SCHEME OF EXAMINATION

and SYLLABI

for

B.E. (Information Technology)

3^{rd} – 8^{th} semester

for

Academic Session

2018-19

VISION:

To produce information engineers who work passionately, creatively and effectively for the betterment of technology and society at large.

MISSION:

- The mission of I.T. department is to provide advance knowledge and educate students in technology and related areas in order to enable them to create and consume information products for dynamic information society.
- The aim is to create a culture that fosters excellence and combines rigorous academic study and the excitement of discovery with the support and intellectual stimulation of a diverse campus community.
- The endeavor is to have up-to-date curricula and pedagogy in the information technology discipline so that students have a solid foundation in the core concepts and develop problem solving and decision making skills. The aim to prepare them for lifelong learning in the discipline by designing the curriculum which anticipates the skills and knowledge needed in the future.
- The mission is to offer internship opportunities to the students and to foster the personal and professional growth of our students.

PROGRAMME EDUCATIONAL OBJECTIVES:

- Graduates are prepared to work in dynamic industry and possess knowledge of IT engineering concepts, practices and tools to support design and development of IT enabled products.
- Graduates are prepared to pursue research and higher education in their area of interest.
- Graduates are prepared to possess professional and managerial skills like team work, ethics and competence in written & oral communication.

PROGRAMME OUTCOMES:

Students in the Information Technology program are expected to know and be able to do the following at the time of their graduation:

a. An ability to apply knowledge of mathematics, computing, science and engineering.

b. An ability to conduct experiments to analyze and solve engineering problems.

c. An ability to design hardware and software system, component or process to meet desired needs, within realistic constraints.

d. An ability to identify, formulate and develop solution for complex engineering problems by using the engineering techniques, skills and modern engineering tools.

e. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

f. An ability to apply ethical principles and commit to professional skills and responsibility.

g. An ability to work with multidisciplinary teams to design, develop and maintain the project by developing professional interaction with each other.

h. An ability to recognize the need for and ability to engage in continuing professional development.

i. Project management techniques and teamwork necessary for successful information engineering technologies, system designs and implementations, and the effective use of communication skills to prepare technical reports, and presentations.

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	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. 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

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.

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X	-	Unsatisfactory
S	-	Satisfactory Completion

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. 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.	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. 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 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

Absolute marks in %	Grade	Absolute marks in %
91	**< A+ <**	**100**
82	**< A <**	**90**

Table-2

Sr. No.	Marks	Grade	Grade Po
1.	**≥ 90**	**A+**	**10**
2.	**≥ 80 &< 90**	**A**	**9**
3.	**≥70 &< 80**	**B+**	**8**
4.	**≥60 &< 70**	**B**	**7**

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 ($\bar{X}\bar{X}$) and class standard deviation (S) of the marks shall be calculated and grades 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

5.	**≥50 &< 60**	**C+**	**6**
6.	**≥45 &< 50**	**C**	**5**
7.	**≥40 &< 45**	**D**	**4**
8.	**<40**	**F**	**0**

4.2.2 NOT REQUIRED

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. **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	4.2.3 NOT REQUIRED 4.3 NOT REQUIRED 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

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.

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 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)

3rd – 8th semester for A.S. 2018-19

Teaching Scheme for B.E. Second Year

Second Year- Third Semester

Subject Code	Subject Name	Scheme of Teaching			Scheme of Examination		
					Theory		Practical *
		L-T-P	Contact hrs/week	Credits	Internal Ass.	Univ. Exam	
MATHS 303	Linear Algebra and Probability Theory	4-1-0	5	4	50	50	-
IT301	Social and Professional Aspects of Information Technology	3-0-0	3	3	50	50	-
IT302	Data Structures	4-0-3	7	4+1	50	50	50
IT303	Digital Electronics	3-1-3	7	4+1	50	50	50
IT304	Computer Architecture & Organization	3-1-0	4	4	50	50	-

***- Note: Marks refer to mid semester evaluation and end semester evaluation**

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

Second Year- Fourth Semester

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

***- Note: Marks refer to mid semester evaluation and end semester evaluation.**

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

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	Internal Ass.	Univ. Exam	
ITE571	Database Management Systems	4-0-3	7	4+1	50	50	50
ITE572	Computer Graphics	4-0-3	7	4+1	50	50	50
ITE573	Multimedia System	4-0-0	4	4	50	50	-
ITE574	Theory of Computation	3-1-0	4	4	50	50	-
ITE575	Internet and Web Technology	4-0-3	7	4+1	50	50	50
ITE576	Industrial Training(after 4th semester)	0-0-0	0	1	-	-	50

***- Note: Marks refer to mid semester evaluation and end semester evaluation**

Total Marks: 700 **Total Credits: 24**

Third Year - Sixth Semester

Subject Code	Subject Name	Scheme of Teaching			Scheme of Examination		
					Theory		Practical*
		L-T-P	Contact hrs./week	Credits	Internal Ass.	Univ. Exam	
ITE671	Wireless Communication	3-1-3	7	4+1	50	50	50
ITE672	Network Security & Cryptography	3-1-0	4	4	50	50	-
ITE673	Software Engineering	4-0-0	4	4	50	50	-
ITE674	Design and Analysis of Algorithms	4-0-3	7	4+1	50	50	50
ITE 675-ITE 682	Elective -I	4-0-0	4	4	50	50	-

***- Note: Marks refer to mid semester evaluation and end semester evaluation**

Total Marks: 600 **Total Credits: 22**

Elective -I *(Choose any one from the following :)*		
Sr No.	**Subject**	**Subject Code**
1	Business Intelligence	ITE675
2	System Software	ITE676
3	Neural Network and Fuzzy Logic	ITE677
4	System Analysis and Design	ITE678
5	Distributed Operating System	ITE679
6	Network Management and Administration	ITE680
7	Cyber Crime and Digital Forensic	ITE681
8	Data Mining and Analytics	ITE682

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	Internal Ass.	Univ. Exam	
ITE741	Digital Signal Processing	4-0-3	7	4+1	50	50	50
ITE746	Compiler Design	4-0-0	4	4	50	50	-
ITE754	Agile Software Development	4-0-3	7	4+1	50	50	50
ITE744 ITE745 ITE748	Elective-II	4-0-0	4	4	50	50	-
ITE795	Project-I	0-0-4	4	2	-	-	100
ITE796	Industrial Training (after 6th Semester)	0-0-0	0	1	-	-	50

***- Note: Marks refer to mid semester evaluation and end semester evaluation.**

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

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	Internal Ass.	Univ. Exam	
ITE841	Digital Image Processing	3-1-3	7	4+1	50	50	50
ITE842	Embedded System Design	3-1-3	7	4+1	50	50	50
ITE843	Java Technologies	4-0-3	4	4+1	50	50	50
ITE845 ITE847 ITE848	Elective-III	3-1-0	4	4	50	50	-
ITE897	Seminar	0-0-2	2	1	-	-	50
ITE898	Project II	0-0-4	4	2	-	-	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

***- Note: Marks refer to mid semester evaluation and end semester evaluation.**

Elective Course-III *(Choose any one from the following :)*		
Sr No.	**Subject**	**Subject Code**
1.	Soft Computing	ITE845
2.	Natural Language Processing	ITE847
3.	Theory of Computation	ITE 848

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 semester 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	Students will be able to I. Understand the use of linear algebra and linear transformations. II. Design solutions using matrices and eigen vectors III. Apply probability theory in different engineering problems. IV. Understand the use of random variables in different 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**

Systems of Linear equations: **(05)**

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).

Vector Spaces: **(05)**

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 Reference 1).

Eigen values and Eigenvectors, Diagonalization: **(04)**

Introduction, Polynomials in matrices, Characteristic polynomial, Cayley-Hamilton theorem,Eigen-values and Eigen-vectors, computing Eigen-values and Eigen-vectors, Diagonalizingmatrices. (Scope as in Chapter 8, Sections 8.1-8.5 of Reference 1).

Linear Transformations: **(05)**

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).

Matrices and Linear transformations: **(05)**

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).

SECTION-B

Probability **(07)**

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 variancesof linear combinations of random variables, Chebyshev's inequality

Probability Distributions **(07)**

Joint Probability distributions, Marginal and Conditional distributions, Binomial, Poisson, Uniform and Normal distributions, Normal and Poisson approximations to Binomial, Moments, Moment generating function.

Two Dimensional Random Variables **(07)**

Joint distributions – Marginal and conditional distributions – Covariance – Correlation andRegression – function of a random variable-Transformation of random variables - Central limit theorem.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2	2					1		
CO2	2	2		1			1		
CO3	2	2		1			1		
CO4	1	2		1			1		

COURSE INFORMATION SHEET

Course Code	**ITE301**
Course Title	Social and Professional Aspects of Information Technology
Type of Course	**Core**
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	**Introduction to Information Technology**
Course Objectives	1. To familiarize students with social and professional aspects of Information Technology. 2. To provide a basic knowledge on business processes and organization. 3. To develop technical communication skills. 4. Explore the security and legal issues in computing. 5. To develop the understanding of social, professional, ethical issues and responsibility. 6. To aware students with Privacy and Civil Liberties Acts
Course Outcomes	The students should be able to: I. Describe the social, ethical &professional aspects of Information Technology. II. Have skills relating to technical writing & effective oral presentation. III. Get knowledge on intellectual Property Rights. IV. Have an update of various Acts relating to Privacy & Civil Liberties.

