifecycle.	**(08)**
Agile Design Agile Design Practices, Design smells and software rotting, SOLID Principles: SRP – The Single Responsibility Principle, OCP – the Open Closed Principle, LSP – The Liskov Substitution, DIP – The Dependency Inversion Principle, ISP – The Interface Segregation Principle.	**(6)**
Agile Methodologies Scrum: Overview of scrum theory, Scrum Team, Scrum Roles, The Sprint, Sprint Planning, Daily Scrum, Sprint review, Sprint retrospective, Scrum artifacts, Product back log, sprint backlog, Progress Monitoring. Extreme Programming(XP): Overview of XP, Concept, Values, Rules, Princip Scalability, Practices, Issues.	**(9)**

SECTION-B	
Agile Project Management Overview of Agile project management, Agile project management model: Overview of agile enterprise framework and agile delivery framework, Scaling and governing agile projects. Tools for Agile project management	**(10)**
Agile Testing Introduction to agile testing, Principles for testers, Overview of organizational challenges, The Agile testing Quadrants, Test Automation, The Agile lifecycle and its impact on testing, Types of testing in agile : TDD, BDD, Acceptance tests Exploratory testing, Risk based testing, Regression tests, Unit testing, Integration testing, system testing, Tools to support the Agile Tester	**(12)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Agile Principles, Patterns, and Practices in C#	Martin C. Robert, Martin Micah	Prentice Hall, 2006
2	Agile Project Management: Creating Innovative Products, 2nd Edition	Jim Highsmith	Addison-Wesley Professional, 2010
3	Agile Testing: A Practical Guide for Testers and Agile Teams	Janet Gregory, Lisa Crispin	Addison-Wesley .

COURSE INFORMATION SHEET

Course Code	**IT602**
Course Title	**Agile Software Development (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Introduction of Information Technology
Course Objectives	To get exposure to various tools such as AgileFant, JUnit.
SYLLABUS **Practical based on theory.**	

COURSE INFORMATION SHEET

Course Code	**IT603**
Course Title	**Theory of Computation (Theory)**
Type of Course	**core**
L T P	**3 1 0**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Discrete Structures
Course Objectives	The objective of the course is to construct and prove the equivalence of languages described by finite state machines and regular expressions, pushdown automata and Turing machines.
Course Outcomes	After completion of the course, students will be able to 1. explain and interpret the fundamental, mathematical and computational principles laying the foundation of Computer science. 2. define and apply methods for the equivalence of languages described by various types of automata and their equivalent recognizable languages. 3. understand the key results in algorithmic complexity, computability and solvability of problems. 4. design grammars and recognizers for different formal languages

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction to the Theory of Computation Basic concepts – Languages, Grammars, Automata, Strings, Alphabet, Chomsky Classification of Grammars and Languages.	**(2)**
Finite Automata Finite automation model, Acceptance of strings and language, Deterministic Finite Automaton, Non Deterministic Finite Automaton (NDFA), Equivalence of NDFA and DFA, Conversion of NFA into DFA, Minimization of Number of States in Finite Automata, equivalence between two FSMs, Moore and Mealy machines. Conversion of Mealy to Moore machine, Conversion of Moore to Mealy machine.	**(10)**
Regular expressions and regular languages Regular Expressions, Identities for Regular Expressions, Finite Automata and Regular Expressions, Transition System Containing null moves, NDFAs with null moves and	**(10)**

Regular Expressions, Eliminating epsilon-Transitions, Algebraic Method Using Arden's Theorem, Construction of Finite Automata Equivalent to a Regular Expression, Equivalence of Two Finite Automata, Equivalence of Two Regular Expressions , Closure Properties of Regular Languages under Simple Set Operations ((proofs omitted) , Identifying Non regular Languages using Pumping Lemma.	
SECTION-B	
Context free grammar and Pushdown Automata Context-free Languages and Derivation Trees, Ambiguity in Context-free Grammars, Simplification of Context-free Grammars, Construction of Reduced Grammars, Elimination of Null Productions, Elimination of Unit Productions, Normal Forms for Context-free Grammars, Chomsky Normal Form, Greibach Normal Form, Pumping Lemma for Context-free Languages, Pushdown Automata - Basic Definitions, Acceptance by pushdown automata, Pushdown Automata and Context-free Languages, Parsing and pushdown automata, Top-down Parsing Using Deterministic pushdown automata, Bottom-up Parsing .	**(10)**
Turing Machines Linear Bounded Automata Turing Machine Model, Representation of Turing Machines, Language Acceptability by Turing Machines, Design of Turing Machines, Techniques for TM Construction -Turing Machine with Stationary Head, Storage in the State, Multiple Track Turing Machine, Subroutines, Variants of Turing Machines (proofs omitted) – Multi tape Turing Machines, Nondeterministic Turing Machines, The Model of Linear Bounded Automaton (LBA), Relation Between LBA and Context-sensitive Languages, Turing Machines and Type 0 Grammars .	**(11)**
Undecidability Undecidability, Introduction to recursive & non-recursive enumerable languages, Universal Turing machine	**(2)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Theory of computation	Mishra &Chandrashekharan	PHI Learning Pvt. Ltd
2	Introduction to automata theory, languages and computation	Hopcroft H.E. & Ullman	Pearson/Addison Wesley
3	An introduction to formal languages and automata	Peter linz	Jones & Bartlett Learning
4	Introduction to languages and the theory of automata	John C Martin	McGraw-Hill
5	Elements of theory of computation	H.P. Lewis and C.H. papadimition	Prentice-Hall

COURSE INFORMATION SHEET

Course Code	**IT604**
Course Title	**Artificial Intelligence (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Data Structures, Discrete Structures
Course Objectives	To introduce the essential principles, ideas and techniques of Artificial Intelligence (AI), so that it can be used to solve real world problems.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the various problem solving techniques of Artificial Intelligence. 2. Utilize knowledge representation concepts for inference-based problem solving. 3. Understand various Planning problems, algorithms and approaches. 4. Apply the knowledge base for generating different applications for intelligent decision making.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction Artificial Intelligence and its applications, Artificial Intelligence Techniques, criteria of success, Intelligent Agents, Nature and structure of Agents, Learning Agents.	**(06)**
Problem solving techniques State space search, control strategies, heuristic search, problem characteristics, production system characteristics., Generate and test, Hill climbing, best first search, A* search, Constraint satisfaction problem, Mean-end analysis, Min-Max Search, Alpha-Beta Pruning, Additional refinements, Iterative Deepening.	**(09)**
Knowledge representation Mapping between facts and representations, Approaches to knowledge representation, procedural vs declarative knowledge, Forward vs. Backward reasoning, Matching, conflict resolution, Non-monotonic reasoning, Default reasoning, statistical reasoning, fuzzy logic Weak and Strong filler structures, semantic nets, frame, conceptual	**(08)**

dependency, scripts.	
SECTION-B	
Planning The Planning problem, planning with state space search, partial order planning, planning graphs, planning with propositional logic, Analysis of planning approaches, Hierarchical planning, conditional planning, Continuous and Multi Agent planning.	**(06)**
Learning Forms of Learning, inductive learning, Decision trees, Computational learning theory, Logical formulation, knowledge in learning, Explanation based and relevance based learning, statistical learning, Learning with complete data and hidden variables, instance based learning, Neural Networks.	**(10)**
Introduction to Natural Language processing and Expert system Basic Tasks of Natural Language processing, Expert systems, Expert system examples, Expert System Architectures, Rule base Expert systems, Non Monotonic Expert Systems, Decision tree base Expert Systems.	**(06)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	AI: A Modern Approach	Stuart J.Russel, Peter Norvig	Pearson Education, Latest Edition
2	Artificial Intelligence	Elaine Rich, Knight	McGraw Hill, 1993
3	Artificial Intelligence	Partick Henry Winston	Addison Wesley, Latest Edition
4	Artificial Intelligence	George Luger	Pearson Education, Latest Edition
5	Introduction to AI and Expert Systems	DAN, W. Patterson	PHI, latest Edition
6	Principles of AI	A.J. Nillson	Narosa publications, latest Edition

