

SCHEME OF EXAMINATION

and SYLLABI

for

B.E. (Information Technology)

3rd – 8th semester

for

Academic Session

2016-17

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.E. 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.

<p>2.0 Credit System</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>2.4 Earning Credits : At the end of every course, a letter grade is</p>	<p>2.0 Credit System</p> <p>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.</p> <p>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.</p> <p>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</p> <p>2.4 Earning Credits : At the end of every course, a letter grade is</p>
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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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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.

Table-2

Absolute marks in %	Grade	Absolute marks in %

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

Sr. No.	Marks	Grade
1.	≥ 90	A+
2.	$\geq 80 \& < 90$	A

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

3.	$\geq 70 \text{ & } < 80$	B+	8
4.	$\geq 60 \text{ & } < 70$	B	7
5.	$\geq 50 \text{ & } < 60$	C+	6
6.	$\geq 45 \text{ & } < 50$	C	5
7.	$\geq 40 \text{ & } < 45$	D	4
8.	< 40	F	0

4.2.2 For more than 30 students in a course, the statistical method shall be used for the award of grades. After expressing the score obtained by the students in a course in percentage (X), the class mean (\bar{X}) and class standard deviation (S) of the marks shall be calculated and grades shall be awarded to a student as shown in Table-3

If X is the raw score in % ; \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 :

$$\bar{X} = \frac{\text{Sum of all scores}}{\text{Number of Scores}} = \frac{\sum_{i=1}^N X_i}{N}$$

$$S = \sqrt{\frac{\sum_{i=1}^N (X_i - \bar{X})^2}{N}}$$

4.2.2 NOT REQUIRED

Table-3

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

< F <	$\bar{X} - 1.5S$																												
<p>4.2.3 In case, class student strength in a course lies between 15 and 30, any of the above methods (given in 4.2.1 and 4.2.2) may be used for the award of grades.</p> <p>4.3 Finalization of Grades</p> <p>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.</p> <p>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.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 30%;">Grade % of Population</th> <th style="text-align: left; width: 30%;">Remarks</th> <th style="text-align: left; width: 40%;"></th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">A 7</td> <td style="text-align: left;">Includes</td> <td></td> </tr> <tr> <td colspan="3">A+ and A</td> </tr> <tr> <td style="text-align: left;">B 24</td> <td style="text-align: left;">Includes</td> <td></td> </tr> <tr> <td colspan="3">B+ and B</td> </tr> <tr> <td style="text-align: left;">C 38</td> <td style="text-align: left;">Includes</td> <td></td> </tr> <tr> <td colspan="3">C+ and C</td> </tr> <tr> <td style="text-align: left;">D 24</td> <td></td> <td></td> </tr> <tr> <td style="text-align: left;">F 7</td> <td></td> <td></td> </tr> </tbody> </table> <p>* 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.</p> <p>5.0 Evaluation of Performance</p> <p>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).</p> <p>SGPA is the grade point average for the</p>	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			<p>4.2.3 NOT REQUIRED</p> <p>4.3 NOT REQUIRED</p>	
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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 =

$$\sum (\text{Course Credits} \times \text{Grade Points}) \text{ for courses to D grade has been obtained}$$

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.

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

$$SGPA = \frac{\sum (\text{Course Credits})}{\text{Semester}}$$

$$\sum (\text{Course Credits}) \text{ except audit and S/Z grade Courses Semester}$$

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

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

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

The CGPA is calculated as given below :

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

$$CGPA = \frac{\sum (\text{Course Credits} \times \text{Grade Points})}{\text{All Semester}}$$

$$\sum (\text{Course Credits earned}) \text{ except audit and S/Z grade Courses All Semester}$$

NOTE:

In addition, the following rules will apply:

- 1. The students should have minimum CGPA of 7.5 and no pending reappear upto 6th semester in order to opt for Minor Specialization or Honors.**
- 2. Student can opt for Honors degree by undertaking two additional courses from 'Departmental Honors Courses' bucket in 6th semester and three additional Departmental Honors Courses' bucket in 7th semester and earn additional 20 credits.**
- 3. Students can opt for Minor Specialization in IT by undertaking Minor Specialization courses I & II in 6th semester and Minor Specialization courses III, IV & V in 7th semester and earn additional 20 credits.**
- 4. The 20 credits of Honors/ Minor Specialization Courses have to compulsorily be earned to get degree in Honors/ Minor Specialization**

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

3rd – 8th semester for A.S. 2016-17

Teaching Scheme for B.E. Second Year

Second Year- Third Semester

Subject Code	Subject Name	Scheme of Teaching			Scheme of Examination		
		L-T-P	Contact hrs/week	Credits	Theory	Practical *	
Internal Ass.	Univ. Exam						
ITE301	Cyber laws & IPR	4-0-0	4	4	50	50	-
MATHS-302	Linear Algebra and Operations Research	3-1-0	4	4	50	50	-
ITE341	Analog & Digital Communication	3-1-3	7	4+2	50	50	50
ITE342	Object Oriented Programming	3-1-3	7	4+2	50	50	50
ITE343	Digital Electronics	3-1-3	7	4+2	50	50	50
ITE344	Computer Architecture & Organization	3-1-0	4	4	50	50	-

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

Total Marks: 750

Total Credits: 30

Second Year- Fourth Semester

Subject Code	Subject Name	Scheme of Teaching			Scheme of Examination		
		L-T-P	Contact hrs./week	Credits	Theory	Practical *	
Internal Ass.	Univ. Exam						
HSS-401	Elective- I	4-0-0	4	4	50	50	-
MATHS 402	Discrete Mathematics	3-1-0	4	4	50	50	
ITE441	Data Structures and Algorithms	3-1-3	7	4+2	50	50	50
ITE442	Microprocessor	3-1-3	7	4+2	50	50	50
ITE443	Computer Networks	3-1-0	4	4	50	50	-
ITE444	Internet and web Technology	3-1-3	7	4+2	50	50	50
ITE445	Educational Tour	-	-	-	-	-	-

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

Total Marks: 750

Total Credits: 30

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		
		L-T-P	Contact hrs./week	Credits	Theory	Practical *	
ITE541	Data Base Management Systems	3-1-3	7	4+2	50	50	50
ITE542	Computer Graphics	3-1-3	7	4+2	50	50	50
ITE543	Operating System	3-1-3	7	4+2	50	50	50
ITE544	Multimedia System	4-0-0	4	4	50	50	-
ITE545	Principles of Telecommunication	4-0-0	4	4	50	50	-
ITE596	Industrial Training(after 4 th semester)	0-0-0	0	1	-	-	50

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

Total Marks: 700

Total Credits: 27

Third Year - Sixth Semester

Subject Code	Subject Name	Scheme of Teaching			Scheme of Examination		
		L-T-P	Contact hrs./week	Credits	Theory	Practical*	
ITE641	Wireless Communication	3-1-3	7	4+2	50	50	50
ITE642	Business Intelligence	4-0-3	7	4+2	50	50	50
ITE643	Network Security & Cryptography	3-1-0	4	4	50	50	-
ITE644- ITE646	Departmental Elective Course-I	4-0-0	4	4	50	50	-
ITE647- ITE650	Open Elective	4-0-0	4	4	50	50	-
ITE651 - ITE 653	Departmental Honours Course-I	4-0-0	4	4	50	50	-
ITE654	Minor Specialization Course-I						
ITE651 - ITE 653	Departmental Honours Course-II	4-0-0	4	4	50	50	-
ITE655	Minor Specialization Course-II						

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

Total Marks: 600/800

Total Credits: 24/32

Departmental Elective Course-I <i>(Choose any one from the following :)</i>		
Sr No.	Subject	Subject Code
1	Software Engineering	ITE644
2	System Software	ITE645
3	Data Acquisition and Hardware Interfacing	ITE646

Open Elective <i>(Choose any one from the following :)</i>		
Sr No.	Subject	Subject Code
1	Analysis and Design of Algorithms	ITE647
2	Neural Network and Fuzzy Logic	ITE648
3	System Analysis and Design	ITE649
4	Distributed Operating System	ITE650

Departmental Honors Course (I, II) <i>(Choose any two from the following)</i>		
Sr No.	Subject	Subject Code
1	Network Management and Administration	ITE651
2	Cyber Crime and Digital Forensics	ITE652
3	Optical Fiber Communication	ITE653

Minor Specialization Course-I		
Sr No.	Subject	Subject Code
1	Data Mining and Analytics	ITE654

Minor Specialization Course-II		
Sr No.	Subject	Subject Code
1	Software Project Management	ITE655

Teaching Scheme for B.E. Fourth Year

Fourth Year - Seventh Semester

Subject Code	Subject Name	Scheme of Teaching			Scheme of Examination		
		L-T-P	Contact hrs./week	Credits	Theory	Practical *	
					Internal Ass.		
ITE741	Digital Signal Processing	3-1-3	7	4+2	50	50	50
ITE742	Agile Software Development	4-0-3	7	4+2	50	50	50
ITE743	Mobile Computing	4-0-0	4	4	50	50	-
ITE744	Cloud Computing	4-0-0	4	4	50	50	-
ITE745- ITE747	Elective-II	4-0-0	4	4	50	50	-
ITE795	Project-I	0-0-4	4	2	-	-	100
ITE796	Industrial Training (after 6 th Semester)	0-0-0	0	1	-	-	50

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

Total Marks: 750

Total Credits: 27

Elective-II

Choose any one from the following:

- ITE745 Artificial Intelligence
- ITE746 Compiler Design
- ITE747 Building Enterprise Applications

Fourth Year - Eighth Semester

Subject Code	Subject Name	Scheme of Teaching			Scheme of Examination		
		L-T-P	Contact hrs./week	Credits	Theory	Practical *	
					Internal Ass.		
ITE841	Digital Image Processing	3-1-3	7	4+2	50	50	50
ITE842	Embedded System Design	3-1-3	7	4+2	50	50	50
ITE843	Java Technologies	4-0-3	7	4+2	50	50	50
ITE844- ITE846	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: 25
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OR OPTION – 2						
Sub Code	Sub Name	Duration	Credits	Int. Ass.	Marks*	Grand Total
ITE899	Industrial Training	6 months	25	300	400	700

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

Elective III

Choose any one from the following:

- ITE844 Theory of Computation
- ITE845 Soft Computing
- ITE846 Mobile Apps Development

