DEPARTMENT OF INFORMATION TECHNOLOGY

B.E., INFORMATION TECHNOLOGY

REVISED REGULATIONS & SYLLABI

(Students Admitted From the Academic Year 2018-2019)

1. Condition for Admission

Candidates for admission to the first year of the four year B.E. Degree programmes shall be required to have passed the final examination of the plus 2 Higher Secondary Course with Mathematics, Physics and Chemistry as courses of study and candidates who have passed the Higher Secondary Examination through vocational stream under Engineering, conducted by the Board of Secondary Education, Government of Tamil Nadu or an examination of any other authority accepted by the Syndicate of this University as equivalent thereto. They shall satisfy the conditions regarding qualifying marks, age and physical fitness as may be prescribed by the Syndicate of the Annamalai University from time to time.

Candidates who have passed the Diploma programme in Engineering of the State Board of Technical Education, Tamil Nadu (listed in Annexure-I) will be eligible for admission to the second year of the four year degree programme in B.E. under the lateral entry scheme provided they satisfy other conditions.

2. Branches of Study in B.E.

BRANCH I	-	Chemical Engineering
BRANCH II	-	Civil Engineering
BRANCH III	-	Civil and Structural Engineering
BRANCH IV	-	Computer Science and Engineering
BRANCH V	-	Electrical and Electronics Engineering
BRANCH VI	-	Electronics and Communication Engineering
BRANCH VII	-	Electronics and Instrumentation Engineering
BRANCH VIII	-	Information Technology
BRANCH IX	-	Mechanical Engineering
BRANCH X	-	Mechanical Engineering (Manufacturing)

3. Courses of Study and Scheme of Examinations

The courses of study with respective syllabi and the scheme of Examinations are given separately.

4. Choice Based Credit System (CBCS)

The curriculum includes six components namely Humanities / Social Sciences /Management, Basic Sciences, Engineering Sciences, Professional Core, Professional Electives and Open Electives in addition to Seminar & Industrial Training and Project. Each semester curriculum shall normally have a blend of theory and practical courses. The total credits for the entire degree Programme is 166 (124 for lateral entry students).

5. Eligibility for the Degree

A candidate shall be eligible for the degree of Bachelor of Engineering if the candidate has satisfactorily undergone the prescribed courses of study for a period of four academic years and has passed the prescribed examinations in all the four academic years. For the award of the degree, a student has to

5.1 Earn a minimum of 166 credits (124 for lateral entry students).

5.2 Serve in any one of the Co-curricular activities such as

- National Cadet Corps (NCC)
- National Service Scheme (NSS)
- National Sports Organization (NSO) and
- Youth Red Cross (YRC)

for at least one year. The students enrolled in any one of the co-curricular activities (NCC / NSS / NSO / YRC) will undergo training for about 80 hours and attend a camp of about seven days. The training shall include classes on hygiene and health awareness and also training in first-aid. While the training activities will normally be during weekends, the camp will normally be during vacation period.

(or)

Enrol as a student member of a recognized professional society such as

- Student Chapters of Institution of Engineers (India)
- Student Chapters of other Professional bodies like ICI, ISA, IIChE, IEEE, SAE, ASHRAE, CSI and IWS

5.3 B.E (Honours) Degree

A student shall be eligible to get Under Graduate degree with Honours, if he/she completes an additional 20 credits. Thus the total credits are 186. Out of 186 credits (144 credits for lateral entry students), 20 credits must be earned by studying additional course offered by the same or allied Departments (listed in Annexure-II) in sixth, seventh and eighth semesters. These additional 20 credits could be acquired through the MOOC courses of SWAYAM portal also.

5.4 B.E Degree with Minor Engineering

A student shall be eligible to get Under Graduate degree with additional Minor Engineering, if he/she completes an additional 20 credits. Out of the 186 credits, 20 credits must be earned from the courses offered by any one of the Departments (listed in Annexure-II) in the Faculty of Engineering and Technology in sixth, seventh and eighth semesters . These additional 20 credits could be acquired through the MOOC courses offered in SWAYAM portal also.

6. Assignment of Credits for Courses

Each course is normally assigned one credit per hour of lecture/tutorial per week and half credit for one hour for laboratory or practical or drawing course per week.

7. Duration of the Programme

A student is normally expected to complete the B.E. programme in four years but in any case not more than seven years from the time of admission.

8. Registration for Courses

A newly admitted student will automatically be registered for all the courses prescribed for the first, second and third semesters without any option.

Every other student shall enrol for the courses intended to be credited in the succeeding semester in the current semester itself by completing the registration form indicating the list of courses. This registration will be done a week before the last working day of the current semester.

A student is required to earn 166 (124 for lateral entry students) credits in order to be eligible for obtaining the degree. However the student is entitled to enjoy an option to earn either more or less than the total number of credits prescribed in the curriculum of a particular semester on the following guidelines:

8.1 Slow Learners

The slow learners may be allowed to withdraw certain courses with the approval by the Head of the Department and those courses may be completed by them in the fifth year of study and still they are eligible to be awarded with I Class. A student can withdraw a maximum of 2 courses per semester from IV semester to VII semester and take up those courses in the fifth year of study. However, courses withdrawn during odd semesters (V and VII) must be registered in the odd semester of fifth year and courses withdrawn during even semesters (IV and VI) must be registered in the even semester of fifth year.

8.2 Advance Learners

The advance learners may be allowed to take up the open elective courses of eighth semester in sixth and seventh semesters one in each to enable them to pursue industrial training/project work in the entire eighth semester period provided they should register those courses in the fifth semester itself. Such students should meet the teachers offering those elective courses themselves for clarifications. No specific slots will be allotted in the time table for such courses.

9. Mandatory Internship (Industrial Training)

To promote industrial internship at the graduate level in technical institutes and also to enhance the employability skills of the students passing out from Technical Institutions, the internship for the students at different stages of the programme, is included in the curriculum. The student has to undergo the internship during the summer vacation, after the II semester / IV semester / VI semester of the programme as per the details outlined below. Further the student has to submit a report on completion of the internship during the subsequent Odd semester that is in the III / V / VII semesters respectively.

9.1 During the summer vacation, after the II Semester,

The student must get involved in any of the following Inter/ Intra Institutional

Activities for 4 weeks duration:

(i) Training with higher Institutions; Soft skill training organized by Training and Placement Cell.

(ii) Contribution at incubation/ innovation /entrepreneurship cell of the institute.

(iii) Participation in conferences/ workshops/ competitions.

(iv) Learning at Departmental Lab/ Institutional workshop.

(v) Working for consultancy/ research project within the University.

(vi) Participation in activities like IPR workshop / Leadership Talks/ Idea/ Design/ Innovation/ Technical Expos.

9.2 During the summer vacation, after the IV Semester and also after the VI Semester,

The student may choose any of the following Internship / Innovation / Entrepreneurship related activities for 4 weeks duration:

(i) Work on innovation or entrepreneurial activities resulting in start-up

(ii) Undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises

(iii) Undergo internship with National Employment Enhancement Mission (NEEM) Facilitator.

10. Project Work

The student typically registers for project at the end of seventh semester and completes it at the end of the eighth semester along with the courses prescribed for study in the eighth semester. However a student who has registered and successfully completed the courses of eighth semester by acquiring additional credits in the earlier semesters can attempt to spend his/her period of study in an industry and complete his/her project work, submit the project report and appear for viva-voce examination at the end of eighth semester.

11. Mandatory Induction program

A 3-week long induction program for the UG students entering the institution, right at the start is proposed. Normal classes start only after the induction program is over. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

Physical Activity
Creative Arts
Imparting Universal Human Values
Literary Activities
Conduct of crash courses on soft skills
Lectures by Eminent People
Visits to Local Area
Familiarization to Dept./Branch & Innovative practices

12. Electives

The elective courses fall under two basic categories: Professional Electives and Open Electives.

12.1 Professional Elective courses

The Professional Elective courses are offered in the concerned branch of specialization

and a student can choose the Professional Elective courses with the approval of the Head of the Department concerned.

12.2 Open Elective courses

Apart from the various Professional elective courses, a student must study three open elective courses two of which offered by the Department concerned and the other open elective course offered by any other Department in the Faculty of Engineering & Technology during either sixth or seventh or eighth semester of study, with the approval of the Head of the Department and the Head of the Department offering the course.

12.3 MOOC (SWAYAM) Courses

Further, the student can be permitted to earn not more than 20 % of his total credits (that is 32 credits) by studying the Massive Open Online Courses offered through the SWAYAM Portal of UGC with the approval of the Head of the Department concerned. These courses will be considered as equivalent to the professional elective and/or open elective courses. Thus the credit earned through MOOC courses can be transferred and considered for awarding Degree to the student concerned.

12.4 Value added courses (Inter Faculty Electives)

Of the four open elective courses, a student must study one value added course that is offered by other Faculties in our University either in sixth or seventh semester of the B.E programme.

12.5 One Credit Courses

One credit courses shall be offered by a Department with the prior approval from the Dean, Faculty of Engineering and Technology.

12.5.1 Industry Expert

For one credit courses, a relevant potential topic may be selected by a committee consisting of the Head of the Department concerned and the Board of Studies member from the Department and a senior faculty member from the Department concerned. An expert from industry familiar with the topic chosen may be accordingly invited to handle classes for the students. The details of the syllabus, time table and the name of the industrial expert may be sent by the above committee to the Dean for approval. The credits earned through the one credit courses shall be over and above the total credit requirement prescribed in the curriculum for the award of the degree. Students can take a maximum of two one credit courses (one each in VI and VII semesters). They shall be allowed to take one credit courses offered in other Departments with the permission of Head of the Department offering the courses. A separate mark sheet shall be issued for one credit courses.

12.5.2 NSQF Courses

A student can be permitted to acquire additional credits not more than two by undergoing any two of the one credit courses conducted under the auspices of National Skills Qualification Framework (NSQF). NSQF is a nationally integrated education and competency based skill and quality assurance framework that will provide for multiple pathways, horizontal as well as vertical, including vocational education, vocational training, general education and technical education, thus linking one level of learning to another higher level. This will enable a student to

acquire desired competency levels, transit to the job market and at an opportune time, return for acquiring additional skills to further upgrade their competencies.

13. Assessment

13.1 Theory Courses

The break-up of continuous assessment and examination marks for theory courses is as follows:

First assessment (Mid-Semester Test-I)	:	10 marks
Second assessment (Mid-Semester Test-II)	:	10 marks
Third Assessment	:	5 marks
End Semester Examination	:	75 marks

13.2 Practical Courses

The break-up of continuous assessment and examination marks for Practical courses is as follows:

First assessment (Test-I)	:	15 marks
Second assessment (Test-II)	:	15 marks
Maintenance of record book	:	10 marks
End Semester Examination	:	60 marks

13.3 Project Work

The continuous assessment marks for the project work will be 40 and to be assessed by a review committee consisting of the project guide and a minimum of two members nominated by the Head of the Department. One of the committee members will be nominated as the Chairman by the Head of the Department. The Head of the Department may be a member or the Chairman. At least two reviews should be conducted during the semester by the review committee. The student shall make presentation on the progress made before the committee. 60 marks are allotted for the project work and viva voce examination at the end of the semester.

13.4 Industrial Internship

After attending the internship during the summer vacation of even semester (II / IV / VI semester), the student has to present a report at the start of the subsequent odd semester (III / V / VII semester) to the committee which will assess and award marks out of 100. The committee is constituted with an Internship Coordinator and a minimum of two members nominated by the Head of the Department for each class.

14. Substitute Assessment

A student, who has missed, for genuine reasons accepted by the Head of the Department, one or more of the assessments of a course other than the final examination, may take a substitute assessment for any one of the missed assessments. The substitute assessment must be completed before the date of the third meeting of the respective class committees.

A student who wishes to have a substitute assessment for a missed assessment must apply to the Dean / Head of the Department within a week from the date of the missed assessment.

15. Student Counsellors (Mentors)

To help the students in planning their course of study and for general advice on the academic programme, the Dean / Head of the Department will attach a certain number of students to a member of the faculty who shall function as student counsellor for those students throughout their period of study. Such student counsellors shall advise the students, give preliminary approval for the courses to be taken by the students during each semester and obtain the final approval of the Dean / Head of the Department.

16. Class Committee

For all the branches of study during the first two semesters, a common class committee will be constituted by the Dean of the faculty. From among the various teachers teaching the same common course to different classes during each semester of the first year, the Dean shall appoint one of them as course coordinator. The composition of the class committee during first and second semesters will be as follows:

- Course coordinators of all courses.
- All the Heads of the Sections, among whom one may be nominated as Chairman by the Dean.
- The Dean may opt to be a member or the Chairman.

For each of the higher semesters, separate class committees will be constituted by the respective Head of the Departments. The composition of the class committees from third to eighth semester will be as follows:

- Teachers of the individual courses.
- A seminar coordinator (for seventh semester only) shall be appointed by the Head of the Department
- A project coordinator (for eighth semester only) shall be appointed by the Head of the Department from among the project supervisors.
- One Professor or Associate Professor, preferably not teaching the concerned class, appointed as Chairman by the Head of the Department.
- The Head of the Department may opt to be a member or the Chairman.

The class committee shall meet three times during the semester. The first meeting will be held within two weeks from the date of class commencement in which the type of assessment like test, assignment etc. for the third assessment and the dates of completion of the assessments will be decided.

The second meeting will be held within a week after the completion of the first assessment to review the performance and for follow-up action.

The third meeting will be held after all the assessments but before the University semester examinations are completed for all the courses, and at least one week before the commencement of the examinations. During this meeting the assessment on a maximum of 25 marks for theory/40 marks for seminar/ industrial training, practical and project work will be finalized for every student and tabulated and submitted to the Head of the Department (to the Dean in the case of I & II Semester) for approval and transmission to the Controller of Examinations.

17. Attendance requirements

The students with 75% attendance and above are permitted to appear for the University examinations. However, the Vice Chancellor may give a rebate / concession not exceeding 10% in attendance for exceptional cases only on Medical Grounds.

18. Temporary break of study

A student is permitted to go on break of study for a maximum period of one year either as two breaks of one semester each or a single break of one year.

If a student wishes to apply for break of study, the student shall apply to the Dean in advance, in any case, not later than the last date of the first assessment period.

The application duly filled by the student shall be submitted through the Head of the Department. In the case of short term employment/ training/ internship, the application for break of study shall be approved and forwarded by the Head of the Department concerned to the Dean.

However, the student must complete the entire programme within the maximum period of seven years.

19. Procedure for withdrawing from the Examinations

A student can withdraw from all the examinations of the semester only once during the entire programme on valid grounds accepted by the University. Such withdrawal from the examinations of a semester will be permitted only if the candidate applies for withdrawal at least 24 hours before the commencement of the last examination. The letter grade 'W' will appear in the mark sheet for such candidates.

20. Passing and declaration of examination results

All assessments of all the courses on an absolute marks basis will be considered and passed by the respective results passing boards in accordance with the rules of the University. Thereafter, the Controller of Examinations shall convert the marks for each course to the corresponding letter grade as follows, compute the Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), and prepare the mark sheets.

90 to 100 marks	:	Grade 'S'
80 to 89 marks	:	Grade 'A'
70 to 79 marks	:	Grade 'B'
60 to 69 marks	:	Grade 'C'
55 to 59 marks	:	Grade 'D'
50 to 54 marks	:	Grade 'E'
Less than 50 marks	:	Grade 'RA'
Withdrawn from the examination	:	Grade 'W'

A student who obtains less than 30 / 24 marks out of 75 / 60 in the theory / practical examinations respectively or is absent for the examination will be awarded grade RA.

A student who earns a grade of S, A, B, C, D or E for a course, is declared to have successfully completed that course. Such a course cannot be repeated by the student.

A student who is detained for lack of attendance must re-register for and repeat the courses in the respective semester.

A student who obtains letter grade RA in the mark sheet must reappear for the examination of the courses except for Honours courses.

A student who obtains letter grade W in the mark sheet must reappear for the examination of the courses.

The following grade points are associated with each letter grade for calculating the grade point average and cumulative grade point average.

S - 10; A - 9; B - 8; C - 7; D - 6; E - 5; RA - 0

Courses with grade RA / W are not considered for calculation of grade point average or cumulative grade point average.

A student can apply for re-valuation of one or more of his examination answer papers within a week from the date of issue of mark sheet to the student on payment of the prescribed fee per paper. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.

After the results are declared, mark sheets will be issued to the students. The mark sheet will contain the list of courses registered during the semester, the grades scored and the grade point average for the semester.

GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the courses for the semester, divided by the sum of the number of credits for all courses taken in that semester.

CGPA is similarly calculated considering all the courses taken from the time of admission.

21. Awarding Degree

After successful completion of the programme, the degree will be awarded with the following classification based on CGPA.

21.1 Honours Degree

To obtain Honours Degree a student must earn a minimum of 186 credits within four years (144 credits within three years for lateral entry students) from the time of admission, pass all the courses in the first attempt from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students) and obtain a CGPA of 8.25 or above.

21.2 First Class with Distinction

To obtain B.E Degree First Class with Distinction, a student must earn a minimum of 166 Credits within four years (124 credits within three years for lateral entry students) from the time of admission, by passing all the courses in the first attempt from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students) and obtain a CGPA of 8.25 or above.

21.3 First Class

To obtain B.E Degree First Class, a student must earn a minimum of 166 credits within ***five*** years (124 credits within ***four*** years for lateral entry students) from the time of admission and obtain a CGPA of 6.75 or above for all the courses from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

21.4 Second Class

For Second Class, the student must earn a minimum of 166 credits within seven years (124 credits within six years for lateral entry students) from the time of admission.

21.5 B.E Degree with Minor Engineering

For Minor Engineering, the student must earn a minimum of 186 credits within four years (144 credits within three years for lateral entry students) from the time of admission, pass all the courses. The rules for awarding the B.E degree in First Class with Distinction or in First Class or in Second Class will be applicable for this also.

22. Ranking of Candidates

The candidates who are eligible to get the B.E. degree with Honours will be ranked together on the basis of CGPA for all the courses of study from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

The candidates who are eligible to get the B.E. degree in First Class with Distinction will be ranked next after those with Honours on the basis of CGPA for all the courses of study from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

The Candidates passing with First Class will be ranked next after those with distinction on the basis of CGPA for all the courses of study from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

The ranking of candidates will be done separately for each branch of study.

23. Transitory Regulations

The University shall have powers to revise or change or amend the regulations, the scheme of examinations, the courses of study and the syllabi from time to time.

Wherever there had been change of syllabi, examinations based on the existing syllabi will be conducted for three consecutive times after implementation of the new syllabi in order to enable the students to clear the arrears. Beyond that the students will have to take up their examinations in equivalent courses, as per the new syllabi, on the recommendations of the Head of the Department concerned.

DIPLOMA PROGRAMMES ELIGIBLE FOR THE B.E (LATERAL ENTRY) PROGRAMMES OFFERED IN FEAT

(FROM 2019-2020)

Sl.No.	Branches of Study	Eligible Diploma Programme (FT / PT / SW)
1.	**Chemical Engineering**	i. Petrochemical Engineering ii. Chemical Engineering iii. Environmental Engineering and Pollution Control iv. Leather Technology (Footwear) v. Leather Technology vi. Plastic Technology vii. Polymer Technology viii. Sugar Technology ix. Textile Technology x. Chemical Technology xi. Ceramic Technology xii. Petro Chemical Technology xiii. Pulp & Paper Technology xiv. Petroleum Engineering
2.	**Civil Engineering**	i. Civil Engineering ii. Civil Engineering (Architecture) iii. Environmental Engineering and Pollution Control (Full Time)
3.	**Civil and Structural Engineering.**	iv. Architectural Assistantship v. Civil Engineering (Rural Tech.) vi. Civil and Rural Engineering vii. Agricultural Engineering
4.	**Computer Science and Engineering**	i. Electronics and Communication Engineering ii. Computer Technology iii. Computer Science and Engineering iv. Information Technology v. Computer Engineering vi. Computer Networking vii. Electronics(Robotics) viii. Mechatronics Engineering
5.	**Electrical and Electronics Engineering**	i. Electrical and Electronics Engineering ii. Electronics and Communication Engg. iii. Electronics and Instrumentation Engg iv. Electronics Engineering(Instrumentation) v. Instrument Technology vi. Instrumentation and Control Engineering vii. Electrical Engineering (Instruments and Control) viii. Electrical Engineering ix. Instrumentation Technology x. Electronics (Robotics) xi. Mechatronics Engineering
6.	**Electronics and Communication Engineering**	i. Electronics and Communication Engineering ii. Computer Technology iii. Computer Science and Engineering iv. Information Technology v. Computer Engineering

Sl.No.	Branches of Study	Eligible Diploma Programme (FT / PT / SW)
		vi. Computer Networking vii. Electronics(Robotics) viii. Mechatronics Engineering ix. Electrical and Electronics Engineering x. Electronics and Instrumentation Engg
Sl.No.	**Branches of Study**	**Eligible Diploma Programme (FT / PT / SW)**
7.	**Electronics and Instrumentation Engineering**	i. Electrical and Electronics Engineering ii. Electronics and Communication Engg. iii. Electronics and Instrumentation Engg iv. Electronics Engineering(Instrumentation) v. Instrument Technology vi. Instrumentation and Control Engineering vii. Electrical Engineering (Instruments and Control) viii. Electrical Engineering ix. Instrumentation Technology x. Electronics (Robotics) xi. Mechatronics Engineering
8.	**Information Technology**	i. Electronics and Communication Engineering ii. Computer Technology iii. Computer Science and Engineering iv. Information Technology v. Computer Engineering vi. Computer Networking vii. Electronics(Robotics) viii. Mechatronics Engineering
9.	**Mechanical Engineering**	i. Mechanical Engineering ii. Mechanical and Rural Engineering iii. Mechanical Design and Drafting iv. Production Engineering v. Production Technology vi. Automobile Engineering vii. Automobile Technology viii. Metallurgy ix. Mechatronics Engineering x. Machine Tool Maintenance and Repairs xi. Tool and Die making xii. Tool Engineering xiii. Tool Design xiv. Foundry Technology xv. Refrigeration and Air Conditioning xvi. Agricultural Engineering xvii. Agricultural Technology xviii. Marine Engineering xix. Mechanical Engineering(Production) xx. Mechanical Engineering(Tool &Die) xxi. Mechanical Engineering (Foundry) xxii. Mechanical Engineering(R & A.C.) xxiii. Electronics(Robotics) xxiv. Mining Engineering xxv. Agricultural Engineering and Farm Machinery xxvi. Equipment Technology
10.	**Mechanical Engineering (Manufacturing Engineering)**	

S.No.	Branch of Study in B.E	Honours Elective Courses from Same and Allied Departments of	Minor Engineering Courses from Other Departments of
1.	Chemical Engineering	1. Chemical Engineering 2. Pharmacy 3. Electronics and Instrumentation Engineering	1. Civil Engineering 2. Mechanical Engineering 3. Electronics and Instrumentation Engg 4. Information Technology 5. Civil and Structural Engg 6. Electrical Engineering 7. Electronics and Communication Engg 8. Mechanical (Manufacturing) Engg 9. Computer Science and Engineering
2.	Civil Engineering	1. Civil Engineering 2. Civil and Structural Engg.	1. Mechanical Engineering 2. Electrical Engineering 3. Chemical Engineering 4. Computer Science and Engineering 5. Mechanical (Manufacturing) Engg 6. Electronics and Instrumentation Engg 7. Information Technology 8. Electronics and Communication Engg
3.	Civil and Structural Engineering		
4.	Computer Science and Engineering	1. Computer Science and Engg. 2. Information Technology 3. Electronics and Communication Engineering	1. Civil Engineering 2. Electronics and Instrumentation Engg 3. Electronics and Communication Engg 4. Mechanical Engineering 5. Mechanical

			(Manufacturing) Engg 6. Civil and Structural Engg 7. Electrical Engineering 8. Chemical Engineering
5.	Electrical and Electronics Engineering	1. Electrical Engineering 2. Electronics and Instrumentation Engineering 3. Electronics and Communication Engineering	1. Civil Engineering 2. Civil and Structural Engg 3. Mechanical Engineering 4. Chemical Engineering 5. Mechanical (Manufacturing) Engg 6. Computer Science and Engineering 7. Information Technology
6.	Electronics and Communication Engg.		
7.	Electronics and Instrumentation Engg.		
8.	Information Technology	1. Computer Science and Engg. 2. Information Technology 3. Electronics and Communication Engineering	1. Civil Engineering 2. Electronics and Instrumentation Engg 3. Electronics and Communication Engg 4. Mechanical Engineering 5. Mechanical (Manufacturing) Engg 6. Civil and Structural Engg 7. Electrical Engineering 8. Chemical Engineering
9.	Mechanical Engineering	1. Mechanical Engineering 2. Mechanical (Manufacturing) Engg.	1. Civil Engineering 2. Civil and Structural Engg 3. Electrical Engineering 4. Chemical Engineering 5. Computer Science and Engineering 6. Electronics and Instrumentation Engg 7. Information Technology 8. Electronics and Communication Engg
10.	Mechanical (Manufacturing) Engg.		