COURSE INFORMATION SHEET

Course Code	**IT604**
Course Title	**Artificial Intelligence(Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Data Structures, Discrete Structures
Course Objectives	This course provides an introduction to the fundamentals of artificial intelligence. It contains a theory component about the concepts and principles that underlie modern AI algorithms, and a practice component to relate theoretical principles with practical implementation.
SYLLABUS **Practical based on theory.**	

Professional Elective-II

COURSE INFORMATION SHEET

Course Code	**IT605a**
Course Title	**Advanced Computer Networks (Theory)**
Type of Course	**Professional Elective-II**
L T P	**4 0 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Introduction to Information Technology, computer network.
Course Objectives	The aim of the course is to provide students with an advanced & deep knowledge on relevant computer networking topics The main course objectives are: 1. Familiarize the student with the new advance topics of computer networks. 2. Give deep knowledge of various existing protocols for data communication in computer networks.
Course Outcomes	After completion of this course, the students will be able to: 1. Apply the basic knowledge of computer network topics to understand the advance about those topics 2. Understand new advance topics like resource Management and QoS etc. 3. Learn the functioning of network and transport layer in deep. 4. Understand the functioning of wireless network protocols and Security in depth.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction Overview of computer networks, seven-layer architecture, TCP/IP suite of protocols, etc.	**(5)**
Medium Access MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless ethernet, etc.)	**(5)**

Internetworking and Routing Packet Switching, The Internetworking Problem, The IP/TCP split connections, Scaling IP, Routers: Forwarding and Routing, The IP forwarding path, Unicast Internet routing: Intra and Inter domain routing, Router Design and Implementation, Security problems with Internet Architecture, IPV6	**(7)**
Resource Management End-to-End Congestion Control, Router-Assisted Congestion Control: Active Queue Management, Fair Queuing and Variants, Modeling and Measurement: Packet Trains, TCP Congestion Control Impediments, Adaptive Network Applications.	**(6)**
SECTION-B	
Quality Of Service (QOS) Why QoS; Basic Models and Architecture, Mechanisms and Properties, Modeling and Measurement: Traffic Self-Similarity; Virus Propagation.	**(4)**
Group Communication Multicast Routing and Transport, IP Multicasting: Multicast routing protocols, address assignments, session discovery etc., Multicasting in mobile networks.	**(5)**
Transport Layer Protocol TCP protocol dynamics, TCP extensions for high-speed networks, transaction-oriented applications. Other new options in TCP.	**(5)**
Wireless Networks Wireless LAN architecture, Mobile IP, Broadcast file system, Agent technology, Satellite technology.	**(3)**
Security Network security at various layers. Secure-HTTP, SSL, ESP, Authentication header, Key distribution protocols. Digital signatures, digital certificates.	**(5)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Computer Networks, 4th Edition	Andrew S. Tanenbaum	Prentice Hall of India
2	Data and Computer Communications	William Stallings	Prentice Hall of India
3	Data Communication and Networking	Behrouz A Forouzan	Tata McGraw Hill
4	Design & Analysis of Computer Communication Networks	Vijay Ahuja	McGraw Hill
5	Data Communications and Networks	Douglas E. Coomer	Prentice Hall of India

COURSE INFORMATION SHEET

Course Code	**IT605b**
Course Title	**Computer Graphics (Theory)**
Type of Course	**Professional Elective-II**
L T P	**4 0 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Data Structures
Course Objectives	The objective of the course is to build the foundation of digital image generation concepts and techniques so as to use this knowledge for building graphics applications. The course covers computer graphics hardware, software, outputs primitives and graphics processing algorithms.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the principles of interactive graphics IO devices and study the applications of computer graphics. 2. Learn various graphics primitives and apply operations like transformations in 2D and 3D. 3. Analyze and implement the concepts of 2D viewing and clipping. 4. Design and implement algorithms for building computer graphics applications.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Overview of Graphics System Applications of computer graphics, Picture representation, color table ,Video Display Devices: Direct View Storage Tubes, Flat Panel Displays: Emissive andNonEmissiveDisplays; Plasma Panel, Thin Film Electroluminescent and Liquid CrystalDisplays, Color Display Techniques: Shadow Mask and Beam-penetration Methods, ThreeDimensional Viewing Devices, Raster Scan Systems, Random ScanSystems, Display Processor, Co-ordinate Representations, Screen Coordinates Input Devices.	**(07)**

Output primitives Scan conversion, Frame buffer, Point and Lines, Line Drawing Algorithms: DDA Algorithm, Bresenham's Line Algorithm, Circle Generating Algorithm: Midpoint circle algorithm, Pixel Addressing and Object Geometry, Scan-Line Polygon Fill Algorithm, Inside-Outside Tests, Boundary-Fill Algorithm, Flood-Fill Algorithm, Antialiasing and Halftoning, Character Generation.	**(07)**
Two Dimensional Geometric Transformations and Viewing Basic Transformations: Translation, Rotation ,Scaling, Reflection and Shear, Inverse transform, Composite Transformation Matrix, Viewing Pipeline, Window to Viewport Coordinate Transformation, Clipping Operations: Line, Polygon, Segments: creation and storage.	**(08)**
SECTION-B	
Three Dimensional Concepts, Transformations and Viewing Three Dimensional Display Methods, Three Dimensional Transformations; ThreeDimensional Viewing Pipeline; Viewing Coordinates; Specifying the View Plane, Projections: Parallel Projections, Perspective Projections.	**(09)**
Splines and Curves Curved Lines and Surfaces, Spline Representations, Cubic Splines, Bezier Curves and theirproperties, B-Spline Curves.	**(07)**
Visible Surface Detection Methods Classification of Visible Surface Detection Methods, Back Face Detection, Depth Buffer,A-Buffer, Scan Line and Depth-Sorting Methods, Wireframe Methods.	**(07)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Computer Graphics C Version	Donald Hearn, M.P. Baker	Pearson Education
2	Principle of interactive Computer Graphics, 2nd Edition	Newman and Sproul	McGraw Hill
3	Graphics, A programming Approach, 2nd Edition	Steven Harrington	Tata McGraw Hill
4	Mathematical Elemants of Computer Graphics, 2nd Edition	Rogar and Adams	McGraw Hill
5	Introduction to Computer Graphics, 1st Edition	N.Krishnamurthy	Tata McGraw Hill