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	ITE301
Course Title	Cyber Laws & IPR (Theory)
Type of Course	Core
L T P	4 0 0
Credits	04
Total Lectures	45
Course Assessment Methods	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Introduction to Information Technology
Course Objectives	<p>1. To familiarize students with the dynamics of Cyber Law with a focus on new forms of cybercrime,</p> <p>2. To establish a basic knowledge on the technical side of Cyber Law,</p> <p>3. To give an update of recent Cyber Laws developments and case law make students conversant with the social and intellectual property issues emerging from 'Cyberspace;</p> <p>4. Explore the legal and policy developments in various countries to regulate Cyberspace;</p> <p>5. Develop the understanding of relationship between commerce and cyberspace; and give students in depth knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security and Data Protection.</p>
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Describe the need for cyber law II. Get familiarize with the dynamics of Cyber Law with a focus on new forms of cyber crime. III. Get established a basic knowledge on the technical side of Cyber Law IV. Have an update of recent Cyber Laws developments and case law V. Get engaged with today's Cyber Laws reality and debates VI. Work on tools for further study of

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

Basics of Computer & Internet Technology Internet, ISP & domain name; Network Security; Encryption Techniques and Algorithms; Digital Signatures	(08)
Introduction to Cyber World Introduction to Cyberspace and Cyber Law; Different Components of cyber Laws; Cyber Law and Netizens	(03)
E-Commerce Introduction to E-Commerce; Different E-Commerce Models; E-Commerce Trends and Prospects; E-Commerce and Taxation; Legal Aspects of E-Commerce.	(08)

SECTION-B

Intellectual Property Rights IPR, Copyright and Patents, International Treaties and Conventions, Business Software Patents, Domain Name Disputes and Resolution.	(11)
IT Act, 2000 Reasons, Aims, Objectives and Applications, Regulators under IT Act, Role of Certifying Authority, Digital Signature Certificates, Duties of the Subscribers, Cyber Crimes-Offences and Contraventions, Grey Areas of IT Act.	(11)
Project Work Candidates will be required to work on a project. At the end of the course, students will make a presentation and submit the project report.	(04)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	A Guide to Cyber Laws & IT Act 2000 with Rules & Notification	Nandan Kamath	Universal Law Publishing
2	Cyber Cops, Cyber Criminals & Internet	Keith Merill & Deepti Chopra	I K International
3	Information Technology Law	Diane Row Land, Routledge-Cavendish	
4	Handbook of Cyber Laws	Vakul Sharma	McMillian

PO CO	a	b	c	d	e	f	g	h	i
CO1	1						1	1	
CO2	1						1	1	
CO3	1						2		
CO4							2	1	
CO5						2		2	
CO6					2		2		

COURSE INFORMATION SHEET

Course Code	MATHS-302
Course Title	Linear Algebra and Operations Research (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	Nil
Course Objectives	<p>This course is designed to provide an introduction to Sequences and Series, Linear algebra and Complex functions. Particularly, this course will:</p> <ol style="list-style-type: none"> 1. Definitions and learning various concepts related to vector space, basis and system of equations, eigen values and vectors and diagonalization of matrices. 2. To learn modeling of practical problem in the form of linear programming problems and explain various concepts of optimization theory and duality theory. 3. To learn various methods for the solutions of transportation problem, assignment problem, CPM and PERT.
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> I. Understand various concepts of linear algebra, solution techniques for system of linear equations and implementation of these techniques for solution of various practical problems. II. Construct the mathematical model of any system involving linear constraints and examine its optimal solution. III. Interpret the economical structure of the optimization problem using duality. IV. Learn the importance of transportation and assignment problems in real life and will be able to choose the best possible solution of the combinatorial problem.

	V. Analyze the progress of the project using CPM and PERT.
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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
Linear Algebra: Concept of linear independence and dependence, Rank of a matrix: Row – Echelon form, Vector space, Dimension, Basis, System of linear equations: Condition for consistency of system of linear equations, Solution by Gauss elimination method. Inverse of a matrix: Gauss – Jordan elimination method. (Scope as in Chapter 6, Sections 6.3 – 6.5, 6.7 of Reference 1).	(07)
Eigen values, eigen vectors, Cayley – Hamilton theorem (statement only). Similarity of matrices, Basis of eigenvectors, diagonalization (Scope as in Chapter 7, Sections 7.1, 7.5 of Reference 1).	(07)
Optimization Problems. Linear Programming: Graphical Method (Scope as in Chapter 1 of Reference 4). Solution of simultaneous linear equations: An overview (Scope as in Chapter 2, Sections 2.15 – 2.16 of Reference 4). Basic solutions, lines and hyperplanes, convex sets, extreme points, convex sets and hyperplanes (Scope as in Chapter 2, Sections 2.19 – 2.21 of Reference 4). Reduction of any feasible solution to a system of equations to a basic feasible solution. Simplex Method: The simplex algorithm (Scope as in Chapter 3, 4 of Reference 4). Tableau format for simplex computations, Charne's M-method, Two phase method (Scope as in Chapter 5 of Reference 4). Tableau format for simplex computations, Charne's M-method, Two phase method (Scope as in Chapter 5 of Reference 4).	(11)
SECTION-B	
Duality theory: Formulation of the dual problem, Theorems on duality: Weak Duality Theorem, Strong Duality Theorem, Complementary Slackness Theorem, Dual Simplex Algorithm (Scope as in Chapter 8, Sections 8.1 – 8.12 of Reference 4).	(07)
Transportation Problem: Initial solution by North-West corner rule, Row minima method, Column minima method, Matrix minima method, Vogel's method. Tableau of transportation problem, u-v algorithm for solving transportation problem. Degeneracy in transportation problem. (Scope as in Chapter 9 of Reference 4).	(07)
The Assignment Problem: Hungarian Method (Scope as in Chapter 5, Section 5.4 of Reference 4).	(03)
CPM and PERT: Network representation, Critical path computations, Construction of time schedule, Linear programming formulation of CPM, PERT networks (Scope as in Chapter 6, Section 6.6 of Reference 5).	(03)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Advanced Engineering Mathematics, Eighth Edition	E. Kreyszig	John Wiley
2.	Advanced Engineering Mathematics, Second Edition	Michael D. Greenberg	Pearson Education
3.	Linear Algebra	Vivek Sahai, Vikas Bist	Narosa Publishing House
4.	Linear Programming	G. Hadley	Narosa Publishing House
5.	Operations Research, An Introduction, Seventh Edition	Hamdy A. Taha	Pearson Education
6.	Operations Research, Twelfth Edition	Kanti Swaroop, P. K. Gupta, Man Mohan.	Sultan Chand and Sons
7.	Operations Research, 2005	A. M. Natarajan, P. Balasubramani, A. Tamilarasi	Pearson Education

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

COURSE INFORMATION SHEET

Course Code	ITE341
Course Title	Analog and Digital 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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Introduction to Electronics
Course Objectives	<ol style="list-style-type: none"> 1. To understand about the modulation techniques used for digital data transmission. 2. To have knowledge about the digital communication, spread spectrum and multiple access techniques.
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> I. Acquire knowledge about AM, FM and PM transmission and reception. II. Understand and analyze various pulse modulation techniques. III. Understand and apply the principles of digital transmission. IV. Learn different digital modulation techniques.
SYLLABUS	
<p>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.</p>	
SECTION A	
Amplitude Modulation Techniques	Hours (08)
Concept of Modulation its merits & demerits, Principle and generation of Amplitude Modulation, DSB/SC, SSB signal, Balanced modulator, Detection of AM, DSB/SC, and SSB signals, Super heterodyne Radio Receivers.	
Frequency Modulation Techniques	(08)

Principles and generation of Frequency Modulation and Phase Modulation signals, FM and PM Transmitter, FM and PM receiver with various stages.	
Pulse Modulation & Demodulation Sampling Theorem, Quanitization, Principles, Generation and detection of Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation & Pulse Code Modulation signals, DPCM, Delta modulation, Adaptive delta modulation, Noise in pulse modulation system, Companding, Expanding.	(08)
SECTION-B	
Digital Transmission Data and signals, Periodic analog signals, Digital signals, Data rate limit, Performance, Line coding, Line coding schemes, Block coding , Scrambling, Transmission Modes, Digital technology, Modem classification. Modem interfacing, Interconnection of data circuits to telephone loops.	(11)
Digital Modulation Techniques Principal of transmission and reception: ASK, QASK, PSK, FSK, BPSK, BFSK, QPSK, MSK, QAM, Error Calculations for ASK, PSK, FSK.	(10)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	1. Electronic Communication Hill	George Kennedy	Tata McGraw Hill
2.	Data Communication and Networking,	Forouzan,5E	Wiley
3.	Principles of Digital Communication, 1 st Edition	J. Das, S.K. Mullick, P.K. Chatterjee	New Age International (P) Ltd
4.	Digital Communications, 4 th Edition	J.G. Proakis	Tata McGraw Hill

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

COURSE INFORMATION SHEET

Course Code	ITE341
Course Title	Analog and Digital Communication (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Objectives	<p>Introduction to Electronics</p> <ol style="list-style-type: none"> Build an understanding of the fundamental concepts of Modulation techniques. Familiarize the student with the basic terminology of the communication system.

SYLLABUS

Practical based on theory.