B.E. (FOUR YEAR) DEGREE PROGRAMME (FULL–TIME)

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM FOR FIRST YEAR B.E

COURSES OF STUDY AND SCHEME OF EXAMINATIONS (REGULATION 2018-19)

SEMESTER I									
Course Code	**Category**	**Course**	**L**	**T**	**P**	**CA**	**FE**	**Total**	**Credits**
ETBS101	**BS-I**	Physics	3	1	0	25	75	100	4
ETBS102	**BS-II**	Mathematics – I	3	1	0	25	75	100	4
ETES103	**ES-I**	Basic Electrical Engineering	3	1	0	25	75	100	4
ETBP104	**BSP-I**	Physics Laboratory	0	0	3	40	60	100	1.5
ETSP105	**ESP-I**	Electrical Engineering Laboratory	0	0	2	40	60	100	1
ETSP106	**ESP-II**	Engineering Workshop/ Manufacturing Practices	1	0	4	40	60	100	3
						Total Credits			**17.5**
SEMESTER II									
Course Code	**Category**	**Course**	**L**	**T**	**P**	**CA**	**FE**	**Total**	**Credits**
ETHS201	**HS-I**	English	2	0	0	25	75	100	2
ETBS202	**BS-III**	Chemistry	3	1	0	25	75	100	4
ETES203	**ES-II**	Programming for Problem Solving	3	0	0	25	75	100	3
ETBS204	**BS-IV**	Mathematics – II	3	1	0	25	75	100	4
ETHP205	**HSP-I**	Communication Skills and Language Laboratory	0	0	2	40	60	100	1
ETBP206	**BSP-II**	Chemistry Laboratory	0	0	3	40	60	100	1.5
ETSP207	**ESP-III**	Computer Programming Lab	0	0	4	40	60	100	2
ETSP208	**ESP-IV**	Engineering Graphics and Design	1	0	4	40	60	100	3
						Total Credits			**20.5**
Students must undergo Internship for 4 weeks during summer vacation which will be assessed in the forthcoming III Semester.									

HS	Humanities and Social Sciences including Management courses
BS	Basic Science courses
ES	Engineering Science Courses
CA	Continuous Assessment Marks
FE	Final Exam Marks

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSES OF STUDY AND SCHEME OF EXAMINATIONS (REGULATION -2019)

Course Code	Category	Course	L	T	P	CA	FE	Total	Credits
S e m e s t e r – III									
ETBS301	**BS-V**	Engineering Mathematics - III	3	1	-	25	75	100	4
ETES302	**ES-III**	Environmental Studies	3	-	-	25	75	100	3
ITES303	**ES-IV**	Analog and Digital Communication	3	-	-	25	75	100	3
ITES304	**ES-V**	Basic Electronics Engineering	2	-	-	25	75	100	2
ITPC305	**PC-I**	Microprocessors and Microcontrollers	3	-	-	25	75	100	3
ITPC306	**PC-II**	Data Structures and Algorithms	3	1	-	25	75	100	4
ITSP307	**ESP-V**	Basic Electronics Engg Lab	-	-	3	40	60	100	1.5
ITCP308	**PCP-I**	Microprocessors and Microcontrollers Lab	-	-	3	40	60	100	1.5
ITCP309	**PCP-II**	Data Structures and Algorithms Lab	-	-	3	40	60	100	1.5
ETIT310	**IT-I**	Internship Inter/ Intra Institutional Activities*	***Four*** *weeks during the summer vacation at the end of* ***II Semester***				100	100	**4.0**
For the **Lateral entry students total credit for III Semester is **23.5** as they are exempted from internship during summer vacation of II semester.*							**Total Credits**		**27.5**

Course Code	Category	Course	L	T	P	CA	FE	Total	Credits
S e m e s t e r - IV									
ITBS401	**BS-VI**	Discrete Mathematics	3	-	-	25	75	100	3
ITES402	**ES-VI**	Signals and Systems	2	-	-	25	75	100	2
ITPC403	**PC-III**	Object Oriented Programming and C++	3	-	-	25	75	100	3
ITPC404	**PC-IV**	Computer Architecture	3	-	-	25	75	100	3
ITPC405	**PC-V**	Computer Networks	3	-	-	25	75	100	3
ITPC406	**PC-VI**	Database Management	3	-	-	25	75	100	3

		System							
ITCP407	**PCP-III**	Object Oriented Programming and C++ Lab	-	-	3	40	60	100	1.5
ITCP408	**PCP-IV**	Database Management System Lab	-	-	3	40	60	100	1.5
ITCP409	**PCP-V**	Computer Networks Lab	-	-	3	40	60	100	1.5
						Total Credits			**21.5**
Students must undergo Internship for 4 weeks during summer vacation which will be assessed in the forthcoming V Semester.									

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSES OF STUDY AND SCHEME OF EXAMINATIONS (REGULATION -2019)

Course Code	Category	Course	L	T	P	CA	FE	Total	Credits
S e m e s t e r - V									
ITPC501	**PC-VII**	Theory of Computation	3	-	-	25	75	100	3
ITPC502	**PC-VIII**	Digital Signal Processing	3	-	-	25	75	100	3
ITPC503	**PC-IX**	Computer Graphics and Multimedia	3	-	-	25	75	100	3
ITPC504	**PC-X**	Operating System	3	-	-	25	75	100	3
ITPE505	**PE-I**	Professional Elective-I	3	-	-	25	75	100	3
ITPE506	**PE-II**	Professional Elective-II	3	-	-	25	75	100	3
ITCP507	**PCP-VI**	Computer Graphics and Multimedia Lab	-	-	3	40	60	100	1.5
ITCP508	**PCP-VII**	Operating System Lab	-	-	3	40	60	100	1.5
ITCP509	**PCP-VIII**	Digital Signal Processing Lab	-	-	3	40	60	100	1.5
ETIT510	**IT-II**	Industrial Training / Rural Internship/Innovation / Entrepreneurship	***Four*** *weeks during the summer vacation at the end of* ***IV Semester***				100	100	**4.0**
						Total Credits			**26.5**

Course Code	Category	Course	L	T	P	CA	FE	Total	Credits
S e m e s t e r - VI									
ITPC601	**PC-XI**	Data Warehousing and Data Mining	3	-	-	25	75	100	3
ITPC602	**PC-XII**	Information Coding Techniques	3	-	-	25	75	100	3

ITPE603	**PE-III**	Professional Elective-III	3	-	-	25	75	100	3
ITPE604	**PE-IV**	Professional Elective-IV	3	-	-	25	75	100	3
ITPE605	**PE-V**	Professional Elective-V	3	-	-	25	75	100	3
YYOE606	**OE-I**	Open Elective-I	3	-	-	25	75	100	3
ITCP607	**PCP-IX**	Information Coding Techniques Lab	-	-	3	40	60	100	1.5
ITCP608	**PCP-X**	Data Mining Lab	-	-	3	40	60	100	1.5
						Total Credits			**21.0**
Students must undergo Internship for 4 weeks during summer vacation which will be assessed in the forthcoming VII Semester.									

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSES OF STUDY AND SCHEME OF EXAMINATIONS (REGULATION -2019)

Course Code	Category	Course	L	T	P	CA	FE	Total	Credits
S e m e s t e r - VII									
ETHS701	**HS-II**	Engineering Ethics	2	-	-	25	75	100	2
ITPC702	**PC-XIII**	Information System and Network Security	3	-	-	25	75	100	3
ITPE703	**PE-VI**	Professional Elective-VI	3	-	-	25	75	100	3
ITPE704	**PE-VII**	Professional Elective-VII	3	-	-	25	75	100	3
YYOE705	**OE-II**	Open Elective-II	3	-	-	25	75	100	3
ITCP706	**PCP-XI**	Network Security Lab	-		3	40	60	100	1.5
ETIT707	**IT-III**	Industrial Training / Rural Internship/Innovation / Entrepreneurship	***Four*** *weeks during the summer vacation at the end of* ***VI Semester***				100	100	**4.0**
						Total Credits			**19.5**

Course Code	Category	Course	L	T	P	CA	FE	Total	Credits
	S e m e s t e r - VIII								
ITOE801	**OE-III**	Open Elective-III (from the same dept)	3	-	-	25	75	100	3
ITOE802	**OE-IV**	Open Elective-IV (from the same	3	-	-	25	75	100	3

		dept)							
ITPV803	**PV-I**	Project Work and Viva-voce	-	PR 10	S 2	40	60	100	6
						Total Credits			**12**

L	No. of Lecture Hours	**TR**	No. of Hours for Discussion on Industrial Training
T	No. of Tutorial Hours	**S**	No. of Seminar Hours on Industrial Training / Project
P	No. of Practical Hours	**PR**	No. of Hours for Discussion on Project work
CA	Continuous Assessment Marks	**FE**	Final Examination Marks
Credits	Credit points allotted to that course	**Total**	Total Marks

DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

To produce globally competent, quality technocrats, to inculcate values of leadership and research qualities and to play a vital role in the socio – economic progress of the nation.

MISSION

- To partner with the University community to understand the information technology needs of faculty, staff and students
- To develop dynamic IT professionals with globally competitive learning experience by providing high class education
- To involve graduates in understanding need based Research activities and disseminate the knowledge to develop entrepreneur skills

PROGRAMME EDUCATIONAL OBJECTIVES

1. To offer students with core competence in mathematical, scientific and basic engineering rudiments necessary to prepare, analyze and solve hardware/software engineering problems and/or also to pursue advanced study or research.
2. To educate students with good scope of knowledge in core areas of IT and related engineering so as to comprehend engineering tradE-offs, analyze, design, and synthesize data and technical concepts to create novel products and solutions for the real life problems.
3. To instil in students to maintain high proficiency and ethical standards, effective oral and written communication skills, to work as part of teams on multidisciplinary projects and diverse professional environments, and relate engineering issues to the society, global economy and to emerging technologies.
4. To deliver our graduates with learning environment awareness of the life-long learning needed for a successful professional career and to introduce them to written ethical codes and guidelines, perform excellence, leadership and demonstrate good citizenship.

B.E. INFORMATION TECHNOLOGY

PROGRAMME OUTCOMES

After the successful completion of the B.E. Information Technology degree programme, the students will be able to:

PO 1: Capability to apply knowledge of mathematics, Science, Engineering fundamentals and core IT skills to the solution of complex engineering problems.

PO 2: Identify, articulate, research literature and analyze complex engineering problems in IT.

PO 3: Design and develop software solutions for complex problems in data engineering, distributed systems and information systems.

PO 4: Use research based knowledge and methodologies in the design and conduct of experiments, organization, analyze and interpretation of data to identify patterns, produce meaningful conclusion and recommendation for complex problems.

PO 5: Create, select and apply appropriate techniques, resources and modern engineering and IT tools to complex engineering problems.

PO 6: Apply reasoning informed by the contextual knowledge to societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Understand the impact if the professional engineering solution in societal and environmental context and demonstrate the knowledge and need for sustainable development.

PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice in managing information technology.

PO 9: Function effectively as an individual and as a member or leader in diverse teams to deliver reports and projects.

PO 10: Communicate effectively in complex engineering activities. Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological changes.

Mapping Programme Educational Objectives (PEOs) with Programme Outcomes (POs)				
	PEO1	PEO2	PEO3	PEO4
PO1	✓	✓		✓
PO2	✓	✓		✓
PO3	✓	✓		
PO4		✓		
PO5	✓	✓	✓	
PO6			✓	✓
PO7			✓	✓
PO8	✓	✓	✓	✓
PO9	✓	✓	✓	✓
PO10	✓	✓	✓	✓

LIST OF PROFESSIONAL ELECTIVES

S. NO	CODE	COURSE
1.	ITPESCN	Java Programming
2.	ITPESCN	Perl Programming
3.	ITPESCN	Python Programming
4.	ITPESCN	Linear Integrated Circuits
5.	ITPESCN	Software Engineering
6.	ITPESCN	Distributed Objects
7.	ITPESCN	Service Oriented Architecture
8.	ITPESCN	Digital Image Processing
9.	ITPESCN	Business Intelligence and Its Applications
10.	ITPESCN	Free and Open Source Software
11.	ITPESCN	Object Oriented Analysis and Design
12.	ITPESCN	System Software and Compiler Design
13.	ITPESCN	Software Testing and Quality Assurance
14.	ITPESCN	Mobile Communication
15.	ITPESCN	Optical Communication
16.	ITPESCN	Mobile Adhoc and Wireless Sensor Networks
17.	ITPESCN	GIS and Remote Sensing
18.	ITPESCN	Cloud Computing
19.	ITPESCN	Parallel and distributed computing
20.	ITPESCN	Software Defined Networks
21.	ITPESCN	Web technology
22.	ITPESCN	Wireless communication
23.	ITPESCN	Robotics and Automation
24.	ITPESCN	Satellite Communication
25.	ITPESCN	Distributed Systems
26.	ITPESCN	Information Retrieval
27.	ITPESCN	Compiler Design

LIST OF OPEN ELECTIVES

S.NO	CODE	COURSE
1.	ITOESCN	Enterprise Resource Planning
2.	ITOESCN	E-Commerce
3.	ITOESCN	Bioinformatics
4.	ITOESCN	Supply Chain Management
5.	ITOESCN	Cyber Forensics
6.	ITOESCN	System Modeling and Simulation
7.	ITOESCN	Social Network Analytics
8.	ITOESCN	Soft Computing Techniques
9.	ITOESCN	Knowledge Management
10.	ITOESCN	Project Management
11.	ITOESCN	Product Design
12.	ITOESCN	Organizational Behaviour and Management

LIST OF HONOURS ELECTIVES

S.NO	CODE	COURSE	Credits
1.	ITHESCN	Internet of Things	**4**
2.	ITHESCN	Machine Learning Techniques	**4**
3.	ITHESCN	Speech signal processing	**3**
4.	ITHESCN	Big Data technologies	**3**
5.	ITHESCN	Neural Networks and Deep Learning	**3**
6.	ITHESCN	Data Analytics	**3**

LIST OF MINOR ENGINEERING ELECTIVES

S.NO	CODE	COURSE	Credits
•	ITMISCN	Introduction to Information Technology	**3**
•	ITMISCN	Fundamentals of Object Oriented Programming	**3**
•	ITMISCN	Data Communication and Computer Networks	**4**
•	ITMISCN	Basics of Computer Graphics and Multimedia	**3**
•	ITMISCN	Information Security	**3**
•	ITMISCN	Fundamentals of Data Mining	**4**

SYLLABUS FOR B.E. (INFORMATION TECHNOLOGY)

THIRD SEMESTER

ETBS301	ENGINEERING MATHEMATICS – III	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES

- To learn, partial differential equations, Fourier series, Boundary value problems.
- To learn the transforms such as Sine, Cosine, Fourier transform and Z–transforms.
- To gain knowledge of the method to find the Solution of difference equations.

Unit–I

Partial Differential Equations – Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Solution of standard type of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second order with constant coefficients.

Unit–II

Fourier Series – Dirichle's conditions – General Fourier series – Odd and Even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's identity.

Unit–III

Boundary value problems – Solutions of one dimensional wave equation – One dimensional heat equation (without derivation) – Fourier series solutions in Cartesian co-ordinates.

Unit–IV

Fourier Transform – Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

Unit–V

Z – Transform – Elementary properties – Inverse Z – Transform – Convolution theorem – Solution of difference equations using Z – Transform.

TEXT BOOKS

1. Kandasamy P, Tilagavathy K and Gunavathy K, "Engineering Mathematics", 6thedition, (Vol I & II) S.Chand& Co Ltd. 2006, New Delhi.
2. Ventakataraman M K, "Engineering Mathematics", The National Publishing Co., Chennai, 2003.

REFERENCES

1. Veerarajan T, "Engineering Mathematics", 3rd edition, Tata McGraw Hill Pub., 2005.
2. Singaravelu A, "Engineering Mathematics", Meenakshi Publications, Chennai, 2004.

COURSE OUTCOMES

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

1. Solve partial differential equations and Fourier series problems.
2. Understand Fourier transform and Z–transforms.
3. Solve boundary value problems.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓		✓		✓					
CO2	✓			✓	✓				✓	
CO3	✓	✓			✓	✓				

ETES302	**ENVIRONMENTAL STUDIES**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To make the students conversant with basic principles of natural resources, forest resources, ecosystem and bio-diversity.
- To get knowledge about pollution and its control.
- To know about the importance of Information Technology in Environment and Human health.

Unit–I

Introduction – Multidisciplinary nature of environmental studies – Definition, scope and importance – Need for public awareness.

Natural resources – Forest resources: use and over–exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources: Use and over–utilization of surface and ground water, floods, drought, conflicts over water, daMS-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer–pesticide problems, Energy resources: Growing energy needs, renewable and Non-renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources– Equitable use of resources for sustainable lifestyles.

Unit–II

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological – pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem – Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit–III

Introduction – Definition: genetic, species and ecosystem diversity – Bio geographical classification of India – Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega–diversity nation – Hot–spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man–wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In–situ and Ex–situ conservation of biodiversity

Unit–IV

Definition – Cause, effects and control measures of Air pollution – Water pollution – Soil pollution – Marine pollution– Noise pollution – Thermal pollution – Nuclear hazards– Solid waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Disaster management : floods, earthquake, cyclone and landslides. Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, and watershed management – Resettlement and rehabilitation of people; its problems and concerns. – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation.

Unit–V

Population growth, variation among nations – Population explosion – Family Welfare Programme-Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare-Role of Information Technology in Environment and human health –Case Studies.

TEXT BOOKS

1. Agarwal, K.C., 2001. Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R).

REFERENCES

1. Brunner R.C., 1989, ***Hazardous Waste Incineration***, McGraw Hill Inc. 480p.
2. Clark R.S., ***Marine Pollution***, Clanderson Press Oxford.
3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, ***Environmental Encyclopaedia***, Jaico Publ. House, Mumbai, 1196p.
4. De A.K., ***Environmental Chemistry***, Wiley Eastern Ltd.
5. ***Down to Earth***, Centre for Science and Environment.
6. Gleick, H.P. 1993. ***Water in crisis***, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p.
7. Hawkins R.E., ***Encyclopaedia of Indian Natural History***, Bombay Natural History Society, Bombay.

8. Heywood, V.H & Waston, R.T. 1995. ***Global Biodiversity Assessment***. Cambridge Univ. Press 1140p.
9. Jadhav, H & Bhosale, V.M. 1995. ***Environmental Protection and Laws***. Himalaya Pub. House, Delhi 284 p.
10. Mckinney, M.L. & School, R.M. 1996. ***Environmental Science systems & Solutions***, Web enhanced edition. 639p.
11. Mhaskar A.K., ***Matter Hazardous***, Techno–Science Publication.
12. Miller T.G. Jr. ***Environmental Science***, Wadsworth Publishing Co.
13. Odum, E.P. 1971. ***Fundamentals of Ecology***. W.B. Saunders Co. USA, 574p.
14. Rao M N. & Datta, A.K. 1987. ***Waste Water treatment***. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
15. Sharma B.K., 2001. ***Environmental Chemistry***. Geol Publ. House, Meerut.
16. Survey of the Environment, The Hindu (M).
17. Townsend C., Harper J, and Michael Begon, ***Essentials of Ecology***, Blackwell Science.
18. Trivedi R.K., ***Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards***, Vol I and II, Enviro Media (R).
19. Trivedi R. K. and P.K. Goel, ***Introduction to air pollution***, Techno–Science Publication.
20. Wanger K.D., 1998 ***Environmental Management***. W.B. Saunders Co. Philadelphia, USA 499p.

COURSE OUTCOMES

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

1. To conversant with basic principles of natural resources, forest resources
2. To conversant with basic principles of ecosystem and bio–diversity
3. To identify the causes of pollution and its control measures

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1		✓								
CO2		✓					✓			✓
CO3						✓				

ITES303	**ANALOG AND DIGITAL COMMUNICATION**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To emphasize the fundamentals of analog and digital communication systems.
- To explore the various modulation techniques of digital transmission.
- To provide the basic ideas about synchronous and asynchronous communication, error detection, control and correction techniques.

- To study about the working of low–speed and high–speed modems.

Unit–I

Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

Unit–II

Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.

Unit–III

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM),Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

Unit–IV

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

Unit–V

Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.

TEXT BOOKS

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.

REFERENCES

1. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
2. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering'', John Wiley, 1965.
3. Barry J. R., Lee E. A. and Messerschmitt D. G., "Digital Communication'', Kluwer Academic Publishers, 2004.
4. Proakis J.G., ``Digital Communications'', 4th Edition, McGraw Hill, 2000.

COURSE OUTCOMES

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

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance

4. Analyze different digital modulation schemes and can compute the bit error performance

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓						
CO2	✓	✓	✓							
CO3	✓	✓	✓	✓	✓	✓	✓		✓	
CO4	✓	✓			✓					

ITES304	**BASIC ELECTRONICS ENGINEERING**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

COURSE OBJECTIVES

- To understand the fundamentals of semiconductor devices, transistors and amplifiers
- To introduce the laws of Boolean algebra and solve problems in combinational logic
- To explain sequential logic and memory circuits and systems

Unit–I

Semiconductor Devices: Review of behaviour of PN junction diode-Characteristics–piecewise linear model of a diode-Applications – Rectifier circuits – filters – critical inductance and bleeder resistance-Zener diode-principle of operation – characteristics – Zener diode as a voltage regulator. Principle of operation, characteristics and applications of FET, UJT, SCR, IGBT.

Unit–II

Transistors: Bipolar junction transistor–Current components – CB, CE, CC, Configuration–input and output characteristics– Transistor biasing and thermal stabilization – Transistor as an amplifier– Classification of amplifiers – Low frequency response of a RC coupled amplifier and influence of bypass capacitor. Transformer coupled amplifier– Power amplifiers–Classification–class A, B, AB–single ended, push pull configurations–power dissipation–output power, efficiency, distortion–complementary symmetry.

Unit–III

Feedback And Differential Amplifiers: Positive and negative feedback – Effects of negative feedback– Loop gain–Types of negative feedback. Oscillators – Requirements for oscillation – phaseshift oscillator –weinbridge oscillator, Hartley, Colpitts and crystal oscillator– Multivibrators– Schmitt trigger circuit–.Analysis of BJT differential amplifiers–Differential voltage gain – CMRR.

Unit–IV

Combinational Logic: Transistor as a switch – Reversible stable states – Laws of boolean algebra–Boolean expressions and logic diagrams- Negative logic – Introduction to mixed logic – Min Terms and Max Terms – Truth tables and maps –

Solving digital problems using maps – Sum of products and product of sums map reduction – Hybrid functions–Incompletely specified functions – Multiple output minimization – Implementation of Boolean expressions using AND, OR, INVERT Logic gates& Universal gates–Multiplexer – Demultiplexer – Decoder – Code converter.

Unit–V

Sequential Logic: Sequential logic – Flip–flops – Counters – Types of counters – Ripple counter design – Type T, type D and type JK design – Design using state equations – Shift registers– Asynchronous sequential circuits– Memory circuit and systems ROM, PROM, EPROM,EEPROM, RAM, DRAM – PLA,PAL architecture.

TEXT BOOKS

1. Morris Mano, "Digital Logic and Computer Design", Prentice Hall, Fourth Edition, 2013.
2. Rashid, "Microelectronic circuits", Thomson Publications, 2010.

REFERENCES

1. Floyd, "Electron Devices", Pearson Asia, 5th Edition, 2013.
2. R.P. Jain, "Modern Digital Electronics", Tata McGraw Hill, 4th Edition, 2010.
3. Donald P Leach, Albert Paul Malvino, Goutan Saha, "Digital Principles and Applications", Seventh Edition, 2010.
4. V.K. Mehta, Rohit Mehta, "Principles of Electronics", S.Chand Publications, 2005.
5. Donald A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, 5th Edition, 2007.

COURSE OUTCOMES

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

1. Acquire knowledge of diodes, rectifiers and transistors.
2. Understand the operation of amplifiers and oscillators.
3. Implement Boolean expressions using gates.
4. Design counters using flip flops.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓			✓			✓			
CO2	✓	✓	✓				✓		✓	
CO3		✓	✓	✓	✓	✓				✓
CO4		✓	✓	✓	✓				✓	

ITPC305	**MICROPROCESSORS AND MICROCONTROLLERS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To study the architecture of 8085/8086 microprocessor and other processor.
- To learn the design aspects of I/O and Memory Interfacing circuits.

- To study about communication and bus interfacing.
- To study the architecture of 8051 microcontroller.

Unit–I

Introduction to 8086 – Microprocessor architecture-Addressing modes – Instruction set and assembler directives – Assembly language programming – Modular Programming – Linking and Relocation – Stacks – Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

Unit–II

8086 Architecture –Basic Configuration – 8086 Minimum and Maximum mode configurations – Addressing modes – Basic Instructions – System bus timing – System design using 8086 – IO programming – Introduction to Multiprogramming – System Bus Structure — 8086 Interrupts – Assembly levels programming – Introduction to 80186 – 80286 – 80386 – 80486 and Pentium processors.