COURSE INFORMATION SHEET

Course Code	**IT605c**
Course Title	**Advanced Cryptography**
Type of Course	**Professional Elective-II**
L T P	**4 0 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Network Security and Cryptography
Course Objectives	1. To understand advanced features of Cryptography and Network Security. 2. To be able to secure a message over in secure channel by various means. 3. To learn about how to apply biometrics and steganography over data. 4. To understand various protocols for network security to protect against the threats in the networks.
Course Outcomes	After completion of this course, the students will be able to: 1. Apply cryptography for dataconfidentiality, integrity, authentication as well as for key distribution and e-mail security. 2. Analyze the working of various advanced security controls, techniques and standards to combat attacks on web, wired and wireless networks. 3. Describe the various access controlmodels applicable for information security. 4. Apply emerging topics such as Steganography, Biometrics for Information security.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Number Theory and Public-Key Encryption Modular arithmetic, Multiplicative inverse modulo *n*, Euclid's algorithm to find the GCD, Extended Euclid algorithm, RSA algorithm – derivation of public/private keys and examples, Diffie-Hellman key exchange.	**(07)**
Key Distribution and Management Needham Schroeder protocol; Public-key certificates – steps to generate, contents of a certificate, certificate revocation, classes of certificates, secure communication using certificates; Key distribution (public keys and secret keys) using public-key authority Kerberos – protocol steps, advantages and weaknesses.	**(05)**
Biometrics Biometric systems – identification vs. verification, performance metrics, basic blocks of a biometric system, Comparison of biometric systems; Multi-biometric systems and different levels of fusion; Cancelable biometrics.	**(04)**
Steganography Steganography Models, types (secret key, public-key), LSB-based substitution, problem of collisions and solution; Information hiding in palette images, through quantization using predictive coding, Information hiding through automated generation of English texts using Context-free grammar (CFG)	**(06)**
SECTION-B	
Access Control Models Mandatory access control model – Multi-level security in databases , Biba integrity model, Bell LaPadula confidentiality model; Discretionary access control (DAC) – UNIX file permissions; weakness of DAC; Dynamic access control model – Chinese wall model: read and write rules; Role-based access control model (RBAC) and hierarchical RBAC.	**(08)**
Email and Web Security PGP for authentication, confidentiality and both; Use of Radix-64 format for PGP; PGP keys; S/MIME; DKIM standard, Cookies, Applets vs.ActiveX; Cross-site Scripting (XSS) attacks – persistent and nonpersistent, XSS attacks and solutions, Cross-site Request Forgery (XSRF) attacks and prevention strategies.	**(08)**
Email and Web Security PGP for authentication, confidentiality and both; Use of Radix-64 format for PGP; PGP keys; S/MIME; DKIM standard, Cookies, Applets vs.ActiveX; Cross-site Scripting (XSS) attacks – persistent and nonpersistent, XSS attacks and solutions, Cross-site Request Forgery (XSRF) attacks and prevention strategies.	**(07)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Principles of Cryptography, 4th Edition	William Stallings	Pearson Education
2	Security in Computing, 2nd Edition	Charles P.Pfleeger	Prentice Hall International
3	Cryptography & Network Security, 2nd Edition	Atul Kahate	TMH
4	Applied Cryptography: Protocols, Algorithms, and Source Code in C, 2nd Edition	Bruce Schneier	John Wiley and Sons
5	Firewalls and Internet Security, 2nd Edition	Bill Cheswick and Steve Bellovin	Addison-Wesley
6	Security Technologies for the world wide web, 2nd Edition	Rolf Oppliger	Artech House, Inc

COURSE INFORMATION SHEET

Course Code	**IT605d**
Course Title	**Software Engineering (Theory)**
Type of Course	**Professional Elective -II**
L T P	**4 0 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Introduction to Information Technology
Course Objectives	This course aims to give students a theoretical foundation in software engineering. Students will learn about the principles and methods of software engineering, including current and emerging software engineering practices and support tools.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the concept of process models. 2. Analyze the project management and specification concepts. 3. Understand the concept of software designing and testing. 4. To gain the knowledge about the metrics measurements and CASE tools.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction Introduction to Software Engineering, System Engineering Vs Software Engineering, Software Evolution, Software Characteristics, Cost of Software Production, Software Components, Crisis – Problem and Causes, Challenges in Software Engineering.	**(05)**
Software Process Model SDLC, Waterfall Model, Incremental Model, Prototyping Model, Evolutionary Model, Spiral Model, Rapid Application Development Model, Formal Methods, Open Source Development, Object Oriented Life Cycle Model, Agile Methods.	**(06)**
Project Management Concepts Management Activities, Project Planning, Project Scheduling, Size Estimation – LOC, FP; Cost Estimation Models –COCOMO, COCOMO-II.	**(06)**
Software Requirements Analysis and Specification Concepts Requirement Engineering, Requirement Elicitation Techniques, Requirements	**(05)**

Documentation, Characteristics and Organization of SRS, Analysis Principles, Analysis Modeling – Data Modeling, Functional Modeling and Behavioral Modeling; Structured vs. Object Oriented Analysis.	
SECTION-B	
Software Design and Coding Concepts Design Principles, Data Design, Architectural design, Interface Design, Component Level Design, Object Oriented Design Concepts, Cohesion and Coupling and their classification, top-down, bottom-up and middle-out design, Coding, Coding Standards, Coding Conventions, Programming Style.	**(06)**
Testing Verification and Validation, Testing Process, Design of Test Cases, Software Testing Strategies, Unit Testing, Integration Testing, Top Down and Bottom Up Integration Testing, Alpha & Beta Testing, System Testing and Debugging.	**(05)**
Technical Metrics for Software Software Measurements: What and Why, A Framework for Technical Software Metrics, Metrics for the Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Software Quality, Metrics for Maintenance.	**(06)**
CASE (Computer Aided Software Engineering) and Introduction to UML CASE and its Scope, Building blocks of CASE, CASE Tools, CASE Environment, UML Concepts, Use Case Diagrams, Sequence Diagrams, Collaboration Diagrams, Class Diagrams, State Transition Diagrams, Component and Deployment Diagrams.	**(06)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Software Engineering, 3rd Edition	Ian Somerville	Pearson Education
2	S/W Engineering-A Practitioner's Approach, 6th Edition	Roger S. Pressman	McGRAW-HILL
3	Software Engineering: Theory and Practice, Second Edition	S.L. Pfleeger, J.M. Atlee	Pearson Education
4	Software Engineering for Students, Fourth Edition	Douglas Bell	Pearson Education
5	Software Engineering	Pankaj Jalote	Narosa Publisher
6	Software Engineering, Second Edition	K.K. Aggarwal, Yogesh Singh	New Age International