COURSE INFORMATION SHEET

Course Code	ITE342
Course Title	Object Oriented 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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Programming Fundamentals
Course Objectives	<ul style="list-style-type: none"> 1. To provide students in-depth theoretical and practical base of Object Oriented Programming paradigm. 2. To prepare students to learn new computer languages on their own and enable them to design and code various real world problems.
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Understand the fundamentals of Object Oriented Programming paradigm. II. Learn and apply core object oriented concepts like classes, objects and overloading, code reusability. III. Learn how the data flows between the programs and files in OO framework and implement various file handling operations. IV. Analyze information systems in real-world settings and prepare an OO design for 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
Principles of Object Oriented Programming Advantages of OOP, comparison of OOP with Procedural Paradigm	(03)
C++ Constructs Tokens, Expressions and control structures, various data types, and data structures, Variable declarations, Dynamic Initializations, Operators and Scope of Operators, Typecasting, Unformatted and formatted console I/O Operations	(03)
Functions Classes and Objects: Prototyping, Referencing the variables in functions, Inline, static	(05)

and friend functions. Memory allocation for classes and objects. Arrays of objects, pointers to member functions.	(05)
Constructors and Destructors Characteristics and its various types, Dynamic Constructors, Applications, Order of Invocation, C++ garbage collection, dynamic memory allocation.	(05)
Polymorphism Using function and Operator overloading, overloading using friend Functions, type conversions from basic data types to user defined and vice versa.	(05)
SECTION-B	
Inheritance Derived classes, types of inheritance, various types of classes, Invocation of Constructors and Destructors in Inheritance, aggregation, composition, classification hierarchies, metaclasses/abstract classes.	(06)
Pointers Constant pointers, Use of this Pointer, Pointer to derived and base classes, virtual functions, Bindings, Pure virtual Functions and polymorphism	(05)
I/O Operations and Files Classes for files, Operations on a file, file pointers	(04)
Generic Programming With Templates Definition of class template, Function Templates, Overloading Template Functions, Class templates and member functions templates with parameters, Standard C++ classes, persistent objects, streams and files, namespaces, exception handling, generic classes, standard template library: Library organization and containers, standard containers, algorithm and Function objects, iterators and allocators, strings, streams, manipulators, user defined manipulators and vectors	(06)
Introduction: Object Oriented System, Analysis and Design.	(03)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Programming with C++, 2 nd Edition	BalaGuruswamy	Tata McGraw Hill
2	C++ Primer Plus	Prata	Pearson Education
3	The C++ Programming Language	Bjarne Stroutstrup	Prentice Hall of India
4	The Complete Reference to C++	Schildt	Tata McGraw Hill
5	OOPs Using C++	Sanjeev Sofat	Khanna Publishers

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

COURSE INFORMATION SHEET

Course Code	ITE342
Course Title	Object Oriented Programming (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Programming Fundamentals
Course Objectives	Understanding of object oriented programming concepts and fundamentals of programming in C++ by designing and implementing moderately complex problems. Students should master modern tools for computer aided software engineering along with good program documentation.
SYLLABUS	
List of experiments:	<ol style="list-style-type: none"> 1. Functions, Classes and Objects 2. Constructors and Destructors 3. Operator Overloading and Type Conversion 4. Inheritance and Virtual Functions 5. File Handling 6. Exception Handling and Generic Programming

COURSE INFORMATION SHEET

Course Code	ITE343
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	Introduction to Electronics
Course Objectives	<p>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.</p> <p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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.
Course Outcomes	

SYLLABUS

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

SECTION-A	Hours
Introduction Representation of Logic, Logic Variables, Boolean Algebra, Boolean Expressions and minimization of Boolean expression using K-Map, Review of Logic Gates & Flip-flops, design & Implementation of Adder, Subtractor, Multiplexer, DeMultiplexer, Encoder, Decoder, ROM, Digital Comparators, Code Converters	(10)
Number Systems and Codes Decimal, Binary, Hexadecimal, Octal's complement, 2's complement, addition and subtraction, weighted binary codes, Error detecting codes, Error correcting codes, Alphanumeric codes.	(07)
Counters & Shift Registers Ripple Counters, Design of Modulo-N ripple counter, Up-Down counter, design of synchronous counters with and without lockout conditions, design of shift registers	(07)

with shift-left, shift-right & parallel load facilities, Universal shift Registers.

SECTION-B

Data Converters

Sample & Hold switch, D/A converters: weighted type, R-2R Ladder type; A/D Converters: Counter-Ramp type, Dual Slope Type, Successive approximation type, flash type; Specifications of ADC & DAC

(07)

Digital Logic families

Characteristics of digital circuits: fan in, fan-out, power dissipation, propagation delay, noise margin; Transistor-transistor Logic(TTL), TTL NAND Gate with active pull up, its input and output Characteristics, MOS and CMOS. Comparison of Characteristics of TTL, ECL, MOS & CMOS logic circuits

(06)

Semiconductor Memories & Programmable Logic

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

(04)

Synchronous sequential logic

Sequential circuits, State Reduction and Assignment, Design Procedure.

(04)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Digital Electronics – An introduction to theory and practice, 2 nd 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	ITE343
Course Title	Digital Electronics (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Introduction to Electronics
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 XOR using 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	ITE344
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, Introduction to Electronics
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 System design, Design levels- Gate level, Register level, Processor level.	(04)
Basic Computer Organization & Design	(08)

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

RECOMMENDED BOOKS

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

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	4 0 0
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Nil
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 Nature of Economics, Economic Thoughts, Economic Activities, Relationship of Economics with other Social Sciences and Engineering	(06)
Theory of Consumer Behaviour Demand: Types, Law of Demand, Determinants of Demand and Change in Demand Elasticity of Demand: Nature, Degrees, Types, Measurement and Factors Affecting Elasticity of Demand and its Application Laws of Consumption: Concept and Applicability of Law of Diminishing Marginal Utility and Law of Equi-Marginal Utility	(12)

Theory of Production and Cost Cost: Types of Costs, Production: Law of Variable Proportion, Returns to Factor and Returns to Scale, Economies and Diseconomies of Scale	(06)
SECTION-B	
Theory of Market Nature and Relevance of Perfect Competition, Monopoly and Monopolistic Competition	(08)
Basic Concepts of Macro Economics National Income: Concept and Measurement, Determination of Equilibrium of Income Inflation: Concept, Causes and Effect of Inflation, Measures to Control Inflation	(09)
Project Presentations	(04)

RECOMMENDED BOOKS

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

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	4 0 0
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Nil
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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.	Organisational Behaviour 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	4 0 0
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Nil
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 Sociology as a Science, Impact of Industrial and French Revolution on the Emergence of Sociology, Relevance of Sociology for Engineering	(03)
Basic Concepts Society, Association, Institution, Culture Relativism, Social Structure, Social System, Socialisation, Competition, Conflict, Accommodation, Social Mobility	(04)
Pioneering Contributions to Sociology Seminal Views of Karl Marx, Emile Durkheim, Max Weber, Alwin Toeffler	(04)
Evolution of Society	(05)

Primitive, Agrarian, Industrial and Post-Industrial, Features of Industrial and Post-Industrial Society, Impact of Automation and Industrialization on Society	
Economy and Society	(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	Ranjay Vardhan 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	Vidya Bhushan and D.R. Sachdeva	KitabMahal Publications
5.	Sociological Thought	Francis Abraham and J.H. Morgan	Macmillan India Ltd.
6.	Social Problems	Etzioni Amitai	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	a	b	c	d	e	f	g	h	i
CO									
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	4 0 0
Credits	4
Course Assessment Methods	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional, Assignments, Quiz)	50
Course Prerequisites	
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

The Russian Alphabet, consonants, vowel, words, stress, sentence patterns.	(4)
Grammar: Noun, gender, personal pronoun, the conjunction conjugation of verbs, number (singular-plural), possessive pronoun, adverbs, translation (Russian to English & vice-versa)	(5)

Section-B

Irregular plurals, Imperative mood, demonstrative pronoun, declaration of noun (nominative case, prepositioned case, the past tense, reflexive verbs, adjectives. Translation (Russian in to English & Vice-versa.)	(4)
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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	MATHS402
Course Title	Discrete Mathematics (Theory)
Type of Course	Core
L T P	3 1 0
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Mathematics
Course Objectives	<ul style="list-style-type: none"> 1. To provide the knowledge of core mathematical foundation of Computer Science. 2. To make them familiar with foundation about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones; synthesize elementary proofs, especially proofs by induction. 3. To model and analyze computational processes using analytic and combinatorial methods. 4. The subject enhances one's ability to reason and ability to present a coherent and mathematically accurate argument 5. A course designed to prepare math, computer science, and engineering majors for a background in abstraction, notation, and critical thinking for the mathematics most directly related to computer science.
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Understand the notion of mathematical thinking, mathematical proofs and algorithmic thinking, and will be able to apply them in problem solving II. Construct simple mathematical proofs

	<p>III. and possess the ability to verify them.</p> <p>IV. Use effectively algebraic techniques to analyze basic discrete structures and algorithms in the context of discrete probability.</p> <p>V. Have substantial experience to comprehend formal logical arguments. Acquire ability to describe computer programs (e.g. recursive functions and generating functions) in a formal mathematical manner</p> <p>VI. Apply basic counting techniques to solve combinatorial problems of a variety of discrete structures.</p> <p>VII. Construct proofs using direct proof, proof by contraposition, proof by contradiction, and proof by cases, and mathematical induction.</p> <p>VIII. Apply algorithms and use definitions to solve problems to prove statements in elementary number theory.</p>
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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
Principles of Counting – I: Rule of Sum and Product, Permutations, Combinations, Combinations with repetition (Scope as in Chapter 1, Sections 1.1 – 1.4 of Reference 1).	(05)
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).	(09)
Relations and Functions: Cartesian Products and Relations, 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). Properties of Relations, Zero-One Matrices and Directed Graphs, Partial orders: Hasse Diagrams, Equivalence relations and Partitions (Scope as in Chapter 7, Sections 7.1 – 7.4 of Reference 1).	(09)
SECTION-B	
Principles of Counting – II: The principle of Inclusion and Exclusion, Generalizations, Derangements, Rook Polynomials, Arrangements with forbidden	(11)

<p>positions (Scope as in Chapter 8, Sections 8.1 – 8.5 of Reference 1). Generating Functions: Definitions and Examples: Calculational Techniques, Partitions of Integers, The exponential generating function, The summation operator (Scope as in Chapter 9, Sections 9.1 – 9.5 of Reference 1).</p> <p>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).</p> <p>Graph Theory and Applications: 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).</p> <p>Trees: Definitions, Properties and examples, Rooted trees, Trees and Sorting (Scope as in Chapter 12, Sections 12.1 – 12.3 of Reference 1).</p> <p>Optimization and Matching: Dijkstra's Shortest Path Algorithm, Minimal Spanning Trees: The algorithms of Kruskal and Prim, Transport networks: The Max-Flow Min-Cut Theorem, Matching Theory (Scope as in Chapter 13, Sections 13.1 – 13.4 of Reference 1).</p>	(11)
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RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Discrete and Combinatorial Mathematics, Fourth Edition, 2002	Ralph P. Grimaldi	Pearson Education
2	Discrete Mathematical Structures, Fifth Edition, 2004	B. Kolman, R. C. Busby, S. C. Ross, Nadeem-ur-Rehman	Narosa Publishing House
3	Discrete Mathematics for Computer Scientists and Mathematicians, Second Edition, 2003	J. L. Mott, A. Kandel, T. P. Baker.	Prentice-Hall of India
4	Elements of Discrete Mathematics, Second Edition, 2000	C. L. Liu.	Tata McGraw-Hill
5	Discrete Mathematics, Second Edition, Schaum's Outlines	S. Lipschutz, M. Lipson	Tata McGraw-Hill
6	Graph Theory with Applications to Engineering and Computer Science	Narsingh Deo	PHI