Unit–III

Memory Interfacing and I/O interfacing – Parallel communication interface-Serial communication interface-D/A and A/D Interface-Timer – Keyboard/display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display, LCD display, Keyboard display interface and Alarm Controller.

Unit–IV

Architecture of 8031/ 8051 – Special Function Registers (SFRs) – I/O Pins Ports and Circuits – Instruction set – Addressing modes – Assembly language programming –Introduction to 16 bit Microcontroller.

Unit–V

Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD & Keyboard Interfacing – ADC, DAC & Sensor Interfacing – External Memory Interface- Stepper Motor and Waveform generation.

TEXT BOOKS

1. Yu–Cheng Liu, Glenn A. Gibson, “Microcomputer Systems: The 8086 / 8088 Family –Architecture, Programming and Design”, Prentice Hall of India, Second Edition, 2007.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, RolinMcKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Pearson Education, Second Edition, 2011.

REFERENCES

1. Doughlas V. Hall, “Microprocessors and Interfacing, Programming and Hardware”, TMH, 2012.
2. Ramesh S. Gaonkar, “Microprocessor Architecture Programming and Applications with 8085”, Penram International Publishing, Fourth Edition, 2000.
3. Kenneth J. Ayala., “The 8051 Microcontroller Architecture Programming and Applications”, Penram International Publishing (India), 1996.

COURSE OUTCOMES

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

1. Design the programs on 8086 microprocessor.
2. Analyze the Input/output circuits.
3. Identify Memory Interfacing circuits.
4. Implement 8051 microcontroller based system.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓	✓	✓				
CO2	✓	✓	✓						✓	
CO3	✓	✓	✓	✓	✓	✓				
CO4	✓	✓	✓	✓	✓		✓	✓	✓	

ITPC306	**DATA STRUCTURES AND ALGORITHMS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

COURSE OBJECTIVES

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To enable them to write algorithms for solving problems with the help of fundamental data structures

Unit–I

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Unit–II

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit–III

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Unit–IV

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the

trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Unit–V

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

TEXT BOOKS

1. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Illustrated Edition, Computer Science Press.

REFERENCES

1. Mark Allen Weiss, "Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition, Addison-Wesley Publishing Company
2. R. G. Dromey, "How to Solve it by Computer", 2nd Impression, Pearson Education.

COURSE OUTCOMES

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

1) analyze the algorithms to determine the time and computation complexity and justify the correctness.
2) implement for a given Search problem (Linear Search and Binary Search)
3) implement for a given problem of Stacks, Queues and linked list and analyze the same to determine the time and computation complexity.
4) write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

implement Graph search and traversal algorithms and determine the time and computation complexity.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓					✓	
CO2	✓	✓	✓	✓	✓	✓				
CO3	✓			✓	✓					
CO4	✓	✓	✓	✓			✓		✓	✓
CO5		✓		✓	✓		✓		✓	✓

ITSP307	**BASIC ELECTRONICS ENGINEERING LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

COURSE OBJECTIVES

- To get familiar with basic electronic compounds such as registers, capacitor, inductor diodes, transmitters, etc.

- To text and understand the function of various electronic components.
- The student will be equipped with IC interfacing and its applications.

LIST OF EXPERIMENTS

1) Characteristics of Semiconductor Diodes.
2) Characteristics of Zener Diode.
3) Characteristics of Bipolar Junction Transistor (BJT).
4) Estimation of Ripple factor and efficiency in a full wave rectifier with and without filter.
5) Verification of logic gates using integrated chips.
6) Simplification of Boolean expressions using Karnaugh Map.
7) Verification of Digital Multiplexer and DeMultiplexer.
8) Design and Simulation of 3–bit Synchronous Counter using electronic work bench software.

COURSE OUTCOMES

At the end of this course, the student will be able to

1) Students will be able to explain basic circuit concepts and responses.
2) The student can explain the concept at capacitance, inductance and the concepts at terminal devices.
3) Familiarize with working principles, assembly and applications of IC.

ITCP308	MICROPROCESSORS AND MICROCONTROLLERS LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- The students will be able to understand the microprocessor programs and its applications.
- The students will be able to understand the architecture of 8085 and 8086 microprocessor.
- To study and understand the assembly language programming using 8085 microprocessor.
- The students will be equipped with microprocessor interfacing and its applications.

LIST OF EXERCISES

1) Study of 8085 and study of 8086 microprocessor.
2) 8–bit Arithmetic Operation.
3) 16–bit Arithmetic Operation.
4) Find the number of even and odd number in a block of data.
5) Fibonacci series
6) Hexadecimal to binary conversion.
7) Matrix Addition.
8) Sorting an array of number.

9) Searching a string
10) Digital clock
11) Square wave generation using 8253IC.
12) Stepper motor interface using 8255IC.
13) Data transfer using USART.
14) Keyboard status
15) Message display 8279IC.
16) Simulation of traffic light control signal.

COURSE OUTCOMES

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

1) Familiarize with assembly language programming.
2) Design circuits for various applications using interfaces.
3) An in– depth knowledge of applying concepts on real time applications.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓		✓							
CO2	✓	✓	✓	✓	✓	✓				
CO3	✓	✓	✓	✓		✓	✓			

ITCP309	**DATA STRUCTURES AND ALGORITHMS LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

COURSE OBJECTIVES

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

LIST OF EXERCISES

1. Array implementation of List ADT, Stack ADT, Queue ADT.
2. Implementation of Singly linked list (addition, deletion, insertion in all positions).
3. Implementation of Doubly linked list (addition, deletion, insertion in all positions).
4. Implementation of Stack and Queues using linked list.
5. Implementation of binary search technique.
6. Program for tree traversal (inorder, postorder, preorder).
7. Implementation of Quick sort, Merge sort, Shell sort.
8. Implementation of Dijkstra's algorithm.
9. Implementation of Depth First Search.
10. Applications of Linked List, Stack and Queue in real world.

FOURTH SEMESTER

ITBS401	DISCRETE MATHEMATICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Discrete Mathematics is designed to study various finite structures of Mathematics which are essential to develop the various concepts of Computer Science.
- The rise of the digital computer over the second half of the twentieth century has coincided with a growth of interest in these fields.
- Discrete Mathematics has now become a major area of Mathematics in its own right.

Unit–I

Mathematical Logic: Propositions – Connectives – Tautology and contradiction – Equivalence of prepositions – Tautological Implication – Normal Forms – Theory of Inference-Rules of Inference.

Unit–II

Set Theory and Relations: Set operations – Ordered pairs and Cartesian product – Relations – Type of relations – Operations or relations – Properties of relations – Equivalence classes – Partition of set – Matrix and Graphical representation of relation.

Unit–III

Lattice and Boolean Algebra: Partial ordered set – Hasse diagram – Lattices – Properties of Lattices – Boolean Algebra – Karnaugh map method.

Unit–IV

Group and Group code: Algebraic systems – Semi groups and Monoids – Groups – Permutation Group – Subgroups – Coding Theory – Group codes – Hamming codes – Procedure for Encoding and Decoding Group codes.

Unit–V

Graph Theory: Graphs – Special simple graphs – Matrix representation of graphs – Path cycles and connectives – Eulerian and Hamiltonian graphs – Shortest path algorithms.

TEXT BOOKS

1. Veerarajan T, “Discrete Mathematics with Graph Theory and Combinatorics”, Tata McGraw Hill Publishing Company Ltd, 2014.

REFERENCES

1. Venkataraman M K, “Discrete Mathematics”, The National Publishing Company, 2008.
2. Kolman Busby Ross, “Discrete Mathematical Structures”, Pearson Education Pvt Ltd, 2000.
3. Trembley J P and Manohar R P, “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw Hill Publishing Company Ltd, 2005.

COURSE OUTCOMES

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

1. Acquire the basic concepts in Mathematical Logic and theory of inferences.
2. Understand the concepts of Set theory, Relations and equivalence classes with matrix representation.
3. Familiarize Lattice theory, Boolean algebra and Group theory
4. Design coding and encoding group codes concept.
5. Understand the basic concepts of Graph theory, Eulerian and Hamiltonian graphs

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓			✓			✓
CO2	✓	✓	✓		✓				✓	✓
CO3	✓	✓		✓	✓	✓				
CO4	✓	✓		✓	✓				✓	✓
CO5	✓	✓					✓			

ITES402	**SIGNALS AND SYSTEMS**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

COURSE OBJECTIVES

- To introduce the fundamental ideas of signals and systems analysis and characterization.
- To provide a foundation to numerous applications that deal with signal and system concepts directly or indirectly. Application areas of signals and systems include audio and image processing, communications, control systems, machine learning, and finance.
- To serve as a central building block for students interested in further studying information processing in any form.

Unit–I

Signals and systems as seen in everydaylife, and in various branches of engineering and science.

Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability.

Unit–II

Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input output behavior with a periodic convergent inputs. Characterization of causality and stability of linear shift-invariant systems. System representation through differential equations and difference equations.

Unit–III

Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. The idea of signal space and orthogonal bases.

Unit–IV

The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior.

The z-Transform for discrete time signals and systems- eigen functions, region of convergence, z-domain analysis.

Unit–V

State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role. The Sampling Theorem and its implications- Spectra of sampled signals.

Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and its effects. Relation between continuous and discrete time systems.

TEXT BOOKS

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.
3. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.

REFERENCES

1. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, 1998.
2. Douglas K. Lindner, "Introduction to Signals and Systems", McGraw Hill International Edition, 1999.
3. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited, 1998.
4. Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems", John Wiley and Sons, 1995.
5. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", TMH, 2003.
6. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.
7. Ashok Ambardar, "Analog and Digital Signal Processing", 2nd Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company), 1999.

COURSE OUTCOMES

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

1. Analyze different types of signals
2. Represent continuous and discrete systems in time and frequency domain using different transforms
3. Investigate whether the system is stable

4. Sampling and reconstruction of a signal

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2	✓	✓	✓	✓	✓					
CO3	✓	✓	✓	✓	✓	✓	✓			
CO4	✓	✓				✓			✓	

ITPC403	**OBJECT ORIENTED PROGRAMMING AND C++**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To get a clear understanding of object–oriented concepts.
- To understand the basics of C++, objects and classes, Inheritance, Polymorphism.
- To understand the basics of I/O and file management, and advance topics including templates, exceptions and Standard Template Library.

Unit–I

Introduction: Traditional Versus Object Orientation Approach – Benefits and applications of OOP– Characteristics of Object Oriented Programming Languages: Objects – Classes – Data encapsulation – Data hiding–Inheritance-Polymorphism – Overloading– Dynamic Binding – Message Passing – Extensibility.

Unit–II

C++ Programming Basics: Overview–C++ Data Types–Basics of object and class in C++– Program structure- Member Functions and Member Variable-Techniques for Creating and Initialising Objects – Initialising and Cleaning Objects – Data Hiding – Namespace- Identifiers– Variables – Constants– Operators– Typecasting– Control structures– Loops and Decisions –Constructors and their types – Destructor – Access specifiers: Private Public and Protected members.

Unit–III

C++ Functions: Simple functions– Arguments passed by value and by reference- Overloading of functions – Constructor Overloading–Inline functions – Passing and returning of objects– friend function – Friend Classes –Static Functions – Operator Overloading: Overloading Unary Operators– Overloading Binary Operators – Data Conversion: Conversions Between Objects and Basic Types – Conversions Between Objects of Different Classes.

Unit–IV

Inheritance: Concept of Inheritance –Types of Inheritance: Single –MultiplE-Multilevel – Hierarchical –Hybrid – Virtual Functions: Normal Member Functions Accessed with Pointers – Virtual Member Functions Accessed with Pointers – Abstract Classes and Pure Virtual Functions – Virtual Destructors –Virtual Base Classes – THIS Pointer.

Unit–V

I/O and File Management, Templates, Exceptions and STL: C++ streams –C++ streams classes –Unformatted I/O Operations –Formatted console I/O Operations – Managing output with manipulators –File stream classes – Opening and Closing a Files –Finding end of file –File opening modes –File pointers and manipulators – Sequential input and Output operations –Exception Handling Fundamentals–try – catch –throw –multiple catch –Catching All Exceptions –Restricting Exceptions – Rethrowing an Exception –Implementing user defined exceptions –Overview and Use of Standard Template Library.

TEXT BOOKS

1. Robert Lafore, "Object – Oriented Programming in C++", Sams Publication, Fourth Edition, 2002.
2. Balagurusamy, E., "Object Oriented Programming with C++", Tata McGraw–Hill Publication, 2013.

REFERENCES

1. Herbert Schildt, "The Compete Reference C++" , Tata McGraw–Hill Publication, Third Edition, Fourth Edition,1998.
2. Safee Vohra, "Object Oriented Programming with C++", Bookrent.in Publication, First Edition, 2015.
3. M.T. Guru, D.S. Nagendraswamy, H.S. Manjunatha, K.S. Somashekara, "Object Oriented Programming with C++", PHI Publication, Second Edition, 2012.
4. R.S. Salaria, “Mastering Object Oriented Programming with C++”, Khanna Publishing House, New Delhi.
5. D. Samantha, “Object Oriented Programming in C++ and Java”, PHI.

COURSE OUTCOMES

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

1. Analyze and design a computer program based on Object Oriented Principles.
2. Solve a real world problems based on Object Oriented Principles.
3. Gain the basic knowledge on Object Oriented concepts.
4. Develop applications using Object Oriented Programming Concepts.
5. Implement features of object oriented programming to solve real world problems.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓							
CO2	✓	✓	✓	✓	✓	✓				
CO3	✓	✓								
CO4	✓			✓		✓	✓			
CO5	✓		✓	✓		✓		✓		

ITPC404	COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

To expose the students to the following :

- Instruction Level Architecture and Instruction Execution
- The current state of art in memory system design
- How I/O devices are accessed and its principles.
- Concepts of advanced pipelining techniques.

Unit–I

Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Queues, Subroutines.

Unit–II

Processor organization, Information representation, number formats. Multiplication & division, ALU design, Floating Point arithmetic, IEEE 754 floating point formats.

Unit–III

Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit. Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit. Microprogrammed computers - CPU control unit.

Unit–IV

Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory.

Unit–V

System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces

Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network

TEXT BOOKS

1. V.Carl Hammacher, “Computer Organisation”, Fifth Edition.
2. A.S.Tanenbum, “Structured Computer Organisation” , PHI, Third edition

REFERENCES

1. Y.Chu, "Computer Organization and Microprogramming”, II, Englewood Chiffs, N.J., Prentice Hall Edition
2. M.M.Mano, “Computer System Architecture”, Edition
3. C.W.Gear, “Computer Organization and Programming”, McGraw Hill, N.V. Edition
4. Hayes J.P, “Computer Architecture and Organization”, PHI, Second edition

COURSE OUTCOMES

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

1. learn how computers work
2. know basic principles of computer's working
3. analyze the performance of computers
4. know how computers are designed and built
5. Understand issues affecting modern processors (caches, pipelines etc.).

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓		✓		✓	✓				
CO2	✓	✓	✓	✓						
CO3	✓	✓	✓	✓		✓			✓	✓
CO4	✓	✓	✓	✓	✓			✓		
CO5	✓	✓	✓	✓	✓	✓				

ITPC405	**COMPUTER NETWORKS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- To provide an opportunity to do network programming
- To provide a WLAN measurement ideas.

Unit–I

Data communication Components: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

Unit–II

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA

Unit–III

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Unit–IV

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

Unit–V

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

TEXT BOOKS

1. Behrouz A. Forouzan, "Data Communication and Networking", 4th Edition, McGraw- Hill.
2. William Stallings, "Data and Computer Communication", 8th Edition, Pearson Prentice Hall India.

REFERENCES

1. Andrew S. Tanenbaum, "Computer Networks", 8th Edition, Pearson New International Edition.
2. Douglas Comer, "Internetworking with TCP/IP", Volume 1, 6th Edition Prentice Hall of India.
3. W. Richard Stevens, "TCP/IP", Illustrated, Volume 1, Addison-Wesley, United States of America.

COURSE OUTCOMES

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

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
4. For a given problem related TCP/IP protocol developed the network programming.
5. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓							
CO2	✓	✓				✓			✓	
CO3	✓	✓	✓	✓	✓		✓			
CO4	✓	✓	✓	✓	✓		✓			✓
CO5	✓	✓	✓	✓	✓		✓		✓	

ITPC406	DATA BASE MANAGEMENT SYSTEM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.

Unit–I

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit–II

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit–III

Storage strategies: Indices, B-trees, hashing.

Unit–IV

Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit–V

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, 6th Edition, McGraw-Hill.

REFERENCES

1. J. D. Ullman, “Principles of Database and Knowledge – Base Systems”, Vol 1, Computer Science Press.

2. R. Elmasri and S. Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education
3. Serge Abiteboul, Richard Hull, Victor Vianu, "Foundations of Databases", Addison-Wesley

COURSE OUTCOMES

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

1. Write relational algebra expressions for a given query and optimize the developed expressions
2. Design the databases using E_R method and normalization, for a given specification of the requirement.
3. Construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2 for a given specification.
4. Optimize its execution using Query optimization algorithms for a given query
5. Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓					✓				✓
CO2	✓	✓	✓	✓		✓			✓	
CO3	✓	✓			✓			✓		
CO4	✓	✓	✓	✓	✓					
CO5	✓	✓	✓	✓	✓	✓				✓

ITCP407	**OBJECT ORIENTED PROGRAMMING AND C++ LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

COURSE OBJECTIVES

The student should be made to:

- Be familiar with the main features of C++ language
- Understands Object Oriented Programming paradigm
- Be able to test and debug C++ programs
- Able to apply Object Oriented Programming concepts in solving software problems

LIST OF EXERCISES

1. Classes and Objects

1. write a C++ program that uses a class where the member functions are defined inside a class.
2. write a C++ program that uses a class where the member functions are defined outside a class.
3. write a C++ program to demonstrate the use of static data members.
4. write a C++ program to demonstrate the use of const data members.

2.Constructors and Destructors

1. write a C++ program to demonstrate the use of zero argument and parameterized constructors.
2. write a C++ program to demonstrate the use of dynamic constructor.
3. write a C++ program to demonstrate the use of explicit constructor.

3.Initializer Lists

1. write a C++ program to demonstrate the use of initializer list.

4.Operator Overloading

2. write a C++ program to demonstrate the overloading of increment and decrement operators.
3. write a C++ program to demonstrate the overloading of binary arithmetic operators.
4. write a C++ program to demonstrate the overloading of memory management operators.
5. Typecasting
6. write a C++ program to demonstrate the typecasting of basic type to class type.
7. write a C++ program to demonstrate the typecasting of class type to basic type.
8. write a C++ program to demonstrate the typecasting of class type to class type.

6.Inheritance

1) write a C++ program to demonstrate the multilevel inheritance.
2) write a C++ program to demonstrate the multiple inheritance.
3) write a C++ program to demonstrate the virtual derivation of a class.

7.Polymorphism

1) write a C++ program to demonstrate the runtime polymorphism.

8.Exception Handling

1) write a C++ program to demonstrate the exception handling.

9.Templates and Generic Programming

1) write a C++ program to demonstrate the use of function template.
2) write a C++ program to demonstrate the use of class template.

10.File Handling

1) write a C++ program to demonstrate the reading and writing of objects.
2) write a C++ program to demonstrate the reading and writing of mixed type of data.
3) write a C++ program to copy the contents of a file to another file byte by byte.

ITCP408	DATABASE MANAGEMENT SYSTEM LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- To understand basic database concepts, including the structure and operation of the relational data model.
- To construct simple and moderately advanced database queries using Structured Query Language (SQL).
- To understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- To design and implement a small database project using Microsoft Access.

LIST OF EXERCISES

1) Implementation of queries for student data base
2) Data Definition Language-with constraint and without constraint
3) Data Manipulation language-Insert, Delete, Update, Select and truncate
4) Transaction Control Statement – Commit, Save point, Roll back
5) Data Control Statement – Grant, Revoke
6) Data Projection Statement – Multi column, alias name, arithmetic operations, distinct records, concatenation, where clause
7) Data Selection Statement – Between, and, not in, like, relational operators and logical operators
8) Aggregate functions – count, maximum, minimum, sum, average, order by, group by, having
9) Joint queries – inner join, outer join, selfjoin, Cartesian join, or cross join
10) Sub queries – in, not in, some, any, all, exist, not exist
11) Set operations – union, union all, intersect, minus
12) Database objects – synonym, sequences, views and index
13) Cursor
14) Functions and procedures
15) Trigger
16) Exceptions
17) Packages
18) Factorial of a number
19) Checking whether a number is prime or not
20) Fibonacci series
21) Reverse the string
22) Swapping of numbers
23) Odd or even number
24) Duplication of records

ITCP409	COMPUTER NETWORKS LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- To understand the working principle of various communication protocols.
- To analyze the various routing algorithms.
- To know the concept of data transfer between nodes.

LIST OF EXERCISES

1) Implementation of a socket program for Echo/Ping/Talk commands.
2) Creation of a socket between two computers and enable file transfer between them. Using (a.) TCP (b.) UDP
3) Implementation of a program for Remote Command Execution (Two M/Cs may be used).
4) Implementation of a program for CRC and Hamming code for error handling.
5) Writing a code for simulating Sliding Window Protocols.
6) Create a socket for HTTP for web page upload & Download.
7) Write a program for TCP module Implementation.(TCP services).
8) Write a program to implement RCP (Remote Capture Screen).
9) Implementation (using NS2/Glomosim) and Performance evaluation of the following routing protocols:
    a. Shortest path routing
    b. Flooding
    c. Link State
    d. Hierarchical
10) Broadcast /Multicast routing.
11) Implementation of ARP.
12) Throughput comparison between 802.3 and 802.11.
13) Study of Key distribution and Certification schemes.
14) Design of an E-Mail system
15) Implementation of Security Compromise on a Node using NS2 / Glomosim
16) Implementation of Various Traffic Sources using NS2 / Glomosim

FIFTH SEMESTER

ITPC501	THEORY OF COMPUTATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Understand various computing models like Finite State Machine, Pushdown Automata and Turing Machine.
- Be aware of decidability and un–decidability of various problems.
- Learn types of grammars, tractable and intractable problems.

Unit–I

Finite Automata**:** Introduction– Basic Mathematical Notation and techniques– Finite State systems – Basic Definitions – Finite Automaton – DFA and NDFA – Finite Automaton with €– moves –Regular Languages– Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA's with and without €–moves – Equivalence of finite Automaton and regular expressions –Minimization of DFA– – Pumping Lemma for Regular sets – Problems based on Pumping Lemma.

Unit–II

Grammars**:** Grammar Introduction– Types of Grammar – Context Free Grammars and Languages–Derivations and Languages – Ambiguity– Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols – UNIT productions – Null productions – Greibach Normal form – Chomsky normal form – Problems related to CNF and GNF.

Unit–III

Pushdown Automata: Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Equivalence of Pushdown automata and CFL – pumping lemma for CFL – problems based on pumping Lemma.

Unit–IV

Turing Machines : Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing machine construction – Multi head and Multi tape Turing Machines – The Halting problem – Partial Solvability – Problems about Turing machine-Chomskian hierarchy of languages.

Unit–V

Unsolvable Problems and Computable Functions: Primitive recursive functions – Recursive and recursively enumerable languages – Universal Turing machine. Measuring and Classifying Complexity: Tractable and Intractable problems - Tractable and possibly intractable problems – P and NP completeness – Polynomial time reductions.

TEXT BOOKS

1) Hopcroft, J.E., Motwani R. and Ullman J.D, "Introduction to Automata Theory, Languages and Computations", Pearson Education, Second Edition, 2008 (Unit 1, 2, 3).
2) John C. Martin, "Introduction to Languages and the Theory of Computation", Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2007 (Unit 4, 5).

REFERENCES

1) Mishra, K.L.P. and Chandrasekaran, N., "Theory of Computer SciencE-Automata, Languages and Computation", Prentice Hall of India, Third Edition, 2004.
2) Harry R. Lewis and Christos H. Papadimitriou, "Elements of the Theory of Computation", Pearson Education, Second Edition, New Delhi, 2003.
3) Peter Linz, "An Introduction to Formal Language and Automata", Narosa Publishers, Third Edition, New Delhi, 2002.
4) Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education, 2009.

COURSE OUTCOMES

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

1) Design Finite state Machine, Pushdown Automata and Turing Machine.
2) Explain the decidability or undecidability of various problems.
3) Explain the concept of different types of grammars.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓	✓				✓	
CO2	✓	✓	✓	✓	✓		✓			✓
CO3	✓	✓	✓	✓		✓		✓		✓

ITPC502	**DIGITAL SIGNAL PROCESSING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To study the basic components of DSP systems.
- To study DFT and its computation.
- To study the design techniques for digital filters (IIR & FIR).
- To study the finite word length effects and applications in signal processing.