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**
Organizational Context: Business processes, Workflow, IT environment, Organizational culture, Organizational structure, professionalism	**4**
Teamwork Concepts and Issues: Colaboration, group dynamics, leadership styles, personality types, collaboration tools	**3**
Professional Communications: Skill of effective oral presentation, efficient technical writing, system documentation, technical requirements	**6**
Security and Legal issues in computing: Data security, system security and network security, GhostNet, cloud computing and security, cyber terrorism, hacktivism, information warfare, Compliance, Hackers/crackers, computer crime, viruses, system use policies and monitoring, risk and liabilities of computer-based systems	**9**
Section –B	
Social context of computing: Social informatics, social impact of IT on society, online communities and social implications, globalization issues, economic issues in computing, digital divide	**5**
Intellectual Property: Foundations of Intellectual Property, ownership of information, plagiarism, software piracy, fair use, Digital Millennium Copyright Act (DMCA), copyrights, patents, trademarks and trade secrets, NonDisclosure Agreements (NDAs), International differences	**4**
Professional and Ethical Issues and Responsibility: Relationships with Professional Societies, codes of professional conduct, ethics and history of ethics, whistle-blowing, workplace issues (harassment, discrimination), identify theft, ethical hacking	**5**
Privacy and Civil Liberties Health Insurance Portability and Accountability Act (HIPPA), Family Educational Rights and Privacy Act (FERPA), European Union (E. U.) Data Protection, Gramm-Leach-Bliley Act	**9**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	1. Robert McGinn	The Ethically Responsible Engineer: Concepts and Cases for Students and Professionals	John Wiley and Sons Year 2015
2	2. Michael A. Hitt, C. Chet Miller, Adrienne Colella	Organizational Behavior: A Strategic Approach	John Wiley & Sons.
3	Reeves, S., Lewin, S., Espin, S. and Zwarenstein, M., WileyBlackwell,	Interprofessional Teamwork: Key Concepts and Issues, in Interprofessional Teamwork for Health and Social Care.	Oxford, UK.
4	ArunaKoneru,	Professional Communication	Tata McGraw-Hill Education
5.	Penny Duquenoy, Simon Jones, Barry G. Blundell.	Ethical, Legal and Professional Issues in Computing	Cengage Learning EMEA.
6.	Chuck Huff	Social Issues in Computing	Tata McGraw-Hill.
7.	MargrethBarret	Intellectual Property	Aspen Publishers, The Emanuel Law Outline Series.
8.	Robert McGinn	The Ethically Responsible Engineer: Concepts and Cases for Students and Professionals	John Wiley and Sons. Year 2015
9.	Helen Fenwick.	Civil Liberties and Human Rights	Cavendish Publishing. Third Edition

PO / CO	a	b	c	d	e	f	g	h	i
CO1					2	2			
CO2							2		
CO3								2	
CO4					2				

COURSE INFORMATION SHEET

Course Code	**ITE302**
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, how to represent the inherent relationship of the data in the real world for efficient processing of data and management. 2. To teach students various data structures and to explain the algorithms for performing various operations on these data structures. 3. 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 are able to: I. Understand and compute the time and space complexity of algorithms. II. Learn and implement different abstract data types. III. Implement and analyze different searching and sorting algorithms. IV. 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: **(01)**
Introduction to data structures; Introduction to Algorithms Complexity

Arrays, Stacks & Queues: **(08)**
Concepts; Basic operations & their algorithms: Transverse, Insert, Delete, Sorting of data in these data structures; Prefix, Infix, Postfix Notations;

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: **(08)**
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.

Graphs and their applications: **(08)**
Graphs; Linked Representation of Graphs; Graph Traversal and spanning forests; Depth first search; Breadth first search.

Sorting & Searching: **(10)**
Insertion sort; Selection sort; Merging; Merge sort; Radix sort; Sequential & Binary Search; Indexed Search; Hashing schemes; Binary search Tree.

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

PO / CO	a	b	c	d	E	f	g	h	i
CO1	1	1	1	1					
CO2	1	2	1	1					
CO3	1	2	1	1					
CO4	2	2	1	1					

COURSE INFORMATION SHEET

Course Code	**ITE302**
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	**ITE303**
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 are able to: I. 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. II. Analyze and design Combinational and Sequential circuits. III. Understand the concepts of Data converters; Memories and their types. IV. 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 **(10)**

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

Number Systems and Codes **(07)**

Decimal, Binary, Hexadecimal, Octal's complement, 2's complement, addition and subtraction, weighted binary codes, Error detecting codes, Error correcting codes, Alphanumeric codes.

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 **(07)**

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

Digital Logic families **(06)**

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

Semiconductor Memories & Programmable Logic **(04)**

ROM, PROM, EPROM, EEPROM; RAM: Static RAM, Memory Organization, Reading, & Writing Operation in RAM, PLA, PAL & FPGA.

Synchronous sequential logic **(04)**

Sequential circuits, State Reduction and Assignment, Design Procedure.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2	1	1	1					
CO2	1	2	2						
CO3	1		1						
CO4		1	1						

COURSE INFORMATION SHEET

Course Code	**ITE303**
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	**ITE304**
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 are able to: I. Understand the basics of major components of a computer including CPU, memory, I/O, and parallel processing. II. Analyze the concepts of I/O organization, CPU instruction set and addressing modes. III. Understand the concepts of computer arithmetic & control design. IV. 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 **(04)**
System design, Design levels- Gate level, Register level, Processor level.

Basic Computer Organization & Design **(08)**
Instruction codes, common bus system, computer instruction, Design of basic computer, Design of accumulator logic.

Control Design **(08)**
Basic concepts, Hardwired control, Micro programmed control, Design of control unit.

Central Processing Unit **(08)**
Introduction, General reg. Organization, Inst. Formats Addressing modes, Data transfer & manipulation, RISC & CISC Characteristics.

SECTION-B

Input-Output Organization **(06)**
I/O interface, Modes of transfer, Priority interrupts, DMA, I/O processor.

Memory Organization **(06)**
Memory hierarchy, Main memory, Auxiliary memory, Associative memory. Cache memory, virtual memory, Memory management H/W.

Parallel Processing **(05)**
Introduction, Multiprocessors, Interconnection structure.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2		1		1				1
CO2	2	1	1	1					
CO3	2	1			1				
CO4	2	1			1				

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 are able to: I. Apply engineering knowledge to maximize profit, satisfaction and welfare. II. Identify the forces that affect the economy. III. Learn entrepreneurial skills and analyze the concepts of demand and supply. IV. 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 **(06)**

Nature of Economics, Economic Thoughts, Economic Activities, Relationship of Economics with other Social Sciences and Engineering

Theory of Consumer Behaviour **(12)**

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

Theory of Production and Cost **(06)**

Cost: Types of Costs, Production: Law of Variable Proportion, Returns to Factor and Returns to Scale, Economies and Diseconomies of Scale

SECTION-B

Theory of Market **(08)**

Nature and Relevance of Perfect Competition, Monopoly and Monopolistic Competition

Basic Concepts of Macro Economics **(09)**

National Income: Concept and Measurement, Determination of Equilibrium of Income

Inflation: Concept, Causes and Effect of Inflation, Measures to Control Inflation

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2		2	1	1			2	
CO2					1	1		1	
CO3					1			1	
CO4					1		1	1	

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 are able to: I. Learn the causes and dynamics of human behavior. II. Apply psychological principles to enhance their personal and professional life. III. Develop leadership and managerial qualities into the students. IV. 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

PO / CO	a	b	c	d	e	f	g	h	i
CO1					1	1		1	
CO2						1		2	
CO3						1		2	1
CO4						1	1		

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 are able to: I. Identify the function and application of sociology theory in social sciences. II. Understand how social class affects individual life chances. III. Learn about social structure and how it shapes and influences social interactions. IV. 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 **(03)**

Sociology as a Science, Impact of Industrial and French Revolution on the Emergence of Sociology, Relevance of Sociology for Engineering

Basic Concepts **(04)**

Society, Association, Institution, Culture Relativism, Social Structure, Social System, Socialisation, Competition, Conflict, Accommodation, Social Mobility

Pioneering Contributions to Sociology **(04)**

Seminal Views of Karl Marx, Emile Durkheim, Max Weber, AlwinToeffler

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 **(05)**

Economic Systems of Simple and Complex Societies, Sociological Dimensions of Economic Life, Market (free) Economy and Controlled (planned) Economy

SECTION-B

Industrial Sociology **(04)**

Nature and Scope of Industrial Sociology, Pre-Conditions and Consequences of Industrialization

Science and Technology **(04)**

Ethos of Science and Social Responsibility of Science

Social Change **(05)**

Theories of Change, Factors of Change, Directed Social Change, Social Policy and Social Development, Social Cost Benefit Analysis, Role of Engineers in Development

Understanding Indian Society **(07)**

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

Social Problems **(04)**

AIDS, Alcoholism, Drug Addiction, Corruption

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1					2	1			
CO2					1			1	
CO3						1			
CO4					2		1	1	

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 (CO)	
Course Outcome	

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. (4)
Grammar: Noun, gender, personal pronoun, the conjunction conjugation of verbs, number (5)
(singular-plural), possessive pronoun, adverbs, translation (Russian to English & vice-versa)

Section-B

Irregular plurals, Imperative mood, demonstrative pronoun, declaration of noun (nominative (4)
case, prepositioned case, the past tense, reflexive verbs, adjectives. Translation (Russian in to English & Vice-versa.)

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 INFORMATION 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	Students will be able to I. Get familiar and understand the fundamental notions in discrete mathematics. II. Acquire the knowledge of core mathematical foundation of computer science. III. Aware of the counting principles, basic properties of graph, trees and model simple applications. IV. 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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1	1		1					
CO2	2	2		2					
CO3	1	1		1					
CO4	1	1							

COURSE INFORMATION SHEET

Course Code	**ITE401**
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 are able to: I. Understand the architecture of 8085 and its interfacing with Memory and peripheral I/O devices. II. Apply the concepts of microprocessor to write assembly language programs using 8085 programming instructions. III. Analyze the operation and time delays caused by loop counters. IV. 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: **(06)**

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..

Interfacing I/O Devices **(06)**
Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Devices, Memory- Mapped I/O

Programming the 8085: **(07)**
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.

Programming Techniques with Additional Instructions: **(06)**
Programming Techniques Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Operations Related to Memory, Logic Operations.

SECTION-B

Counters and Time Delays: **(06)**
Counters and Time Delays, Hexadecimal Counter, Modulo Ten, Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs.