CO	PO								
	a	b	c	d	e	f	g	h	i
CO1	2	2	1	2	1		1	1	1
CO2	2	2	1	2	1		1	1	1
CO3	2	2	1	2	1		1	1	1
CO4	2	2	1	2	1		1	1	1
CO5	2	2	1	2	1		1	1	1
CO6	2	2	2	2	1		1	1	1
CO7	2	2	2	2	1		1	1	1

COURSE INFORMATION SHEET

Course Code	ITE441				
Course Title	Data Structures and Algorithms (Theory)				
Type of Course	Core				
L T P	3 1 3				
Credits	4				
Total Lectures	45				
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50				
Course Prerequisites	Programming Fundamentals, Object Oriented Programming				
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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					
<p>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.</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 2px;">SECTION-A</th> <th style="text-align: center; padding: 2px;">Hours</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Introduction: Introduction to data structures; Introduction to Algorithms Complexity</td> <td style="text-align: center; padding: 2px;">(01)</td> </tr> </tbody> </table>		SECTION-A	Hours	Introduction: Introduction to data structures; Introduction to Algorithms Complexity	(01)
SECTION-A	Hours				
Introduction: Introduction to data structures; Introduction to Algorithms Complexity	(01)				

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;

SECTION-B

Trees:

Binary Trees and their representation using arrays and linked lists; Trees and their applications; Binary tree transversal; Inserting, deleting and searching in binary trees; Heap & Heap Sort; General Trees; Thread binary tree; Height balance Tree (AVL); B-Tree.

Graphs and their applications:

Graphs; Linked Representation of Graphs; Graph Traversal and spanning forests; Depth first search; Breadth first search.

Sorting & Searching:

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	ITE441
Course Title	Data Structures and Algorithms (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Programming Fundamentals, Object Oriented Programming
Course Objectives	<ol style="list-style-type: none"> 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 Trees.
- 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	ITE442
Course Title	Microprocessor (Theory)
Type of Course	Core
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Digital Electronics
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	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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: Microprocessor Architecture, The 8085 MPU: Block Diagram, Pin Diagram, Address/ Data Buses, Concept of de-multiplexing of Buses, Control and status signals, Registers, Ports, Flags, Instruction Decoding and Execution, memory Interfacing.	(06)
Interfacing I/O Devices Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Devices, Memory- Mapped I/O	(06)

Programming the 8085: Introduction to 8085 Assembly Language Programming, The 8085 Programming Model, Instruction Classification, Instruction Format. Data Transfer (Copy) Operations, Arithmetic Operations, Logic Operations, Branch Operations, Writing Assembly Language Programs.	(07)		
Programming Techniques with Additional Instructions: Programming Techniques Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Operations Related to Memory, Logic Operations.	(06)		
SECTION-B			
Counters and Time Delays: Counters and Time Delays, Hexadecimal Counter, Modulo Ten, Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs.	(06)		
Stack and Subroutines: Stack, Subroutine, Conditional Call and Return Instructions	(04)		
Interrupts: The 8085 Interrupt, 8085 Vectored interrupts.	(03)		
General –Purpose Programmable Peripheral Devices: Block Diagram, Working and Control word of: The 8255A Programmable Peripheral Interface, The 8259 A Programmable Interrupt Controller, Programmable communications interface 8251.	(07)		
RECOMMENDED BOOKS			
S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S. Gaonkar	PHI
2	Advanced Microprocessors & Interfacing	Badri Ram	Tata McGraw Hill
3	Microprocessor Principles and Applications	Charles M. Gilmore	Tata McGraw Hill
4	Microprocessors and Interfacing programming and Hardware	Douglas V. Hall	Tata McGraw Hill

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	ITE442
Course Title	Microprocessor (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Digital Electronics
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	ITE443
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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Analog & Digital Communication
Course Objectives	<p>This course is to provide students with an overview of the concepts of data communication and computer networks. The main course objectives are:</p> <ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> I. Understand basic concepts of computer network including switching, multiplexing, various propagation media, network topologies, reference models and protocols. 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 and to compare the IP, UDP and TCP protocols. 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, switching; multiplexing; Network Hardware: LAN, MAN, WAN, Wireless networks, Internet; Network Software: Layer, Protocols, interfaces and services; Reference Model: OSI/TCP/IP and their comparison.	(08)		
Physical Layer: Transmission media: Magnetic, Twisted pair, coaxial cable, fiber optics, wireless transmission (radio, microwave, infrared, light wave). Circuit Switching & Packet Switching. Introduction to ATM, ISDN (Narrowband & Broadband), Cellular radio and communication satellites.	(09)		
Data Link Layer: Framing; Error control; Error correction & Detection; sliding window protocols (one bit, Go back n, selective repeat); Examples of DLL Protocols-HDLC, SLIP; Medium Access Sub layer: Channel Allocation, MAC protocols -ALOHA, CSMA protocols, Collision free protocols, Limited Contention Protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.	(09)		
SECTION-B			
Network Layer: Design issues, routing algorithms (shortest path, flooding, flow based, distance vector, hierarchical, broadcast, multicast).Congestion control algorithms (Leaky bucket, Token bucket, Choke, Packet, Load shedding), IPV4, IP addressing, IPV6.	(09)		
Transport Layer: Addressing, establishing and releasing connection, flow control & buffering, multiplexing, crash recovery, Internet Transport protocol (TCP and UDP).	(06)		
Application Layer: Network Security; Domain Name System; Simple Network Management Protocol; Electronic Mail.	(05)		
RECOMMENDED BOOKS			
S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Computer Networks, 4 th 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	ITE444
Course Title	Internet & Web Technology (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	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 (07)
Introduction 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	
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	a	b	c	d	e	f	g	h	i
CO									
CO1	1				2				
CO2	2				1				
CO3	2			1	1				
CO4	1	1	2		2				

COURSE INFORMATION SHEET

Course Code	ITE444
Course Title	Internet & Web Technology (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Programming Fundamentals
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	ITE445
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	<ul style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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	ITE541
Course Title	Data Base Management Systems (Theory)
Type of Course	Core
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Introduction to Information Technology
Course Objectives	<p>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.</p> <ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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: File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence		(06)	
Physical Data Organization: File Organization and Indexing, Index Data Structures, Hashing, B-trees, Clustered Index, Sparse Index, Dense Index, Fixed length and Variable Length Records.		(07)	
Data Models: Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Database Design with the ER Model, Comparison of Models.		(05)	
The Relational Model: Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus, Querying Relational Data.		(05)	
SECTION-B			
SQL: Basic SQL Query, Creating Table and Views, SQL as DML, DDL and DCL, SQL Algebraic Operations, Nested Queries, Aggregate Operations, Cursors, Dynamic SQL, Integrity Constraints in SQL, Triggers and Active Database, Relational Completeness, Basic Query Optimization Strategies, Algebraic Manipulation and Equivalences.		(07)	
Database Design: Design: Functional Dependencies, Reasoning about Functional Dependencies, Normal Forms, Schema Refinement, First, Second and Third Normal Forms, BCNF, Multi-valued Dependency, Join Dependency, Fourth and Fifth Normal Forms, Domain Key Normal Forms, Decompositions.		(08)	
Transaction Management: ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read Problem, Read-Write Locks, Deadlocks Handling, 2PL protocol.		(07)	
RECOMMENDED BOOKS			
S. No.	NAME	AUTHOR(S)	PUBLISHER
1	An Introduction to Database Systems, 8 th Edition	C.J. Date	Pearson
2	Schaum's Outlines Fundamentals of Relational Databases, 3 rd Edition	Toledo	Tata McGraw Hill
3	Database Management Systems, 2 nd Edition	James Martin	PHI
4	Data Base Management Systems, 3 rd Edition	Raghu Ramakrishnan and Johannes Gehrke	McGraw Hill
5	Introduction to Data Base Systems, 3 rd Edition	Bipin C Desai	Galgotia Publications

PO	a	b	c	d	e	f	g	h	i
CO									
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	Data Base Management Systems (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	00 50
Course Prerequisites	Introduction to Information Technology
Course Objectives	<p>1. To use the Oracle and SQL database systems along with hands on experience on DDL, DML as well as DCL Commands.</p> <p>2. To make students able to implement nested queries and various functions based on programming assignments.</p>

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	ITE542
Course Title	Computer Graphics (Theory)
Type of Course	Core
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Data Structures and Algorithms, Programming Fundamentals
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 Applications of computer graphics, Picture representation, color table ,Video Display Devices: Direct View Storage Tubes, Flat Panel Displays: Emissive and NonEmissive Displays; Plasma Panel, Thin Film Electroluminescent and Liquid Crystal Displays,	(07)

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.	
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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)
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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)
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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, 2 nd Edition	Newman and Sproul	McGraw Hill
3	Graphics, A programming Approach, 2 nd Edition	Steven Harrington	Tata McGraw Hill
4	Mathematical Elements of Computer Graphics, 2 nd Edition	Rogar and Adams	McGraw Hill
	Introduction to Computer Graphics, 1 st Edition	N. Krishnamurthy	Tata McGraw Hill