SYLLABUS FOR B.E. (I.T.) SEVENTH SEMESTER

COURSE INFORMATION SHEET

Course Code	**ITE741**
Course Title	**Digital Signal Processing (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	Basics of Electronics Communication, Digital Electronic, Wireless Communication Technologies.
Course Objectives (CO)	1. To understand the analysis and manipulation of digital signals. 2. To understand the operation of Digital Signal Processors 3. To provide the student with the necessary background for taking advanced level courses in signal and image processing
Course Outcome	After completion of this course, the students will be able to: 1. Understand and learn the concept of Digital Signal Processing, types of digital signals/systems and their properties. 2. Analyze and implement Z-transform, Discrete Fourier Transform for Digital System Realization. 3. Learn the structures of digital filters and apply the same in designing them. 4. Understand the architecture and features of Digital Signal Processors

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction to Digital Signal Processing Applications and advantages of DSP. Sampling theorem, concept of frequency in discrete time signals.	**(04)**
Discrete Time Signals and Systems Classification of signals, standard signals and classification of discrete time systems. Linear Time Invariant systems and their representation by difference equations and structures.	**(08)**

Z- Transform Definition of direct, inverse z-transform and its properties. System functions of a LTI system. Inverse z-transform by power series expansion and partial fraction expansion.	**(04)**
Frequency Analysis Fourier series and transform of discrete time signals and properties (DTFT). Discrete Fourier Transform and its properties. Fast Fourier Transform algorithms, decimation in time and decimation in frequency algorithms (radix 2).	**(08)**
SECTION-B	
Realization of FIR & IIR Systems Direct forms, cascade and parallel form IIR structures. Direct form, cascade and linear phase FIR structures.	**(04)**
Design of Digital Filters Comparison of Analog and Digital filters, Comparison of IIR and FIR filters.FIR Filters and linear phase requirement. FIR filters design using the window technique. IIR Filters and their design using the impulse invariance technique and bilinear transformation. Finite word length effects.	**(12)**
DSP Processors Introduction to DSP Processors, architecture of TMS 320CXX and ADSP 21XX	**(05)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Digital Signal Processing: Principles, Algorithms and Applications, 3rd Edition	Proakis&Manolakis	Pearson
2	Digital Signal Processing	E C Ifeacher and B W Jervis	Prentice Hall
3	Digital Signal Processing, 1st Edition	S Salivaharan, A Vallavraj, C Granapriya	TMH
4	Digital Signal Processing	Sanjay Sharma	S.K. Kataria& Sons

COURSE INFORMATION SHEET

Course Code	**ITE741**
Course Title	**Digital Signal Processing (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Basics of Electronics Communication, Digital Electronic, Wireless Communication Technologies.
Course Objectives	To develop skills for analyzing and synthesizing algorithms and systems that process discrete time signals, digital and analog filters with emphasis on realization and simulation in MATLAB.
SYLLABUS **Practical based on theory.**	

COURSE INFORMATION SHEET

Course Code	**ITE742**
Course Title	**Agile Software Development (Theory)**
Type of Course	**Core**
L T P	**4 0 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Software Engineering
Course Objectives	1. To understand the basic concepts of Agile Software process. 2. To gain knowledge in the area of various Agile Methodologies. 3. To know the principles of Agile Testing.
Course Outcomes	After completion of this course, the students will be able to: 1. Define the practices and philosophies of Agile methods. 2. Analyze the tradeoffs in selecting a software engineering method. 3. Define and extend the usage of Scrum and Extreme Programming in software product development. 4. Understand about various testing methods used in Agile.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION A	Hours
Overview of Agile Software development Introduction: What is Agile?, Goals/Manifesto and principles, Key Features, Challenges, Advantages and disadvantages, Agile usage, Agile Vs Traditional Software development (Waterfall), Agile Software Development lifecycle.	**(08)**
Agile Design Agile Design Practices, Design smells and software rotting, SOLID Principles: SRP – The Single Responsibility Principle, OCP – the Open Closed Principle, LSP – The Liskov Substitution, DIP – The Dependency Inversion Principle, ISP – The Interface Segregation Principle.	**(06)**
Agile Methodologies Scrum: Overview of scrum theory, Scrum Team, Scrum Roles, The Sprint, Sprint Planning, Daily Scrum, Sprint review, Sprint retrospective, Scrum artifacts, Product back log, sprint backlog, Progress Monitoring. Extreme Programming(XP): Overview of XP, Concept, Values, Rules, Principles,	**(09)**

Scalability, Practices, Issues.	
SECTION-B	
Agile Project Management Overview of Agile project management, Agile project management model: Overview of agile enterprise framework and agile delivery framework, Scaling and governing agile projects. Tools for Agile project management	**(10)**
Agile Testing Introduction to agile testing, Principles for testers, Overview of organizational challenges, The Agile testing Quadrants, Test Automation, The Agile lifecycle and its impact on testing, Types of testing in agile : TDD, BDD, Acceptance tests Exploratory testing, Risk based testing, Regression tests, Unit testing, Integration testing, system testing, Tools to support the Agile Tester	**(12)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Agile Principles, Patterns, and Practices in C#	Martin C. Robert, Martin Micah	Prentice Hall, 2006
2	Agile Project Management: Creating Innovative Products, 2nd Edition	Jim Highsmith	Addison-Wesley Professional, 2010
3	Agile Testing: A Practical Guide for Testers and Agile Teams	Janet Gregory, Lisa Crispin	Addison-Wesley

COURSE INFORMATION SHEET

Course Code	**ITE742**
Course Title	**Agile Software Development (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Software Engineering
Course Objectives	To get exposure to various tools such as AgileFant, Jenkins, JUnit, ANT, QAlibe/Cucumber.
SYLLABUS **Practical based on theory.**	

COURSE INFORMATION SHEET

Course Code	**ITE746**
Course Title	**Compiler Design (Theory)**
Type of Course	**Core**
L T P	**4 0 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Computer Architecture and Organization, Theory of Computation.
Course Objectives	To provide the in-depth knowledge of different concepts and principles involved in compiler design.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the working of compliers and translators. 2. Develop in-depth knowledge of various phases of compilation. 3. Relate and analyze the concepts learned earlier like higher level programming, assemblers, automata theory and formal languages, data structure and algorithms, operating systems. 4. Apply the ideas, techniques, and knowledge acquired for the purpose of designing a compiler.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction Compilers and Translators; The phases of the compiler – Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Optimization, Code generation, Bookkeeping, Error handling.	**(05)**
Lexical Analysis The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of a tokens, Finite automata: Regular expressions, NFA, DFA.Design of a lexical analyzer generator.	**(05)**
Syntax Analysis The role of a parser, Context free grammars, Writing a grammar, Top down Parsing: Recursive decent parser, Predictive parser, Bottom up Parsing: Handles, Viable	**(12)**

prefixes, Operator precedence parsing, LR parsers: SLR, LALR, CLR. Parser generator (YACC).Error Recovery techniques for different parsers.	
SECTION-B	
Syntax directed translation Syntax directed definitions, Synthesized and inherited attributes, Construction of syntax trees.	**(04)**
Run time environments Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization (Subdivision of run-time memory, Activation records), Storage allocation strategies, Symbol tables: storage, data structures used.	**(06)**
Intermediate code generation Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).	**(03)**
Code optimization and code generation Introduction, Basic blocks & flow graphs, DAG, principle sources of optimization: loop optimization, eliminating induction variable, eliminating common sub-expression, loop unrolling, loop jamming etc., Issues in the design of code generator, a simple code generator, Register allocation & assignment, Peephole optimization.	**(10)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Compilers: Principles, Techniques and Tools	Aho, Sethi and Ullman	Pearson Education
2	Principles of Compiler Design	Aho, Ullman	Narosa Publication
3	Compiler Construction- Principles and Practice	Dhamdhere	Macmillan, India
4	Compiler Design in C	Holub	PHI