Stack and Subroutines: **(04)**
Stack, Subroutine, Conditional Call and Return Instructions

Interrupts: **(03)**
The 8085 Interrupt, 8085 Vectored interrupts.

General –Purpose Programmable Peripheral Devices: **(07)**
Block Diagram, Working and Control word of: The 8255A Programmable Peripheral Interface, The 8259 A Programmable Interrupt Controller, Programmable communications interface 8251.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2	2	1	1					
CO2	2	2	2	2			1		1
CO3	2		1						
CO4		1	2						

COURSE INFORMATION SHEET

Course Code	**ITE401**
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	**ITE402**
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 are able to: I. Understand basic concepts of computer network including various, reference models and protocols, propagation media II. 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. III. Learn the functioning of network and transport layer. IV. 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: **(08)**

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.

Physical Layer: **(08)**

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.

Data Link Layer: **(09)**

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.

SECTION-B

Network Layer: **(09)**

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.

Transport Layer: **(06)**

Addressing, establishing and releasing connection, flow control & buffering, multiplexing, crash recovery, Internet Transport protocol (TCP and UDP).

Application Layer: **(05)**

Network Security; Domain Name System; Simple Network Management Protocol; Electronic Mail.

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

PO / CO	a	b	c	D	e	f	g	h	i
CO1	2								
CO2	2	1	1						
CO3	2	1	1						
CO4	1	1	1	1					

COURSE INFORMATION SHEET

Course Code	**ITE403**
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 are able to: I. Understand the design of operating systems and its services. II. Learn the concepts of process management by understanding scheduling and synchronization III. 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.. IV. 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: **(05)**
Concept of an operating systems, batch system, Multi-programmed, Time sharing, Personal Computer System, Parallel system, Real time system, General system Architecture.

Features and Objectives of Operating Systems: **(11)**
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.

Memory Management: **(06)**
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.

SECTION-B

Information Management: **(06)**
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.

Distributed-System Structures: **(06)**
Network operating system, Distributed operating systems, Remote services, Robustness, Design Issues.

Distributed file systems and Distributed Coordination: **(06)**
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.

Case Studies: **(05)**
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.

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	NarosaPublishing House
3	Operating Systems: Design and implementation, 3rd Edition	Andrew S. Tanenbaum	PHI
4	Operating system, 5th Edition	Millan Milankovic	McGraw Hill

PO / CO	a	b	c	d	e	f	g	h	i
CO1			1		1			1	
CO2	1	1	2	2					
CO3	2	1	2	2					
CO4	1	1	1	2	1			1	

COURSE INFORMATION SHEET

Course Code	**ITE403**
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**
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 stylesheets 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	**ITE405**
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 are able to: I. Motivate and help to take full advantage of all learning opportunities presented. II. Bring a dimension to education, which cannot be gained in the classroom. III. Make connections between the different aspects of their educational experience.

PO / CO	a	b	c	d	e	f	g	h	i
CO1				1	2	1	2	2	2
CO2				1	1	1	2	1	1
CO3				1	2		2	1	1

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

COURSE INFORMATION SHEET

Course Code	**ITE571**
Course Title	**Database Management Systems (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	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 are able to: I. Understand the basic concepts of a database management system and its components. II. Understand the relational data model, entity-relationship model and process of relational database design. Design entity-relationship diagrams to represent simple database application scenarios and apply the principles of good relational database design. III. Understand the concept of a transaction and different techniques for concurrency control. IV. 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: **(06)**
File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence

Physical Data Organization: **(07)**
File Organization and Indexing, Index Data Structures, Hashing, B-trees, Clustered Index, Sparse Index, Dense Index, Fixed length and Variable Length Records.

Data Models: **(05)**
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.

The Relational Model: **(05)**
Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus, Querying Relational Data.

SECTION-B

SQL: **(07)**
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.

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: **(07)**
ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read Problem, Read-Write Locks, Deadlocks Handling, 2PL protocol.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1			1					1
CO2	1	1	2	2	1				2
CO3	1	1		1	1				1
CO4	1	1	2	2	1				2

COURSE INFORMATION SHEET

Course Code	**ITE541**
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, Indexes, 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	**ITE572**
Course Title	**Computer Graphics (Theory)**
Type of Course	**Core**
L T P	**4 03**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 50 50
Course Prerequisites	Data Structures
Course Objectives	1. To learn the basic hardware and software fundamentals associated with digital image generation and manipulation with the help of computer. 2. To study and apply the techniques and algorithms related with generation of 2D & 3D graphics with the help of computer.
Course Outcomes	After completion of this course, the students are able to: I. Understand the basic principles & applications of computer graphics and the working of various interactive graphics IO devices II. Learn and apply the various concepts related to output primitives, transformations, viewing and clipping in 2D and 3D domain based on underlying algorithms and mathematical approach. III. Understand and compare the variants of spline curves and visible surface detection methods. IV. Design and implement algorithms to create 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 **(07)**

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.

Output primitives: **(07)**

Scan conversion, Frame buffer, Point and Lines, Line Drawing Algorithms: DDA Algorithm, Bresenham's Line Algorithm, Circle Generating Algorithm: Mid point 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.

Two Dimensional Geometric Transformations and Viewing: **(08)**

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.

SECTION-B

Three Dimensional Concepts, Transformations and Viewing: **(09)**

Three Dimensional Display Methods, Three Dimensional Transformations; ThreeDimensional Viewing Pipeline; Viewing Coordinates; Specifying the View Plane, Projections: Parallel Projections, Perspective Projections.

Splines and Curves: **(07)**

Curved Lines and Surfaces, Spline Representations, Cubic Splines, Bezier Curves and theirproperties, B-Spline Curves.

Visible Surface Detection Methods: **(07)**

Classification of Visible Surface Detection Methods, Back Face Detection, Depth Buffer,A-Buffer, Scan Line and Depth-Sorting Methods, Wireframe Methods.

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
	Introduction to Computer Graphics, 1st Edition	N.Krishnamurthy	Tata McGraw Hill

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2	1	1		2				
CO2	2	1	2	1	1				
CO3	2	1	2	1	1				
CO4	1	1	2	2	1				

COURSE INFORMATION SHEET

Course Code	**ITE 572**
Course Title	**Computer Graphics (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Data Structures , Programming Fundamental
Course Objectives	To understand how the various elements that underlie computer graphics (algebra, geometry, algorithms and data structures, optics, and photometry) interact in the design of graphics software systems.

SYLLABUS

Practical should be covered based on the following directions:

1. Introduction to graphics programming in C/C++ and OpenGL.
2. Initializing graphics system. Basic graphics functions.
3. Drawing lines, circles, ellipses and other common objects.
4. Apply simple and composite transformations
5. Project – apply the various concepts studied in theory and practical.

COURSE INFORMATION SHEET

Course Code	**ITE 573**
Course Title	**Multimedia System (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	Introduction to Information Technology, Computer Networks.
Course Objectives	To gain an intuitive understanding of multimedia concepts and design.
Course Outcomes	After completion of this course, the students are able to: I. Understand the basics of multimedia such as design issues, storage requirements and interchange standards. II. Explain the fundamentals of different media such as digitization process, file formats, color model. III. Apply and analyze the standard compression techniques on a given problem. IV. Outline the basics of multimedia communication and distributed multimedia systems.

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:

Multimedia and its types, Introduction to Hypermedia, Hypertext, Multimedia Systems: Characteristics, Challenges, Desirable Features, Components and Applications, Trends in Multimedia.. **(4)**

Multimedia Technology:

Multimedia Authoring Paradigms, Design Issues in Multimedia Applications, Standardsfor Document Architecture: SGML (Standard Generalized Markup **(6)**

Language), ODA (Open Document Architecture); Multimedia Standards for Document Interchange: MHEG (Multimedia Hypermedia Expert Group).

Storage Media :

Magnetic and Optical Media, RAID and its levels, Compact Disc and its standards, DVD and its standards, Multimedia Servers. **(4)**

Audio:

Basics of Digital Audio, Sample Rates, Bit Size, Nyquist's Sampling Theorem; Audio File Formats; Introduction to MIDI (Musical Instrument Digital Interface): Components of a MIDI System, Hardware Aspects of MIDI, MIDI Messages. **(5)**

SECTION B

Images, Graphics and Videos:

Types of Color Models, Graphic/Image Data Structures, Graphic/Image File Formats, Types of Color Video Signals, TV Standards.. **(4)**

Image Compression:

Types of Redundancies, Classifying Compression Algorithms, Basics of Information Theory, Entropy Encoding: Run-length Encoding, Pattern Substitution, Huffman Coding, Huffman Coding of Images, Adaptive Huffman Coding, Arithmetic Coding, Lempel-Ziv-Welch (LZW) Algorithm, Source Coding Techniques: Transform Coding, Frequency Domain Methods, Differential Encoding, Hybrid Coding: Vector Quantization, JPEG Compression. **(9)**

Audio Compression:

Simple Audio Compression Methods, Psychoacoustics Model, MPEG Audio Compression. **(4)**

Video Compression:

Intra Frame Coding (I-frame), Inter-frame (P-frame) Coding, H.261 Compression, MPEG Compression, MPEG Video, MPEG Video Bitstream, Decoding MPEG Video in Software. **(5)**

Multimedia Communication:

Building Communication Network, Application Subsystem, Transport Subsystem, QOS, Resource Management, Distributed Multimedia Systems. **(4)**

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Multimedia Computing, Communications and Applications	Ralf Steinmetz and KlaraNahrstedt	Pearson Education
2.	Multimedia System Design	Prabhat K. Andleigh, KiranThakkar	PHI
3.	Multimedia Computing	Li, Drew	Pearson Education
4.	Multimedia Communications	Fred Halsall	Pearson Education
5.	Multimedia Systems	ParagHavaldar, Gerard Medioni	Cengage Learning Publication

PO / CO	a	B	c	d	e	f	g	H	i
CO1			2	1					
CO2			2		1				
CO3	2		2	2	1				
CO4			2	2	1				

COURSE INFORMATION SHEET

Course Code	**ITE574**
Course Title	**Theory of Computation (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	Discrete Structures
Course Objectives	To construct and prove the equivalence of languages described by finite state machines and regular expressions, pushdown automata and Turing machines.
Course Outcomes	After successful completion of this course, the students are able to: I. Explain and interpret the fundamental, mathematical and computational principles laying the foundation of computer science. II. Define and apply methods for the equivalence of languages described by various types of automata and their equivalent recognizable languages. III. Interpret and 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: **(02)**

Basic concepts – Languages, Grammars, Automata, Strings, Alphabet, Chomsky Classification of Grammars and Languages

Finite Automata: **(10)**

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.