PO	a	b	c	d	e	f	g	h	i
CO									
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 542
Course Title	Computer Graphics (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Data Structures and Algorithms , Programming Fundamentals
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	ITE543
Course Title	Operating Systems (Theory)
Type of Course	Core
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Introduction to Information Technology, Data Structures and Algorithms
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 (05)
Basic Functions and Concepts of Operating Systems: 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: System components, operating system services, System calls, System Programs, System Structure, System design and implementation. Concept of process, process states, process state transition, process control block, operations of processes, concurrent processes, deadlocks, scheduling algorithms, scheduling criteria, Process Synchronization.		(11)
Memory Management: Logical and physical address space, storage allocation and management techniques, swapping, concepts of multi programming, paging, segmentation, virtual storage management strategies, Demand Paging, Page Replacement Algorithms, and Thrashing.		(06)
SECTION-B		
Information Management: File concept, Access method, Directory structure, Protection File system structure, Allocation methods, Free space management, Directory implementation, Disk structure, Disk Scheduling, Disk management, Swap space management.		(06)
Distributed-System Structures: Network operating system, Distributed operating systems, Remote services, Robustness, Design Issues.		(06)
Distributed file systems and Distributed Coordination: Naming and Transparency, Remote file Access, Stateful versus stateless service, File replication, Event ordering, Mutual Exclusion, Atomicity, Concurrency control, Deadlock Handling, Election Algorithms, Reaching Agreement.		(06)
Case Studies: Unix O.S. Architecture, Operating system services, user perspective, representation of files in Unix system processes and their structure, Input-output system, Memory management, Unix shell, history and evolution of Unix system.		(05)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Operating Systems, 5 th Edition	Galvin & Silberschatz	Addison Wesley Publishing Ltd
2	An Introduction to Operating System, 3 rd Edition	Harvey M. Deitel	Narosa Publishing House
3	Operating Systems: Design and implementation, 3 rd Edition	Andrew S. Tanenbaum	PHI
4	Operating system, 5 th 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	ITE 543
Course Title	Operating Systems (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Data Structures and Algorithms, Programming Fundamentals
Course Objectives	<p>1. To teach students about various operating systems including Windows, and UNIX.</p> <p>2. To be able to students learn about systems configuration and administration. Students learn, explore and practice technologies related to UNIX.</p>

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	ITE 544
Course Title	Multimedia Systems (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	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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, Standards for Document Architecture: SGML (Standard Generalized Markup Language), ODA (Open Document Architecture); Multimedia Standards for Document Interchange:	(6)

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 Klara Nahrstedt	Pearson Education
2.	Multimedia System Design	Prabhat K. Andleigh, Kiran Thakkar	PHI
3.	Multimedia Computing	Li, Drew	Pearson Education
4.	Multimedia Communications	Fred Halsall	Pearson Education
5.	Multimedia Systems	Parag Havaldar, Gerard Medioni	Cengage Learning Publication

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

COURSE INFORMATION SHEET

Course Code	ITE545
Course Title	Principles of Telecommunication (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 Electronics
Course Objectives	To provide basic knowledge about the concepts of different types of communication approaches.
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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	The communication process, Block diagram of a general communication system.	(03)
Probability and Random Signal Theory	Probability basics, Conditional Probability, Random Variables, Discrete Random Variables, Continuous Random Variables, Variance, Standard deviation, Moments, Binomial, and Gaussian distribution	(09)
Noise	Sources of Noise, Shot Noise, resistor Noise, White Noise, Noise Temperature, Signal-to-Noise Ratio, Noise Figure.	(08)
SECTION-B		
Information Theory	(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	
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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	ITE596
Course Title	Industrial Training (After 4 th Semester)
Type of Course	Core
L T P	0 0 0
Credits	1
Course Assessment Methods:	
End Semester Assessment (University Exam.)	00
Continuous Assessment (Practical)	50
Course Prerequisites	Nil
Course Objectives	<ul style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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	ITE641
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	Principles of Telecommunications
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 the channel impairment mitigation techniques, V. Learn the principles of 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 (05)
Introduction Evolution of Mobile Communication Systems: 1G, 2G, 2.5G, 3G, 4G , comparison of common wireless communication systems.	
System Design Fundamentals Frequency reuse, Channel assignment strategies, handoff strategies, interference,	(10)

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

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

(08)

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

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

(08)

Advance Technologies:

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

(05)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Wireless Communications Principles and practice, 2 nd 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, 1 st Edition	Raj Pandya	IEEE Press

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

COURSE INFORMATION SHEET

Course Code	ITE641
Course Title	Wireless Communication (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods:	
End Semester Assessment (University Exam.)	00
Continuous Assessment (Practical)	50
Course Prerequisites	Principles of Telecommunications
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:	
<ul style="list-style-type: none">• Exposure to advanced wireless tools.• Pertinent lab exercises related to wireless communication.	

COURSE INFORMATION SHEET

Course Code	ITE 642
Course Title	Business Intelligence (Theory)
Type of Course	Core
L T P	4 0 3
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Data Base Management System
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 (08)
Introduction to Business Intelligence: 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) 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.	(08)
Introduction to Multi-Dimensional Data Modeling, 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.	(08)
SECTION-B	
Basics of Enterprise Reporting Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, and overall architecture.	(06)
Data Mining Functionalities: Association rules mining, Mining Association rules from single level, multilevel transaction databases, Classification and prediction, Decision tree induction, Bayesian classification, k-nearest neighbor classification	(15)

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, Shaku Atre	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	ITE642
Course Title	Business Intelligence (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Data Base Management System
Course Objectives	To understand the concepts and be able to apply these concepts in various business contexts and through hands-on exercises with leading software applications for OLAP, OLTP, data warehouses, data marts and relational database and models.

SYLLABUS

The assignments for course include the following:

- Seminars from the topics related to Business Intelligence space
- Relevant lab exercises to get exposure to BI concepts & tool

Practical Exposure:

With intent to get some exposure in the business intelligence space, the colleges can arrange for:

- A project that allows the students to apply Technical, Behavioural, Process concepts learnt in the course by:
 - Executing near real-life project (with large data)
 - Working in teams (project teams will ideally comprise of 4 members)

COURSE INFORMATION SHEET

Course Code	ITE643
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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Computer Networks
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 (06)
Basic Encryption and Decryption: Threats and Types of attacks, Challenges for Information Security, Classical Cryptographic Algorithms: Monoalphabetic Substitutions such as Caesar Cipher, Cryptanalysis of Monoalphabetic ciphers; Polyalphabetic Ciphers such as Vigenere, Vernam Cipher; Transposition Cipher.	
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: Modular Arithmetic, Euclidean algorithm, Random number generation	(04)
Key Management Protocols: Solving Key Distribution Problem, Diffie-Hellman Algorithm, Key Exchange with Public Key Cryptography.	(05)
SECTION-B	
Public Key Encryption Systems: Concept and Characteristics of Public Key Encryption system, Rivets-Shamir-Adleman (RSA) Encryption, Digital Signature Algorithms and authentication protocols, Digital Signature Standard (DSA).	(06)
Hash Algorithms: Hash concept, description of Hash Algorithms, Message Digest Algorithms such as MD4 and MD5, Secure Hash Algorithms such as SH1 and SHA2	(05)
Network Security: Kerberos, IP security: Architecture, Authentication Header, Encapsulating Security Payload	(04)
Web Security: Web security consideration, Secure Socket Layer Protocol, Transport Layer Security, Secure Electronic Transaction Protocol	(04)
Firewalls: Firewall Design principles, Trusted Systems, Virtual Private Networks.	(04)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Principles of Cryptography, 4 th Edition	William Stallings	Pearson Education
2.	Security in Computing, 2 nd Edition	Charles P.Pfleeger	Prentice Hall International
3.	Cryptography & Network Security, 2 nd Edition	AtulKahate	TMH
4.	Applied Cryptography: Protocols, Algorithms, and Source Code in C, 2 nd Edition	Bruce Schneier	John Wiley and Sons
5.	Firewalls and Internet Security, 2 nd 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				

DEPARTMENTAL ELECTIVE COURSE -I

COURSE INFORMATION SHEET

Course Code	ITE644
Course Title	Software Engineering (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	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: <ul style="list-style-type: none">I. Understand the concept of process models.II. Analyze the project management and specification concepts.III. Understand the concept of software designing and testingIV. 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 (05)
Introduction Introduction to Software Engineering, System Engineering Vs Software Engineering, Software Evolution, Software Characteristics, Cost of Software Production, Software Components, Crisis – Problem and Causes, Challenges in Software Engineering.	
Software Process Model SDLC, Waterfall Model, Incremental Model, Prototyping Model, Evolutionary Model, Spiral Model, Rapid Application Development Model, Formal Methods, Open Source	(06)

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

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Software Engineering, 3 rd Edition	Ian Somerville	Pearson Education
2.	S/W Engineering-A Practitioner's Approach, 6 th 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	ITE645
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
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 (06)
Introduction: System software and machine architecture. Simplified Instructional Computer (SIC), Traditional CISC and RISC Machines.		
Assemblers: Basic assembler functions, Machine-dependent assembler features, Machine-Independent assembler features, Assembler Design options, Implementation examples: AIX Assembler.		(08)
Macro Processors: Basic Macro processor functions, Machine-Independent Macro processor features, Design options.		(08)
SECTION-B		
Loader and Linkers: Basic loader functions, Machine dependent Loader features, Machine-Independent Loader features, Loader Design options, Implementation examples.		(07)
Compilers: 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.		(10)
Operating Systems: Basic operating system functions, Machine dependent operating system features, Machine independent operating system features, Operating System Design options		(06)

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, 2 nd edition	D. M. Dhamdere	TMH
3	System Programming, 1 st 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	ITE646
Course Title	Data Acquisition and Hardware Interfacing (Theory)
Type of Course	Elective
L T P	4 0 0
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Analog and Digital Communication, Computer Architecture & Organization
Course Objectives	This course will introduce various data acquisition systems and techniques and their application using different hardware interfacing mechanisms.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the principles of operation and limitations of the data acquisition system (single and multiple channels). II. Analyze and generate reports of various acquired signals by using Labview. III. Learn instrumentation system design. IV. Compare different interface mechanism of devices for 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 (09)
Signal conditioning and data acquisition: Analog-to-digital and digital-to-analog converters; sampling rate, multiplexing, resolution, range, and code width; grounding, isolation and noise; single-ended and differential measurements; attenuation, amplification, and filtering; excitation and linearization; impedance mismatch and loading; digital signal conditioning; signal transmission (voltage vs. current loop); and hardware architecture of a modern multi-function data acquisition card. Various DAS Configurations, Single Channel DAS, Multi-Channel DAS, IC Based DAS, Data Acquisition, Data Acquisition in PLC	
Fundamentals of programming logic: Labview: Virtual instruments; indicators and controls; front panel and block diagram; data types and data flow programming; case	(12)

and sequence structures; arrays, loops, and clusters; graphs and charts; sub VIs; and file I/O.