Elective-II

COURSE INFORMATION SHEET

Course Code	**ITE744**
Course Title	**Cloud Computing (Theory)**
Type of Course	**Elective-II**
L T P	**4 0 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Operating System , Computer Networks
Course Objectives	1. To understand the basics of Cloud Computing, different deployment models and service models of Cloud. 2. To have an overview about the Public cloud and Private cloud, and the security issues related to Cloud computing.
Course Outcomes	After completion of this course, the students will be able to: 1. Illustrate the concepts of Cloud Computing and the various deployment and service models. 2. Demonstrate the functioning of Private and Public Cloud. 3. Describe the security concerns of Cloud computing. 4. Understand the need of Cloud computing in industry domains, current challenges and future directions.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Overview of Cloud Computing Brief history and evolution - History of Cloud Computing, Evolution of Cloud Computing, Traditional vs. Cloud Computing. Why Cloud Computing, Cloud service models (IaaS, PaaS& SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing.	**(04)**
Understanding Virtualization Basics of virtualization, Virtualization technologies, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing.	**(04)**
Working with Private Cloud Private Cloud Definition, Characteristics of Private Cloud, Private Cloud deployment models, Private Cloud Building blocks namely Physical Layer, Virtualization Layer,	**(09)**

Cloud Management Layer, Challenges to private Cloud, Virtual Private Cloud. Implementing private cloud (**one out of** CloudStack, OpenStack, Eucalyptus, IBM or Microsoft).	
Working with Public Clouds What is Public Cloud, Why Public Cloud, When to opt for Public Cloud, Public Cloud Service Models, and Public Cloud Players. Infrastructure as a Service Offerings (IaaS), PaaS offerings, Software as a Service Offering (SaaS). Implementing public cloud (**one out of** AWS, Windows Azure, IBM or Rackspace)	**(08)**
SECTION-B	
Overview of Cloud Security Explain the security concerns in Traditional IT, Introduce challenges in Cloud Computing in terms of Application Security, Server Security, and Network Security. Security reference model, Abuse and Nefarious Use of Cloud Computing	**(06)**
Overview of Multi-Cloud Management Systems & Business Cloud: Explain concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems. Cloud Computing in Business, Clouds focused on industry domains (Life Sciences and Social networking) Introduction of Business Intelligence on cloud and Big Data Analytics on Cloud	**(10)**
Future directions in Cloud Computing Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security, Current issues in cloud computing leading to future research directions.	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Cloud Computing: Principles and Paradigms	RajkumarBuyys, James Broberg, Andrzej Goscinski (Editors)	Wiley, 2011
2	Cloud Computing	Michael Miller	Pearson Education 2009
3	Cloud Computing for dummies,	Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper	Wiley, 2009
4	Cloud Computing: A Practical Approach	Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter	McGraw Hill, 2010.
5	Handbook of Cloud Computing	BorkoFurht, Armando Escalante	Springer, 2010

COURSE INFORMATION SHEET

Course Code	**ITE745**
Course Title	**Artificial Intelligence (Theory)**
Type of Course	**Elective-II**
L T P	**4 0 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Data Structures, Discrete Structures
Course Objectives	To introduce the essential principles, ideas and techniques of Artificial Intelligence (AI), so that it can be used to solve real world problems.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the various problem solving techniques of Artificial Intelligence. 2. Utilize knowledge representation concepts for Inference-based problem solving. 3. Understand various Planning problems algorithms and approaches. 4. Apply the knowledge base for generating different applications for intelligent decision making.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction Artificial Intelligence and its applications, Artificial Intelligence Techniques, criteria of success, Intelligent Agents, Nature and structure of Agents, Learning Agents	**(06)**
Problem solving techniques State space search, control strategies, heuristic search, problem characteristics, production system characteristics., Generate and test, Hill climbing, best first search, A* search, Constraint satisfaction problem, Mean-end analysis, Min-Max Search, Alpha-Beta Pruning, Additional refinements, Iterative Deepening	**(09)**
Knowledge representation Mapping between facts and representations, Approaches to knowledge representation, procedural vs declarative knowledge, Forward vs. Backward reasoning, Matching, conflict resolution, Non-monotonic reasoning, Default reasoning, statistical reasoning, fuzzy logic Weak and Strong filler structures, semantic nets, frame, conceptual	**(08)**

dependency, scripts.	
SECTION-B	
Planning The Planning problem, planning with state space search, partial order planning, planning graphs, planning with propositional logic, Analysis of planning approaches, Hierarchical planning, conditional planning, Continuous and Multi Agent planning	**(06)**
Learning Forms of Learning, inductive learning, Decision trees, Computational learning theory, Logical formulation, knowledge in learning, Explanation based and relevance based learning, statistical learning, Learning with complete data and hidden variables, instance based learning, Neural Networks	**(10)**
Introduction to Natural Language processing and Expert system Basic Tasks of Natural Language processing, Expert systems, Expert system examples, Expert System Architectures, Rule base Expert systems, Non Monotonic Expert Systems, Decision tree base Expert Systems.	**(06)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	AI: A Modern Approach	Stuart J.Russel, Peter Norvig	Pearson Education, Latest Edition
2.	Artificial Intelligence	Elaine Rich, Knight	McGraw Hill
3.	Artificial Intelligence	Partick Henry Winston	Addison Wesley, Latest Edition
4.	Artificial Intelligence	George Luger	Pearson Education, Latest Edition
5.	Introduction to AI and Expert Systems	DAN, W. Patterson	PHI, latest Edition
6.	Principles of AI	A.J. Nillson	Narosa publications, latest Edition

COURSE INFORMATION SHEET

Course Code	**ITE748**
Course Title	**Principles of Telecommunication (Theory)**
Type of Course	**Elective-II**
L T P	**4 0 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Basics of Electronic Communication
Course Objectives	To provide basic knowledge about the concepts of various communication approaches.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand and apply the concepts of SignalTheory. 2. Learn the concepts of noise and its types. 3. Analyze the concepts of Information theory and Coding. 4. Learn basics of Optical, Satellite and Wireless Communication.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction The communication process, Block diagram of a general communication system.	**(03)**
Probability and Random Signal Theory Probability basics, Conditional Probability, Random Variables, Discrete Random Variables, Continuous Random Variables, Variance, Standard deviation, Moments, Binomial, and Gaussian distribution	**(09)**
Noise Sources of Noise, Shot Noise, resistor Noise, White Noise, Noise Temperature, Signal-to-Noise Ratio, Noise Figure.	**(08)**
SECTION-B	
Information Theory Unit of Information, Entropy, Rate of Information, Joint entropy and Conditional Entropy, Mutual Information, Channel Capacity, Shannon's Theorem	**(10)**
Coding Need for Coding, Coding Efficiency, Shannon Fano Coding, Huffman Coding	**(08)**