Unit–I

Basic Elements of Digital Signal Processing Systems – Classification of Signals – The concept of frequency in Continuous time and Discrete time domain –

DiscretE-time Signals and Systems – Analysis of Discrete Time-Linear Shift–Invariant Systems – Linearity – Causality and Stability criterion. Discrete-time Systems described Difference Equation – Correlation of Discrete-Time Signals.

Unit–II

Introduction to DFT – Properties of DFT – Filtering methods based on DFT – Relation between DTFT and DFT – FFT computations using Decimation in time and Decimation in frequency algorithms – Overlap–add and save methods.

Unit–III

General Consideration – Design of IIR filters – IIR Filter Design by Impulse Invariance & Bilinear Transformation – pre warping – Realization using direct, cascade and parallel forms – Design of Linear Phase FIR Filters – Design of FIR filter using Windows and by Frequency Sampling Method – Frequency Transformation in the Analog Domain and Digital Domain – Realization of FIR filters – Transversal, Linear phase and Polyphase structures.

Unit–IV

Fixed point and floating point number representations – Comparison – Truncation and Rounding errors – Quantization noise-derivation for quantization noise power – coefficient quantization error – Product quantization error – Overflow error – Round off noise power – limit cycle oscillations due to product round off and overflow errors – signal scaling.

Unit–V

Multirate Signal Processing – Speech Compression – Adaptive Filter – Musical Sound Processing – Image enhancement – Applications of Multi rate signal Processing.

TEXT BOOKS

1. John G. Proakis & Dimitris G.Manolakis, "Digital Signal Processing Princ iples, Algorithms & Applications", Fourth edition, Pearson education/ Prentice Hall, 2007.
2. Alan V. Oppenheim, Ronald W.Schafer & Hohn. R.Back, "Discrete Time Signal Processing", Pearson Education, 2nd edition, 2005.

REFERENCES

1. S. Salivahanan, A. Vallavaraj, C. Gnanapriya, "Digital Signal Processing", TMH/McGraw Hill International, 2007.
2. S.K. Mitra, "Digital Signal Processing, A Computer Based approach", Tata McGraw Hill, 1998.
3. Johny R. Johnson, Introduction to Digital Signal Processing, PHI, 2006.

COURSE OUTCOMES

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

1. Design both analog and digital filters.
2. Design DSP processors.
3. Do the projects in Signal processing, Image processing and Speech Processing.

Mapping with Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓	✓	✓	✓	✓		✓		✓	
CO2	✓	✓	✓	✓	✓			✓	✓	
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	

ITPC503	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To develop, design and implement two dimensional and three dimensional graphical structures.
- To provide knowledge about transformations and clipping techniques.
- To acquire knowledge in OpenGL programming.
- To understand various aspects of multimedia and the concepts of audio, video, images and animation.

Unit–I

Introduction: Overview of Graphics System – Coordinate Representation – Graphics Output Primitives – Attributes of Graphics Primitives – Implementation Algorithms for Graphics Primitives – Introduction to OpenGL – OpenGL functions for Graphics Primitives.

Unit–II

2D Concepts: 2D Transformations – 2D Viewing – Window Viewport Transformation – Line, Polygon, Curve and Text Clipping Algorithms – OpenGL Functions for 2D Transformations and 2D Viewing.

Unit–III

3D Concepts: 3D Transformations – 3D Viewing – 3D Object Representations – Spline Representation – Visible Surface Detection Methods – Color Models – OpenGL Functions for 3D Transformations and 3D Viewing.

Unit–IV

Multimedia Systems Design: Multimedia Basics − Multimedia Applications − Multimedia System Architecture − Evolving Technologies for Multimedia − Defining Objects for Multimedia Systems − Multimedia Data Interface Standards − Multimedia Databases.

Unit–V

Multimedia File Handling and Hypermedia: Compression and Decompression − Data and File Format Standards − Multimedia I/O Technologies − Digital Voice and Audio − Video Image and Animation − Full Motion Video − Storage and Retrieval Technologies – Multimedia Authoring and User Interface − Hypermedia Messaging.

TEXT BOOKS

1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, “Computer Graphics with OpenGL”, Fourth Edition, Pearson Education, 2010.

2. Andleigh, P. K and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2003.

REFERENCES

1. Francis S. Hill Jr. and Stephen M Kelley, “Computer Graphics Using OpenGL”, Third Edition, Prentice Hall, 2007.
2. Foley, Vandam, Feiner and Huges, “Computer Graphics: Principles and Practice”, Second Edition, Pearson Education, 2003.
3. Ralf Steinmetz and Klara Steinmetz, "Multimedia Computing, Communications and Applications", Pearson Education, 2004.
4. Judith Jeffcoate, “Multimedia in practice: Technology and Applications”, PHI, 1998.

COURSE OUTCOMES

At the end of the course, the student will be able to

1) Design2D and 3D graphical structures.
2) Apply 2D and 3D transformations.
3) Implement clipping techniques.
4) Create graphical structures using OpenGL.

Gain knowledge of multimedia systems.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓							
CO2	✓	✓	✓	✓						
CO3					✓			✓		
CO4							✓			✓
CO5					✓			✓		✓

ITPC504	**OPERATING SYSTEM**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication.
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects of concurrency management and memory management.

Unit–I

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an

OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Unit–II

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit–III

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer / Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

Unit–IV

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page

Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit–V

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

TEXT BOOKS

1) Avi Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts Essentials", 9th Edition, Wiley Asia Student Edition.
2) William Stallings, "Operating Systems: Internals and Design Principles", 5th Edition, Prentice Hall of India.

REFERENCES

1) Charles Crowley, "Operating System: A Design-oriented Approach", 1st Edition, Irwin Publishing
2) Gary J. Nutt, "Operating Systems: A Modern Perspective", 2nd Edition, Addison-Wesley
3) Maurice Bach, "Design of the Unix Operating Systems", 8th Edition, Prentice-Hall of India
4) Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, O'Reilly and Associates

COURSE OUTCOMES

At the end of the course, the student will be able to

1) Create processes and threads.
2) Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3) develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time for a given specification of memory organization.
4) Design and implement file management system.
5) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers for a given I/O devices and OS (specify).

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓	✓	✓				
CO2	✓	✓	✓	✓	✓					
CO3	✓	✓	✓							
CO4	✓	✓	✓	✓		✓			✓	✓
CO5	✓					✓				✓

ITCP507	**COMPUTER GRAPHICS AND MULTIMEDIA LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

COURSE OBJECTIVES

- To develop, design and implement two dimensional and three dimensional graphical structures.
- To provide knowledge in OpenGL programming.

- To understand various aspects of multimedia and to learn the concept of sound, images and videos.

LIST OF EXERCISES

1) Implementation of Bresenhams Algorithm – Line and Circle.
2) Implementation of Bresenhams Algorithm – Ellipse.
3) Implementation of Line, Circle and Ellipse attributes.
4) Two Dimensional transformations – Translation, Rotation, Scaling, Reflection, Shear.
5) Cohen Sutherland 2D line clipping and Windowing.
6) Sutherland – Hodgeman Polygon clipping Algorithm.
7) Three dimensional transformations – Translation, Rotation, Scaling.
8) Drawing three dimensional objects and Scenes.
9) Lline DDA, chain of diamonds, chessboard.
10) Generating Fractal images

GIMP

1) Creating Logos.
2) Simple Text Animation.

Audacity

1) Silencing, Trimming and Duplicating the Audio Signal.
2) Giving the Advancing Effect to the Audio Signal.

Windows Movie Maker

1) Applying effect to Video.
2) Creating Titles in Video.

Swish

1) Text Effects.
2) PrE-Loader.

Flash:

1) Changing the shape of the object.
2) Imaging Viewing using Mask.

Photo Impact

1) Text Effects.
2) Image Slicing.

ITCP508	OPERATING SYSTEM LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- To understand basic concepts such as techniques, management, know how to use them.
- To understand Operating System features and its difference from structured design.
- To use the UNIX as a modeling and communication utilities.
- To utilize the step of the process to produce better software.

LIST OF EXERCISES

1) Job scheduling techniques.
2) Disk scheduling techniques.
3) Memory allocation techniques.
4) Memory management techniques.
5) Page replacement techniques.
6) Producer consumer problem.
7) Bankers algorithm.
8) Dining Philosophers problem.
9) Write a shell script to perform the file operations using UNIX commands.
10) Write a shell script to perform the operations of basic UNIX utilities.
11) Write a shell script for arrange'n'numbers using 'awk'.
12) Write a shell script to perform ^{n}Cr calculation using recursion.
13) Write a shell script to sort numbers and alphabetic from a text file using single 'awk' command.
14) Write a Shell script to display all the files which are accessed in the last 10 days and to list all the files in a directory having size less than 3 blocks, greater than 3 blocks and equal to 3 blocks.
15) Write a Shell script to display the numbers between 1 and 9999 in words.
16) Write a Shell script for Palindrome Checking.

ITCP509	DIGITAL SIGNAL PROCESSING LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- To generate various types of continuous and discrete time signals and perform various operations
- To demonstrate various properties of continuous and discrete time systems
- To represent the signals using various forms of Fourier representation
- To characterize and analyze systems using Laplace, Fourier and z - transforms

LIST OF EXERCISES

1) Generation of Elementary Signals.
2) Verification of Sampling Theorem.
3) Impulse and Step Response of LTI System.
4) Linear and Circular Convolution of Discrete Sequences.
5) Correlation and Auto Correlation of Discrete Sequences.
6) Z–Transform and Inverse Z–Transform.
7) Computation of DFT & IDFT of a Signal.
8) Spectral Analysis of a Signal.
9) Alteration of Sampling Rate of a Signal.
10) Design of IIR Filters.
11) Design of FIR Filters.
12) Finding the Sum of two Sinusoidal Signals.
13) N Point FFT of a given sequence.
14) Frequency Response of Analog Low Pass and High Pass Filters.
15) FFT of a given 1–D signal.

SIXTH SEMESTER

ITPC601	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To be familiar with the concepts of data warehouse and data mining,
- To be acquainted with the tools and techniques used for Knowledge Discovery in Databases.
- To learn and know the concepts of mining, clarification and prediction, clustering methods and the applications of data mining.

Unit–I

Data warehousing Components –Building a Data warehouse — Mapping the Data Warehouse to a Multiprocessor ArchitecturE-DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

Unit–II

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multi–relational OLAP – Categories of Tools – OLAP Tools and the Internet.

Unit–III

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data WarehousE-Issues –Data Preprocessing.

Unit–IV

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

Unit–V

Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K–means– Partitioning Methods – Hierarchical Methods – Density–Based Methods –Grid Based Methods – Model–Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TEXT BOOKS

1) Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw Hill Edition, Thirteenth Reprint, 2008.
2) Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

REFERENCES

1) Pang–Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007.

2) K.P. Soman, Shyam Diwakar and V. Aja, "Insight into Data Mining Theory and Practice", Eastern Economy Edition, Prentice Hall of India, 2006.
3) G.K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, 2006.
4) Daniel T.Larose, "Data Mining Methods and Models", Wiley–Interscience, 2006.

COURSE OUTCOMES

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

1) Apply data mining techniques and methods to large data sets.
2) Use data mining tools for different applications.
3) Compare and contrast the various classifiers.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓	✓					
CO2	✓	✓	✓	✓	✓	✓			✓	
CO3				✓	✓		✓		✓	✓

ITPC602	**INFORMATION CODING TECHNIQUES**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To acquire knowledge about information and entropy.
- To acquire knowledge about Hamming weight, minimum distance decoding and different types of codes.
- They also learn about syndrome calculation and design of an encoder and decoder.
- To gain knowledge about text compression techniques. They also learn about speech and audio coding.
- To know about, image compression, graphics interchange format, JPEG and MPEG standards.

Unit–I

Information theory : Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, ShanNon-Fano coding, Huffman coding, Extended Huffman coding – Joint and conditional entropies, Mutual information – Discrete Memory less channels – Binary Symmetric Channel – Channel capacity, Shannon limit.

Unit–II

Error control coding: block codes: Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding – Single parity codes, Hamming codes, Repetition codes – Linear block codes, Cyclic codes – Syndrome calculation, Encoder and decoder.

Unit–III

Error control coding: convolutional codes:Convolutional codes – code tree, trellis, state diagram – Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding.

Unit–IV

Source coding: text, audio and speech: Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 – Speech: Channel Vocal coder, Linear Predictive Coding.

Unit–V

Source coding: image and video: Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: Read, JPEG – Video Compression: Principles– I, B, P frames, Motion estimation, Motion compensation, H.261, MPEG standard.

TEXT BOOKS

1) R. Bose, "Information Theory, Coding and Cryptography", TMH 2007.
2) Fred Halsall, "Multimedia Communications: Applications, Networks, Protocols and Standards", Perason Education Asia, 2002.

REFERENCES

1) K. Sayood, "Introduction to Data Compression" 3/e, Elsevier, 2006.
2) S. Gravano, "Introduction to Error Control Codes", Oxford University Press 2007.
3) Amitabha Bhattacharya, "Digital Communication", TMH, 2006.

COURSE OUTCOMES

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

1) Student should be able to analyze and design an Information coding system.
2) Students will be able to solve a discrete symmetric channel.
3) Gain the basic knowledge on Error Control Coding and Convolutional codes
4) Ability to develop applications using Text, Audio and Speech source codes
5) Develop skill to implement the image and video source codes

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓	✓	✓			✓	
CO2	✓	✓	✓	✓						
CO3	✓	✓	✓	✓	✓					
CO4	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO5	✓	✓	✓	✓	✓			✓	✓	✓

ITCP607	INFORMATION CODING TECHNIQUES LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- To expose students the basic concepts of information theory.
- To make students understand and implement various codes.
- To explore various coding techniques applicable for multimedia inputs such as text, audio, image and video.

LIST OF EXERCISES

1) Determination of entropy of a given source
2) Determination of various entropies and mutual information for a noise free channel
3) Determination of various entropies and mutual information for a binary symmetric channel
4) Coding and decoding of linear block codes
5) Coding and decoding of cyclic codes
6) Coding and decoding of convolutional codes
7) Coding and decoding of BCH codes
8) Coding and decoding of RS codes.
9) Implementation of Shannon-Fano coding algorithm.
10) Implementation of static Huffman coding algorithm.
11) Implementation of dynamic Huffman coding algorithm.
12) Implementation of run length encoding algorithm.
13) Implementation of arithmetic coding algorithm.
14) Implementation of linear predictive coding
15) Implement any one image compression algorithm
16) Implement any one video compression algorithm

ITCP608	DATA MINING LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- To understand the basic principles, concepts and applications of data warehousing and data mining.
- To introduce the task of data mining as an important phase of knowledge recovery process.
- Ability to do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment.
- Have a good knowledge of the fundamental concepts that provide the foundation of data mining.
- Design a data warehouse or data mart to present information needed by management in a form that is usable for management client.

LIST OF EXERCISES

1) Evolution of data management technologies, introduction to data warehousing concepts.
2) Develop an application to implement defining subject area, design of fact dimension table, data mart.
3) Develop an application to implement OLAP, roll up, drill down, slice and dice operation
4) Develop an application to construct a multidimensional data.
5) Develop an application to implement data generalization and summarization technique.
6) Introduction to exploratory data analysis using R
7) Introduction to regression using R
8) Introduction to the Weka machine learning toolkit
9) Performing data preprocessing for data mining in Weka
10) Classification using the Weka toolkit
11) Performing clustering in Weka
12) Association rule analysis in Weka
13) Data mining case study.

SEVENTH SEMESTER

ETHS701	ENGINEERING ETHICS	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To understand the moral and ethical dimensions in engineering.
- To take balanced decisions.
- To know about intellectual property rights (IPR) and business ethics.

Unit–I

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

Unit–II

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics – Codes of Ethics – Industrial Standards – A Balanced Outlook on Law – The Challenger Case Study.

Unit–III

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk – Chernobyl Case Studies and Bhopal.

Unit–IV

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational CrimE-Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Unit–V

Multinational Corporations – Business Ethics – Environmental Ethics – Computer Ethics – Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS

1) Govindarajan, M., Natarajan, S. and Senthilkumar, V.S., "Professional Ethics and Human Values", PHI Learning, New Delhi, 2013.
2) Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.

REFERENCES

1) Charles E. Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
2) Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003.
3) Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4) David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003).

COURSE OUTCOMES

1) Understand the relationship between the engineer and the society.
2) Learn the importance of codes in engineering practice.
3) Acquire knowledge on the legal, moral and ethical aspects in engineering.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓						✓	✓		
CO2		✓				✓	✓		✓	✓
CO3	✓	✓	✓			✓	✓	✓		✓

ITPC702	**INFORMATION SYSTEM AND NETWORK SECURITY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.

- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

Unit–I

An Overview of Computer Security–Security Services–Security MechanisMS-Security Attacks–Access Control Matrix, Policy–Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

Unit–II

Classical Cryptography–Substitution Ciphers–permutation Ciphers–Block Ciphers–DES Modes of Operation– AES–Linear Cryptanalysis, Differential Cryptanalysis– Hash Function – SHA 512– Message Authentication Codes–HMAC–Authentication Protocols.

Unit–III

Introduction to Public key Cryptography– Number theory– The RSA Cryptosystem and Factoring Integer– Attacks on RSA–The ELGamal Cryptosystem–Digital Signature Algorithm–Finite Fields–Elliptic Curves Cryptography– Key management – Session and Interchange keys, Key exchange and generation–PKI.

Unit–IV

Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem Secure Software Development: Secured Coding – OWASP/SANS Top Vulnerabilities–Buffer Overflows – Incomplete mediation – XSS – Anti Cross Site Scripting Libraries – Canonical Data Format – Command Injection – Redirection – Inference –Application Controls.

Unit–V

Secret Sharing Schemes–Kerberos– Pretty Good Privacy (PGP)–Secure Socket Layer (SSL)– Intruders – HIDS– NIDS – Firewalls – Viruses.

TEXT BOOKS

1) William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education, 2006.
2) Matt Bishop, "Computer Security art and science", Second Edition, Pearson Education, 2002.

REFERENCES

1) Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory", Second Edition, Pearson Education, 2007.
2) Jonathan Katz, and Yehuda Lindell, Introduction to Modern Cryptography, CRC Press, 2007.
3) Douglas R. Stinson, "Cryptography Theory and Practice", Third Edition, Chapman & Hall/CRC, 2006
4) Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, First Edition, 2006.
5) Menezes Bernard, "Network Security and Cryptography", Cengage Learning, New Delhi, 2011 Man Young Rhee, Internet Security, Wiley, 2003.

6) Atul Kahate, "Cryptography and Network Security", McGraw Hill.
7) V.K. Jain, "Cryptography and Network Security", Khanna Publishing House.
8) OWASP top ten security vulnerabilities: http://xml.coverpages.org/ OWASPTopTen.pdf

COURSE OUTCOMES

1) Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
2) Analyze the possible security attacks in complex real time systems and their effective countermeasures
3) Identify the security issues in the network and resolve it.
4) Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations
5) Formulate research problems in the computer security field.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓					✓	
CO2	✓	✓	✓	✓						
CO3	✓	✓	✓	✓		✓	✓			✓
CO4		✓	✓		✓	✓	✓			
CO5		✓	✓		✓			✓	✓	✓

ITCP706	**NETWORK SECURITY LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

COURSE OBJECTIVES

The student should be made to:

- Be exposed to the different cipher techniques
- Learn to implement the algorithms DES, RSA,MD5,SHA–1
- Learn to use network security tools like GnuPG, KF sensor, Net Strumbler

LIST OF EXERCISES

1) Implement the following substitution & transposition techniques:
   a. Caesar Cipher
   b. Playfair Cipher
   c. Hill Cipher
   d. Vigenere Cipher
   e. Rail fence-row & Column Transformation
2) Implement the following algorithms
   a. DES
   b. RSA Algorithm
   c. Diffiee-Hellman
   d. MD5

e. SHA–1

3) Implement the SIGNATURE SCHEME-Digital Signature Standard
4) Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5) Setup a honey pot and monitor the honeypot on network (KF Sensor)
6) Installation of rootkits and study about the variety of options
7) Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)
8) Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

ITST708	SEMINAR / INDUSTRIAL TRAINING	L	TR	S	C
		0	1	2	2

COURSE OBJECTIVES

- To encourage the students to study advanced engineering developments.
- To prepare and present technical reports.
- To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative models.

METHOD OF EVALUATIONS

- During the seminar each student is expected to prepare and present the topic on the relevant engineering project topics for duration of about 8 to 10 minutes.
- In a session of 3 periods per week, 15 students are expected to present the seminar.
- Each student is expected to present at least twice during the semester and the student is evaluated based on that.
- At the end of the semester, he/she can submit a report on his/her topic of seminar and marks are given based on the reports.
- A faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also.
- Evaluation is 100% Internal.

EIGHTH SEMESTER

ITPV803	PROJECT WORK AND VIVA VOCE	L	PR	S	C
		0	8	4	10

COURSE OBJECTIVES

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports and to face reviews and viva voce examination.

COURSE OUTCOMES

1) On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology
2) Carrying out any experimental work.

3) Understand the modelling, analysis and design concepts by taking up a structure.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓		✓		✓		
CO2	✓	✓	✓	✓		✓		✓		✓
CO3	✓	✓	✓	✓		✓		✓		✓

PE-PROFESSIONAL ELECTIVES

ITPESCN	**JAVA PROGRAMMING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the concept of web designing using HTML.
- To understand the concept of server–side web designing using Java applets and Swings.
- To understand the concept of server–side web designing using Servlets and JSP.
- To understand the concept of client–side web designing using Java Script.

Unit–I

HTML: Introduction to Internet – HTML: Introduction to HTML5 – Cascading Style Sheets – Canvas – Web Sockets and Web Workers.

Unit–II

Java and Java Swing: Applet class – Event Handling – Introduction to AWT – AWT controls – Layout managers – Menus – Images – Creating a Swing Applet and Application – Labels – Text fields – Buttons – Toggle Buttons – Checkboxes – Radio Buttons – Tabbed PanE-Scroll Panes – Scroll Bars – List – Combo Box – Menu Bar – Menu – Menu Item – Popup Menu – Toolbar.

Unit–III

Java Servlets: Servlet basic – Servlet API basic – Life cycle of a Servlet – Running Servlet – Debugging Servlet – Thread – Safe Servlet – HTTP Redirects – Cookies.

Unit–IV

JSP: JSP overview – JSP language basics – JSP translation and Compilation directives – Standard Java objects from JSP – JSP configuration and deployment – Actions and tags of JSP.

Unit–V

Java Script: Introduction to Scripting – Control Statements – Functions – Arrays– Objects– Event Handling.

TEXT BOOKS

1) Paul Deitel, Harvey Deitel, and Abbey Deitel, “Internet and World Wide Web How to Program”, Pearson education, 3rd Edition, 2012.
2) Herbert Schildt, “The Complete Reference JAVA2”, Tata McGraw Hill, 9th Edition, 2014.

REFERENCES

1) Dustin R. Callway, "Inside Servlets: Server–Side Programming for the Java Platform", Addison Wesley, 1999.
2) Venkata S. R. Krishna R. Chaganti and Paul J. Perrone, "Building Java™ Enterprise Systems with J2EE™", SAMS, 2000.
3) Steven Holzner, "Java2 Black Book", Coriolis Group Books, 2001.
4) Budi Kurniawan, "Java for the Web with Servlets, JSP, and EJB: A Developer's Guide to J2EE Solutions", New Riders Publishing, 2002.
5) Balagurusamy, E., "Programming with A Perimer 3 Java", Tata McGraw Hill, 2007.

COURSE OUTCOMES

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

1) Design static web page using HTML.
2) Develop server–side web page using Java applets and Swings.
3) Acquire engineering knowledge on server–side web page using Servlets.
4) Develop individual and team work based server–side web page using JSP.
5) Perform client–side project management usingJava Script.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓							
CO2	✓	✓	✓							
CO3	✓									
CO4	✓	✓	✓	✓						
CO5	✓	✓	✓	✓	✓				✓	

ITPESCN	**PERL PROGRAMMING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the basic Perl language features.
- To understand Perl language as a tool for convenient text, data storage and file processing.
- Execute programs from Perl environment and process their result.

Unit–I

An overview of Perl: Getting started, Scalar data – Numbers – Strings – Built–in warnings – Operators – Variables – Output with print – Control structures – Getting user input – More control structures.

Unit–II

Lists and Hashes: Introduction to lists, Simple lists, Complex lists, Accessing list values, List slices, Ranges, Combining ranges and Slices. Arrays – Accessing single and Multiple elements from an array – Interpolating Arrays into Strings – For

Control Structure-Array functions (pop, push, shift, unshift, and sort) – Array manipulations; Introduction to Hashes – Hash element access – Hash functions – Typical use of hash.

Unit–III

Files and Data: Input from standard input – Diamond operator – Invocation Arguments – Standard Output – Formatted Output using printf – File Handles – Opening a file handle-Fatal errors – Using file handle-Reopening a standard file handle-Output with say – File handles in a scalar.

Unit–IV

Subroutines and Modules: Introduction to subroutines – Defining – Invoking – Return Values – Arguments – Private variables – Variable length parameter list – Lexical variables – Use strict pragma – Return operator – Non-scalar return values – Perl Modules – Finding and Installing Modules – Using simple Modules–CGI.