SECTION-B

(10)

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

(11)

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

(02)

Undecidability:

Undecidability, Introduction to recursive & non-recursive enumerable languages, Universal Turing machine

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2				1				
CO2	2		1		1				
CO3	1			1	2				
CO4		2	1	1					

COURSE INFORMATION SHEET

Course Code	**ITE575**
Course Title	**Internet and Web Technology (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	Introduction to Information Technology
Course Objectives	1. To enable the students to get familiar with current technologies used in web development and maintenance. 2. To highlight the features of different technologies involved in web technology and various scripting languages.
Course Outcomes	After completion of this course, the students are able to: I. Explain and apply the concepts, terms and technologies used in web development. II. Highlight the theories and principles underlying the design of web pages. III. Apply the design principles and techniques of web site design. IV. Develop web pages using client side programming and analyze the web pages by identifying its elements and attributes.

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 **(07)**

Objected oriented concepts, object oriented programming (review only), advanced concept in OOP relationship, inheritance, abstract classes, polymorphism, Object Oriented design methodology approach, best practices, UML class diagrams, interface, common base class.

Networking & Security **(11)**

Internetworking, working with TCP/IP, IP address, subnetting, DNS, VPN, proxy servers, firewalls, Client/Server concepts, World Wide Web, components of web application, MIME types, browsers and web servers, types of web content, URL, HTML, HTTP protocol, Web applications, performance, application servers, Web security, User Experience Design, basic UX terminology, UXD in SDLC, rapid prototyping in Requirements.

SECTION-B

HTML & Scripting **(07)**

Client Tier using HTML, basic HTML tags, look and feel using CSS, client side scripting using Java Script and validations, Document Object Model (DOM)

Frameworks & Multithreading Programming **(10)**

Business tier using POJO (Plain Old Java Objects), introduction to frameworks, introduction to POJO, multithreaded programming, Java I/O, Java Database Connectivity (JDBC).

Java Servlets & Programming **(10)**

Presentation tier using JSP, Role of Java EE in Enterprise applications, Basics of Servlets, introducing server side programming with JSP, Standard Tag Library.

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Multimedia Computing Communications and Applications	Ralf, by Steinmetz and KlaraNahrstedt	Pearson Education
2.	Internet Book, The: Everything You Need to Know About Computer Networking and How the Internet Works	Douglas E Comer	Prentice Hall
3.	Web Technologies: A Computer Science Perspective	Jeffrey C. Jackson	Prentice Hall
4.	Java: The Complete Reference	Herbert Schildt	McGraw-Hill Professional
5.	Java Frameworks and Components	Michael Nash	Cambridge University Press
6	XML Black Book 2nd Edition	Ted Wugofski	Certification Insider Press
7.	Core Servlets and JavaServer Pages Vol. 1: Core Technologies 2nd Edition	Marty Hall and Larry Brown	Sun Microsystems
8.	Head First Servlets and JSP	Bryan Basham, Kathy Sierra, and Bert Bates, SPD	O'Reilly Media
9.	The Complete reference JSP	Phil Hanna	Tata McGraw-Hill Education

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1				2				
CO2	2				1				
CO3	2			1	1				
CO4	1	1	2		2				

COURSE INFORMATION SHEET

Course Code	**ITE575**
Course Title	**Internet and Web Technology (Practical)**
Type of Course	**Core**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Programming Fundamentals, Object Oriented Programming using C++
Course Objectives	To enable the students to get practical experience with current technologies used in web development and maintenance.

SYLLABUS

Practical Exposure:

The assignments for OOC, HTML, JDBCand JSP are to be completed as part of the Hands-On for the subjects.

- OOC using Java
- HTML/JS
- JDBC
- JSP

Project based on developing & deploying web application(s). The Project Development is primarily based on the Client tier using HTML/JS, JDBC and Presentation tier using JSP with back end database such as MS-Access or Oracle 9i.

The project is a Group Activity-consisting of 4 members in a team. The project specification hosted on the portal has to be completed. The project has to be evaluated before the final examination.

COURSE INFORMATION SHEET

Course Code	**ITE576**
Course Title	**Industrial Training (After 4th Semester)**
Type of Course	**Core**
L T P	**0 0 0**
Credits	**1**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Nil
Course Objectives	1. To enable students to integrate theory with practice. 2. To introduce students to work culture and industrial practices. 3. To provide opportunity for students to work with industrial practitioners.
Course Outcomes	After completion of this course, the students are able to: I. Analyze practical aspects of a problem and designing its solution. II. Apply skills and knowledge of recent technologies to implement solution for a real life problem. III. Demonstrate interpersonal skills and ability of team work and documentation and reporting.

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2	1	2	1	1				
CO2	1	2	2	2					
CO3						1	2	1	2

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

COURSE INFORMATION SHEET

Course Code	**ITE671**
Course Title	**Wireless Communication (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	1. To provide basic knowledge about the concepts, issues and design approaches in wireless communication systems. 2. To make students familiarize with radio propagation techniques, channel impairment mitigation techniques and advanced wireless technologies.
Course Outcomes	After completion of this course, the students are able to: I. Learn the basics of various wireless communication systems and understand their differences. II. Understand and apply the concepts of system design fundamentals, Multiple access techniques in general. III. Understand the working of GSM and CDMA mobile communication systems. IV. Understand and learn the channel impairment mitigation techniquesand advance wireless technologies.

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 **(05)**

Evolution of Mobile Communication Systems: 1G, 2G, 2.5G, 3G, 4G , comparison of common wireless communication systems.

System Design Fundamentals **(10)**

Frequency reuse, Channel assignment strategies, handoff strategies, interference, improving coverage and capacity in cellular systems: cell splitting, cell sectoring and microcell zone concept, Multiple Access Techniques: FDMA, TDMA, SSMA, SDMA.

Mobile Communication Systems **(08)**

GSM: Architecture, Identifiers, Authentication and Security , Control Channels, Services.

SECTION-B

CDMA (IS-95): Architecture ,Forward and Reverse channels ,Soft handoff, call processing Features: Near Far Effect, Cell Breathing, Mobile data over CDMA, CDMA-2000. Comparison of CDMA and GSM **(09)**

Channel Impairment Mitigation Techniques **(08)**

Introduction, Power control, Diversity Techniques: Frequency Diversity, Time Diversity, Space Diversity, Path Diversity, Channel Equalization, Rake receiver, Channel coding and interleaving.

Advance Technologies: **(05)**

Operation, Applications and Technical specification of WiFi, WiMax, EDGE, WSN, LTE

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Wireless Communications Principles and practice, 2nd Edition	Theodore S. Rappaport	Prentice Hall India
2.	Wireless and Cellular Communication, 2009 Edition	Sanjay Sharma	SK Kataria Publisher
3.	Mobile and Personal Communication Systems and services, 1st Edition	Raj Pandya	IEEE Press

PO / CO	a	b	c	d	e	f	g	h	i
CO1					1		1	1	1
CO2	1	2	1	1	1		2	1	2
CO3				1			1		
CO4	1		1	1	1		1		1

COURSE INFORMATION SHEET

Course Code	**ITE671**
Course Title	**Wireless Communication (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 TCP/IP Suite, understand the Wireless Communication Technology (Satellite, Cellular and Bluetooth networking).

SYLLABUS

Wireless Communication lab course includes the following:

- Exposure to advanced wireless tools.
- Pertinent lab exercises related to wireless communication.

COURSE INFORMATION SHEET

Course Code	**ITE672**
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 are able to: I. Identify the security threats and apply relevant cryptographic techniques on data. II. Compare the different techniques of public key cryptography and key exchange. III. Apply the basic concepts of digital signatures and hash algorithms. IV. 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: **(06)**
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.

Stream and Block Ciphers: **(07)**
Rotor Based System and Shift Register Based System. Block cipher: principles, modes of operations. Data Encryption Standard (DES), Analyzing and Strengthening of DES, Introduction to Advance Encryption Standard (AES)

Number Theory and Basic Algebra: **(04)**
Modular Arithmetic, Euclidean algorithm, Random number generation

Key Management Protocols: **(05)**
Solving Key Distribution Problem, Diffie-Hellman Algorithm, Key Exchange with Public Key Cryptography.

SECTION-B

Public Key Encryption Systems: **(06)**
Concept and Characteristics of Public Key Encryption system, Rivets-Shamir-Adleman (RSA) Encryption, Digital Signature Algorithms and authentication protocols, Digital Signature Standard (DSA).

Hash Algorithms: **(05)**
Hash concept, description of Hash Algorithms, Message Digest Algorithms such as MD4 and MD5, Secure Hash Algorithms such as SH1 and SHA2

Network Security: **(04)**
Kerberos, IP security: Architecture, Authentication Header, Encapsulating Security Payload

Web Security: **(04)**
Web security consideration, Secure Socket Layer Protocol, Transport Layer Security, Secure Electronic Transaction Protocol

Firewalls: **(04)**
Firewall Design principles, Trusted Systems, Virtual Private Networks.

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	AtulKahate	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

PO / CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**
CO1	1		2	2	1				
CO2	1		2	2	1				
CO3	1		2	2	1				
CO4	1		2	2	1				

COURSE INFORMATION SHEET

Course Code	**ITE673**
Course Title	**Software Engineering (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	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 are able to: I. Understand the concept of process models. II. Analyze the project management and specification concepts. III. Understand the concept of software designing and testing IV. 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 **(05)**

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.