Types of Communications Basics of Fiber Optic Communication, Principles of Satellite communication, Fundamentals of Wireless communications	**(07)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Communication Systems: Analog and Digital	R P Singh and S D Sapre	TMH, latest Edition
2	Principles of Communication Systems	H. Taub, D. L. Schilling, G. Saha	McGraw Hill, 2011
3	Communication Systems	S. Haykin	Wiley India Limited, 5th Edition
4	Fiber optic communication systems,2E	Govind P. Agrawal	Wiley India
5	Optical Fiber Communications Designs,3rd Edition	Gerd Keiser	McGraw Hill
6	Satellite Communications	Dennis Roddy, John Coolen	Mc-Graw Hill
7	Wireless Communications Principles and practice, 2nd Edition	Theodore S. Rappaport	Prentice Hall India

COURSE INFORMATION SHEET

Course Code	**ITE795**
Course Title	**Project-1**
Type of Course	**Core**
L T P	**0 0 4**
Credits	**02**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **100**
Course Prerequisites	Nil
Course Objectives	1. Students learning skills to tackle realistic problems as they would be solved in the real world. 2. To work as team to deliver project that matches the required specification.
Course Outcomes	After completion of this course, the students will be able to: 1. Analyze and apply skills, knowledge to solve real life problem. 2. Apply software development lifecycle to plan & manage the projects. 3. Document and report the project work, display effective team work capability.

COURSE INFORMATION SHEET

Course Code	**ITE796**
Course Title	**Industrial Training (after 6th Semester)**
Type of Course	**Core**
L T P	**0 0 0**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Nil
Course Objectives	1. To enable students to integrate theoretical knowledge with practical Implementation**.** 2. To introduce students to the work culture of industry and provide opportunity to get hands-on experience to real world problems.
Course Outcomes	After completion of this course, the students will be able to: 1. Analyze practical aspects of a problem and formulate required specification. 2. Apply knowledge of recent technologies to design and implement solution for a real life problem. 3. Document and report the project undertaken during training.

SYLLABUS FOR B.E. (I.T.) EIGHTH SEMESTER

COURSE INFORMATION SHEET

Course Code	**ITE841**
Course Title	**Digital Image Processing (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Computer Graphics, Digital Signal Processing
Course Objectives	1. To understand the significance and applications of digital image processing. 2. To learn and apply various image processing techniques and algorithms.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand and learn the fundamentals of image processing. 2. Apply various image enhancement techniques, filters and image restoration approaches. 3. Analyze basic image processing functions that can help in identifying boundaries, edges and objects/regions in a given digital image. 4. Learn various pattern recognition algorithms and apply the same to realize image processing applications

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction to Image Processing Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation, color models.	**(7)**
Image Transformation and Filtering Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, Pseudo coloring, color	**(12)**

transforms, Basics of Wavelet Transforms.	
Image Restoration Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphic Filtering.	**(6)**
SECTION-B	
Image Compression Coding redundancy, Interpixel redundancy, Psycho-visual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression	**(6)**
Image Segmentation & Representation Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional Descriptors	**(12)**
Object Recognition Patterns and Patterns classes, Recognition based on Decision Theoretic methods.	**(2)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Digital Image Processing	Gonzalez and Woods	Addison Wesley
2	Computer Vision - A First Gurse 2nd Edition	Boyle and Thomas	Blackwell Science 1995
3	Introductory Techniques for 3-D Computer Vision	Trucco&Verri	Prentice Hall, Latest Edition
4	Machine Vision	Jain, Kasturi and Schunk	McGraw-HiII.
5	Image -Processing, Analysis and Machine Vision 2nd edition	Sonka, Hlavac, Boyle	PWS Publishing,

COURSE INFORMATION SHEET

Course Code	**ITE 841**
Course Title	**Digital Image Processing (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Programming Fundamentals, Digital Signal Processing
Course Objectives	To develop skills for analyzing and implementing various image processing algorithms and techniques, with emphasis on realization of these concepts using MATLAB.
SYLLABUS	

Practical should be covered based on the following directions:

1. Reading and displaying images in different formats using different color models.
2. Converting color images into monochrome images, Image color enhancements using
3. Pseudo coloring techniques.
4. Images enhancements using grey level transformations
5. Images enhancements in spatial domain
6. Images enhancements in frequency domain.
7. Image Noise removal and inverse filtering of images
8. Point, Line, Edge and Boundary Detections in images
9. Histogram Processing on images
10. Boundary Linking, Representation and Description techniques on images
11. Thresholding of Images.

Note: Students are required to complete any 10 practicals by implementing them in any of the programming language such as Java, C/C++, C#, MATLAB.

COURSE INFORMATION SHEET

Course Code	**ITE842**
Course Title	**Embedded System Design (Theory)**
Type of Course	**Core**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Microprocessor & Assembly Language Programming, Computer Architecture & organization
Course Objectives	1. To introduce the concepts of embedded systems, its hardware (micro-controllers) and software. 2. To explain real time operating systems, inter-task communication and an exemplary case of RTOS.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand the concept and features of Microprocessors & Microcontrollers, Embedded & external memory devices, CISC & RISC processors, Harvard & Von Neumann Architectures. 2. Learn and understand the architecture, addressing modes, instructions interrupts, timers/counters, serial communication and applications of 8051 Microcontroller and apply and evaluate 8051 based solutions to real problems 3. Explain the features, architecture, memory organization, instructions, addressing Modes and applications of PIC 16C6X/7X Microcontroller. 4. Describe the evolution of architectures used for Embedded Software Development and apply to real-time system's design.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Microcontrollers Comparison of Microprocessors and Microcontrollers. Embedded and external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures.	**(04)**
Overview of 8 bit Microcontrollers Overview of 8051, Architecture, addressing modes and instructions. Interrupts, Timer/ Counters, Serial Communication and applications. Interfacing Overview of Atmel 89C51 microcontroller.	**(19)**
SECTION-B	
PIC Microcontrollers Introduction and features, PIC 16C6X/7X: Architecture, Registers, Reset actions, Memory Organization, Instructions, Addressing Modes, I/O Ports, Interrupts, Timers, ADC. Input Capture, Output Compare, Frequency Measurement, Serial I/O Device.	**(12)**
Software Development & Tools Embedded System Evolution Trends, Round Robin, Round Robin with Interrupts, Function Scheduling architecture, Real Time scheduling: their development, applications and examples.	**(06)**
Real Time Operating Systems RTOS Architecture, Task and Task States, Tasks and Data, Semaphores and shared data, Operating System Services: message queues, timer function, events, memory management, interrupt Routines in an RTOS environment, Basic Design Using RTOS.	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	The 8051 Microcontroller and Embedded Systems	Muhammed Ali Mazidi, Janice GillispieMazidi and Robin D. Mckinlay	Pearson 2nd Edition
2	The 8051 Microcontroller: Architecture, Programming & Applications	Kenneth J. Ayala	Pearson 2nd Edition
3	Microcontrollers (Theory and Applications)	Ajay Deshmukh	TMH Publishers
4	An Embedded Software Primer	David E. Simon	Addison Wesley
5	Specification and Design of Embedded Systems, Latest Edition	D. D. Gajski, F. Vahid, S. Narayan, J. Gong	Prentice Hall