Unit–V

Regular Expressions: Introduction to regular expressions– Simple patterns – Character classes – Matching with regular expression – Processing text with regular expression – Substitutions – Split operator – Join function.

TEXT BOOKS

1) Stephen Spainhour, Ellen Siever, Nathan Patwardhan," Perl in a Nutshell", O'Reilly Media Publications, 1998.
2) Simon Cozens, Peter Wain Wrigth, "Beginning Perl", Wrox press, First Edition, 2000.

REFERENCES

1) Tom Christiansen, Brian D Foy, Larry Wall, Jon Orwant, "Programming Perl", O'Reilly Media, Fourth Edition, 2012.
2) Randal L. Schwartz, Brian D Foy, Tom Phoenix, "Learning Perl", O'Reilly Media, Sixth Edition, 2011.
3) Ellie Quigley, "Perl by Example", Prentice Hall, Fifth Edition, 2014.

COURSE OUTCOMES

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

1) Apply prerequisite basic programming concepts to Perl
2) Write, compile, and run Perl programs, Analyze the effects of using Perl structures that implement decisions, loops, and store arrays and use these structures in a well–designed, OOP program
3) Create Perl programs that make use of various directories and use several files linked together

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓							
CO2	✓	✓	✓	✓	✓					
CO3	✓	✓	✓	✓	✓	✓				

ITPESCN	PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, recursion and function calls.
- To learn how to use basic data structures such as List, Dictionary and be able to manipulate text files and images.
- To understand the process and will acquire skills necessary to effectively attempt.
- Programming problem and implement it with a specific programming languagE-Python.

Unit–I

Elementary Programming, Selections and Loops: History of Python – Getting Started with Python – Programming Style-Writing a Simple Program – Reading Input from the Console-Identifiers – Variables, Assignment Statements, and Expressions – Simultaneous Assignments – Named Constants – Numeric Data Types and Operators – Type Conversions and Rounding–Introduction – Boolean Types, Values, and Expressions –if Statements – Two–Way if–else Statements – Nested if and Multi–Way if–elif–else Statements – Logical Operators – Conditional Expressions – Operator Precedence and Associativity – Detecting the Location of an Object Case Study: Computing Body Mass Index – The while Loop – The for Loop – Nested Loops – Keywords break and continue-Case Studies: Displaying Prime Numbers and Random Walk.

Unit–II

Mathematical Functions, Strings and User Defined Functions: Simple and Mathematical Python Built–in Functions – Strings and Characters –Introduction to Objects and Methods – Formatting Numbers and Strings– Drawing Various Shapes – Drawing with Colors and Fonts – Defining a Function – Calling a Function –Functions with/without Return Values – Positional and Keyword Arguments –Passing Arguments by Reference Values – Modularizing Code-The Scope of Variables – Default Arguments – Returning Multiple Values –Function Abstraction and Stepwise Refinement – Case Study: Generating Random ASCII Characters.

Unit–III

Classes and Objects: Introduction to Object – Oriented Programming – Basic principles of Object – Oriented Programming in Python – Class definition, Inheritance, Composition, Operator Overloading and Object creation – Python special modules – Python Object System – Object representation, Attribute binding, Memory Management, and Special properties of classes including properties, Slots and Private attributes.

Unit–IV

Files, Exception Handling and Network Programming: Introduction –Text Input and Output – File Dialogs – –Exception Handling – Raising Exceptions – Processing Exceptions Using Exception Objects – Defining Custom Exception Classes – Binary IO Using Pickling – Case Studies: Counting Each Letter in a File and Retrieving Data from the Web–Client Server Architecture-sockets – Creating and executing TCP and UDP Client Server UNIT s – Twisted Framework – FTP – Usenets – Newsgroup – Emails – SMTP – POP3.

Unit–V

Database and GUI Programming: DBM database-SQL database-GUI Programming using Tkinter: Introduction – Getting Started with Tkinter – Processing Events – The Widget Classes – Canvas – The Geometry Managers – Displaying Images – Menus – Popup Menus – Mouse, Key Events, and Bindings – Listboxes – Animations – Scrollbars – Standard Dialog Boxes–Grids.

TEXT BOOKS

1) Guttag, John, "Introduction to Computation and Programming Using Python", MIT Press, 2013.
2) Wesley J Chun "Core Python Applications Programming", Prentice Hall, 2012.

REFERENCES

1) Mark Lutz, "Learning Python, Powerful OOPs", O'Reilly, 2011.
2) Jennifer Campbell, Paul Gries, Jason montajo, Greg Wilson, "Practical Programming An Introduction To Computer Science Using Python", The Pragmatic Bookshelf, 2009
3) Mark summerfield "Programming in python 3: A Complete Introduction to Python Languauge", Addison Wesley, Pearson Education, 2010.
4) Zelle, John M. "Python Programming: An Introduction to Computer Science", 1st ed. Franklin Beedle and Associates, 2003.
5) Budd, Timothy, "Exploring Python", McGraw–Hill Science, 2009.
6) Seema Thareja, "Python Programming", Pearson.

COURSE OUTCOMES

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

1) Gain knowledge about the basic concepts of python programming.
2) Solve the basic design problems using object and classes.
3) Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application.
4) Obtain the knowledge of DBM and SQL databases from python.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓	✓								
CO3	✓	✓	✓	✓	✓	✓				
CO4	✓	✓	✓	✓	✓	✓				

ITPESCN	LINEAR INTEGRATED CIRCUITS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

The student should be made to:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and Non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.

Unit–I

BJT differential amplifier analysis – concept of CMRR – methods to improve CMRR – constant current source-active load – current mirror – Darlington pair – differential input impedance-Fundamental MOS differential amplifier The Ideal Op–Amp, Block diagram Representation of Op–Amp, Voltage Transfer Curve of Op–Amp, AC–DC Characteristics of an Op–Amp, Frequency Response, Frequency response of Non-compensated Op–Amp, Compensating Networks, Closed–Loop Frequency Response, Circuit Stability, Slew Rate. Inverting and Non-Inverting Configuration, Ideal Open–Loop and Closed–Loop Operation of Op–Amp, Block diagram Representation of Feedback Configurations.

Unit–II

DC & AC Amplifiers, Peaking Amplifier, Summing, Scaling and Averaging amplifier, Instrumentation Amplifier, Voltage-to–Current Converter, Current to Voltage Converter, The Integrator, The Differentiator, Log and Antilog Amplifier, Peak Detector, Precision Rectifiers, Comparator, Zero Crossing Detector, Schmitt Trigger, Sample and Hold Circuit, Clippers and Clampers, A/D and D/A Converters.

Unit–III

Active Filters: – Butterworth Filters, Band–Pass Filters, Band Reject Filters, All–Pass Filters. Oscillators and Wave Generators:– Phase Shift Oscillator, Wien Bridge Oscillator, Voltage-Controlled Oscillator(VCO), Square Wave Generator, Triangular Wave Generator, Saw–tooth Wave Generator.

Unit–IV

PLL: Closed loop analysis of PLL, Phase Detectors, Analog Multipliers , Applications using PLL: AM, PM and FSK modulators and demodulators, Frequency synthesizers, Timer IC 555: 555 Timer Functional Diagram and Specifications, Application as Monostable, Astable, Bistable, Pulse width modulator.

Unit–V

Voltage Regulators: Fixed, Variable and switching mode, Universal Active Filter, Amplifiers: Power, Audio, Video, Tuned and Isolation. Campander, Optocouplers, Voltage to Frequency Converter. Control ICs: Temperature control and small D.C. motor speed regulation by ICs like SL440, PA436, CA3059 – their block diagram and operational details.

TEXT BOOKS

1) D. Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.
2) Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw Hill, 1997.

REFERENCES

1) OP–AMP and Linear IC's By Ramakant A. Gayakwad, Prentice Hall
2) Digital Integrated Electronics, By Taub and Schilling, McGraw Hill
3) Integrated Electronics, By Millman J. and Halkias C.C., McGraw Hill.
4) Op–Amp and Linear IC's, By Caughlier and Driscoll, PHI

COURSE OUTCOMES

At the end of the course, the student should be able to:

1) Understand the characteristics of Op Amp.
2) Understand the applications ICs in the processing of analog signals.
3) Analyze and design high frequency amplifier using Op Amp.
4) Analyze and design the electronic circuits using linear integrated circuit
5) Analyze and design the Voltage Regulators using ICs`.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓									
CO3	✓	✓	✓	✓						
CO4	✓	✓	✓	✓						
CO5	✓	✓	✓	✓						

ITPESCN	**SOFTWARE ENGINEERING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the phases of development of a Software Project.
- To understand the major considerations for enterprise integration and deployment concepts of Requirements engineering and Analysis Modeling.
- To learn various testing, maintenance measures and risk management methods.
- To learn the Software quality management and configuration management concepts.

Unit–I

The Software process– A Generic Process Model– Perspective Process Models– Specialized Process Models– The Unified Process–Personal and team process models–Agile Development–Extreme Programming (XP) – Requirements Engineering–Requirements Analysis–Establishing the Groundwork– Eliciting

Requirements– Developing Use Cases– Negotiating Requirements– Validating Requirements–Requirements Analysis–Scenario–Based Modeling.

Unit–II

Design concepts–The Design Process–Design Concepts–The Design Model– Architectural Design–Assessing Alternative Architectural Designs– Architectural Mapping Using Data Flow–Component–level design–Designing Class–Based Components–Conducting Component–Level Design–User Interface design–User Interface Analysis and Design– Interface Analysis–Pattern based Design– WebApp design–WebApp Design Quality–WebApp Interface design.

Unit–III

Quality Management– Software Quality– The Software Quality Dilemma– Achieving Software Quality– Review techniques–Cost Impact of Software Defects– Defect Amplification and Removal–Review Metrics and Their Use-Informal Reviews– Formal Technical Reviews–Software Quality Assurance- Test Strategies for Conventional Software-Test Strategies for Object–Oriented Software-SQA Tasks, Goals, and Metrics–Statistical Software Quality Assurance-A Strategic Approach to Software Testing–System Testing–The Art of Debugging.

Unit–IV

Software Configuration Management–The SCM Repository–The SCM Process– Configuration Management for WebApps–A Framework for Product Metrics–Metrics for the Requirements Model–Metrics for the Design Model– Project Management concepts– The management spectrum–People-The Product– The Process–Metrics in the Process and Project Domains.

Unit–V

Software Project Estimation–Decomposition Techniques–Empirical Estimation Models–The Make/Buy Decision–Project Scheduling–Defining a Task Set for the Software Project–Defining a Task Network–Reactive versus Proactive Risk Strategies–Risk Identification–Risk Projection–Risk Refinement–The RMMM Plan– Business Process Reengineering–Software Reengineering–Reverse Engineering– Restructuring–Forward Engineering–The SPI Process–The CMMI–The People CMM– SPI Return on Investment–SPI Trends.

TEXT BOOKS

1) Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Seventh Edition, McGraw Hill International Edition, 2010.
2) Ian Sommerville, “Software Engineering”, 9th Edition, Pearson Education Asia, 2011.

REFERENCES

1) Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI Learning Private Limited, 2009.
2) Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010.
3) Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
4) Stephen R.Schach, “Software Engineering”, Tata McGraw–Hill Publishing Company Limited, 2007.

5) Nasib Singh Gill, "Software Engineering", Khanna Publishing House.
6) K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International.

COURSE OUTCOMES

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

1) Comprehend the basic elements of Software Project Models.
2) Visualize the significance of the different kind of Software Testing methods.
3) Ability to analyze the strategies in Software Designing.
4) Understand the significance of Software Reengineering.
5) Perform SQA process in Software projects.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓						
CO2	✓	✓	✓	✓						
CO3					✓	✓		✓		
CO4	✓								✓	✓
CO5	✓					✓	✓	✓	✓	✓

ITPESCN	**DISTRIBUTED OBJECTS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To know about the fundamentals to programming in distributed objects using Microsoft's COM/DCOM architecture.
- To understand foundations of Distributed Objects.
- To understand the concepts of peer to peer services and file system.
- To understand in detail the system level and support required for distributed Objects.

Unit–I

Fundamental programming architecture-parallel processing – advantages of distributed computing – building distributed systems – COM background – three faces of COM –component ware-COM interfaces – types of components – the COM library – COM as a foundation – activex on COM – The interface definition language-the component's client – the component – COM reuse mechanisms .

Unit–II

Type libraries – C++ client utilizing type library –active template library – COM programming in visual basic – COM programming in java – Threads – apartments– apartment interactions – implementing multithreaded components – the ten threading commandments – COM facilities – automation and component categories – the idispatch interface-building an automation client in C++ – building an

automation client in visual basic – building an automation client in VB Script – scriptlets: building COM objects in HTML – error handling – component categories.

Unit–III

Introduction – Communication between distributed objects – Remote procedure call Events and notifications – Java RMI case Study – Introduction to DFS – File service architecture-Google file system – Introduction to Name Services – Name services and DNS – Directory and directory services – Cluster Computing – mapreduc/bigtable.

Unit–IV

Support – The operating system layer – Protection – Processes and threads – Communication and invocation – Operating system architecture-Virtualization at the operating system level – Distributed Objects and Components Distributed objects – Case study: CORBA – From objects to components – Case studies: Enterprise JavaBeans and Fractal

Unit–V

Web Services –Web services–Service descriptions and IDL for web services – A directory service for use with web services – XML security–Coordination of web services–Applications of web services– Peer–To–Peer Systems –Napster and its legacy–Peer–to–peer middleware-Routing overlays – Overlay case studies: Pastry, Tapestry – Application case studies: Squirrel – OceanStore-Ivy.

TEXT BOOKS

1) Guy Eddon and Henry Eddon, "Inside distributed COM", WP, Microsoft press, 1998.
2) George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education, 2012.

REFERENCES

1) Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.
2) Liu M.L., "Distributed Computing, Principles and Applications", Pearson Education, 2004.
3) Nancy A Lynch, "Distributed Algorithms", Morgan Kaufman Publishers, USA, 2003
4) Andrew S. Tanenbaum, "Modern OS", Prentice Hall, Second Edition, 2001.
5) Kenneth P. Birman, "Reliable Distributed Systems: Technologies, Web Services, and Applications", Springer.

COURSE OUTCOMES

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

1) Acquiring Knowledge on fundamental of distributed objects using Microsoft's COM/DCOM architecture.
2) Gaining experienced skills on Distributed Objects.
3) Familiarizing the peer to peer services and file system.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓						
CO2	✓	✓	✓		✓			✓		
CO3	✓	✓	✓	✓						✓

ITPESCN	**SERVICE ORIENTED ARCHITECTURE**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

The student should be made to:

- Learn XML fundamentals and be exposed to build applications based on XML.
- Understand the key principles behind SOA.
- Be familiar with the web services technology elements for realizing SOA.
- Learn the various web service standards.

Unit–I

XML document structure-Well–formed and valid documents – Namespaces – DTD – XML Schema – X–Files.

Unit–II

Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML.

Unit–III

Characteristics of SOA, Comparing SOA with Client–Server and Distributed architectures – Benefits of SOA — Principles of Service orientation – Service layers.

Unit–IV

Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Message Exchange Patterns – Orchestration – Choreography –WS Transactions.

Unit–V

Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines — Composition – WS–BPEL – WS–Coordination – WS–Policy – WS–Security – SOA support in J2EE.

TEXT BOOKS

1) Ron Schmelzer et al. “XML and Web Services”, Pearson Education, 2002.
2) Thomas Erl, “Service Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005.

REFERENCES

1) Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002
2) Eric Newcomer, Greg Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005

3) Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
4) James McGovern, Sameer Tyagi, Michael E.Stevens, Sunil Mathew, "Java Web Services Architecture", Morgan Kaufmann Publishers, 2003

COURSE OUTCOMES

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

1) Build applications based on XML.
2) Develop web services using technology elements.
3) Build SOA – based applications for intra–enterprise and inter–enterprise applications

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓	✓					
CO2	✓	✓	✓	✓	✓					
CO3	✓	✓	✓	✓	✓	✓		✓	✓	

ITPESCN	**DIGITAL IMAGE PROCESSING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To learn the fundamental concepts of MATLAB.
- To introduce basic concepts like acquiring, storing and processing of images.
- To provide details about enhancing the quality of images and to introduce techniques for extraction and processing of region of interest.
- To understand the applications of Image Processing.

Unit–I

Fundamentals: Digital Imaging: Introduction – Steps in Image Processing Systems – Image Acquisition – Image Sampling and Quantization – Pixel Relationships – Linear and Nonlinear Operations.

Matlab: The MATLAB Desktop – Using the MATLAB Editor/Debugger – Getting Help – Saving and Retrieving work Session Data – Digital Image Representation – Image I/O and Display – Classes and Image Types – M–Function Programming.

Unit–II

Image enhancement: Spatial Domain – Gray level Transformations – Histogram Processing – Spatial Filtering – Smoothing and Sharpening. Frequency Domain: Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.

Unit–III

Image segmentation: Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological Watersheds – Motion Segmentation.

Unit–IV

Multi resolution analysis and compression: Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Wavelet Transforms. Image Compression: Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

Unit–V

Morphological processing and representation: Morphological Image Processing – Preliminaries – Dilation and Erosion – Opening and Closing– The Hit–or–Miss Transformation.

Representation – Boundary Descriptors – Regional Descriptors – Use of Principal Components for Description – Relational Descriptors – Applications of Image Processing –

Image Watermarking – Fingerprint Recognition – Iris Recognition.

TEXT BOOKS

1) Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins, "Digital Image Processing Using Matlab", Second Edition, McGraw Hill, 2010.
2) AL. Bovik, "The Essential Guide to Image processing", Second Edition, Elsevier, 2009.

REFERENCES

1) Anil K. Jain, "Fundamentals of Digital Image Processing", PHI, 2006.
2) Sanjit K. Mitra, & Giovanni L. Sicuranza, "Non Linear Image Processing", Elsevier, 2007.
3) Maria Petrou, Costas Petrou, "Image Processing: The Fundamentals", Wiley, Second Edition, 2010.

COURSE OUTCOMES

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

1) To understand the basic image enhancement techniques in spatial & frequency domains.
2) To understand the basic multi–resolution techniques and segmentation methods.
3) To apply this concepts for image handling in various fields.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓						
CO2	✓	✓	✓	✓						
CO3	✓	✓	✓	✓	✓	✓		✓	✓	

ITPESCN	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Be exposed with the basic rudiments of business intelligence system.
- Understand the modeling aspects behind Business Intelligence.
- Understand of the business intelligence life cycle and the techniques used in it.
- Be exposed with different data analysis tools and techniques.

Unit–I

Business Intelligence: Effective and timely decisions – Data, information and knowledge-Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

Unit–II

Knowledge Delivery: The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self–Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

Unit–III

Efficiency: Efficiency measures – The CCR model: Definition of target objectives– Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis.

Unit–IV

Business Intelligence Applications: Marketing models – Logistic and Production models – Case studies.

Unit–V

Future of Business Intelligence: Future of business intelligence - Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology

TEXT BOOKS

1) Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.
2) Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.

REFERENCES

1) Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
2) David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager" s Guide", Second Edition, 2012.

3) Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw–Hill, 2007.
4) Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,2007.

COURSE OUTCOMES

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

1) Organizational and individual decision–making.
2) Key concepts and current practices of business intelligence.
3) The individual, organizational and societal impacts of bi systems.
4) Analytical techniques used in business intelligence systems.
5) Integration of business intelligence into decision–making processes.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2	✓									
CO3	✓	✓	✓				✓	✓		
CO4	✓	✓	✓							✓
CO5	✓	✓	✓	✓						

ITPESCN	**FREE AND OPEN SOURCE SOFTWARE**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

The student should be made to:

- Learn about various open source licenses and implications for users, developers and the software community in general
- Use the communication modes particular to the open source world through participation in such things as mailing lists, IRC, wikis, etc.
- Learn and understand Agile development methodology and use it to develop open source software within the project
- Work collaboratively with fellow students and other members of the project's community

Unit–I

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources – Application of Open Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode-Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux.

Unit–II

MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time-Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web.

Unit–III

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage-PHP and SQL database-PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates.

Unit–IV

PYTHON: Syntax and Style-Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment.

Unit–V

Web Server: Apache Web server – Working with Web Server – Configuring and Using apache web services MDA: Introduction to MDA – Genesis of MDA – Meta Object Facility – UML – UML Profiles – MDA Applications.

TEXT BOOKS

1) Steve Suchring, "MySQL Bible", John Wiley, 2002.
2) Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002.

REFERENCES

1) Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003.
2) Wesley J. Chun, "Core Phython Programming", Prentice Hall, 2001.
3) Peter Wainwright, "Professional Apache", Wrox Press, 2002.
4) Stephen J. Mellor, Marc Balces, "Executable UMS: A foundation for MDA", Addison Wesley, 2002.

COURSE OUTCOMES

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

1) Have a good understanding of how to develop a software system in a team with other developers
2) Able to develop web–enabled software using common software components such as Spring and Hibernate.
3) Have a basic understanding of Scripting languages and how to develop modern web enabled applications.
4) Have a basic understanding of mobile app development using native applications.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1									✓	
CO2		✓	✓							
CO3		✓	✓	✓	✓	✓				
CO4		✓	✓	✓	✓	✓				

ITPESCN	**OBJECT ORIENTED ANALYSIS AND DESIGN**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand objects, classes and inheritance.
- To understand utilization of software objects to build software projects.
- To use UML in requirements elicitation and designing.
- To develop applications using UML.

Unit–I

Overview of Object Oriented System Development: Introduction – Object Oriented System Development Methodology – Overview of Unified Approach – Object Basics – Systems Development Life Cycle-Unified Approach.

Unit–II

Methodology and Modeling :Introduction –Rumbaugh et al.'s Object Modeling Technique - Booch Methodology – Jacobson et al. Methodologies – Patterns – Framework – Unified approach – Unified Modeling Language.

Unit–III

Object Oriented analysis: Use Case Driven Object Oriented Analysis Object Oriented Analysis: Classification Noun Phrase Approach – Common Class Patterns Approach – Object Relationship analysis.

Unit–IV

Object Oriented Design: Object Oriented Design Process – Object Oriented Design Axioms – Corollaries – Designing Classes: Defining Attributes and methods – Object Store and Access layer – Designing the View Layer Classes.

Unit–V

Applications: Data Acquisition: Weather Monitoring Station – Frameworks: Foundation Class library – Client/Server Computing: Inventory Tracking.

TEXT BOOKS

1) Ali Bahrami, "Object oriented systems development using the unified modeling language", Tata McGraw Hill, 1st Edition 2008.
2) Grady Booch, "Object Oriented Analysis and Design with Applications",Pearson Education, Inc, Second Edition, 2008.

REFERENCES

1) John Deacon, “Object Oriented Analysis and Design”, Addison Wesley, 1st Edition, 2005.
2) Pinson L. and Wiener R., "Application of Object Oriented Programming", Addison Wesley Publishing Company, 1990.
3) Taylor D., "Object Oriented Information Systems", John Wiley and Sons, 1992.

COURSE OUTCOMES

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

1) Analyze the Systems Development Life Cycle.
2) Identify the basic software requirements UML Modeling.
3) Express software design with UML diagrams.
4) Develop applications using UML.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓							
CO2	✓	✓								
CO3	✓	✓	✓			✓				
CO4	✓		✓		✓	✓		✓	✓	

ITPESCN	**SYSTEM SOFTWARE AND COMPILER DESIGN**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- View some of the major tasks of the system software of a computer system, focusing on internal working of the hardware and software interface of a typical system.
- Identify and understand the design, function and implementation of assemblers, linkers, loaders, macro processors and system software tools.
- Understand the theory and practice of compiler implementation and to learn context free grammars, compiler parsing techniques, construction of syntax trees, symbol tables, intermediate representations and actual code generation.

Unit–I

Basics of System Software and Assembler, Loaders And Linkers: Introduction – System software and SIC/XE machine architecture-Basic assembler functions: Assembler algorithms and data structures – Machine dependent assembler features – Machine independent assembler features. Basic loader functions: Design of an Absolute Loader – A Simple Bootstrap Loader – Machine dependent loader features – Machine independent loader features.

Unit–II

Macro Processors and Other System Software: Basic macro processor functions – Macro Definition and Expansion – Macro Processor Algorithm and data structures – Implementation examples: MASM Macro Processor – Text editors – Overview of Editing Process – User Interface-Editor Structure-Interactive Debugging Systems – Debugging functions and capabilities – Relationships with Other parts of the system – User Interface Criteria – Virtual Machines.

Unit–III

Compiler – Lexical Analysis: Phases of Compiler – Compiler Construction Tools – Lexical Analysis: Role of a Lexical analyzer – input buffering – specification and recognition of tokens – Finite Automata – Designing a lexical analyzer generator – Pattern matching based on NFA.

Unit–IV

Compiler– Syntax Analysis, Syntax–Directed Translation: Role of Parser – Top–down parsing – recursive descent and predictive parsers (LL) – Bottom–Up parsing – Operator precedence parsing – LR, SLR and LALR parsers – parser generators – syntax–directed translation – S–attributed definition– L–attributed definition.