SECTION-B

Instrument control: Components of an instrument control system (GPIB and RS-232); detecting and configuring instruments; and instrument drivers.	(6)
Instrumentation system design: Design specifications; functional block representation; design, debugging, and testing; interpretation and presentation of data; user interface; temperature control system design; motor speed control system design; and instrumentation project incorporating multiple sensors, signal interfacing electronics, data-acquisition hardware, instrument control	(6)
Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Instrumentation Buses: Serial (RS232C, USB) and Parallel (GPIB) Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.	(4)
Project Work: Using Labview: Generation of signal (different function generators) on PC and acquiring the signal from sensor at PC again with different sampling rate and quantization level. Representations of different characteristics of acquired signals and their analysis and reporting.	(8)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Instrumentation Devices and Systems	C. S. Rangan, G.R. Sarma and V. S. V. Mani	Tata McGraw-Hill
2	Modern Electronic Instrumentation and Measurement Techniques	D. Helfrick Albert and W. D. Cooper	Prentice Hall India
3	Digital Instrumentation	A.J. Bouvens	McGraw-Hill
4	Process Control Instrumentation Technology	D. Johnson Curtis	Prentice Hall
5	A Course in Electrical and Electronics Measurements and Instrumentation	A.K. Shawhney	Dhanpat Rai & Sons
6	Data acquisition technique using Personal computers	Howard Austurlitz	Academic Press

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

OPEN ELECTIVE

COURSE INFORMATION SHEET

Course Code	ITE647
Course Title	Analysis and Design of Algorithms (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	Programming fundamentals, Data Structures and Algorithms
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 (09)
Analysis of algorithm Role of Algorithms in Computing; Growth of functions: Asymptotic Notation, Standard notation, Performance measurements Introduction to Recurrences: substitution method,	

recursion-tree method, master method; Algorithms; Divide and Conquer Method General Method, Binary Search, Matrix Multiplication, Merge Sort, Quick Sort and their performance analysis	(07)
Greedy Approach Elements of Greedy strategy, Knapsack problem, Single source Shortest paths problem, Minimum Spanning tree problem and analysis of these problems.	(07)
SECTION-B	
Dynamic Programming General Method, Multistage Graph , All Pairs Shortest Path Algorithm , 0/1 Knapsack Problem, Traveling Salesman Problem	(09)
Backtracking The General Method , 8-Queens Problem- Sum of Subsets ,Knapsack	(07)
P and NP Problems Polynomial time, Nondeterministic Algorithms and NP, Reducibility and NP completeness, NP complete Problems	(06)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Fundamentals of Computer Algorithms	Ellis Horowitz, Sartaj Sahni	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	ITE648
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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Discrete Mathematics
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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, Perceptron Networks, Adaline and Madaline, Multilayer Neural Networks, Backpropagation Network, Associative Memory Networks, BAM, Hopfield Networks, Kohonen Self Organizing Feature Maps, Counter propagation Networks, Adaptive Resonance Theory Networks	(15)
Introduction to Fuzzy Logic, Classical Vs Fuzzy sets, Membership Functions, Defuzzification, Fuzzy model, Fuzzy Rule Base, Fuzzy inference systems, Fuzzy	(10)

Expert System

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	ITE649
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	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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: Characteristics and types of system, Manual and automated systems, Real-life Business sub-systems: Production, Marketing, Personnel, Material, Finance	(03)
Systems models: Systems environment and boundaries, Real time and distributed systems, Basic principles of successful systems, Role and need of systems analyst	(03)

System Development cycle: Introduction to systems development life cycle (SDLC) , various phases of development :Analysis, Design, Development, Implementation, Maintenance	(03)
Systems documentation considerations: Principles of system documentation, Types of documentation and their importance	(03)
System Planning: 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	(06)
Systems Design and modeling: 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	(06)
SECTION-B	
Input and Output: Classification of forms: Input/output forms design, User-interface design, Graphical interfaces	(04)
Modular and structured design: Module specifications, coupling and cohesion , Top-down and bottom-up design	(05)
System Implementation and Maintenance: Planning considerations, Conversion methods, producers and controls, System acceptance criteria, System evaluation and performance, Testing and validation, Maintenance activities and issues	(05)
System Audit and Security: 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	(03)
Types of threats to computer system and control measures: Threat to computer system and control measures, Disaster recovery and contingency planning	(04)

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	ITE650
Course Title	Distributed Operating Systems (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	<p>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.</p>
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Understand the process 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 Review of structures: monolithic kernel, layered systems, virtual machines, Process based models and client server.	(05)
Distributed Systems 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.	(08)
Resource Management Resource allocation and deadlock. Deadlock prevention, avoidance and detection.	(08)

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				

DEPARTMENTAL HONOURS COURSES - I, II

COURSE INFORMATION SHEET

Course Code	ITE651
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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Computer Networks
Course Objectives	To familiarize students with advanced concepts of networks, network management, administration and security concepts
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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 (05)
Large Enterprise Networks: Managing Enterprise Networks, need for network management, SNMP: the de facto network management standard.	
Elements of NMS Development: NMS development, data analysis, class design for major NMS features, GUI development, insulating applications from low level code, multiservice switches, MPLS, MPLS and scalability.	(12)
Performance Management in Broadband Networks: 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.	(10)

SECTION-B

Introduction to Unix System Administration Daily Tasks of a System Administrator, Startup and Shutdown, Periodic Processes, Managing File Systems, Responsibilities to the users, Hardware responsibilities, Types of SunOS Systems.	(04)
System Configuration 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.	(07)
Security 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.	(07)

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	IT652
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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Computer Architecture and Organization, Network Security & Cryptography
Course Objectives	<ol style="list-style-type: none"> 1. To teach students about the various forms of cybercrimes and fundamentals of computer forensic technology 2. Introduce students to the different techniques used to collect, preserve and recover computer evidences
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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
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	(7)
Types of computer forensics technology Types of military computer forensic technology, Types of law enforcement, Computer forensic technology, Types of business computer forensic technology, Occurrence of	(7)

cybercrime, Cyber detectives, Fighting cyber crime with risk –management techniques, Computer forensics investigative services SLC: Forensic process improvement.

Data recovery

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

(8)

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, Legal aspects 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	Firewall Media
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	ITE653
Course Title	Optical Fiber Communication (Theory)
Type of Course	Elective
L T P	4 0 0
Credits	4
Total Lectures	45
Course Assessment Methods	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Principles of Telecommunication, Introduction to Electronics
Course Objectives (CO)	To explain the need, significance of Optical Communication System; and to impart knowledge of transmission characteristics, losses, types of optical fibers cables.
Course Outcome	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Understand the need and fundamentals of Optical Communication System. II. Apply knowledge of fiber optics to analyze the losses and causes of signal degradation in optical communication. III. Learn and apply the concepts of light sources and detectors. IV. Impart knowledge of fiber coupling and information regarding latest advances in optical 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

Overview of Optical Fiber Communication: Basic communication system, Block Diagram, Explanation of each block, Advantages of optical communication, applications of fiber optic communication.	(4)
Optical Fiber Wave Guides: Ray Theory of Transmission: Total Internal reflection, Acceptance Angle, Numerical Aperture, Step-Index Fiber, Graded Index Fiber, Modes in SI and GRIN fiber.	(9)
Signal Degradation in Optical Fibers: Attenuation, Material absorption losses, linear and non linear scattering losses, fiber bend loss, dispersion viz intermodal dispersion and intramodal dispersion, overall fiber dispersion and polarization mode dispersion, Introduction to nonlinear effects: Self	(8)

phase modulation, cross phase modulation, Stimulated Brillouin and Raman scattering, Four Wave Mixing

SECTION-B

Optical Sources

(7)

Lasers: Principles of Laser, absorption and emission of adiation, population inversion, optical feedback and laser oscillation. Optical emission from semiconductor- pn junction, spontaneous emission. LED: basic concepts, advantages, power and efficiency.

Optical detectors

(6)

Principles of Photodetection, Photomultiplier, Semiconductor Photodiode, PIN photodiode, Avalanche photodiode,

Optical fiber connections: joints and couplers:

(8)

Fiber alignment and joint loss, Fiber splices, Fiber connectors principles, Fiber couplers,

Advances in Optical Communication:

(3)

Introduction to Free Space Optics, DWDM

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Fiber Optic Communications, latest Edition	Joseph C. Palais	Pearson Education
2	Optical Fiber Communication	John M Senior	PHI
3	Optical Fiber Communications Designs,3rd Edition	Gerd Keiser	McGraw Hill
4	Fiber optic communication systems,2E	Govind P. Agrawal	Wiley India
5	Fiber optic communication technology	D. F. Mynbaev and L. Scheiner	Pearson Education

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

MINOR SPECIALIZATION COURSE-I

COURSE INFORMATION SHEET

Course Code	ITE654				
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 System				
Course Objectives	<ol style="list-style-type: none"> 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	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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					
<p>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.</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 2px;">SECTION-A</th> <th style="text-align: center; padding: 2px;">Hours</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">Introduction to Data Mining</td> <td style="text-align: center; padding: 2px;">(04)</td> </tr> </tbody> </table>		SECTION-A	Hours	Introduction to Data Mining	(04)
SECTION-A	Hours				
Introduction to Data Mining	(04)				

Concepts of Data mining, Functionalities, Issues, Multidimensional data models.	(03)
Elements of Data Analysis 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 Need, Data Cleaning, Integration and Transformation, Reduction, Discretization and Concept Hierarchy Generation Methods	(04)
Concept Description Data Generalization and Summarization based Characterization, Analytical Characterization, Attribute relevance analysis, Mining class comparisons; Comparison with typical machine learning methods.	(04)
Mining Association Rules Introduction, Mining single dimensional , boolean rules using Apriori, FP-Tree method, Mining Multilevel Association Rules, Mining Multidimensional Association Rules, Constraint-Based Association Rule Mining.	(07)
SECTION-B	
Classification and Prediction Issues, Classification by Decision Tree Induction, Bayesian Classification, Backpropagation, k-Nearest-Neighbor Classifiers, Genetic Algorithms, Fuzzy Set Approaches, Bagging and Boosting, Ensemble classifiers.	(06)
Cluster Analysis Definition, Types of Data in Cluster Analysis, Introduction to Partitioning, Hierarchical and Density-Based Methods, Introduction to Outlier Analysis.	(05)
Mining Complex Data Types Mining spatial databases, Multimedia databases, Time series databases and WWW	(05)
Application and Trends Biomedical, Finance, Retail and Telecommunication applications, Social aspects, Trends in Data Mining.	(03)
Project Work (Using SAS Analytica, R tool) 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.	(04)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Data Mining: Concepts and Techniques	Jiawei Han & Micheline Kamber	Morgan Kaufman publishers
2	Data Mining	Pieter Adrians, Dolf Zantinge	Addison Wesley
3	Data Warehousing, Data Mining and OLTP	Alex Berson	McGraw Hill