COURSE INFORMATION SHEET

Course Code	**ITE 842**
Course Title	**Embedded System Design (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Microprocessor & Assembly Language Programming
Course Objectives	To design, implement, test and document the microprocessor-based systems.
SYLLABUS **Practical based on theory.**	

COURSE INFORMATION SHEET

Course Code	**ITE843**
Course Title	**Java Technologies (Theory)**
Type of Course	**Core**
L T P	**4 0 3**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Programming Fundamental, Object Oriented Programming using C++
Course Objectives	The objective of the course is to learn the object oriented concepts from the perspective of Java programming language and UML so as to apply the same to solve various engineering problems. This course covers a practical approach to object-oriented analysis, design and programming using UML and Java.
Course Outcomes	After completion of the course, students will be able to 1. Learn the fundamental concepts of Java programming language such as encapsulation, inheritance, exception handling and multithreading. 2. Understand the Java I/O stream classes. 3. Design graphical user interface using standard java libraries for implementing event driven applications. 4. Examine the enterprise components including Enterprise JavaBeans (EJB) technology, servlets, and Java Server Pages (JSP) technology, JDBC.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Java Methods, Classes and Inheritance Introduction; classes; methods; constructors; overloading methods; arrays; recursion; passing arrays and objects to methods; Inheritance; method overriding; abstract classes; using final; packages; interfaces.	**(8)**
Exceptional Handling and Multithreaded Programming Exception handling fundamentals; exception types; uncaught exceptions; try and catch; creating exception classes; throwing exceptions; Java thread model; thread priorities; creating a thread; interthread communication; thread synchronization; suspending,	**(8)**

resuming and stopping threads.	
I/O, Applets and Graphics I/O basics; stream classes; byte and character streams; reading and writing files; Applet fundamentals; Applet class; Applet initialization and termination; event handling; keyboard and mouse events; AWT class; Layout managers; panels; canvases; Frame windows; drawing lines, rectangles, ellipses.	**(8)**
SECTION-B	
Overview of J2EE and working with JDBC What is J2EE, component based architecture of J2EE: Web, Business and Application component, commonly used classes and interfaces of java.sql package, connecting java application to a database, prepared statements.	**(7)**
Servlets and JSP Java Servlets, compilation, deployment, and testing a servlet, session management, request dispatching, Java Server Pages, deploying and testing a JSP, using java beans in JSP.	**(7)**
Enterprise Java Beans(EJB) Architecture of EJB, creating a stateless-session EJB, statefull-session bean, Life Cycle of session beans, Entity beans, life cycle of entity beans.	**(7)**

RECOMMENDED BOOK

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Java: How to Program, 6th Edition	Deitel and Deitel	Pearson Education
2	The Complete Reference Java2	Herbert Schildt	TMH
3	J2EE: The Complete Reference	James Edward Keogh, Jim Keogh	McGraw-Hill

COURSE INFORMATION SHEET

Course Code	**ITE843**
Course Title	**Java Technologies (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Object Oriented Programming using C++
Course Objectives	To be able to learn the concepts of object-oriented analysis, design and programming using UML and Java.
SYLLABUS **Practical based on theory.**	

ELECTIVE- III

COURSE INFORMATION SHEET

Course Code	**ITE844**
Course Title	**Theory of Computation (Theory)**
Type of Course	**Elective-III**
L T P	**3 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Discrete Structures
Course Objectives	The objective of the course is to construct and prove the equivalence of languages described by finite state machines and regular expressions, pushdown automata and Turing machines.
Course Outcomes	After completion of the course, students will be able to 1. Explain and interpret the fundamental, mathematical and computational principles laying the foundation of Computer science. 2. Define and apply methods for the equivalence of languages described by various types of automata and their equivalent recognizable languages. 3. Understand the key results in algorithmic complexity, omputability and solvability of problems. 4. Design grammars and recognizers for different formal languages

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction to the Theory of Computation Basic concepts – Languages, Grammars, Automata, Strings, Alphabet, Chomsky Classification of Grammars and Languages.	**(02)**

Finite Automata Finite automation model, Acceptance of strings and language, Deterministic Finite Automaton, Non Deterministic Finite Automaton (NDFA), Equivalence of NDFA and DFA, Conversion of NFA into DFA, Minimization of Number of States in Finite Automata, equivalence between two FSMs, Moore and Mealy machines. Conversion of Mealy to Moore machine, Conversion of Moore to Mealy machine.	**(10)**
Regular expressions and regular languages Regular Expressions, Identities for Regular Expressions, Finite Automata and Regular Expressions, Transition System Containing null moves, NDFAs with null moves and Regular Expressions, Eliminating epsilon-Transitions, Algebraic Method Using Arden's Theorem, Construction of Finite Automata Equivalent to a Regular Expression, Equivalence of Two Finite Automata, Equivalence of Two Regular Expressions , Closure Properties of Regular Languages under Simple Set Operations ((proofs omitted) , Identifying Non regular Languages using Pumping Lemma.	**(10)**
SECTION-B	
Context free grammar and Pushdown Automata Context-free Languages and Derivation Trees, Ambiguity in Context-free Grammars, Simplification of Context-free Grammars, Construction of Reduced Grammars, Elimination of Null Productions, Elimination of Unit Productions, Normal Forms for Context-free Grammars, Chomsky Normal Form, Greibach Normal Form, Pumping Lemma for Context-free Languages, Pushdown Automata - Basic Definitions, Acceptance by pushdown automata, Pushdown Automata and Context-free Languages, Parsing and pushdown automata, Top-down Parsing Using Deterministic pushdown automata, Bottom-up Parsing	**(10)**
Turing Machines Linear Bounded Automata Turing Machine Model, Representation of Turing Machines, Language Acceptability by Turing Machines, Design of Turing Machines, Techniques for TM Construction - Turing Machine with Stationary Head, Storage in the State, Multiple Track Turing Machine, Subroutines, Variants of Turing Machines (proofs omitted) – Multi tape Turing Machines, Nondeterministic Turing Machines, The Model of Linear Bounded Automaton (LBA), Relation Between LBA and Context-sensitive Languages, Turing Machines and Type 0 Grammars.	**(11)**
Undecidability Undecidability, Introduction to recursive & non-recursive enumerable languages, Universal Turing machine.	**(02)**

RECOMMENDED BOOK

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Theory of computation	Mishra &Chandrashekharan	PHI Learning Pvt. Ltd
2	Introduction to automata theory, languages and computation	Hopcroft H.E. & Ullman	Pearson/Addison Wesley
3	An introduction to formal languages and automata	Peter linz	Jones & Bartlett Learning
4	Introduction to languages and the theory of automata	John C Martin	McGraw-Hill
5	Elements of theory of computation	H.P. Lewis and C.H. papadimition	Prentice-Hall