Unit–V

Compiler – Code Generation, Optimization: Intermediate languages – graphical representations – DAGs – Three address code-types of three address statements – syntax directed translation into three address code-implementation of three address statements – Code Optimization: Machine dependent and machine independent code generation – Sources of optimization – Code Generation – Semantic stacks – evaluation of expressions – control structures and procedure calls.

TEXT BOOKS

1) Leland Beck, – "System Software-An Introduction to Systems Programming", Pearson Education, Inc., Third Edition, 2008
2) A.V. Aho, R. Shethi and J. D. Ullman; "Compilers – Principles, Techniques and Tools", Pearson Education, Second Edition, 2002.

REFERENCES

1) D.M. Dhamdhere, "Systems Programming and Operating Systems", Tata McGraw Hill Company, Second Edition, 2009.
2) John J. Donovan, "Systems Programming", Tata McGraw Hill Company, Second Edition, 2000.
3) V. Raghavan, "Principles of Compiler Design", Tata McGraw Hill Education Publishers, 2010.
4) Srimanta Pal, "Systems Programming", Oxford University Press, 2011.

COURSE OUTCOMES

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

1) Understand and design principles of assemblers, linkers and loaders.
2) Know the Phases of compilation.
3) Optimize code and study techniques of syntax directed translation.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓						
CO2	✓	✓	✓	✓						
CO3	✓	✓	✓	✓		✓				✓

ITPESCN	**SOFTWARE TESTING AND QUALITY ASSURANCE**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To impart knowledge on software testing, quality and Software Quality Assurance (SQA).
- To introduce the various software testing techniques and different levels of testing.
- To introduce the SQA standards and components of SQA system.
- To explain the components of quality plan for software projects.

Unit–I

Phases of Software project – Quality, Quality assurance and quality control – Testing, Verification and Validation – White box testing – Static testing – Structural testing – Black box testing – Definition, need for black box testing – Black box testing techniques – Requirements based testing, Positive and Negative testing, Boundary Value Analysis, Decision Tables, Equivalence Partitioning, Graph based Testing, Compatibility Testing, Domain Testing.

Unit–II

Integration testing – Integration testing as a type of testing – Integration testing as a phase of testing – Scenario testing – Defect bash – System and Acceptance testing – System testing overview – Need for System testing – Functional system testing – Non-functional testing – Acceptance testing.

Unit–III

Performance testing – Factors governing performance testing – Methodology for performance testing – Tools for performance testing – Process for performance testing – Regression testing – Types of Regression testing – When and how to do Regression testing – Test planning – Test management – Test process – Test reporting.

Unit–IV

Software quality – definition – Software quality assurance-definition and objectives – Software quality assurance and software engineering – Software quality factors – The components of the software quality assurance system – The SQA system – SQA architecture Pre-project components – Software project life cycle components – Infrastructure components for error prevention and improvement – Management SQA components – SQA standards, system certification, and

assessment components – Organizing for SQA – The human components – Considerations guiding construction of an organization's SQA system.

Unit–V

Development plan and quality plan objectives – Elements of the development plan – Elements of the quality plan – Development and quality plans for small projects and for internal projects – Integrating quality activities in the project life cycle-Classic and other software development methodologies – Factors affecting intensity of quality assurance activities in the development process – Verification, validation and qualification – A model for SQA defect removal effectiveness and cost.

TEXT BOOKS

1) Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing: Principles and Practices", Pearson Education India, 1st Edition, 2005.
2) Daniel Galin, "Software quality assurance-from theory to implementation", Pearson Education India, 1st Edition, 2009.

REFERENCES

1) Aditya Mathur, "Foundations of software testing", Pearson Education, 1st Edition, 2008.
2) Ron Patton, "Software Testing", Pearson education, 2nd Edition, 2007.
3) William E. Perry, "Effective Methods for Software Testing: Includes Complete Guidelines, Checklists, and Templates", Wiley Publishing, 3rd Edition, 2006.
4) Alan C Gillies, "Software Quality Theory and Management", Cengage Learning, 2nd Edition, 2003.
5) Yogesh Singh, "Software testing", University Press.
6) Chauhan, "Software Testing Principles and Practices", Oxford University Press.

COURSE OUTCOMES

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

1) Techniques and skills on use of modern software testing tools to support software testing projects.
2) Planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generating a test report.
3) Advanced software testing topics, such as object–oriented software testing methods, and component–based software testing issues, challenges, and solutions.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓						
CO2	✓	✓	✓			✓		✓		✓
CO3	✓				✓	✓		✓	✓	✓

ITPESCN	MOBILE COMMUNICATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study the concepts of mobile internet protocol and transport layer.
- To understand the concepts of mobile telecommunication system.
- To understand the concept of mobile ad–hoc networks.
- To study the concepts of mobile platforms and applications.

Unit–I

Introduction to wireless communication – Applications – Wireless transmission – Frequencies for radio transmission – signals – antennas – signal propagation – need and types of multiplexing techniques – modulation types – use of spread spectrum – cellular Systems. Motivation for a specialized MAC – SDMA – FDMA – TDMA – CDMA and comparison of these methods.

Unit–II

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP– Adaptation of TCP Window – Improvement in TCP Performance.

Unit–III

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

Unit–IV

Ad–Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – VANET – MANET Vs VANET – Security.

Unit–V

Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, Black Berry, Windows Phone-M–Commerce-Structure-Pros & Cons – Mobile Payment System – Security Issues.

TEXT BOOKS

1) Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi – 2012.
2) Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi, 2007.

REFERENCES

1) Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
2) Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
3) William C.Y. Lee, “Mobile Cellular Telecommunications – Analog and Digital Systems”, Second Edition, Tata Mc Graw Hill Edition, 2006.

4) C.K. Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.
5) Android Developers : http://developer.android.com/index.html
6) Apple Developer : https://developer.apple.com/
7) Windows Phone Dev Center : http://developer.windowsphone.com
8) BlackBerry Developer : http://developer.blackberry.com/

COURSE OUTCOMES

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

1) Understand the principles and concepts of mobile communication.
2) Describe the characteristics and design issues of ad– hoc networks.
3) Analyze and compare the multiplexing techniques.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2	✓	✓					✓			✓
CO3	✓	✓	✓	✓						

ITPESCN	**OPTICAL COMMUNICATION**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration
- To learn fiber slicing and connectors, noise effects on system performance, operational principles of WDM and solutions

Unit–I

Motivation –optical spectral bands –key elements of optical fiber systems – optical fibers –basic optical laws and definition –optical fiber modes and configurations –mode theory for circular wave guides –single mode fibers –graded–index fiber structure –fiber materials –photonic crystal fibers – fiber fabrication – fiber optic cables.

Unit–II

Light emitting diodes(LED) : structures –materials –quantum efficiency –LED power – modulation of an LED –Laser diodes: modes –threshold conditions –laser dioderate equations –external quantum efficiency –resonant frequencies –structure and radiation patterns –single mode lasers –modulation of laser diodes – power launching and coupling –source to fiber power launching –fiber of fiber joints –LED coupling to single mode fibers –fiber splicing –optical fiber connectors.

Unit–III

pin photo detector – avalanche photodiodes – photo detector noise –detector response time-avalanche multiplication noise-signal degradation in optical fibers – attenuation –UNIT s –absorption –scattering losses –bending losses – core and cladding losses –signal distortion in fibers –overview of distortion origin –modal delay –factors contributing to delay –group delay – material dispersion – wave guide dispersion –polarization – mode dispersion – characteristics of single mode fibers.

Unit–IV

Fundamental receiver operation – digital receiver performance-eye diagrams – coherent detection – homo dyne and heterodyne-burst mode receiver – analog receivers. Digital links – point to point links – link power budget – rise time budget – power penalties – Analog links – overview of analog links – carrier to noise ratio – multichannel transmission techniques.

Unit–V

Wavelength division multiplexing (WDM) concepts – operational principles of WDM – passive optical star coupler – isolators – circulators –active optical components – MEM Stechnology – variable optical attenuators – tunable optical filters – dynamic gain equalizers – polarization controller – chromatic dispersion compensators – Optical amplifiers – basic applications and types of optical amplifiers – Erbium Doped Fiber Amplifiers(EDFA) –amplification mechanism – architecture-power conversion efficiency and gain – Amplifier noise-optical SNR – system applications.

TEXT BOOKS

1) Gerd Keiser, "Optical Fiber Communication", McGraw Hill International, Singapore, 3rd ed., 2000.
2) Govind P. Agrawal, "Fiber–optic communication Systems", Third Edition, John Wiley & Sons, 2004.

REFERENCES

1) J. Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 1994.
2) J. Gower, "Optical Communication System", Prentice Hall of India, 2001.
3) R.P. Khare, "Fiber Optics and Optoelectronics", Oxford University Press, 2007.

COURSE OUTCOMES

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

1) Comprehend the basic elements of optical fiber transmission link, fiber modes and structure configurations.
2) Visualize the significance of the different kind of losses, signal distortion in optical wave guides, signal degradation factors and dispersion management techniques in optical system performance.
3) Compare the various optical source materials, LED structures, quantum efficiency as well as structures and figure of merit of Laser diodes.
4) Analyze the fiber optic receiver operation and configuration.
5) Identify and integrate fiber optical components in variety of schemes and operational principles WDM.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓	✓	✓							
CO3	✓			✓						
CO4		✓	✓	✓		✓				
CO5	✓	✓							✓	

ITPESCN	**MOBILE ADHOC AND WIRELESS SENSOR NETWORKS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of ad hoc routing protocols.
- Learn the architecture and protocols of wireless sensor networks.

Unit–I

Routing: Cellular and Ad hoc wireless networks – Issues of MAC layer and Routing – Proactive, Reactive and Hybrid Routing protocols – Multicast Routing – Tree based and Mesh based protocols – Multicast with Quality of Service Provision.

Unit–II

Quality of Service: Real–time traffic support – Issues and challenges in providing QoS – Classification of QoS Solutions – MAC layer classifications – QoS Aware Routing Protocols – Ticket based and Predictive location based QoS Routing Protocols.

Unit–III

Energy Management: Need for Energy Management – Classification of Energy Management Schemes – Battery Management and Transmission Power Management Schemes – Network Layer and Data Link Layer Solutions – System power Management schemes.

Unit–IV

Sensor Networks: Introduction – Sensor Network architecture-Data Dissemination – Data Gathering – MAC Protocols for sensor Networks – Location discovery – Quality of Sensor Networks – Evolving Standards – Other Issues – Recent trends in Infrastructure less Networks.

Unit–V

Hybrid Wireless Networks : Introduction – Next Generation Hybrid Wireless Architectures – Routing in Hybrid Wireless Networks – Pricing in Multi–Hop Wireless Networks – Power Control Schemes in Hybrid Wireless Networks – Load Balancing in Hybrid Wireless Networks

TEXT BOOKS

1) C. Siva Ram Murthy and B.S.Manoj, "Ad hoc Wireless Networks – Architectures and Protocols", 1st Edition, Pearson Education, 2006.
2) Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks – An Information Processing Approach", 1st Edition, Morgan Kaufman Publishers, 2004.

REFERENCES

1) C.K. Toh, "Adhoc Mobile Wireless Networks: Protocols and Systems", Pearson Education, 2002.
2) Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007.
3) Carlos De Morais Cordeiro, Dharma Prakash Agarwal, "Adhoc and Sensor Networks: Theory and Applications", World Scientific Publishing Company Private Limited, 2006.

COURSE OUTCOMES

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

1) Have an understanding of the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructurE-based networks.
2) Analyze the protocol design issues of ad hoc and sensor networks.
3) Understanding of the principles and characteristics of wireless sensor networks.
4) Have gained an understanding of the current topics in MANETs and WSNs, both from an industry and research point of views.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓	✓				✓		✓		
CO3	✓	✓	✓							✓
CO4	✓	✓	✓	✓		✓				✓

ITPESCN	**GIS AND REMOTE SENSING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To introduce the students to the basic concepts and principles of various components of remote sensing.
- To provide an exposure to GIS and its practical applications.

Unit–I

EMR and its Interaction with Atmosphere & Earth Material: Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan–Boltzman and Weins Displacement Law – Atmospheric scattering, absorption –

Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

Unit–II

Platforms and Sensors: Types of platforms – orbit types, Sun–synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

Unit–III

Image Interpretation And Analysis: Types of Data Products – types of image interpretation – basic elements of image interpretation – visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

Unit–IV

Geographic Information System: Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type-Spatial and Non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

Unit–V

Data Entry, Storage And Analysis: Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

TEXT BOOKS

1) Lillesand,T.M., Kiefer, R.W. and J.W.Chipman. "Remote Sensing and Image Interpretation" 5th Edition., John Willey and Sons Asia Pvt. Ltd., New Delhi, 2004.
2) Anji Reddy, M. "Textbook of Remote Sensing and Geographical Information System" 2nd edition. BS Publications, Hyderabad, 2001.

REFERENCES

1) Lo. C.P. and A.K.W.Yeung, "Concepts and Techniques of Geographic Information Systems", Prentice Hall of India Pvt. Ltd., New Delhi, 2002
2) Peter A. Burrough, Rachael A. McDonnell, "Principles of GIS", Oxford University Press, 2000.
3) Ian Heywood "An Introduction to GIS", Pearson Education Asia, 2000.

COURSE OUTCOMES

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

1) Principles of Remote Sensing and GIS.
2) Analysis of RS and GIS data and interpreting the data for modeling applications.
3) Real time application of RS and GIS.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓					✓				
CO2	✓	✓	✓		✓				✓	✓
CO3			✓	✓	✓		✓	✓		✓

ITPESCN	**CLOUD COMPUTING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

The student should be made to:

- Understand how Grid computing helps in solving large scale scientific problems
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing
- Learn how to program the grid and the cloud
- Understand the security issues in the grid and the cloud environment

Unit–I

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers – Grid computing Infrastructures – cloud computing – service oriented architecture-Introduction to Grid Architecture and standards–Elements of Grid – Overview of Grid Architecture.

Unit–II

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

Unit–III

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software-Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure-virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

Unit–IV

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model – Introduction to Hadoop Framework – Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

Unit–V

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure-Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TEXT BOOKS

1) Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.
2) Jason Venner, "Pro Hadoop– Build Scalable, Distributed Applications in the Cloud", A Press, 2009.

REFERENCES

1) Tom White, "Hadoop The Definitive Guide", First Edition. O'Reilly, 2009
2) Bart Jacob (Editor), "Introduction to Grid Computing", IBM Red Books, Vervante, 2005
3) Ian Foster, Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", 2nd Edition, Morgan Kaufmann.
4) Frederic Magoules and Jie Pan, "Introduction to Grid Computing" CRC Press, 2009.
5) Daniel Minoli, "A Networking Approach to Grid Computing", John Wiley Publication, 2005.
6) Barry Wilkinson, "Grid Computing: Techniques and Applications", Chapman and Hall, CRC, Taylor and Francis Group, 2010.

COURSE OUTCOMES

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

1) Apply grid computing techniques to solve large scale scientific problems.
2) Apply the concept of virtualization.
3) Use the grid and cloud tool kits.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓		✓						
CO2	✓			✓	✓	✓				
CO3	✓	✓			✓					

ITPESCN	**PARALLEL AND DISTRIBUTED COMPUTING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To study about the Data, Task parallelism and java multithreading.
- To understand the concepts of Deadlocks and Parallel Computational Models.
- To study typical models for distributed algorithms and programming languages.
- To demonstrate the general concepts on Cloud computing, grid computing, and peer-to-peer systems

Unit–I

INTRODUCTION: THE POWER AND POTENTIAL OF PARALLELISM: The power and potential of parallelism-purpose of using parallelism- different parallel architecture- reasoning about performance of parallel programs.

Unit–II

DATA, TASK PARALLELISM AND JAVA MULTITHREADING: Introduction of data and task parallelism-Independent parallelism- Introduction to Java multithreading- Fork-join parallelism- Analyze fork and join parallelism- parallel prefix-parallel pack.

Unit–III

MUTUAL EXCLUSION, DEADLOCKS AND PARALLEL COMPUTATIONAL MODELS : Concurrency- STM-Mutual exclusion- locks- Deadlocks-race condition-Read/write locks-condition variables- Flynn's Taxonomy- PRAM- EREW- CREW-ERCW- CRCW- Simulating CRCW-CREW and EREW- PRAM algorithms- Parallel Programming Models-PVM- MPI Paradigms.

Unit–IV

PARALLEL ALGORITHMS AND PROGRAMMING LANGUAGES: Parallel Programming Language - Brent's Theorem - Simple parallel programs in MPI environments- Parallel algorithms on network- Addition of Matrices- Multiplication of Matrices- Parallel quick sort-Synchronizing shared data structure-Shared memory.

Unit–V

DISTRIBUTED SYSTEM MODEL AND CASES: Distributed system models-Inter process communication-Message passing- Message passing algorithm-Distributed synchronization-Consistency- replication- Cluster computing-MapReduce- Distributed storage- Wide area computing-Distributed hash table-Peer-to-peer systems.

Cases : Parallel computing algorithms and representative programming models- Convergence of parallel- distributed and cloud computing- Cluster Computing-its performance model and system evolution.

TEXT BOOKS

1. "A. Grama, A. Gupta, G. Karypis and V. Kumar, "Introduction to Parallel Computing", (2nd edition), Addison Wesley (2002).
2. H. El-Rewini and T.G. Lewis, "Distributed and Parallel Computing", Manning (1997).
3. Foster, "Designing and Building Parallel Programs", Addison Wesley (1995).

REFERENCES

1. Kai Hwang and ZhiweiXu, "Scalable Parallel Computing", McGraw Hill (1998).
2. Michael J. Quinn, "Parallel Programming in C with MPI and Open MP", McGraw Hill (2003).
3. Barry Wilkinson and Michael Allen, "Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers", (2nd Edition), Prentice Hall PTR (2005).

COURSE OUTCOMES

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

1. To reason about ways to parallelize a problem and be able to evaluate a parallel platform for a given problem
2. To understand and explore the concepts with programming with MPI and Map Reduce/Hadoop
3. To demonstrate the general concepts on Cloud computing, grid computing, and peer-to-peer systems
4. To become familiar with evaluation of online social networks and their potential

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓						
CO2	✓	✓	✓						✓	
CO3	✓	✓	✓	✓						
CO4	✓	✓	✓	✓	✓				✓	

ITPESCN	**SOFTWARE DEFINED NETWORKS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To learn the fundamentals of software defined networks.
- To understand the separation of the data plane and the control plane.
- To study about the SDN Programming.
- To study about the various applications of SDN

Unit–I

INTRODUCTION: History of Software Defined Networking (SDN) – Modern Data Center – Traditional Switch Architecture – Why SDN – Evolution of SDN – How SDN Works – Centralized and Distributed Control and Date Planes

Unit–II

OPEN FLOW & SDN CONTROLLERS: Open Flow Specification – Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor-Based Overlays – SDN via Opening up the Device – SDN Controllers – General Concepts

Unit–III

DATA CENTERS: Multitenant and Virtualized Multitenant Data Center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE

Unit–IV

SDN PROGRAMMING: Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs – Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications

Unit–V

SDN: Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller – Floodlight Controller – Bandwidth Calendaring – Data Center Orchestration

TEXT BOOKS

1. Paul Goransson and Chuck Black, ―Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.
2. Thomas D. Nadeau, Ken Gray, ―SDN: Software Defined Networks, O'Reilly Media, 2013.

REFERENCES

1. Siamak Azodolmolky, ―Software Defined Networking with Open Flow, Packet Publishing, 2013.
2. Vivek Tiwari, ―SDN and Open Flow for Beginners‖, Amazon Digital Services, Inc., 2013.
3. Fei Hu, Editor, ―Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

COURSE OUTCOMES

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

1. Analyze the evolution of software defined networks
2. Express the various components of SDN and their uses
3. Explain the use of SDN in the current networking scenario
4. Design and develop various applications of SDN

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓		✓						
CO2	✓									
CO3		✓								
CO4			✓	✓	✓				✓	

ITPESCN	**WEB TECHNOLOGY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the technologies used in Web Programming.
- To know the importance of object oriented aspects of Scripting.
- To understand creating database connectivity using JDBC.
- To learn the concepts of web based application using sockets.

Unit–I

Scripting: Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script-Object, names, literals, operators and expressions- statements and features- events - windows - documents - frames -

data types - built-in functions- Browser object model - Verifying forms.-HTML5-CSS3- HTML 5 canvas - Web site creation using tools.

Unit–II

Java : Introduction to object oriented programming-Features of Java – Data types, variables and arrays – Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming – Input/Output – Files – Utility Classes – String Handling.

Unit–III

JDBC: JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– InetAddress class – URL class- TCP sockets – UDP sockets, Java Beans –RMI.

Unit–IV

Applets : Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

Unit–V

XML and Web Services : Xml – Introduction-Form Navigation-XML Documents-XSL – XSLT- Web services-UDDI-WSDL-Java web services – Web resources.

TEXT BOOKS

1. Harvey Deitel, Abbey Deitel, "Internet and World Wide Web: How To Program", 5th Edition.
2. Herbert Schildt, "Java - The Complete Reference", 7th Edition. Tata McGraw- Hill Edition.

REFERENCES

1. John Pollock, "Javascript - A Beginners Guide", 3rd Edition, Tata McGraw-Hill Edition.
2. Keyur Shah, "Gateway to Java Programmer Sun Certification", Tata McGraw Hill, 2002.
3. Michael Morrison, "XML Unleashed", Tech Media, SAMS.

COURSE OUTCOMES

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

1. Design web pages.
2. Use technologies of Web Programming.
3. Apply object oriented aspects to Scripting.
4. Create databases with connectivity using JDBC.
5. Build web based application using sockets.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**

CO1			✓	✓	✓	✓		✓	✓	✓
CO2			✓							
CO3		✓		✓						
CO4	✓		✓					✓		
CO5		✓	✓	✓	✓	✓			✓	✓

ITPESCN	**WIRELESS COMMUNICATION**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To know the characteristic of wireless channel
- To learn the various cellular architectures
- To understand the concepts behind various digital signaling schemes for fading channels
- To be familiar with various multipath mitigation techniques and multiple antenna systems

Unit–I

WIRELESS CHANNELS : Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters- Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

Unit–II

CELLULAR ARCHITECTURE : Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept-Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement.

Unit–III

DIGITAL SIGNALING FOR FADING CHANNELS : Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

Unit–IV

MULTIPATH MITIGATION TECHNIQUES : Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver

Unit–V

MULTIPLE ANTENNA TECHNIQUES : MIMO systems – spatial multiplexing - System model -Pre-coding - Beam forming – transmitter diversity, receiver diversity-Channel state information-capacity in fading and non-fading channels.

TEXT BOOKS

Rappaport,T.S., "Wireless communications", Second Edition, Pearson Education, 2010.

Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2006.

REFERENCES

1. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
2. Upena Dalal, " Wireless Communication", Oxford University Press, 2009.
3. Van Nee, R. and Ramji Prasad, "OFDM for wireless multimedia communications", Artech House, 2000.

COURSE OUTCOMES

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

1. Characterize wireless channels
2. Design and implement various signaling schemes for fading channels
3. Design a cellular system
4. Compare multipath mitigation techniques and analyze their performance
5. Design and implement systems with transmit/receive diversity and MIMO systems and analyze their performance

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2			✓	✓	✓		✓	✓	✓	✓
CO3			✓	✓	✓		✓	✓	✓	✓
CO4	✓	✓								
CO5			✓	✓	✓		✓	✓	✓	✓

ITPESCN	**ROBOTICS AND AUTOMATION**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To introduce the functional elements of Robotics
- To impart knowledge on the direct and inverse kinematics
- To introduce the manipulator differential motion and control
- To educate on various path planning techniques

Unit–I

Introduction: Definition, Classification of Robots, geometric classification and control Classification, Robot Elements: Drive system, control system, sensors, end effectors, gripper actuators and gripper design.

Unit–II

Robot Coordinate Systems and Manipulator Kinematics: Robot co-ordinate system representation, transformation, homogenous transform and its inverse, relating the robot to its world. Manipulators Kinematics, parameters of links and joints, kinematic chains, dynamics of kinematic chains, trajectory planning and control, advanced techniques of kinematics and dynamics of mechanical systems, parallel actuated and closed loop manipulators.

Unit–III

Robot Control: Fundamental principles, classification, position, path velocity and force control systems, computed torque control, adaptive control, Seroo system for robot control, and introduction to robot vision.

Unit–IV

Robot Programming: Level of robot programming, language based programming, task level programming, robot programming synthesis, robot programming for welding, machine tools, material handing, assembly operations, collision free motion planning.

Unit–V

Applications: Application of robot in welding, machine tools, material handling, assembly operations parts sorting and parts inspection.