Software Process Model **(06)**

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.

Project Management Concepts **(06)**

Management Activities, Project Planning, Project Scheduling, Size Estimation – LOC, FP; Cost Estimation Models –COCOMO, COCOMO-II.

Software Requirements Analysis and Specification Concepts **(05)**

Requirement Engineering, Requirement Elicitation Techniques, Requirements 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 **(06)**

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.

Testing **(05)**

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.

Technical Metrics for Software **(06)**

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.

CASE (Computer Aided Software Engineering) and Introduction to UML **(06)**

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.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1		2	1	1					1
CO2			1	1	1		1		2
CO3	1	2	1						2
CO4	1				1				2

COURSE INFORMATION SHEET

Course Code	**ITE674**
Course Title	**Design and Analysis of Algorithms(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	Programming Fundamental, Data Structures
Course Objectives	1. To understand the basic concepts related to analysis of algorithms. 2. To demonstrate a familiarity with key algorithms. 3. To understand and implement different algorithm design techniques. 4. To design algorithms based on the strategies learned and apply the same to solve different problems.
Course Outcomes	After completion of this course, the students are able to: I. Analyze the asymptotic performance of algorithms. II. Compare the performance of different algorithms in terms of time and space complexity. III. Apply important algorithmic design paradigms and methods of analysis. IV. Develop efficient algorithms in common engineering design situations.

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 **(09)**

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;

Divide and Conquer Method **(07)**
General Method, Binary Search, Matrix Multiplication, Merge Sort, Quick Sort and their performance analysis

Greedy Approach **(07)**
Elements of Greedy strategy, Knapsack problem, Single source Shortest paths problem, Minimum Spanning tree problem and analysis of these problems.

SECTION-B

Dynamic Programming **(09)**
General Method, Multistage Graph , All Pairs Shortest Path Algorithm , 0/1 Knapsack Problem, Traveling Salesman Problem

Backtracking **(07)**
The General Method , 8-Queens Problem- Sum of Subsets ,Knapsack

P and NP Problems **(06)**
Polynomial time, Nondeterministic Algorithms and NP, Reducibility and NP completeness, NP complete Problems

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2	2			1				
CO2	2	2	1		1				
CO3	2	2	1	2	1				
CO4	2	2	2	2	1				

COURSE INFORMATION SHEET

Course Code	**ITE674**
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.

ELECTIVE -I

COURSE INFORMATION SHEET

Course Code	**ITE 675**
Course Title	**Business Intelligence (Theory)**
Type of Course	**Elective**
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	Database Management Systems
Course Objectives	1. To impart knowledge of data warehousing and data mining for Business Processes. 2. To understand the role of Business Intelligence in taking business decisions.
Course Outcomes	After completion of this course, the students are able to: I. Illustrate the concept and importance of Business Intelligence, Data Integration, ETL, Data Profiling and Data Quality. II. Compare E-R model with multidimensional model and apply the concept of dimensions, facts, and star-snowflake schema to real world problems. III. Design and Implement different kinds of Enterprise Reports. IV. Understand the concept of data mining and be able to apply various data mining techniques in real world scenario.

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 Business Intelligence: **(08)**

Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities

Basics of Data Integration (Extraction Transformation Loading) **(08)**

Concepts of data integration, need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL, Introduction to data quality, data profiling concepts and applications.

Introduction to Multi-Dimensional Data Modeling, **(08)**

Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema.

SECTION-B

Basics of Enterprise Reporting **(06)**

Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, and overall architecture.

Data Mining Functionalities: **(15)**

Association rules mining, Mining Association rules from single level, multilevel transaction databases, Classification and prediction, Decision tree induction, Bayesian classification, k-nearest neighbor classification

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Fundamentals of Business Analytics	R N Prasad, Seema Acharya	Wiley India
2.	Data Mining: Concepts and Techniques	J. Han and M. Kamber	Morgan Kaufman publishers, Harcourt India pvt. Ltd
3.	Business Intelligence: The Savvy Manager's Guide	David Loshin	Latest Edition By Knowledge Enterprise
4.	Business Intelligence roadmap	Larissa Terpeluk Moss, ShakuAtre	Addison Weseley
5.	Successful Business Intelligence: Secrets to making Killer BI Applications	Cindi Howson	Tata McGraw Hill
6.	Business intelligence for the enterprise	Mike Biere	Addison Weseley

PO / CO	a	b	c	d	e	f	g	h	i
CO1				2					
CO2		1		2					
CO3			2						2
CO4	1			2					

COURSE INFORMATION SHEET

Course Code	**ITE676**
Course Title	**System Software**
Type of Course	**Elective**
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, Microprocessor & assembly language programming
Course Objectives	1. To introduce the major concepts areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers, linkers, loaders and assemblers. 2. To gain knowledge and skills necessary to develop system software covering a broad range of engineering and scientific applications and will learn context free grammars, compiler parsing techniques, construction of abstract syntax trees, symbol tables, and actual code generation and provided with a thorough coverage of the basic issues in programs interacting directly with operating systems.
Course Outcomes	After completion of this course, the students are able to: I. Understand the functions of modern compilers, linkers, loaders, assemblers & macros w.r.t. machine architecture. II. Understand the machine dependent and machine independent features of various system softwares. III. Apply knowledge of data structures & algorithms needed for the processing of assemblers, compilers, linkers, loaders and macros. IV. Understand system software for real machines by using implementation examples.

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: **(06)**

System software and machine architecture. Simplified Instructional Computer (SIC), Traditional CISC and RISC Machines.

Assemblers: **(08)**

Basic assembler functions, Machine-dependent assembler features, Machine-Independent assembler features, Assembler Design options, Implementation examples: AIX Assembler.

Macro Processors: **(08)**

Basic Macro processor functions, Machine-Independent Macro processor features, Design options.

SECTION-B

Loader and Linkers: **(07)**

Basic loader functions, Machine dependent Loader features, Machine-Independent Loader features, Loader Design options, Implementation examples.

Compilers: **(10)**

Basic Compiler functions, Phases of Compiler, Grammar, Lexical Analysis, Syntax Analysis, Code Generation, Machine dependent compiler features, Machine-Independent compiler features, and Compiler Design options.

Operating Systems: **(06)**

Basic operating system functions, Machine dependent operating system features, Machine independent operating system features, Operating System Design options

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	System Software, An Introduction to System Programming, 3d Edition	Leland L.Beck	Addison Wesley
2	System Programming and Operating System, 2nd edition	D.M.Dhamdere	TMH
3	System Programming, 1st Edition	Mednick& Donovan	TMH
4	Compilers: Principles, Techniques and Tools	A.V.Aho, R.Sethi, J.D Ullman	Addison Wesley

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1	2	2				2		
CO2	1		1	2					
CO3			2	2					
CO4	1	2	1	1					

COURSE INFORMATION SHEET

Course Code	**ITE677**
Course Title	**Neural Network and Fuzzy Logic (Theory)**
Type of Course	**Elective**
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	Discrete Structures
Course Objectives	1. To introduce students to neural networks and fuzzy logic concepts and techniques and foster their abilities in designing. 2. To implement neural networks and fuzzy logic based solutions for real-world problems.
Course Outcomes	After completion of this course, the students are able to: I. Identify and describe neural network and Fuzzy Logic techniques and their roles in building intelligent machines II. Design and apply neural networks to pattern classification and regression problems III. Model fuzzy logic and reasoning to handle uncertainty and solve engineering problems IV. Analyze and implement neuro-fuzzy systems for various 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, PerceptronNetworks,Adaline and Madaline, Multilayer Neural Networks, Backpropagation Network, Associative Memory Networks, BAM, Hopfield Networks, Kohonen Self Organizing Feature Maps, **(15)**

Counter propagation Networks, Adaptive Resonance Theory Networks

Introduction to Fuzzy Logic, Classical Vs Fuzzy sets, Membership Functions, Defuzzification, Fuzzy model, Fuzzy Rule Base, Fuzzy inference systems, Fuzzy Expert System **(10)**

SECTION-B

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Fuzzy Equation **(04)**

Fuzzy Logic: Classical Logic, Multivalued Logic, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges **(04)**

Uncertainty Based Information: Information and Uncertainty, Nonspecificity of Crisp Sets, Nonspecificity of Fuzzy Sets, Fuzziness of Fuzzy Sets **(04)**

Applications of Fuzzy Logic: Medicine and Economics **(04)**

Introduction to Neuro Fuzzy Systems, Architecture of a Neuro Fuzzy systems **(04)**

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	Neural Networks-A Comprehensive Foundations	Simon S. Haykin	Prentice-Hall International
5	Neural Networks: Algorithms, Applications and Programming Techniques	J.A. Freeman & D.M. Skapura	Addison Wesley, Reading, Mass

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1	2	2	2					
CO2	1	2	2	2	1				
CO3	1	2	2	2	1				
CO4	1	2	2	2	1				

COURSE INFORMATION SHEET

Course Code	**ITE678**
Course Title	**System Analysis and Design (Theory)**
Type of Course	**Elective**
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	To be able to analyze business problems, design solutions and document the results.
Course Outcomes	After completion of this course, the students are able to: I. Demonstrate the concept of different types of system by giving examples and understand the role and need of a system analyst. II. Understand the various phases of SDLC and be able to develop different types of documentation based on the outcome of different phases. III. Analyze different techniques like fact gathering technique, prototyping, cost-benefit analysis and fact analysis to perform feasibility study and be able to create feasibility reports. . IV. Design graphical user interface by designing the input-output forms and make use of top-down and bottom-up design techniques for module designing.

SYLLABUS

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part-A and two from Part-B.