COURSE INFORMATION SHEET

Course Code	**ITE845**
Course Title	**Soft Computing (Theory)**
Type of Course	**Elective-III**
L T P	**3 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Discrete Structures
Course Objectives	To build the foundations of soft computing concepts and techniques so as to foster their abilities in designing and implementation of soft computing based solutions for real-world problems.
Course Outcomes	After completion of this course, the students will be able to: 1. Identify and describe soft computing techniques and their roles in building intelligent machines 2. Design and apply neural networks to pattern classification and regression problems 3. Model fuzzy logic and reasoning to handle uncertainty and solve engineering problems 4. Implement genetic algorithms and hybrid systems for various optimization and real life problems

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Fundamentals of Artificial Neural Networks & Applications, Characteristics of ANNs The Biological Prototype, Evolution of Neural Networks, Learning Methods McCulloch-Pitts Neuron, Hebb Network, Perceptron Networks, Adaline and Madaline, Multilayer Neural Networks, Backpropagation Network, Associative Memory Networks, BAM, Hopfield Networks, Kohonen Self Organizing Feature Maps	**(15)**
Introduction to Fuzzy Logic, Classical Vs Fuzzy sets, Membership Funstions, Defuzzification, Fuzzy model, Fuzzy Rule Base, Fuzzy inference systems, Fuzzy Expert System.	**(8)**

SECTION-B	
Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Fuzzy Equation Fuzzy Logic: Classical Logic, Multivalued Logic, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges. Uncertainty Based Information: Information and Uncertainty, Nonspecificity of Crisp Sets, Nonspecificity of Fuzzy Sets, Fuzziness of Fuzzy Sets, applications of fuzzy logic: Medicine and Economics.	**(12)**
Introduction to Neuro Fuzzy Systems, Architecture of a Neuro Fuzzy system	**(04)**
Genetic Algorithm: An overview, Basic Terminologies in Genetic Algorithm, Operators in Genetic Algorithm, Problem solving using Genetic Algorithm, Implementation of GA and GP, Applications of GA & GP.	**(06)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	An Introduction to Neural Networks,	J.A.Anderson	MIT Press
2	Introduction to the Theory of Neural Computation	Hertz J. Krogh, R.G. Palmer,	Addison-Wesley
3	Fuzzy Sets & Fuzzy Logic	G.J. Klir & B. Yuan	Prentice Hall
4	An Introduction to Genetic Algorithm	Melanie Mitchell	MIT Press
5	Neural Networks-A Comprehensive Foundations	Simon S. Haykin	Prentice-Hall International
6	Neural Networks: Algorithms, Applications and Programming Techniques	J.A. Freeman & D.M. Skapura	Addison Wesley, Reading, Mass

COURSE INFORMATION SHEET

Course Code	**ITE 847**
Course Title	**Natural Language Processing (Theory)**
Type of Course	**Elective-III**
L T P	**3 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Discrete Structures
Course Objectives	The objective of the course is to familiarize students with the fundamental concepts and techniques for processing natural languages. The course covers the methodologies, syntax and semantic analysis, generation and retrieval mechanisms to efficiently analyze collections of text in natural languages.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand different levels of natural language processing. 2. Learn and analyze the concepts of: regular expressions, finite automata, context free grammar and parsing in the study of natural language systems. 3. Apply the concepts of natural language processing for creating intelligent language systems. 4. Develop in-depth knowledge of language generation tasks.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having parts covering the whole syllabus. Three questions have to be set from Part A and three questions from Part B of the syllabus. Candidate is required to attempt at least two questions from each part. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
INTRODUCTION A computational framework for natural language, description of English or an Indian language in the frame work, lexicon, algorithms and data structures for implementation of the framework, Finite state automata, The different analysis levels used for NLP (morphological, syntactic, semantic, pragmatic and discourse). Applications like machine translations.	**(08)**
WORD LEVEL AND SYNTACTIC ANALYSIS Word Level Analysis: Regular Expressions, Finite-State Automata, Morphological Parsing, Spelling Error Detection and correction, Words and Word classes, Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar, Constituency,	**(10)**

Parsing-Probabilistic Parsing. Machine-readable dictionaries and lexical databases, RTN, ATN.	
SEMANTIC ANALYSIS Semantic Analysis: Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation. Discourse Processing: cohesion, Reference Resolution, Discourse Coherence and Structure. Knowledge Representation, reasoning.	**(10)**
SECTION-B	
NATURAL LANGUAGE GENERATION Natural Language Generation (NLG): Architecture of NLG Systems, Generation Tasks and Representations, Application of NLG. Machine Translation: Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Translation involving Indian Languages.	**(10)**
INFORMATION RETRIEVAL AND LEXICAL RESOURCES Information Retrieval: Design features of Information Retrieval Systems, Classical, Nonclassical, Alternative Models of Information Retrieval, valuation Lexical Resources:WordNet,Frame Net, Stemmers, POS Tagger.	**(07)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Natural Language Understanding	James Allen	Pearson Education
2	NLP: A Paninian Perspective	AksharBharati, Vineet Chaitanya, and Rajeev Sangal	Prentice Hall
3	Meaning and Grammar	G. Chirchia and S. McConnell Ginet	MIT Press
4	An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition	Daniel Jurafsky and James H. Martin	Pearson Education
5	Natural language processing in Prolog	Gazdar, &Mellish	Addison-Wesley

COURSE INFORMATION SHEET

Course Code	**ITE897**
Course Title	**Seminar**
Type of Course	**Core**
L T P	**0 0 2**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Nil
Course Objectives	1. Investigate some of the current scientific issues facing society. 2. Students will examine and develop self-management skills necessary for academic success.
Course Outcomes	After completion of this course, the students will be able to: 1. Understand current technology topics being studied. 2. Extend a greater amount of interaction between teacher and students.

COURSE INFORMATION SHEET

Course Code	**ITE898**
Course Title	**Project-II**
Type of Course	**Core**
L T P	**0 0 4**
Credits	**02**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **100**
Course Prerequisites	Nil
Course Objectives	1.Students learning skills to tackle realistic problems as they would be solved in the real world. 2.To work as team to deliver project that Matches the required specification.
Course Outcomes	After completion of this course, the students will be able to: 1. Analyze and apply skills, knowledge to solve real life problem. 2.Apply software development lifecycle to plan & manage the projects. 3. Document and report the project work, display effective team work capability.

COURSE INFORMATION SHEET

Course Code	**ITE899**
Course Title	**Industrial Training**
Type of Course	**Core**
Duration	**6 months**
Credits	**22**
Course Assessment Methods: Marks Internal Assessment	 **400** **300**
Course Prerequisites	Nil
Course Objectives	1. To enable students to integrate theoretical knowledge with practical implementation**.** 2. To introduce students to the work culture of industry and provide opportunity to get hands-on experience to real world problems.
Course Outcomes	After completion of this course, the students will be able to: 1. Analyze practical aspects of a problem and formulate required specification. 2. Apply knowledge of recent technologies to design and implement solution for a real life problem. 3. Document and report the project undertaken during training.