TEXT BOOKS

1. Coifet Chirroza, "An Introduction to Robot Technology" Kogan Page.
2. Y. Koren "Robotics for Engineers" Mcgraw Hill.

REFERENCES

1. Grover, Mitchell Weiss, Nagel Octrey, "Industrial Robots" Mcgraw Hill.
2. Asfahl, "Robots & Manufacturing Automat (c)All TCP SYN Packets.
3. K.S. Fu, R.C. Gonzalez Y & CSG Lee, "Robotics", McGraw Hill.
4. J.J. Craig, "Robotics", Addison Wesley.

COURSE OUTCOMES

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

1. analyze Instrumentation systems and their applications
2. know about the differential motion add statics in robotics
3. know about the various path planning techniques
4. know about the dynamics and control in robotics industries

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1		✓		✓			✓			
CO2	✓									
CO3	✓	✓		✓						
CO4	✓	✓		✓						

ITPESCN	SATELLITE COMMUNICATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basics of satellite orbits.
- To understand the satellite segment and earth segment.
- To analyze the various methods of satellite access.
- To understand the applications of satellites.

Unit–I

INTRODUCTION TO SATELLITE COMMUNICATION : Historical background, Basic concepts of Satellite Communications, Communication Networks and Services, Comparison of Network Transmission technologies, Orbital and Spacecraft problems, Growth of Satellite communications.

Unit–II

SATELLITE ORBITS : Kepler‟s Laws, Newton‟s law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage-Launching Procedures – launch vehicles and propulsion.

Unit–III

THE SPACE LINK : Introduction, Equivalent Isotropic Radiated Power, Transmission Losses, Free-space transmission, Feeder losses, Antenna misalignment losses, Fixed atmospheric and ionospheric losses, The Link-Power Budget Equation, System Noise, Carrier-to-Noise Ratio, The Uplink, Saturation flux density, Input backoff, Downlink, Output back-off, Combined Uplink and Downlink C/N Ratio

Unit–IV

EARTH SEGMENT : Introduction – Receive – Only home TV systems – Outdoor unit – Indoor unit for analog (FM) TV – Master antenna TV system – Community antenna TV system – Transmit – Receive earth stations – Problems – Equivalent isotropic radiated power – Transmission losses – Free-space transmission – Feeder losses – Antenna misalignment losses – Fixed atmospheric and ionospheric losses – Link power budget equation – System noise – Antenna noise – Amplifier noise temperature – Amplifiers in cascade – Noise factor – Noise temperature of absorptive networks – Overall system noise temperature – Carrierto- Noise ratio – Uplink – Saturation flux density – Input back off – The earth station – HPA – Downlink – Output back off – Satellite TWTA output – Effects of rain – Uplink rain– Fade margin – Downlink rain – Fade margin – Combined uplink and downlink C/N ratio – Inter modulation noise.

Unit–V

SATELLITE APPLICATIONS : INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast

(DAB)- World space services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.

TEXT BOOKS

1. Dennis Roddy, "Satellite Communication", 4th Edition, McGraw Hill International, 2006.
2. Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007.

REFERENCES

1. N. Agarwal, "Design of Geosynchronous Space Craft", Prentice Hall, 1986.
2. Bruce R. Elbert, "The Satellite Communication Applications", Hand Book, Artech House Bostan London, 1997.
3. Tri T. Ha, "Digital Satellite Communication", II nd edition, 1990.
4. Emanuel Fthenakis, "Manual of Satellite Communications", McGraw Hill Book Co., 1984.
5. Robert G. Winch, "Telecommunication Trans Mission Systems", McGraw-Hill Book Co., 1983.
6. Brian Ackroyd, "World Satellite Communication and earth station Design", BSP professional Books, 1990.
7. G.B.Bleazard, "Introducing Satellite communications", NCC Publication, 1985.
8. M.Richharia, "Satellite Communication Systems-Design Principles", Macmillan 2003

COURSE OUTCOMES

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

1. Analyze the satellite orbits.
2. Analyze the earth segment and space segment.
3. Design various satellite applications

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2	✓	✓								
CO3			✓	✓	✓	✓	✓	✓		✓

ITPESCN	**DISTRIBUTED SYSTEMS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- Understand foundations of Distributed Systems
- Introduce the idea of peer to peer services and file system
- Understand in detail the system level and support required for distributed system
- Understand the issues involved in studying process and resource management

Unit–I

INTRODUCTION : Introduction – Examples of Distributed Systems–Trends in Distributed Systems – Focus on resource sharing – Challenges. Case study: World Wide Web.

Unit–II

COMMUNICATION IN DISTRIBUTED SYSTEM : System Model – Inter process Communication – the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI Remote Method Invocation And Objects: Remote Invocation – Introduction – Request-reply protocols – Remote procedure call – Remote method invocation. Case study: Java RMI – Group communication – Publish-subscribe systems – Message queues – Shared memory approaches Distributed objects – Case study: Enterprise Java Beans -from objects to components

Unit–III

PEER TO PEER SERVICES AND FILE SYSTEM : Peer-to-peer Systems – Introduction – Napster and its legacy – Peer-to-peer – Middleware – Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems – Introduction – File service architecture – Andrew File system. File System: Features-File model -File accessing models – File sharing semantics Naming: Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP.

Unit–IV

SYNCHRONIZATION AND REPLICATION : Introduction – Clocks, events and process states – Synchronizing physical clocks- Logical time and logical clocks – Global states – Coordination and Agreement – Introduction – Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions - Nested transactions – Locks – Optimistic concurrency control – Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication – Case study – Coda.

Unit–V

PROCESS & RESOURCE MANAGEMENT : Process Management: Process Migration: Features, Mechanism – Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

TEXT BOOKS

1. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.
2. Pradeep K Sinha, “Distributed Operating Systems: Concepts and Design”, Prentice Hall of India, 2007.

REFERENCES

1. Tanenbaum A.S., Van Steen M., “Distributed Systems: Principles and Paradigms”, Pearson Education, 2007.
2. Liu M.L., “Distributed Computing, Principles and Applications”, Pearson Education, 2004.
3. Nancy A Lynch, “Distributed Algorithms”, Morgan Kaufman Publishers, USA, 2003.

COURSE OUTCOMES

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

1. Discuss trends in Distributed Systems.
2. Apply network virtualization.
3. Apply remote method invocation and objects.
4. Design process and resource management systems.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2		✓	✓							
CO3		✓	✓							
CO4			✓	✓	✓	✓				✓

ITPESCN	**INFORMATION RETRIEVAL**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To learn the role of information retrieval in various real-time applications
- To learn and apply information retrieval models
- To design Web Search Engine
- To be exposed to Link Analysis

Unit–I

Introduction- History of IR –Components of IR-Issues– Open source Search engine Frameworks- The impact of the web on IR-The role of artificial intelligence (AI) in IR–IRVersus Web Search- Components of a Search engine – Characterizing the web

Unit–II

Boolean and vector-space retrieval models - Term weighting- TF- IDF weighting – cosine similarity – Preprocessing – Inverted indices-efficient processing with sparse vectors–Language Model based IR – Probabilistic IR– Latent Semantic Indexing-Relevance feedback and query expansion.

Unit–III

Web search overview, web structure, the user, paid placement, search engine optimization/spam. Web size measurement-search engine optimization/spam –Web Search Architectures - crawling- meta-crawlers – Focused Crawling – web indexes – Near-duplicate detection – Index Compression – XML retrieval

Unit–IV

Link Analysis – husband authorities – Page Rank and HITS algorithms-Searching and Ranking– Relevance Scoring and ranking for Web – Similarity –

Hadoop & Map Reduce-Evaluation- Personalized search - Collaborative filtering and content-based recommendation of documents and products – handling "invisible" Web- Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval

Unit–V

Information filtering; organization and relevance feedback – Text Mining- Text classification and clustering – Categorization algorithms: naïve Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization(EM).

TEXT BOOKS

1. C.Manning, P.Raghavan, and H.Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2008.
2. Ricardo Baeza –Yates and Berthier Ribeiro-Neto, "Modern Information Retrieval : The Concepts and Technology behind Search", 2nd Edition, ACM Press Books, 2011.

REFERENCES

1. Bruce Croft, Donals Metzler and Trevor Strohman, "Search Engines : Information Retrieval in Practice", 1st Edition, Addison Wesley, 2009.
2. Mark Levene, "An Introduction to Search Engines and Web Navigation", 2nd Edition, Wiley, 2010.
3. Stefan Buettcher, Charles L.A. Clarke, Gordon V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", The MIT Press, 2010.
4. Ophir Frieder, "Information Retrieval: Algorithms and Heuristics: The information Retrieval Series", 2nd Edition, Springer, 2004.
5. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", First Edition, Gate Mustru Publishing, 2008.
6. www.nptel.ac.in

COURSE OUTCOMES

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

1. Gain an understanding of the basic concepts and techniques in Information Retrieval;
2. Understand how statistical models of text can be used to solve problems in IR, with a focus on how the vector-space model and language models are implemented and applied to document retrieval problems;
3. Understand how statistical models of text can be used for other IR applications, for example clustering and news aggregation;
4. Appreciate the importance of data structures, such as an index, to allow efficient access to the information in large bodies of text;
5. Understand common text compression algorithms and their role in the efficient building and storage of inverted indices.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓		✓		✓					
CO3		✓	✓	✓	✓	✓	✓			
CO4	✓									
CO5			✓							

ITPESCN	**COMPILER DESIGN**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To learn the design principles of a Compiler.
- To learn the various parsing techniques and different levels of translation.
- To learn how to optimize and effectively generate machine codes.

Unit–I

INTRODUCTION TO COMPILERS : Translators-Compilation and Interpretation-Language processors -The Phases of Compiler Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools - Programming Language basics.

Unit–II

LEXICAL ANALYSIS : Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions- Converting Regular Expression to DFA-Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.

Unit–III

SYNTAX ANALYSIS : Need and Role of the Parser-Context Free Grammars -Top Down Parsing –General Strategies- Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR Item- Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language .

Unit–IV

SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT : Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S Attribute Definitions- Design of predictive translator - Type Systems-Specification of a simple type checker- Equivalence of Type Expressions-Type Conversions. RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation-Storage Allocation in FORTAN.

Unit–V

CODE OPTIMIZATION AND CODE GENERATION : Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis-Efficient Data Flow Algorithms-Issues in Design of a Code Generator - A Simple Code Generator Algorithm.

TEXT BOOKS

1. Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers – Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2007.
2. Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence-based Approach", Morgan Kaufmann Publishers, 2002.

REFERENCES

1. Steven S. Muchnick, "Advanced Compiler Design and Implementation", Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
2. Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004.
3. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008.

COURSE OUTCOMES

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

1. Design and implement a prototype compiler.
2. Apply the various optimization techniques.
3. Use the different compiler construction tools.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1			✓	✓					✓	✓
CO2		✓		✓	✓				\	
CO3	✓	✓		✓	✓					

OPEN ELECTIVES

ITOESCN	**ENTERPRISE RESOURCE PLANNING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To know the basics of ERP and to understand the key implementation issues of ERP
- To know the business Modules of ERP
- To be aware of some popular products in the area of ERP
- To appreciate the current and future trends in ERP

Unit–I

ERP: Enterprise-An Overview – Basic ERP Concepts – Risks of ERP – Benefits of ERP – ERP and Related Technologies – Business Intelligence(BI) – Business Process Reengineering (BPR) – Data Warehousing – Data Mining – OLAP – SCM.

Unit–II

Implementation Challenges – Implementation Strategies – ERP Implementation Lifecycle-Implementation Methodologies – Vendors and Consultants – Contracts with Vendors – Consultants and Employees – Project Management and Monitoring – Post Implementation Activities.

Unit–III

Business Modules of an ERP Package-Finance, Manufacturing – Human Resources – Plant Maintenance-Materials Management – Quality Management – Marketing – Sales and Distribution.

Unit–IV

ERP Market Place and Market Place Dynamics – SAP AG – PeopleSoft – JD Edwards – Oracle Corporation – QAD Inc – QAD Analytics – QAD Open Technology – SSA Global – Lawson Software-Epicor – Intuitive-ERP UNIT s.

Unit–V

Turbo Charge the ERP System – Limitations of ERP Systems – Enterprise Application Integration (EAI) – ERP and E-Business – ERP, Internet and WWW – ERP and Total Quality Management – Future Directions and Trends in ERP.

TEXT BOOKS

1. Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2008.
2. Mary Sumner, "Enterprise Resource Planning", Pearson Education, 2007.

REFERENCES

1. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2012.
2. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003.
3. K.Ganesh, Sanjay Mohapatra, S.P.Anbu udayasankar, P.Sivakumar, "Enterprise Resource Planning: Fundamentals of Design and Implementation", Springer, 2014.

COURSE OUTCOMES

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

1. Design and develop ERP implementation cycle.
2. Awareness of core and extended Modules of ERP.
3. Knowledge about the business Modules of ERP.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1			✓	✓	✓	✓	✓			✓
CO2	✓	✓								
CO3	✓	✓								

ITOESCN	E- COMMERCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To provide basic knowledge about the types of Electronic payment systems.
- To illustrate the concepts of various On–Demand Education and Software Agents

Unit–I

E-Commerce Infrastructure: E-Commerce framework – Media Convergence-Anatomy of E-Commerce Applications – Consumer and Organization Applications – Market forces influencing the I–way – Components of the I–way – Network Access Equipment – Distribution Networks – Issues – Internet Terminology – NSFNET – Research and Education network – Internet Governance.

Unit–II

E-Commerce and Web: Architecture frame work for E- Commerce-WWW as the architecture-Hypertext publishing – Technology and Security on Web – Consumer Oriented Applications – Mercantile Process Model – Mercantile Models from the perspective of Consumer and merchants.

Unit–III

Electronic Payment Systems and EDI: Types of Electronic payment systems – Digital token based system – Smart cards – Credit card based system – Risk factors – Designing Electronic payment systems. EDI – EDI Applications in business – Legal, Security and Privacy issues – Standardization in EDI – EDI software implementation – EDI envelope-VANs – Internet based EDI.

Unit–IV

Inter organizational E-Commerce and Marketing: Internal Information Systems – Macro forces and Internal Commerce-Work–flow automation – Customization – SCM – Corporate Digital Library: Dimensions, Making a business case, Types of Digital Documents – Advertising on Internet – Charting the online marketing process – Market Research.

Unit–V

On–Demand Education and Software Agents: Computer based Education and Training – Technological Components – Digital Copyrights and E-Commerce-History of software agents – Characteristics and Properties of Agents – Technology behind the Agents – Telescript Agent Language-SafE-Tcl – Software Agents in action – SGML.

TEXT BOOKS

1. Ravi Kalakota, Andrew B. Whinston, "Frontiers of Electronic Commerce", Paperback – Addison–Wesley Publishing Company, 1996.
2. Kenneth C. Laudon, "E-Commerce: Business, Technology", Society– 2016 Edition 10.

REFERENCES

1. Dave Chaffey, "E-Business and E-Commerce Management: Strategy, Implementation and Practice", 2013.
2. Tharam Dillon, Elizabeth Chang, "E-Commerce: Fundamentals and Applications", Wiley publication 2007.
3. David Whiteley, "E-Commerce: Strategy, Technologies and Applications", Tata McHill 2001.

COURSE OUTCOMES

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

1. Identify and analyze the construction and working principles of E-Commerce.
2. Develop and implement the Electronic Payment Systems and EDI.
3. Select suitable Computer based Education and Training.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2			✓	✓	✓			✓	✓	✓
CO3	✓	✓						✓		

ITOESCN	**BIO INFORMATICS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To study the fundamentals of Bio informatics technologies
- To learn principles of modern bio–informatics and to apply basic predictive methods those are common use in the field.
- To study the tools and databases applied in the field.

Unit–I

Introduction: Need for Bioinformatics technologies –Overview of Bioinformatics technologies Structural bioinformatics –Data format and processing–Secondary resources and applications –Role of Structural bioinformatics –Biological Data Integration System.

Unit–II

Data warehousing and datamining in bioinformatics: Bioinformatics data – Data warehousing architecture –data quality –Biomedical data analysis – DNA data analysis –Protein data analysis –Machine learning –Neural network architecture and applications in bioinformatics.

Unit–III

Modeling for bioinformatics: Hidden markov modeling for biological data analysis –Sequence identification –Sequence classification–multiple alignment generation –Comparative modeling –Protein modeling – genomic modeling –

Probabilistic modeling –Bayesian networks –Boolean networks–Molecular modeling –Computer programs for molecular modeling.

Unit–IV

Pattern matching and visualization: Gene regulation –motif recognition –motif detection –strategies for motif etection –Visualization –Fractal analysis –DNA walk models–one dimension –two dimension –higher dimension –Game representation of Biological sequences –DNA, Protein, Amino acid sequences.

Unit–V

Microarray analysis: Microarray technology for genome expression study – image analysis for data extraction –preprocessing –segmentation –gridding –spot extraction –normalization, filtering –cluster analysis –gene network analysis – Compared Evaluation of Scientific Data Management Systems –Cost Matrix – Evaluation model –Benchmark –Tradeoffs.

TEXT BOOKS

1. Yi–Ping Phoebe Chen (Ed), "BioInformatics Technologies", First Indian Reprint, Springer Verlag, 2007.
2. Arthur M. Lesk, "Introduction to bioinformatics", First Edition, Oxford University Press, 2002.

REFERENCES

1. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.
2. Arthur M Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press, 2005.
3. Dan E. Krane, Michael L. Raymer, "Fundamental Concepts of Bioinformatics", First Edition, 2002.

COURSE OUTCOMES

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

1. Develop models for biological data.
2. Apply pattern matching techniques to bioinformatics data –protein data genomic data.
3. Apply micro array technology for genomic expression study.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓			✓		✓	✓
CO2	✓	✓		✓	✓					
CO3	✓	✓				✓	✓	✓		

ITOESCN	SUPPLY CHAIN MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the importance of major decisions in supply chain management
- To present the vision of supply chain management and their role in enterprise competitiveness
- To appreciate the current trends in SCM

Unit–I

Supply Chain – Fundamentals –Evolution– Role in Economy – Importance-Decision Phases – Supplier– Manufacturer–Customer chain – Enablers/ Drivers of Supply Chain Performance –Supply chain strategy – Supply Chain Performance Measures.

Unit–II

Outsourcing – Make Vs buy – Identifying core processes – Market Vs Hierarchy – Make Vs buy continuum – Sourcing strategy: Portfolio Approach – Reconfiguration of the Supply Base –Impact of the internet on Sourcing Strategy.

Unit–III

Distribution Network Design – Role-Factors Influencing Distribution Network Design – Design Option for a Distribution Network – E-Business and the Distribution Network – Network Design in Supply Chain – Role-Factors Influencing Network Design Decisions – Framework for Network Design Decisions – Impact of uncertainty on Network Design.

Unit–IV

Demand Forecasting in a Supply Chain – The Role of Forecasting in a Supply Chain – Characteristics – Components – Risk Management in Forecasting – Managing Economies of Scale in a Supply Chain – RolE-Economies of Scale to Exploit Fixed Costs – Estimating Cycle Inventory– Managing supply chain cycle inventory – Uncertainty in the supply chain.

Unit–V

Supply Chain Integration – Building partnership and trust in SC Value of Information: Bullwhip Effect – Effective forecasting – Coordinating the supply chain – SC Restructuring – SC Mapping – SC process restructuring, Postpone the point of differentiation – IT in Supply Chain – Agile Supply Chains –Reverse Supply chain – Agro Supply Chains.

TEXT BOOKS

1. Janat Shah, “Supply Chain Management – Text and Cases”, Pearson Education, 2009.
2. Sunil Chopra and Peter Meindl, “Supply Chain Management–Strategy Planning and Operation”, PHI Learning / Pearson Education, 2007.

REFERENCES

1. Ballou Ronald H, "Business Logistics and Supply Chain Management", Pearson Education, 5th Edition, 2007.
2. David Simchi–Levi, Philip Kaminsky, Edith Simchi–Levi, "Designing and Managing the Supply Chain: Concepts, Strategies, and Cases", Tata McGraw–Hill, 2005.
3. Altekar Rahul V, "Supply Chain Management–Concept and Cases", PHI, 2005.
4. Shapiro Jeremy F, "Modeling the Supply Chain", Thomson Learning, Second Edition, 2006.
5. Joel D. Wisner, G. Keong Leong, Keah–Choon Tan, "Principles of Supply Chain Management– A Balanced Approach", South–Western, Cengage Learning, 2008.

COURSE OUTCOMES

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

1. Ability to build a competitive supply chain using strategies, models, techniques and information technology.
2. Manage a competitive supply chain using strategies, models, techniques and information technology.
3. Knowledge about current trends in Supply Chain Management.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓			✓	✓	✓		
CO2	✓	✓				✓	✓	✓		
CO3	✓					✓				✓

ITOESCN	**CYBER FORENSICS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To study the fundamentals of Computer Forensics
- To learn, analyze and validate Forensics Data
- To study the tools and tactics associated with Cyber Forensics

Unit–I

Introduction: Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Computer Forensics Systems – Vendor and Computer Forensics Services.

Unit–II

Computer forensics evidence and capture: Data Recovery – Evidence Collection and Data Seizure-Duplication and Preservation of Digital Evidence-Computer Image Verification and Authentication.

Unit–III

Computer forensic analysis: Discover of Electronic Evidence-Identification of Data – Reconstructing Past Events – Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

Unit–IV

Information warfare: Arsenal – Surveillance Tools – Hackers and Theft of Components – Contemporary Computer Crime-Identity Theft and Identity Fraud – Organized Crime &Terrorism – Avenues Prosecution and Government Efforts – Applying the First Amendment to Computer Related Crime-The Fourth Amendment and other Legal Issues.

Unit–V

Computer forensic cases: Developing Forensic Capabilities – Searching and Seizing Computer Related Evidence –Processing Evidence and Report Preparation – Future Issues.

TEXT BOOKS

1. John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", Cengage Learning, 2nd Edition, 2005. (CHAPTERS 1 – 18). (UNIT I – IV)
2. Marjie T Britz, "Computer Forensics and Cyber Crime: An Introduction", Pearson Education, 2nd Edition, 2008. (CHAPTERS 3 – 13). (UNIT IV – V)

REFERENCES

1. MariE-Helen Maras, "Computer Forensics: Cybercriminals, Laws, and Evidence", Jones & Bartlett Learning; 2nd Edition, 2014.
2. Chad Steel, "Windows Forensics", Wiley, 1st Edition, 2006.
3. Majid Yar, "Cybercrime and Society", SAGE Publications Ltd, Hardcover, 2nd Edition, 2013.
4. Robert M Slade, "Software Forensics: Collecting Evidence from the Scene of a Digital Crime", Tata McGraw Hill, Paperback, 1st Edition, 2004.

COURSE OUTCOMES

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

1. Identify the present indicators that a Cyber Security incident has occurred.
2. Collect, Process, Analyze, and present Computer Forensic Evidence.
3. Apply Criminal Justice Methods to Cyber Security and Computer Forensic Investigations.
4. Work in teams to analyze and resolve Cyber Security issues.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2		✓	✓	✓						
CO3			✓	✓	✓	✓	✓	✓		✓
CO4									✓	✓

ITOESCN	SYSTEM MODELING AND SIMULATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basic system concept and definitions of system.
- To understand the system concept and apply functional modeling method to model the activities of a static system.
- To understand the behavior of a dynamic system and create an analogous model for a dynamic system.
- To understand simulate the operation of a dynamic system and make improvement according to the simulation results.

Unit–I

Introduction – Simulation Terminologies– Application areas – Model Classification – Types of Simulation – Steps in a Simulation study– Concepts in Discrete Event Simulation – Monte Carlo Simulation – Simulation Examples.

Unit–II

Statistical Models – Concepts – Discrete Distribution– Continuous Distribution – Poisson Process– Empirical Distributions– Queueing Models – Characteristics– Notation – Queueing Systems – Markovian Models– Properties of random numbers– Generation of Pseudo Random numbers– Techniques for generating random numbers–Testing random number generators– Generating Random–Variates– Inverse Transform technique Acceptance- Rejection technique-Composition and Convolution Method.

Unit–III

Input Modeling – Data collection – Assessing sample independence- Hypothesizing distribution family with data – Parameter Estimation – Goodness–of–fit tests – Selecting input models in absence of data– Output analysis for a Single system – Terminating Simulations – Steady state simulations.

Unit–IV

Model Building – Verification of Simulation Models – Calibration and Validation of Models – Validation of Model Assumptions – Validating Input – Output Transformations.

Unit–V

Simulation Tools – Model Input – High level computer system simulation – CPU – Memory Simulation – Comparison of systems via simulation – Simulation Programming techniques – Development of Simulation models – Simulation Project Management.

TEXT BOOKS

1. Banks J and John Carson, “Discrete Event System Simulation”, Pearson Education, 2010.
2. Geoffrey Gordon, “System Simulation”, Second Edition, PHI, 2006.

REFERENCES

1) Kelton, WD, Sadowski, R, Zupick, Simulation with Arena, McGraw–Hill, 2014.
2) Frank L. Severance, "System Modeling and Simulation", Wiley, 2001.
3) Averill M. Law and W.David Kelton, "Simulation Modeling and Analysis, Third Edition, McGraw Hill, 2006.
4) Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice", Wiley, 1998.
5) Altiok, T, Melamed, B, Simulation Modeling and Analysis with Arena, Academic Press, 2007.