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

Minor Specialization Course-II

COURSE INFORMATION SHEET

Course Code	ITE655
Course Title	Software Project Management
Type of Course	Elective
L T P	4 0 0
Credits	4
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Software Engineering
Course Objectives	<ol style="list-style-type: none"> 1. To study the Introduction of project management and its basic concepts and techniques. 2. To understand how to calculate risk, manage people, and to do resource allocation.
Course Outcomes	<p>After completion of this course, the students are able to:</p> <ol style="list-style-type: none"> I. Understand and practice the process of project management and its application in delivering successful IT projects II. Evaluate a project to develop the scope of work , provide accurate cost estimates and to plan the various activities III. Apply risk management analysis techniques to identify risks in project and effect of risk on project timescales IV. Identify the resources required for a project and to produce a work plan and resource schedule and to understand how different management and development practices affect software and process quality
SYLLABUS	
<p>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.</p>	
SECTION-A	
Hours	

Introduction to project management: Introduction, Importance of software project management, Project and different types of project, Problems with software projects, Environmental Appraisal with Projects, Requirement Specification, Management Control, Steps in project planning.	(08)
Programme management and project evaluation: Programme Management, Managing resources within programme, Strategic programme management, Aids to programme management, Evaluation / Assessment of projects, Cost-benefit Analysis, Cash flow forecasting, Cost-benefit evaluation techniques, Risk evaluation	(08)
Project approach and Software effort estimation: Selection of an appropriate project technology, Choice of process model, Data Structure, Delivery Model, Basis for software estimation, Problem with over and under estimates, Estimation Techniques, Expert judgment, Albrecht Function Point Analysis, Function points Mark II, COSMIC Function point, COCOMO Model	(10)

SECTION-B

Activity Planning: Objective of Planning, Project Schedule, Activities – Sequencing and Scheduling, Development of Project Network, Time Estimation, Forward and backward Pass, Critical Path and Activities.	(03)
Risk Management: Risk, Risk categories, identification, assessment, planning, management PERT and CPM Models, Monte Carlo Simulation	(03)
Resource Allocation, Monitoring and Control: Resources, Nature of Resources, Resource Requirement, Scheduling, Counting and Costing, Monitoring Framework, Cost Monitoring, Earned Value Analysis, Project targets, Change Control Management	(08)
Managing people and organizing teams: Management Spectrum, Associating human resource with job, Motivation, Oldham- job Characteristics Model, Decision Making, Leadership, Stress, Health and Safety.	(05)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Software Project Management	Bob Hughes & Mike Cotterell	Tata McGraw Hill Publication
2	Projects – Planning, Analysis, Selection, Financing, Implementation and Review	Prasanna Chandra	6th, Tata McGraw Hill Publication
3	Project Management	JeffreyPinto	Pearson Publications

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

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

COURSE INFORMATION SHEET

Course Code	ITE741
Course Title	Digital Signal Processing (Theory)
Type of Course	Core
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Analog & Digital Communication
Course Objectives (CO)	<ol style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 Applications and advantages of DSP. Sampling theorem, concept of frequency in discrete time signals.	(04)

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

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Digital Signal Processing: Principles, Algorithms and Applications, 3 rd Edition	Proakis & Manolakis	Pearson
2.	Digital Signal Processing	E C Ifeache and B W Jervis	Prentice Hall
3.	Digital Signal Processing, 1 st 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	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Analog And Digital 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	ITE742
Course Title	Agile Software Development (Theory)
Type of Course	Core
L T P	4 0 3
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Software Engineering
Course Objectives	<ul style="list-style-type: none"> I. To understand the basic concepts of agile software process. II. To gain knowledge in the area of various Agile Methodologies. III. To know the principles of Agile Testing.
Course Outcomes	<p>At the end of the subject, student will be able to :</p> <ul style="list-style-type: none"> 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. Compare and select an agile method to the needs of the project.

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
Agile Development Agile Practices, Overview of Extreme Programming, Planning, Testing, refactoring, A programming Episode.	(08)
Agile Design What is Agile Design?, SRP – The Single Responsibility Principle, OCP – the Open Closed Principle, LSP – The Liskov Substitution, DIP – The Dependency Inversion Principle, ISP – The Interface Segregation Principle, Need for Refactoring, Refactoring TechniquesContinuous Integration, Automated Build tools, Version Control, Test driven Development(TDD), xUnit framework and tools for TDD	(08)
Agile Project Management	(08)

Agile Project phases, Agile estimation, Planning Game, Product backlog, Sprint backlog, Iteration Planning, User story definition, Characteristics and content of user stories, Acceptance tests and verifying stories, Agile project velocity, Burn down chart, sprint planning and retrospective, Daily scrum, scrum roles , Scrum case study, Tools for Agile project management	
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SECTION-B

Agile testing The Agile lifecycle and its impact on testing, Testing User stories – acceptance tests and scenarios, Planning and managing Agile Testing, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile Tester	(16)
Agile in Market Market Scenario and adoption of Agile, Roles in an Agile project, Agile applicability, Agile in Distributed Teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile Projects on Cloud, Balancing Agility with Discipline, Agile rapid development Technologies	(05)

Case Studies The Payroll Case Study, The Weather Station Case Study, The ETS Case Study	
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RECOMMENDED BOOKS				
S. No.	NAME	AUTHOR(S)	PUBLISHER	
1.	Agile and Iterative Development : A Manager's Guide 2004	Craig Larman	Pearson Education	
2.	Essential Scrum: A Practical Guide to the Most Popular Agile Process 1 st Edition	K.S. Rubin	Addison-Wesley	
3.	Software Development Rhythms 2008	K.M. Lui and KCC Chan	John Wiley	

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	ITE742
Course Title	Agile Software Development (Practical)
Type of Course	Core
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Software Engg.
Course Objectives	To get exposure to various tools such as AgileFant, Jenkins, JUnit, ANT, QAlibe/Cucumber
SYLLABUS	
Students should implement (and learn to use the tools to accomplish this task) the following during Practical hours: (illustrative only) :	
<ol style="list-style-type: none"> 1. Understand a given business scenario and identify product backlog, user stories and sprint tasks 2. Define user stories for a given feature 3. Fill user stories, sprint schedule and sprint tasks in an Agile tool such as AgileFant 4. Write unit tests aligned to xUnit framework for TDD 5. Refactor a given design for next sprint requirements 6. Execute continuous integration using a tool such as Jenkins 7. Automate a set of given tests using Test automation tool 	

COURSE INFORMATION SHEET

Course Code	ITE743
Course Title	Mobile Computing (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	Wireless Communication
Course Objectives	<ul style="list-style-type: none"> 1. To impart fundamental concepts in the area of mobile computing. 2. To provide a perspective on related issues, protocols and tools. 3. To introduce selected topics of current research interest in the field.
Course Outcomes	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Understand the fundamentals of mobile computing, GSM system and MAC. II. Analyze the issues related to mobile transport layer and mobile network layer. III. Explain database issues and data dissemination. IV. Develop an understanding of mobile ad-hoc networks, wireless protocols and 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 to Mobile Computing: Introduction to MC, novel applications, limitations and architecture. GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.	(6)
Medium Access Control (Wireless): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.	(5)
Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).	(6)

Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.	(6)
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SECTION-B

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.	(6)
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Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, pushbased mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.	(5)
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Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.	(5)
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Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.	(6)
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RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Mobile Communication	Jochen Schiller	Pearson Education
2.	Handbook of Wireless Networks and Mobile Computing, 2002.	Stojmenovic and Cacute	Wiley
3.	Principles of Mobile Computing	U. Hansman and L. Merck	Springer
4.	Computer Networks, 4 th Edition	A. S. Tanenbaum	Pearson Education
5.	Mobility Processes, Computers and Agents	D. Milojicic, F. Douglos	Addison Wesley
6.	Mobile Computing	Raj Kamal	Oxford University Press

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

COURSE INFORMATION SHEET

Course Code	ITE744
Course Title	Cloud Computing (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	Operating System , Computer Networks
Course Objectives	<ol style="list-style-type: none"> 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	<p>After the completion of this course, the students will be able to:</p> <ol style="list-style-type: none"> 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: Brief history and evolution - History of Cloud Computing, Evolution of Cloud Computing, Traditional vs. Cloud Computing. Why Cloud Computing, Cloud service models (IaaS, PaaS & SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing.	(04)
Understanding Virtualization Basics of virtualization, Virtualization technologies, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing.	(04)

Working with Private Cloud: Private Cloud Definition, Characteristics of Private Cloud, Private Cloud deployment models, Private Cloud Building blocks namely Physical Layer, Virtualization Layer, Cloud Management Layer, Challenges to private Cloud, Virtual Private Cloud. Implementing private cloud (one out of CloudStack, OpenStack, Eucalyptus, IBM or Microsoft)	(09)
Working with Public Clouds: What is Public Cloud, Why Public Cloud, When to opt for Public Cloud, Public Cloud Service Models, and Public Cloud Players. Infrastructure as a Service Offerings (IaaS), PaaS offerings, Software as a Service Offering (SaaS). Implementing public cloud (one out of AWS, Windows Azure, IBM or Rackspace)	(08)
SECTION-B	
Overview of Cloud Security: Explain the security concerns in Traditional IT, Introduce challenges in Cloud Computing in terms of Application Security, Server Security, and Network Security. Security reference model, Abuse and Nefarious Use of Cloud Computing	(06)
Overview of Multi-Cloud Management Systems & Business Cloud: Explain concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems. Cloud Computing in Business, Clouds focused on industry domains (Life Sciences and Social networking) Introduction of Business Intelligence on cloud and Big Data Analytics on Cloud	(10)
Future directions in Cloud Computing Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security, Current issues in cloud computing leading to future research directions.	(04)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Cloud Computing: Principles and Paradigms	Rajkumar Buyya, 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	Borko Furht, 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					

Elective-II

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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Data Structures and Algorithms
Course Objectives	<ul style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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: Artificial Intelligence and its applications, Artificial Intelligence Techniques, criteria of success, Intelligent Agents, Nature and structure of Agents, Learning Agents	(06)
Problem solving techniques: State space search, control strategies, heuristic search, problem characteristics, production system characteristics., Generate and test, Hill climbing, best first search,	(09)

A* search, Constraint satisfaction problem, Mean-end analysis, Min-Max Search, Alpha-Beta Pruning, Additional refinements, Iterative Deepening	
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(08)

Knowledge representation:

Mapping between facts and representations, Approaches to knowledge representation, procedural vs declarative knowledge, Forward vs. Backward reasoning, Matching, conflict resolution, Non-monotonic reasoning, Default reasoning, statistical reasoning, fuzzy logic Weak and Strong filler structures, semantic nets, frame, conceptual 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	a	b	c	d	e	f	g	h	i
CO									
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	ITE746
Course Title	Compiler 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	Computer Architecture and Organization
Course Objectives	To provide the in-depth knowledge of different concepts involved while designing a compiler.
Course Outcomes	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Understand the working of compiler 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 Compilers and Translators; The phases of the compiler – Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Optimization, Code generation, Bookkeeping, Error handling.	(05)
Lexical Analysis The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of tokens, Finite automata: Regular expressions, NFA, DFA. Design of a lexical analyzer generator.	(05)
Syntax Analysis The role of a parser, Context free grammars, Writing a grammar, Top down Parsing: Recursive decent parser, Predictive parser, Bottom up Parsing: Handles, Viable prefixes, Operator precedence parsing, LR parsers: SLR, LALR, CLR. Parser generator	(12)

(YACC). Error Recovery techniques for different parsers.