SECTION-A **Hours**

System definition and concepts: **(03)**
Characteristics and types of system, Manual and automated systems, Real-life Business sub-systems: Production, Marketing, Personnel, Material, Finance

Systems models: **(03)**

Systems environment and boundaries, Real time and distributed systems, Basic principles of successful systems, Role and need of systems analyst

System Development cycle: **(03)**

Introduction to systems development life cycle (SDLC) , various phases of development :Analysis, Design, Development, Implementation, Maintenance

Systems documentation considerations: **(03)**

Principles of system documentation, Types of documentation and their importance

System Planning: **(06)**

Data and fact gathering techniques: Interviews, Group communication, Presentations, Site visits; Feasibility study and its importance, Types of feasibility reports, selection plan and proposal, prototyping, tools and techniques of cost-benefit analysis

Systems Design and modeling: **(06)**

Process modeling, Logical and physical design, Design representation, Systems flowcharts and structured charts, Data flow diagrams, Common diagramming conventions and guidelines using DFD, Data Modeling and systems analysis , Designing the internals: Program and Process design , Designing Distributed Systems

SECTION-B

Input and Output: Classification of forms: **(04)**

Input/output forms design, User-interface design, Graphical interfaces

Modular and structured design: **(05)**

Module specifications, coupling and cohesion , Top-down and bottom-up design

System Implementation and Maintenance: **(05)**

Planning considerations, Conversion methods, producers and controls, System acceptance criteria, System evaluation and performance, Testing and validation, Maintenance activities and issues

System Audit and Security: **(03)**

Computer system as an expensive resource: Data and strong media procedures and norms for utilization of computer equipment, Audit of computer system usage, Audit trails

Types of threats to computer system and control measures: **(04)**

Threat to computer system and control measures, Disaster recovery and contingency planning

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	System analysis and design	Perry Edwards	McGraw-Hill
2	Analysis and design of information systems	James A.Senn	McGraw-Hill

COs	POs								
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**
CO1					2	1		2	
CO2	1								
CO3					2				
CO4				1	2				

COURSE INFORMATION SHEET

Course Code	**ITE679**
Course Title	**Distributed Operating System (Theory)**
Type of Course	**Elective**
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
Course Objectives	This course is designed to examine the fundamental principles of distributed operating systems, and provide students hands-on experience in developing distributed protocols. Emphasis will be placed on communication, process, naming, synchronization, consistency and replication, and fault tolerance.
Course Outcomes	After completion of this course, the students are able to: I. Understandtheprocess of distributed system design and implementation. II. Knowledge of various areas of research in distributed systems and mobile computing. III. Understand and design of fault tolerant distributed system IV. Compare various types of distributed operating systems.

SYLLABUS

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part A and Part B.

SECTION-A **Hours**

Operating System Structures **(05)**

Review of structures: monolithic kernel, layered systems, virtual machines, Process

based models and client server.

Distributed Systems **(08)**

The micro-kernel based client-server approach. Inter process communication and Remote Procedure Call. Tasks and Threads. Examples from LINUX, Solaris 2 and Windows NT.

Resource Management **(08)**

Resource allocation and deadlock. Deadlock prevention, avoidance and detection. Resource management in distributed systems: Logical time, reaching agreement, failure recovery and distributed deadlocks.

SECTION-B

Protection and Security **(08)**

Requirements for protection and security regimes. The access matrix model of protection. System and user modes, rings of protection, access lists, capabilities. User authentication, passwords and signatures.

File Systems **(09)**

Issues in the design of distributed file systems: naming, transparency, update semantics and fault resilience. Use of the Virtual File system layer. Examples of distributed systems including Sun NFS, and Coda files system. Design of the sever file system. Example systems: NTFS, Unix ext2 and ext3.

Middleware **(07)**

The common Object Request Broker Architecture and Microsoft DCOM models and software and their relationship to Operating Systems.

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Distributed Systems: Principles and Paradigms	Andrew S. Tranebnaum	Pearson Education
2	Distributed Operating Systems	Andrew S. Tanenbaum	Pearson Education
3	Distributed Operating Systems: Concepts and Design	Pradeep K. Sinha	PHI Learning Pvt. Ltd.

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1			2					
CO2	1	2			2				
CO3	1				2				
CO4	1			2	1				
CO5				2	1				

COURSE INFORMATION SHEET

Course Code	**ITE680**
Course Title	**Network Management and Administration (Theory)**
Type of Course	**Elective**
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 Networks
Course Objectives	To familiarize students with advanced concepts of networks, network management, administration and security concepts
Course Outcomes	After completion of this course, the students are able to: I. Understand the principles of network management. II. Analyze performance management strategies in broadband networks III. Learn UNIX system administration and configuration. IV. Identify various security issues and security 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**

Large Enterprise Networks: **(05)**

Managing Enterprise Networks, need for network management, SNMP: the de facto network management standard.

Elements of NMS Development: **(12)**

NMS development, data analysis, class design for major NMS features, GUI development, insulating applications from low level code, multiservice switches, MPLS, MPLS and scalability.

Performance Management in Broadband Networks: **(10)**

Performance Control, Performance Monitoring in T-carrier systems, Performance Monitoring in SDH/SONET based networks, Performance Monitoring in ATM networks, Performance Monitoring in Frame Relay networks, Transmission Quality Assurance, Traffic Management.

SECTION-B

Introduction to Unix System Administration **(04)**

Daily Tasks of a System Administrator, Startup and Shutdown, Periodic Processes, Managing File Systems, Responsibilities to the users, Hardware responsibilities, Types of SunOS Systems.

System Configuration **(07)**

Kernel configuration; Adding Hardware Special Files in Solaris 10.0, IRIX 5.X, Digital UNIX and Ultrix, Systems Directories,/ -root/ etc- systems. Creating networks and subnets, configuring network interfaces, obtaining network statistics, routing , /user-system programs, libraries, etc; User accounts-admittance, login procedure, Password Aging.

Security **(07)**

System Security Concerns, Need for security, Security Programs, Security Response Teams, The password and group files, File and Directory Permissions, EEPROM Security, Secure the console port, Security Loopholes, Additional Security features in Solaris 10.0, Secure Shell, SSII, SSII Programs, Control Files, Setting up the Service, Login Process.

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Network Management, MIBs and MPLS	Stephen B. Morris	Pearson Publications
2	Network Management in wired and wireless networks	Tejinder S. Randhawa, Stephen Hardy	Kulwer Academic publication
3	Unix System Administration Handbook	Evi Nemeth, Garth Snyder, Scott Seabass, Trent Hein	Prentice Hall of India Private Ltd
4	Essential UNIX System Administration	Aeleen Frisch	O'Reilly Media
5	Solaris System Administration's Guide	Janice Winsor	Macmillian Technical Publishing

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1		1			1			
CO2	1		2	1					
CO3	1		1						
CO4	1		2			1			

COURSE INFORMATION SHEET

Course Code	**ITE681**
Course Title	**Cyber Crime and Digital Forensic (Theory)**
Type of Course	**Elective**
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, Network Security& Cryptography
Course Objectives	1. To teach students about the various forms of cybercrimes and fundamentals ofcomputer forensic technology 2. Introduce students to the different techniques used to collect, preserve and recover computer evidences
Course Outcomes	After completion of this course, the students are able to: I. Understand and identify the need for computer forensics. II. Learn the legal aspects of collecting &preserving computer evidence and the process of data recovery. III. Analyze the computer forensics technology and learn how to recover electronic documents. IV. Examine different forensic scenarios for reconstruction from past events.

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**

(7)

Computer forensics fundamentals : Introduction: Basics of computer forensics, Use of computer forensics in law enforcement,Computer forensics assistance to human resources /employment proceedings, Computer forensics services, Benefits of professional forensics methodology SLC:Steps taken by computer forensics specialists

Types of computer forensics technology **(7)**

Types of military computer forensic technology, Types of law enforcement, Computer forensictechnology, Types of business computer forensic technology, Occurrence of cybercrime, Cyberdetectives, Fighting cyber crime with risk –management techniques, Computer forensicsinvestigative services SLC: Forensic process improvement.

Data recovery **(8)**

Introduction of Data recovery, Data back-up and recovery, the role of back-up in data recovery,data-recovery solution.

SECTION-B

(7)

Evidence collection and data seizure

Why collect evidence?, Collection options, Obstacles, Types of evidence, The rules of evidence,Volatile evidence, General procedure, Collection and archiving, Methods of collection, Artifacts,Collection steps, Preserving the digital crime scene, Computer evidence processing scene, Legalaspects of collecting SLC: preserving computer forensic evidence.

(8)

Computer image verification and authentication: Special needs of evidential authentication, Practical consideration, Practical implementation, Electronic document discovery:a powerful new litigation tool, Time travel, SLC: Forensics identification and analysis of technical surveillance devices.

(8)

Reconstruction past events : How to become a digital detective, Useable file formats, Unusable file formats, Converting files, Network forensics scenario, A technical approach, Destruction of e-mail, Damaging computer evidence, Documenting the intrusion on destruction of data SLC:System testing.

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Computer Forensics: Computer Crime Scene Investigation.	John R VACCA	FirewallMedia
2.	Guide To Computer Forensics And Investigations	Bill Nelson, Amelia Phillips,Christopher Stuart	Cengage Learning Publications
3.	Computer Forensics	David Cowen -CISSP	McGraw Hill Education

PO / CO	a	b	c	d	e	f	g	h	i
CO1					2	1			
CO2	2	2			1				
CO3		2		2	1				
CO4	2	2	1	1					

COURSE INFORMATION SHEET

Course Code	**ITE682**
Course Title	**Data Mining and Analytics**
Type of Course	**Elective**
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	Database Management Systems
Course Objectives	1. To introduce basic concepts and algorithms of data mining. 2. To examine different types of data to be mined and apply preprocessing and mining methods. 3. To comprehend the role that data mining plays in various fields.
Course Outcomes	After completion of this course, the students are able to: I. Understand the basic concepts of data mining such as preprocessing, generalization, characterization, comparison. II. Evaluate and implement various types of data mining techniques such as Association Rule mining, Classification and Prediction techniques. III. Illustrate the concept of cluster analysis and understand how to do the mining of complex data types. IV. Apply the understanding of data mining techniques to various domains such as Biomedical, finance 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**

Introduction to Data Mining **(04)**

Concepts of Data mining, Functionalities, Issues, Multidimensional data models.

Elements of Data Analysis **(03)**

Averaging, Filtering and Smoothing, Descriptive and summary statistics, Discrete Random Variables, distributions, cumulative distribution, expectation, Variance, Conditional Probability, independence, Bayes, Continuous random variables, density function, linear functions, Multiple Linear regression

Data Preprocessing **(04)**

Need, Data Cleaning, Integration and Transformation, Reduction, Discretization and Concept Hierarchy Generation Methods

Concept Description **(04)**

Data Generalization and Summarization based Characterization, Analytical Characterization, Attribute relevance analysis, Mining class comparisons; Comparison with typical machine learning methods.

Mining Association Rules **(07)**

Introduction, Mining single dimensional , boolean rules using Apriori, FP-Tree method, Mining Multilevel Association Rules, Mining Multidimensional Association Rules, Constraint-Based Association Rule Mining.

SECTION-B

Classification and Prediction **(06)**

Issues, Classification by Decision Tree Induction, Bayesian Classification, Backpropagation, k-Nearest-Neighbor Classifiers, Genetic Algorithms, Fuzzy Set Approaches, Bagging and Boosting, Ensemble classifiers.

Cluster Analysis **(05)**

Definition, Types of Data in Cluster Analysis, Introduction to Partitioning, Hierarchical and Density-Based Methods, Introduction to Outlier Analysis.

Mining Complex Data Types **(05)**

Mining spatial databases, Multimedia databases, Time series databases and WWW

Application and Trends **(03)**

Biomedical, Finance, Retail and Telecommunication applications, Social aspects, Trends in Data Mining.

Project Work (Using SAS Analytica, R tool) **(04)**

Comprehensive descriptive statistical analysis of data in different formats. Data pre-processing, Normalising, cleaning, integration and transformation tasks using SAS toolboxes. Application of different data mining functionalities such as frequent pattern analysis, linear (uni variable and multi variable) and logistic regression, classification, clustering on different categories of data.

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Data Mining: Concepts and Techniques	JiaweiHan&MichelineKamber	Morgan Kaufman publishers
2	Data Mining	Pieter Adrians, DolfZantinge	Addison Wesley
3	Data Warehousing, Data Mining and OLTP	Alex Berson	McGraw Hill

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2								
CO2	2	1	1	1					
CO3	1	1	1	1	1				
CO4		1	1	2	1				

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	**4 0 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 (CO)	1. To understand how to analyze and manipulate digital signals and have the fundamental MATLAB programming knowledge to do so. 2. To provide the student with the necessary background for taking advanced level courses in signal and image processing.
Course Outcome	After the completion of this course, the students are able to: I. Understand and learn the concept of Digital Signal Processing, types of digital signals/systems and their implementation in MATLAB. II. Analyze and implement z-transform, Discrete Fourier Transform in MATLAB. III. Learn the structures of digital filters and apply in designing them both theoretically and in MATLAB IV. Understand the architecture and features of Digital Signal Processors

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 parts having three questions each and the candidate is required to attempt at least two questions from each section.

SECTION-A **Hours**

Introduction to Digital Signal Processing **(04)**

Applications and advantages of DSP. Sampling theorem, concept of frequency in discrete time signals.

Discrete Time Signals and Systems **(08)**

Classification of signals, standard signals and classification of discrete time systems. Linear Time Invariant systems and their representation by difference equations and structures.

Z- Transform **(04)**

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.

Frequency Analysis **(08)**

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).

SECTION-B

Realization of FIR & IIR Systems: **(04)**

Direct forms, cascade and parallel form IIR structures. Direct form, cascade and linear phase FIR structures.

Design of Digital Filters: **(12)**

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.

DSP Processors **(05)**

Introduction to DSP Processors, architecture of TMS 320CXX and ADSP 21XX

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1	1			1				
CO2	1	2	2	1	1				
CO3	1	2	2	1	1				
CO4	1	1	2	1	1				

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
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	**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
Course Objectives	To provide the in-depth knowledge of different concepts involved while designing a compiler.
Course Outcomes	After the completion of this course, the students are able to: I. Understand the working of complier and translators. II. Develop in-depth knowledge of major stages of compiling. III. Relate and analyze the concepts learned earlier in their study like higher level programming, assemblers, automata theory and formal languages, data structure and algorithms, operating systems. IV. Apply the ideas, the techniques, and the knowledge acquired for the purpose of designing the 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 **(05)**

Compilers and Translators; The phases of the compiler – Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Optimization, Code generation, Bookkeeping, Error handling.

Lexical Analysis **(05)**

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.

Syntax Analysis **(12)**

The role of a parser, Context free grammars, Writing a grammar, Top down Parsing: Recursive decent parser, Predictive parser, Bottom up Parsing: Handles, Viable prefixes, Operator precedence parsing, LR parsers: SLR, LALR, CLR. Parser generator (YACC).Error Recovery techniques for different parsers.

SECTION-B

Syntax directed translation **(04)**

Syntax directed definitions, Synthesized and inherited attributes, Construction of syntax trees.

Run time environments **(06)**

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.

Intermediate code generation **(03)**

Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).

Code optimization and code generation **(10)**

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.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1		2	2					
CO2	1	1	2	2	1				
CO3	1	1	2	2	1			1	
CO4	1	1	2	2	1		1		

COURSE INFORMATION SHEET

Course Code	**ITE754**
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	At the end of the subject, student will be able to : I. Define the practices and philosophies of agile methods. II. Analyze the tradeoffs in selecting a software engineering method. III. Define and extend the usage of Scrum and Extreme Programming in software product development. IV. 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 **(08)**

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.

Agile Design **(06)**

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.

Agile Methodologies **(09)**

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, Scalability, Practices, Issues.

SECTION-B

Agile Project Management **(10)**

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

Agile Testing **(12)**

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

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 Professional, ISBN: 9780321616944

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2				1			1	1
CO2		2	1	2	1			1	
CO3	1	1	1	2	1			1	
CO4	1	2	1		1	1	2	1	1

COURSE INFORMATION SHEET

Course Code	**ITE754**
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, JUnit.

SYLLABUS

Practical based on theory.

Elective-II

COURSE INFORMATION SHEET

Course Code	**ITE744**
Course Title	**Cloud Computing (Theory)**
Type of Course	**Elective**
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 the completion of this course, the students will be able to: I. Illustrate the concepts of Cloud Computing and the various deployment and service models of Cloud Computing. II. Demonstrate the functioning of Private and Public Cloud. III. Describe the security concerns of Cloud Computing. IV. Understand the need of cloud computing in industry domains and current challenges and future directions of cloud computing.

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: **(04)**

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.

Understanding Virtualization **(04)**

Basics of virtualization, Virtualization technologies, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing.

Working with Private Cloud: **(09)**

Private Cloud Definition, Characteristics of Private Cloud, Private Cloud deployment models, Private Cloud Building blocks namely Physical Layer, Virtualization Layer, 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: **(08)**

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)

SECTION-B

Overview of Cloud Security: **(06)**

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

Overview of Multi-Cloud Management Systems & Business Cloud: **(10)**

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

Future directions in Cloud Computing **(04)**

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.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1	1							
CO2	1	2	2						
CO3		1	1	1					
CO4		1	1	2					

COURSE INFORMATION SHEET

Course Code	**ITE745**
Course Title	**Artificial Intelligence (Theory)**
Type of Course	**Elective**
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	1. To introduce the main concepts, ideas and techniques of artificial intelligence (AI) to the students so that they could know the various aspects of AI. 2. To understand some essential principles and are able to implement some basic AI techniques in their projects or other related work.
Course Outcomes	After the completion of this course, the students are able to: I. Understand the various problem solving techniques of Artificial Intelligence. II. Utilize knowledge representation concepts for inference-based problem solving. III. Understand various Planning problems, algorithms and approaches. IV. Apply knowledge obtained from observations, neural networks and expert system.

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: **(06)**

Artificial Intelligence and its applications, Artificial Intelligence Techniques, criteria of success, Intelligent Agents, Nature and structure of Agents, Learning Agents

Problem solving techniques: **(09)**

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

Knowledge representation: **(08)**

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 dependency, scripts

SECTION-B

Planning: **(06)**

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

Learning : **(10)**

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

Introduction to Natural Language processing and Expert system: **(06)**

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.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1	2	1	2	1				
CO2	1	2	1	2	1				
CO3	1		1	1	2				
CO4	1	2	1	2	1				

COURSE INFORMATION SHEET

Course Code	**ITE748**
Course Title	**Principles of Telecommunication (Theory)**
Type of Course	**Elective**
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 different types of communication approaches.
Course Outcomes	After completion of this course, the students are able to: I. Understand and apply the concepts of signal theory. II. Learn the concepts of Noise and its types. III. Analyze the concepts of Information theory and coding IV. 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 **(03)**

The communication process, Block diagram of a general communication system.

Probability and Random Signal Theory **(09)**

Probability basics, Conditional Probability, Random Variables, Discrete Random Variables, Continuous Random Variables, Variance, Standard deviation, Moments, Binomial, and Gaussian distribution

Noise **(08)**

Sources of Noise, Shot Noise, resistor Noise, White Noise, Noise Temperature, Signal-to-Noise Ratio, Noise Figure.

SECTION-B

Information Theory **(10)**

Unit of Information, Entropy, Rate of Information, Joint entropy and Conditional Entropy, Mutual Information, Channel Capacity, Shannon's Theorem

Coding **(08)**

Need for Coding, Coding Efficiency, Shannon Fano Coding, Huffman Coding

Types of Communications **(07)**

Basics of Fiber Optic Communication, Principles of Satellite communication, Fundamentals of Wireless communications

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

COs	Pos								
	a	b	c	d	e	f	g	h	I
CO1	2			1					
CO2	2								
CO3	2		1	1					
CO4			1				1		

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. Teachers serving as facilitators help in clarity of objectives to be achieved. 3. Students (usually, but not always) working in pairs or groups.
Course Outcomes	After the completion of this course, the students are able to: I. Understand the requirements for real life engineering and societal problems. II. Analyze and apply skills and knowledge to solve real life problem. III. Demonstrate interpersonal skills and ability of team work and documentation and reporting.