SECTION-B

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

RECOMMENDED BOOKS

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

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	ITE747
Course Title	Building Enterprise Applications (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	Business Intelligence
Course Objectives	To expose the students to the essentials of building enterprise applications.
Course Outcomes	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Understand how to build enterprise applications by learning the skills required and by knowing the life cycle of raising an enterprise application. II. Model business process by making use of requirement elicitation, use cases, prototyping and understand the concept of planning, estimation and enterprise analysis. III. Design enterprise application by making use of different design components such as networking, IT hardware-software and middleware and be able to create a documentation of the design process. IV. Distinguish different kinds of testing such as performance testing, penetration testing etc and to understand the process of rolling out an enterprise application.

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 Enterprise application Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications.	(8)

Incepting enterprise application and business process modeling Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation.	(8)
Enterprise Architecture and designing enterprise application Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture - design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design.	(8)

SECTION-B

Constructing enterprise application Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage.	(11)
Testing and rolling out enterprise application Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.	(10)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Raising Enterprise Applications	Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, Veerakumar Esakimuthu	Wiley India, First Edition, 2012
2.	Building Java Enterprise Applications	Brett McLaughlin	O' Reily Media , Latest Edition
3.	Software Requirements: Styles &Techniques	Soren Lauesen	Latest Edition By Addison- Wesley Professional
4.	Software Systems Requirements Engineering: In Practice	Brian Berenbach, Daniel J. Paulish, Juergen Kazmeier, Arnold Rudorfer	McGraw-Hill/Osborne Media, 2009
5.	Managing Software Requirements: A Use Case Approach	Dean Leffingwell, Don Widrig	First Edition by Pearson 2003
6.	Software Architecture: A Case Based Approach	Vasudev Verma	Pearson 2009

7.

Software Testing Principles And Practices

Srinivasan Desikan,
Gopalaswamy RameshFirst Edition
by Pearson
2006

PO CO	a	b	c	d	e	f	g	h	i
CO 1	1	2	2	2	1	1	1		
CO2	1	1	2	1	1		1		1
CO3	1	1	2	2			1		2
CO4	1	1	1	1			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	<ul style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. To introduce students the significance of digital image processing. 2. To apply the various algorithms to solve different image processing problems.
Course Outcomes	<p>After the completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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: Intensity transform functions, histogram processing, Spatial filtering, fourier transforms and its properties, frequency domain filters, Pseudo coloring, color transforms, Basics of Wavelet Transforms.	(12)
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-Hill. 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	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Programming Fundamentals, Digital Signal Processing
Course Objectives	<ul style="list-style-type: none"> 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, Computer Architecture & Organization
Course Objectives	<ol style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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	
<p>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.</p>	
SECTION-A	
Hours	

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

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	The 8051 Microcontroller and Embedded Systems	Muhammed Ali Mazidi, Janice Gillispie Mazidi and Robin D. McKinlay	Pearson 2 nd Edition
2.	The 8051 Microcontroller: Architecture, Programming & Applications	Kenneth J. Ayala	Pearson 2 nd 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	a	b	c	d	e	f	g	h	i
CO									
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	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Microprocessor
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 Fundamentals, Object Oriented Programming
Course Objectives	<ol style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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: Introduction; classes; methods; constructors; overloading methods; arrays; recursion; passing arrays and objects to methods; Inheritance; method overriding; abstract classes; using final; packages; interfaces.	(8)
Exceptional Handling and Multithreaded Programming: Exception handling fundamentals; exception types; uncaught exceptions; try and catch; creating exception classes; throwing exceptions; Java thread model; thread priorities; creating a thread; interthread communication; thread synchronization; suspending, resuming and stopping threads.	(8)
I/O, Applets and Graphics: I/O basics; stream classes; byte and character streams; reading and writing files; Applet fundamentals; Applet class; Applet initialization and termination; event handling; keyboard and mouse events; AWT class; Layout managers; panels; canvases; Frame windows; drawing lines, rectangles, ellipses.	(8)
SECTION-B	
Overview of J2EE and working with JDBC: What is J2EE, component based architecture of J2EE: Web, Business and Application component, commonly used classes and interfaces of java.sql package, connecting java application to a database, prepared statements.	(7)
Servlets and JSP: Java Servlets, compilation, deployment, and testing a servlet, session management, request dispatching, Java Server Pages, deploying and testing a JSP, using java beans in JSP.	(7)
Enterprise Java Beans(EJB): Architecture of EJB, creating a stateless-session EJB, statefull-session bean, Life Cycle of session beans, Entity beans, life cycle of entity beans.	(7)

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Java: How to Program, 6 th 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	a	b	c	d	e	f	g	h	i
CO									
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	0 2
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Programming Fundamentals, Object Oriented Programming
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	ITE844
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 Mathematics
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	<p>After successful completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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 finite automata: Strings, alphabet, language operations, finite state machine, finite automation model, acceptance of strings and language, deterministic finite automaton, deterministic finite automaton, equivalence between NFA and DFA, conversion of NFA into DFA, minimization of FSM, equivalence between two FSMs, Moore and Mealy machines.	(12)
Regular expressions and regular languages: Regular sets, regular expressions, identity rules, manipulation rules, manipulation of	(11)

regular expressions, equivalence between RE and FA, inter conversion, pumping lemma, closure properties of regular sets(proofs not required), regular grammars, right linear and left linear grammars, equivalence between regular linear programming and FA

SECTION-B

Context free grammar and languages:

(8)

Context free grammar, derivation trees, chomsky normal form, greibach normal form, push down automata, acceptance of CFL, equivalence of CFL and PDA, properties of CFL (proofs omitted)

Turing Machines:

(7)

Turing machine definition model, design of TM, computable functions, recursive enumerable language, church's hypothesis, counter machine, types of TM's (proofs not required), chomsky hierarchy of languages, linear bounded automata and context sensitive language, introduction of DFCL and DPDA, LR(0) grammar

Undecidability:

(7)

Undecidability, properties of recursive & non-recursive enumerable languages, universal Turing machine

RECOMMENDED BOOKS

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

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

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.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Discrete Mathematics, Artificial Intelligence
Course Objectives	<ol style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ol style="list-style-type: none"> 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 Networks, BAM, Hopfield Networks, Kohonen Self Organizing Feature Maps	(15)
Introduction to Fuzzy Logic, Classical Vs Fuzzy sets, Membership Functions, Defuzzification, Fuzzy model, Fuzzy Rule Base, Fuzzy inference systems, Fuzzy	(12)

Expert System

SECTION-B

Applications of fuzzy logic: Medicine and Economics	(04)
Introduction to Neuro Fuzzy Systems, Architecture of a Neuro Fuzzy system	(04)
Genetic Algorithm: An overview, Basic Terminologies in Genetic Algorithm, Operators in Genetic Algorithm, Problem solving using Genetic Algorithm, Implementation of GA and GP, Applications of GA & GP	(10)

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	ITE846
Course Title	Mobile Apps Development (Theory)
Type of Course	Elective
L T P	3 1 0
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Java Technologies
Course Objectives	<ul style="list-style-type: none"> 1. To expose essentials of mobile apps development. The core modules include designing, developing, testing, signing, packaging and distributing high quality mobile apps. 2. To teach mobile app development using Android as the development platform.
Course Outcomes	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> I. Understand and compare various mobile platforms. II. Learn the building blocks of mobile apps development. III. Apply graphics, animation and multimedia in mobile apps development. IV. Experiment with mobile apps using testing techniques and distribute mobile apps to market.

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
Getting started with Mobility Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development.	(08)
Building blocks of mobile apps App user interface designing - mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity states and life cycle, interaction amongst activities. App functionality beyond user interface - Threads, Async task, Services - states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs Native data handling - on-device file I/O, shared preferences, mobile databases such as	(16)

SQLite, and enterprise data access (via Internet/Intranet).

SECTION-B

Sprucing up mobile apps

(08)

Graphics and animation - custom views, canvas, animation APIs, multimedia - audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope).

Testing mobile apps

(08)

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, Monkey Talk.

Taking apps to Market

(05)

Versioning, signing and packaging mobile apps, distributing apps on mobile market place.

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Mobile Apps Development, Edition I, 2013	Anubhav Pradhan	Anil V Deshpande
2	Android Application Development All in one for Dummies, Edition: I	Barry Burd	John Wiley & Sons
3	Teach Yourself Android Application Development In 24 Hours, Edition: I	Carmen Delessio, Lauren Darcey, Shane Conder	SAMS

PO CO	a	b	c	d	e	f	g	h	i
CO1	1		1						
CO2	1		2	2	1				
CO3	1	1	1	1	1				
CO4	1	2	1	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	<ul style="list-style-type: none"> 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	<p>After successful completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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	25
Course Assessment Methods:	
Marks	400
Internal Assessment	300
Course Prerequisites	Nil
Course Objectives	<ul style="list-style-type: none"> 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	<p>After the completion of this course, the students are able to:</p> <ul style="list-style-type: none"> 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