PO / CO	a	b	c	d	e	f	g	h	i
CO 1	1	2	1	2	1		1		2
CO2	2	2	1	2	1		1		1
CO3			1	1		1	2	1	2

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 theory with practice. 2. To introduce students to work culture and industrial practices. 3. To provide opportunity to students to hands on current problems industrial practitioners are dealing with.
Course Outcomes	After the completion of this course, the students are able to: I. Analyze practical aspects of a problem and designing its solution. II. Apply skills and knowledge of recent technologies to implement solution for a real life problem. III. Demonstrate interpersonal skills and ability of team work and documentation and reporting.

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2	1	2	1	1				
CO2	1	2	2	2					
CO3						1	2	1	2

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 introduce students the significance of digital image processing. 2. To apply the various algorithms to solve different image processing problems.
Course Outcomes	After the completion of this course, the students are able to: I. Understand and learn the basics of image processing. II. Learn& apply various image enhancement filters and restoration techniques. III. Analyze basic image processing functions that can help in identifying boundaries, edges and objects/regions in a given digital image. IV. Implement algorithms to solve different image processing 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 Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation, color models. **(7)**

Image Transformation and Filtering: **(12)**

Intensity transform functions, histogram processing, Spatial filtering, fourier transforms and its properties, frequency domain filters, Pseudo coloring, color transforms, Basics of Wavelet Transforms.

Image Restoration: **(6)**

Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphic Filtering.

SECTION-B

Image Compression: **(6)**

Coding redundancy, Interpixel redundancy, Psycho-visual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression

Image Segmentation & Representation: **(12)**

Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional Descriptors

Object Recognition: **(2)**

Patterns and Patterns classes, Recognition based on Decision Theoretic methods

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Digital Image Processing	Gonzalez and Woods	Addison Wesley 1992
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.	Introductory Computer Vision and Image Processing	Low	McGraw-Hill 1991
5.	Machine Vision	Jain, Kasturi and Schunk	McGraw-HiII. 1995
6.	Image -Processing, Analysis and Machine Vision 2nd edition	Sonka, Hlavac, Boyle	PWS Publishing,1999

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2		1		1				
CO2	2	2	1		2				
CO3	1	1	2	2	2				
CO4	1	1	2	2	1				

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	I. To develop an overview of the field of image processing, understand the fundamental algorithms. II. To implement, prepare and read the current image processing research literature, gain experience in applying image processing algorithms to real problems.

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**
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 students to the 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 the completion of this course, the students are able to: I. Understand the concept and features of Microprocessors & Microcontrollers, Embedded & external memory devices, CISC & RISC processors, Harvard & Von Neumann Architectures. II. 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 III. Explain the features, architecture, memory organization, instructions, addressing Modes and applications of PIC 16C6X/7X Microcontroller. IV. Describe the evolution of architectures used for Embedded Software Development and apply to real-time system's design.

SYLLABUS

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, 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 section.

SECTION-A **Hours**

Introduction to Microcontrollers **(04)**

Comparison of Microprocessors and Microcontrollers. Embedded and external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures.

Overview of 8 bit Microcontrollers **(19)**

Overview of 8051, Architecture, addressing modes and instructions. Interrupts, Timer/ Counters, Serial Communication and applications. Interfacing Overview of Atmel 89C51 microcontroller.

SECTION-B

(12)

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

(06)

Software Development & Tools

Embedded System Evolution Trends, Round Robin, Round Robin with Interrupts, Function Scheduling architecture, Real Time scheduling: their development, applications and examples.

(04)

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

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1			1	1				
CO2	1	2	2	1	1	2			
CO3	1	2	2	1	1	2			
CO4	1	2	2	1	1	2			

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	1. To provide students with the principles of object orientation from the perspective of Java implementation and UML. 2. To be able to learn the concepts of and practical approaches to object-oriented analysis, design and programming using UML and Java.
Course Outcomes	After the completion of this course, the students are able to: I. Understand Java programming fundamentals such as encapsulation, inheritance, exception handling and multithreading. II. Understand I/O stream classes. III. Design graphical user interface using standard java libraries to implement event driven applications. IV. 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: **(8)**
Introduction; classes; methods; constructors; overloading methods; arrays; recursion; passing arrays and objects to methods; Inheritance; method overriding; abstract classes; using final; packages; interfaces.

Exceptional Handling and Multithreaded Programming: **(8)**
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.

I/O, Applets and Graphics: **(8)**
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.

SECTION-B

Overview of J2EE and working with JDBC: **(7)**
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.

Servlets and JSP: **(7)**
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.

Enterprise Java Beans(EJB): **(7)**
Architecture of EJB, creating a stateless-session EJB, statefull-session bean, Life Cycle of session beans, Entity beans, life cycle of entity beans.

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2			1					
CO2	2			1					
CO3	2	1	2	1					
CO4	2			1					

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 and practical approaches to object-oriented analysis, design and programming using UML and Java.

SYLLABUS

Practical based on theory.

ELECTIVE- III

COURSE INFORMATION SHEET

Course Code	**ITE845**
Course Title	**Soft Computing (Theory)**
Type of Course	**Elective**
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	1. To introduce students to soft computing concepts and techniques and foster their abilities in designing. 2. To implement soft computing based solutions for real-world problems.
Course Outcomes	After the completion of this course, the students are able to: I. Identify and describe soft computing techniques and their roles in building intelligent machines II. Design and apply neural networks to pattern classification and regression problems III. Model fuzzy logic and reasoning to handle uncertainty and solve engineering problems IV. 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 **(15)**

Networks, BAM, Hopfield Networks, Kohonen Self Organizing Feature Maps

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 **(12)**
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 **(04)**
Introduction to Neuro Fuzzy Systems, Architecture of a Neuro Fuzzy system

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1	2	2	2					
CO2	1	2	2	2	1		1		
CO3	1	2	2	2	1		1		
CO4	1	2	2	2	1		1		

COURSE INFORMATION SHEET

Course Code	**ITE 847**
Course Title	**Natural Language Processing (Theory)**
Type of Course	**Elective**
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 students should be able to study language and the tools that are available to efficiently study and analyze large collections of text. They should learn about and discuss the effects of electronic communication on our language.
Course Outcomes	After completion of this course, the students are able to: I. Understand different levels of natural language processing. II. Relate and analyze the concepts learned earlier like: regular expressions, finite automata, context free grammar and parsing in the study of natural language systems. III. Apply the concepts of natural language processing for creating intelligent language systems. IV. 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, Parsing-Probabilistic Parsing. Machine-readable dictionaries and lexical databases, RTN, ATN. **(10)**

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 **(10)**

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.

INFORMATION RETRIEVAL AND LEXICAL RESOURCES **(07)**

Information Retrieval: Design features of Information Retrieval Systems, Classical, Nonclassical, Alternative Models of Information Retrieval, valuation Lexical Resources:WordNet,Frame Net, Stemmers, POS Tagger.

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

PO / CO	a	b	c	d	e	f	G	h	i
CO1	1	2	2	1					1
CO2	1	1	2	1					
CO3	2	2	2	1	1				1
CO4	1	1	2	1					

COURSE INFORMATION SHEET

Course Code	**ITE848**
Course Title	**Theory of Computation (Theory)**
Type of Course	**Elective**
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 construct and prove the equivalence of languages described by finite state machines and regular expressions, pushdown automata and turing machines.
Course Outcomes	After successful completion of this course, the students are able to: I. Explain and interpret the fundamental, mathematical and computational principles laying the foundation of computer science. II. Define and apply methods for the equivalence of languages described by various types of automata and their equivalent recognizable languages. III. Understand the key results in algorithmic complexity, computability and solvability of problems. IV. Interpret and 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: (02)

Basic concepts – Languages, Grammars, Automata, Strings, Alphabet, Chomsky Classification of Grammars and Languages

Finite Automata: (10)

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

Regular expressions and regular languages: (10)

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.

SECTION-B

Context free grammar and Pushdown Automata: (10)

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

Turing Machines Linear Bounded Automata (11)

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

Undecidability: (02)

Undecidability, Introduction to recursive & non-recursive enumerable languages, Universal Turing machine

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

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2				1				
CO2	2		1		1				
CO3	1			1	2				
CO4		2	1	1					

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 successful completion of this course, the students are able to: I. Understand current technology topics being studied. II. Extend a greater amount of interaction between teacher and students.

PO / CO	a	b	c	d	e	f	g	h	i
CO1	1		1	1	2	1		1	1
CO2						2	1	2	2

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. Teachers serving as facilitators help in clarity of objectives to be achieved. 3. Students (usually, but not always) working in pairs or groups.
Course Outcomes	After the completion of this course, the students are able to: I. Understand the requirements for real life engineering and societal problems. II. Analyze and apply skills and knowledge to solve real life problem. III. Demonstrate interpersonal skills and ability of team work and documentation and reporting.

PO / CO	a	b	c	d	e	f	g	h	i
CO 1	1	2	1	2	1		1		2
CO2	2	2	1	2	1		1		1
CO3			1	1		1	2	1	2

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 theory with practice. 2. To introduce students to work culture and industrial practices. 3. To provide opportunity to students to hands on current problems industrial practitioners are dealing with.
Course Outcomes	After the completion of this course, the students are able to: I. Analyze practical aspects of a problem and designing its solution. II. Apply skills and knowledge of recent technologies to implement solution for a real life problem. III. Demonstrate interpersonal skills and ability of team work and documentation and reporting.

PO / CO	a	b	c	d	e	f	g	h	i
CO1	2	1	2	1	1				
CO2	1	2	2	2					
CO3						1	2	1	2