COURSE OUTCOMES

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

1. Acquiring knowledge of Simulation Terminologies and Classification.
2. Familiarizing the idea of Mathematical Models.
3. Familiarizing of Simulation Data.
4. Gaining experience skills on Verification and Validation of Simulation Models.
5. Familiarizing on Simulation Tools and Simulation Project Management.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓	✓	✓							
CO3	✓	✓	✓							
CO4	✓	✓	✓	✓	✓					
CO5	✓	✓	✓						✓	✓

ITOESCN	**SOCIAL NETWORK ANALYTICS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the concept of semantic web and related applications
- To learn knowledge representation using ontology
- To understand human behavior in social web and related communities
- To learn visualization of social networks

Unit–I

Introduction – Development of Semantic Web – Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web–based networks – Applications of Social Network Analysis

Unit–II

Ontology–based knowledge Representation –Resource Description Framework – Web Ontology Language-Modeling and aggregating social network data: State-of–the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.

Unit–III

Extracting evolution of Web Community y from a Series of Web Archive-Detecting communities in social networks – Evaluating communities – Methods for community y detection and mining – Applications of community y mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks

Unit–IV

Understanding and predicting human behaviour for social communities – User data management – Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness – Privacy in online social networks – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and countermeasures.

Unit–V

Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix – based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community y welfare-Collaboration networks – Co-Citation networks.

TEXT BOOKS

1. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1st Edition, 2010.
2. Peter Mika, "Social Networks and the Semantic Web", Springer, First Edition, 2007.

REFERENCES

1. Guandong Xu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", Springer , First Edition, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé –Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
4. John G Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

COURSE OUTCOMES

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

1. Know basic notation and terminology used in network science
2. Work on the internals components of the social network
3. Model and visualize the social network
4. Understand the behaviour of the users in the social network

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓	✓	✓							
CO3		✓	✓	✓				✓		
CO4	✓	✓	✓	✓						

ITOESCN	**SOFT COMPUTING TECHNIQUES**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- Learn the various soft computing frameworks
- Be familiar with the design of various Neural Networks
- Be exposed to Fuzzy Logic
- Learn Genetic programming and Hybrid Systems

Unit–I

Artificial neural network: Introduction, characteristics– learning methods – taxonomy – Evolution of neural networks– basic models – important technologies – Applications. Fuzzy logic: Introduction – Crisp sets– Fuzzy sets – Crisp relations and Fuzzy relations: Cartesian product of relation – Classical relation, Fuzzy relations, Tolerance and Equivalence relations, Non-iterative fuzzy sets. Genetic algorithm– Introduction – Biological background – Traditional optimization and Search techniques – Genetic basic concepts.

Unit–II

ANS and BPN: Network inputs and outputs – Feedback interconnections and network stability – Feed forward networks – Adaptive networks – Supervised and Unsupervised learning – Back Propagation Network – Approach – Operation – Generalized Delta RulE-Update of output – Layer weights – Updates of hidden layer weights – Training data – Network sizing – Weights and Learning Parameters – BPN Applications – Data compression.

Unit–III

Membership functions: Features, Fuzzification, methods of membership value assignments– Defuzzification: Lambda cuts – Methods – Fuzzy arithmetic and fuzzy measures: Fuzzy arithmetic – Extension principle-Fuzzy measures – Measures of fuzziness –Fuzzy integrals – Fuzzy rule base and approximate reasoning : Truth values and tables, Fuzzy propositions, formation of rules– Decomposition of rules,

Aggregation of fuzzy rules, Fuzzy reasoning–Fuzzy inference systems-Overview of fuzzy expert system–Fuzzy decision making.

Unit–IV

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

Unit–V

Neuro–fuzzy hybrid systems – Genetic Neuro Hybrid systems – Genetic fuzzy hybrid and Fuzzy genetic hybrid systems – Simplified fuzzy ARTMAP – Applications: A fusion approach of Multispectral images with SAR, Optimization of Traveling Salesman Problem using Genetic Algorithm approach, Soft computing based hybrid fuzzy controllers.

TEXT BOOKS

1. J.S.R. Jang, C.T. Sun and E. Mizutani, “Neuro–Fuzzy and Soft Computing”, PHI/Pearson Education 2004.
2. S.N. Sivanandam and S.N. Deepa, "Principles of Soft Computing", Wiley India Pvt. Ltd., 2011.

REFERENCES

1. S. Rajasekaran and G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications", Prentice-Hall of India Pvt. Ltd., 2006.
2. David E. Goldberg, “Genetic Algorithm in Search, Optimization and Machine Learning” Pearson Education India, 2013.
3. James A. Freeman, David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
4. George J. Klir, Ute St. Clair, Bo Yuan, “Fuzzy Set Theory: Foundations and Applications” Prentice Hall, 1997.
5. Simon Haykin, “Neural Networks Comprehensive Foundation” Second Edition, Pearson Education, 2005.

COURSE OUTCOMES

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

1. Select and apply various soft computing frameworks
2. Design of various neural networks
3. Use fuzzy logic
4. Apply genetic programming
5. Understand hybrid soft computing

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓						
CO2		✓	✓	✓	✓					
CO3			✓	✓	✓					
CO4			✓	✓	✓					
CO5	✓		✓	✓	✓					

ITOESCN	**KNOWLEDGE MANAGEMENT**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- Design and maintain knowledge management system.
- Coverage of knowledge management concepts and methodologies which includes knowledge creation, knowledge architecture and knowledge codification.
- Broad understanding of knowledge management tools and knowledge portals as well as the notions of knowledge transfer in the E-world.

Unit–I

Knowledge Management: KM Myths – KM Life Cycle-Understanding Knowledge-Knowledge, intelligence –Experience-Common Sense-Cognition and KM – Types of Knowledge-Expert Knowledge-Human Thinking and Learning.

Unit–II

Knowledge Management System Life Cycle : Challenges in Building KM Systems – Conventional vs KM System Life Cycle (KMSLS)– Knowledge Creation and Knowledge Architecture - Nonaka's Model of Knowledge Creation and Transformation– Knowledge Architecture.

Unit–III

Capturing Knowledge: Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge-Knowledge Capturing Techniques – Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid–Concept Mapping – Black boarding.

Unit–IV

Knowledge Codification: Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer's Skill Set – System Testing and Deployment – Knowledge Testing –Approaches to Logical Testing – User Acceptance Testing – KM System Deployment Issues – User Training – Post Implementation.

Unit–V

Knowledge Transfer And Sharing: Transfer Methods – Role of the Internet – Knowledge Transfer in E-world – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence-Decision

Making Architecture-Data Management – Knowledge Management Protocols – Managing Knowledge Workers.

TEXT BOOKS

1. Elias. M. Award & Hassan M. Ghaziri, "Knowledge Management" , Pearson Education, Second Edition, 2008.
2. Stuart Barnes, "Knowledge Management Systems – Theory and Practice", Cengage Learning, 2002.

REFERENCES

1. Guus Schreiber, Hans Akkermans, AnjoA njewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, "Knowledge Engineering and Management", Universities Press, Second Edition, 2001.
2. C.W. Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol. 1 and 2, 2003.
3. Irma Becerra Fernandez, Rajiv Sabherwal, "Knowledge Management: Systems and Processes", Routledge, Second Edition, 2015.

COURSE OUTCOMES

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

1. Obtain Knowledge of components in KMS and how to use in business environment for effective decision making.
2. Become familiar with the current theories, practices, tools and techniques in Knowledge Management.
3. Learn to determine the infrastructure requirements to manage the intellectual capital in organizations.
4. Identify and select tools and techniques of KM for the stages of creation, acquisition, transfer and management of knowledge.
5. Evaluate the impact of technology including telecommunications, networks, and internet/intranet role in managing knowledge.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓									✓
CO3	✓					✓				✓
CO4	✓	✓			✓					
CO5	✓	✓	✓	✓						

ITOESCN	**PROJECT MANAGEMENT**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the activities in project management.
- To impart knowledge on project scheduling, monitoring and to control.
- To Study about managing people and teams.

Unit–I

Project Definition – Contract Management – Activities Covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.

Unit–II

Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

Unit–III

Objectives – Project Schedule-Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

Unit–IV

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value-Priortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

Unit–V

Introduction – Understanding Behaviour – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies.

TEXT BOOKS

1. Bob Hughes, Mike Cotterell, Rajib Mall "Software Project Management", Fifth Edition, Tata McGraw Hill, 2011.
2. Gopalaswamy Ramesh, "Managing Global Software Projects", Tata McGraw Hill, New Delhi, 2006.

REFERENCES

1. Pankaj Jalote, "Software Project Management in Practice", Pearson Education, reprinted 2009.
2. Walker Royce, "Software Project Management", Pearson Education, 2002.
3. Kelkar SA, "Software Project Management", PHI Learning, New Delhi, 2013.

COURSE OUTCOMES

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

1. Understand the basic concepts and issues of software project management
2. Effectively planning the software projects and Create project plans that address real–world management challenges.
3. Implement the project plans through managing people, communications and change.
4. Deliver successful software projects that support your organization's strategic goals.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓	✓				✓				✓
CO3		✓	✓	✓		✓				
CO4	✓	✓		✓					✓	✓

ITOESCN	**PRODUCT DESIGN**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To familiarize the students about the aspects of product design and development.
- To provide basic knowledge about the costs of product development.
- To illustrate the concepts of Quality control and reliability of product.

Unit–I

Introduction: Significance of product design– challenges of product design–product design and development process–sequential engineering design method–the challenges of product development– Identifying opportunities evaluate and prioritize projects–allocation of resources.

Unit–II

Identifying customer needs and product Specifications: Competitor and customer –behavior analysis– understanding customer–involve customer in development and managing requirements–Interpret raw data in terms of customers need–organize needs in hierarchy – establish the relative importance of needs–Establish target specifications– setting final specifications .

Unit–III

Product Development: Detailed design– Analysis and modeling– Best practices for detailed design– Design analysis–Prototypes in Detailed Design–Test and Evaluation–Design review, prototyping–simulation and testing–manufacturing–strategies–planning and methodologies.

Unit–IV

Costs for product Development: Sources of funds for development cost – product costs– Estimating product costs– kinds of cost procedures– value Engineering– Cost reduction.

Unit–V

Quality Control and reliability: Quality control procedure-Inspection and test equipment–statistical quality control–manufacturing reliability– probability of tool reliability–reliability operations–developing a quality–control and reliability programme.

TEXT BOOKS

1. Karl Ulrich, Steven Eppinger, "Product Design and Development", Tata McGraw Hill, 6th Edition, 2015
2. Alex Milton, Paul Rodgers, "Product Design", Laurence King Publishing, 2011

REFERENCES

1. Niebel B.W and Draper A.B., "Product design and process Engineering", McGraw Hill Book Company, New York, 1974.
2. Stephen C. Armstrong, "Engineering and product development management – the holistic Approach", Cambridge University press, 2005.
3. Zaidi. A., "SPC Concepts–Methodologies and Tools", Prentice Hall of India Pvt Ltd.,
4. Kevin Otto, "Product design", Pearson Education Limited, 2007.

COURSE OUTCOMES

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

1. Describe an engineering design and development process
2. Demonstrate individual skill using selected manufacturing techniques, including drilling, tapping, and rapid prototyping
3. Employ engineering, scientific and mathematical principles to execute a design from concept to finished product

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓						✓		✓
CO2			✓	✓		✓			✓	
CO3		✓	✓	✓	✓	✓				

ITOESCN	**ORGANIZATIONAL BEHAVIOUR AND MANAGEMENT**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- Educate the students with the basic nature of management and its process.
- Know the responsibilities of a professional manager as well as the organizational behavior.
- Know the importance about leadership.
- Understand the performance at the individual and group levels.

Unit–I

Organizational Behavior: Introduction – Definition, Need and Importance of Organizational Behavior – Nature and Scope-Framework of Organizational Behavior models. Management: Introduction – Meaning and Nature of management – Management Systems and Processes – Tasks and Responsibilities of a Professional Manager – Managerial skills.

Unit–II

Individual Behavior: Personality – Types – Factors influencing personality theories. Learning: Types of learners – The learning process – Learning Theories – Organizational Behavior Modification – Misbehavior: Types – Management Intervention – Emotions: Emotional Labor – Emotional Intelligence-Theories – Attitudes: Characteristics – Components – Formation – Measurement – Values – Perceptions: Importance-Factors influencing Perception – Interpersonal Perception – Impression Management – Motivation: Importance-Types – Effects on Work Behavior.

Unit–III

Group Behavior: Organization Structure-Formation – Groups in Organizations – Influence-Group Dynamics – Group Decision making Techniques – Team Building – Interpersonal Relations – Communication – Control – Conflict Management – Nature of Conflict – Types of Conflict.

Unit–IV

Leadership and Power: Leadership – Meaning – Importance Traits – Leadership Styles – Behavioral and Contingency Theories – Leaders vs. Managers – Sources of Power – Power Centers – Organization Politics.

Unit–V

Dynamics of Organizational Behavior: Organizational Culture and Climate-Factors affecting Organizational Climate – Importance - Job Satisfaction: Determinants – Measurements – Influence on Behavior – Organizational Change: Importance-Stability Vs. Change - Proactive vs. Reaction Change-the Change Process – Resistance to Change-Managing Change-Stress: Work Stressors – Prevention and Management of Stress – Balancing Work and Life. Organizational Development: Characterizes – Objectives – Developing Gender sensitive Workspace.

TEXT BOOKS

1. Stephen P. Robbins, "Organizational Behavior", Prentice Hall of India, Eleventh Edition, 2008.
2. Fred Luthans, "Organizational Behavior", McGraw Hill, Eleventh Edition, 2001.

REFERENCES

1. Udai Pareek, "Understanding Organizational Behavior", Oxford Higher Education, Third Edition, 2011.
2. Mc Shane & von Glinov, "Organizational Behavior", Tata McGraw Hill, Fourth Edition, 2007.
3. Nelson, Quick, Khandelwal, "ORGB – An Innovative Approach to Learning and Teaching", Cengage learning, Second Edition, 2012.
4. Jerald Greenberg, "Behavior in Organization", PHI Learning, Tenth Edition, 2011.

COURSE OUTCOMES

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

1. Understand about management, its process and also the responsibilities of a professional manager.
2. Understand the performance at the individual and group levels.
3. Obtain leadership quality.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓							
CO2	✓	✓	✓	✓		✓			✓	
CO3									✓	✓

HONOURS ELECTIVES

ITHESCN	**INTERNET OF THINGS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**4**

COURSE OBJECTIVES

- To understand the basics of IoT and its application sectors
- To understand M2M and IoT
- To understand and apply IoT protocols appropriately
- To design and develop IoT based applications

Unit–I

Introduction to IOT, definition and characteristics of IOT- Architecture of Internet of Things, Physical and logical design of IOT, IOT enabling technologies, IOT levels and deployment templates- Domain specific IOTs, home automation, cities, environment, Domain specific IOTs, Energy, retail, agriculture, industry, health and lifestyle.

Unit–II

IoT and M2M Communication: M2M, difference between IOT and M2M, ETSI M2M Architecture, system architecture- ETSI M2M SCL resource structure, Security in ETSI M2M framework, SDN and NFV for IOT, IOT system management, need for IOT system management- SNMP, Network operator requirements, NETCONF-YANG, IOT system management with NETCONF-YANG, IoT Design methodology-case study on IOT system for Weather Monitoring.

Unit–III

IoT Platforms: Introduction to Hardware used for IoT: Microcontrollers, Microprocessors, SoC, Sensors- Introduction to Arduino, Pi, Spark, Intel Galileo.

Unit–IV

IoT Technical Standards And Protocols: RF Protocols: RFID, NFC; IEEE 802.15.4: ZigBee, Z-WAVE, THREAD; Bluetooth Low Energy (BLE), IPv6 for Low Power and Lossy Networks (6LoWPAN) and Routing Protocol for Low power and

lossy networks (RPL)- CoAP, XMPP, Web Socket, AMQP, MQTT, WebRTC, PuSH-Architectural Considerations in Smart Object Networking.

Unit–V

Developing Internet Of Things: IoT platforms design methodology, IoT Physical devices and endpoints- IoT Systems: Logical design using Python, IoT physical servers and cloud offerings (Cloud computing for IoT)

TEXT BOOKS

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things, A Hands -on Approach", 1st Edition 2015, University Press.
2. Oliver Hersent, David Boswarthick, Omar Elloumy, "The Internet of Things",1st Edition ,2015.

REFERENCES

1. Michael Miller, "The Internet of Things, How Smart TVs, Smart Cars, Smart Homes, and Smart Cities are changing the World", First edition ,2015, Pearson.
2. Jeeva Jose, "Internet of Things", KBP House.
3. https://thingsee.com/blog/quality-hardware-list-for-your-iot-projects, as on date: 25/04/16
4. https://tools.ietf.org/html/rfc7452, as on date: 25/04/2016
5. http://dret.net/lectures/iot-spring15/protocols, as on date: 25/04/2016
6. http://iot.intersog.com/blog/overview-of-iot-development-standards-and-frameworks, as on date: 25/04/2016

COURSE OUTCOMES

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

1. Identify the components of IoT.
2. Analyze various protocols of IoT.
3. Design portable IoT using appropriate boards.
4. Develop schemes for the applications of IOT in real time scenarios.
5. Design business Intelligence and Information Security for WoT

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2	✓		✓	✓	✓		✓			
CO3		✓		✓						
CO4		✓	✓	✓	✓					
CO5		✓		✓	✓	✓				

ITHESCN	MACHINE LEARNING TECHNIQUES	L	T	P	C
		3	0	0	4

COURSE OBJECTIVES

- To understand the concepts of machine learning.
- To appreciate supervised and unsupervised learning and their applications.
- To understand the theoretical and practical aspects of Probabilistic Graphical Models.
- To appreciate the concepts and algorithms of reinforcement learning.

Unit–I

Machine Learning: Machine Learning Foundations - Overview - applications - Types of machine learning - basic concepts in machine learning Examples of Machine Learning - Applications - Linear Models for Regression - Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison.

Unit–II

Supervised Learning: Linear Models for Classification - Discriminate Functions -Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression - Decision Trees - Classification Trees- Regression Trees - Pruning. Neural Networks - Feed-forward Network Functions - Error Back propagation Regularization - Mixture Density and Bayesian Neural Networks - Kernel Methods - Dual Representations - Radial Basis Function Networks - Ensemble methods - Bagging - Boosting.

Unit–III

Unsupervised Learning: Clustering - K-means - EM - Mixtures of Gaussians - The EM Algorithm in General - Model selection for latent variable models - high-dimensional spaces - The Curse of Dimensionality - Dimensionality Reduction - Factor analysis - Principal Component Analysis - Probabilistic PCA - Independent components analysis.

Unit–IV

Probabilistic graphical models: Directed Graphical Models - Bayesian Networks - Exploiting Independence Properties - From Distributions to Graphs - Examples - Markov Random Fields - Inference in Graphical Models - Learning - Naive Bayes classifiers - Markov Models - Hidden Markov Models - Inference - Learning - Generalization - Undirected graphical models - Markov random fields - Conditional independence properties - Parameterization of MRFs - Examples - Learning - Conditional random fields (CRFs) - Structural SVMs.

Unit–V

Advanced learning: Sampling - Basic sampling methods - Monte Carlo - Reinforcement Learning - K-Armed Bandit- Elements - Model Based Learning - Value Iteration - Policy Iteration. Temporal Difference Learning - Exploration Strategies - Deterministic and Non-deterministic Rewards and Actions - Eligibility Traces - Generalization- Partially Observable States - The Setting - Example - Semi

Supervised Learning - Computational Learning Theory - Mistake bound analysis - Sample complexity analysis - VC dimension-Occam learning - Accuracy and confidence boosting .

TEXT BOOKS

1. Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2006.

REFERENCES

1. Ethem Alpaydin, "Introduction to Machine Learning", Prentice Hall of India, 2005.
2. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.
3. Hastie, Tibshirani, Friedman, "The Elements of Statistical Learning", (2nd ed)., Springer, 2008.
4. Stephen Marsland, "Machine Learning –An Algorithmic Perspective", CRC Press, 2009.

COURSE OUTCOMES

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

1. Define various methods and learning techniques in machine learning.
2. Identify the choice of using an available tool for different machine learning techniques.
3. Apply probabilistic discriminative and generative algorithms for an application.
4. Experiment different clustering algorithms on various applications.
5. Design and implement probabilistic graphical

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓		✓			✓		
CO2	✓	✓	✓		✓	✓				
CO3	✓					✓	✓	✓	✓	
CO4	✓		✓	✓	✓					
CO5	✓	✓					✓	✓	✓	✓

ITHESCN	**SPEECH SIGNAL PROCESSING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the basic mechanism of speech production and auditory perception.
- To learn the basic concepts of time and frequency domain analysis of speech signal.

- To extract various parameters of speech.
- To develop several applications of speech signal processing.

Unit–I

Introduction to Digital Speech Processing: The Speech Signal, The Speech Stack, Applications of Digital Speech Processing.

Fundamentals of Human Speech Production: Introduction, The Process of Speech Production, Short-Time Fourier Representation of Speech, Acoustic Phonetics, Distinctive Features of the Phonemes of American English. Hearing, Auditory Models, and Speech Perception: Anatomy and Function of the Ear, The Perception of Sound, Auditory Models, Measurement of Speech Quality and Intelligibility

Unit–II

Time-Domain Methods for Speech Processing: Introduction, Short-Time Analysis of Speech, Short-Time Energy and Short-Time Magnitude, Short-Time Zero-Crossing Rate, The Short-Time Autocorrelation Function, The Modified Short-Time Autocorrelation Function, The Short-Time Average Magnitude Difference Function.

Frequency-Domain Representations: Introduction, Discrete-Time Fourier Analysis, Short-Time Fourier Analysis, Spectrographic Displays, Overlap Addition Method of Synthesis, Filter Bank Summation Method of Synthesis

Unit–III

The Cepstrum and Homomorphic Speech Processing: Introduction, Homomorphic Systems for Convolution, Computing the Short-Time Cepstrum and Complex Cepstrum of Speech, Homomorphic Filtering of Natural Speech, Cepstrum Distance Measures.

Linear Predictive Analysis of Speech Signals: Introduction, Basic Principles of Linear Predictive Analysis, The Prediction Error Signal - Auto correlation method – Solution of LPC equations – Durbin's Recursive algorithm.

Unit–IV

Algorithms for Estimating Speech Parameters: Introduction, Median Smoothing and Speech Processing, Speech-Background/Silence Discrimination, A Bayesian Approach to Voiced/Unvoiced/Silence Detection, Pitch Period Estimation, Formant Estimation, Feature Extraction: LPC, LPCC, MFCC

Digital Coding of Speech Signals: Introduction, Sampling Speech Signals, A Statistical Model for Speech, Instantaneous Quantization, Adaptive Quantization, Quantizing of Speech Model Parameters, Delta Modulation, Differential PCM (DPCM), Enhancements for ADPCM Coders, Analysis-by-Synthesis Speech Coders, Applications of Speech Coders, Subband Coding, Adaptive Transform Coding

Unit–V

Automatic Speech Recognition: Introduction, Basic ASR Formulation, Overall Speech Recognition Process, Building a Speech Recognition System, The Decision Processes in ASR, The Search Problem, Simple ASR System: Isolated Digit Recognition, Performance Evaluation of Speech Recognizers.

Text dependent and text independent speaker identification and verification. Natural Language Understanding: Spoken Language Understanding, Dialog Management and Spoken Language Generation, User Interfaces, Multimodal User Interfaces.

Text-to-Speech Synthesis Methods: Introduction, Text Analysis, Evolution of Speech Synthesis Methods, Early Speech Synthesis Approaches, Unit Selection Methods.

TEXT BOOKS

1. Lawrence Rabiner and Ronald Schafer, *Theory and Applications of Digital Speech Processing* (1st ed.). Prentice Hall Press, Upper Saddle River, NJ, USA. 2011
2. Daniel Jurafsky and James H Martin, "Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education, 2009.

REFERENCES

1. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing, Processing and Perception of Speech and Music", Wiley- India Edition, 2006
2. Thomas F Quatieri, "Discrete-Time Speech Signal Processing – Principles and Practice", Pearson Education, 2004.
3. Douglas O'Shaughnessy, Speech communications: human and machine, Institute of Electrical and Electronics Engineers, 2000.
4. Lawrence Rabiner and Biing-Hwang Juang, "Fundamentals of Speech Recognition", Pearson Education, 2003.
5. L. R. Rabiner and R. W. Schaffer, "Digital Processing of Speech signals", Prentice Hall, 1993.

COURSE OUTCOMES

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

1. Understand human speech communication system
2. Interpret time varying signals and system for modeling speech
3. Analyze short-time characteristics of speech signal
4. Extract various types of parameters and representations from speech
5. Develop applications using various speech processing techniques

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓	✓								
CO3		✓								
CO4		✓	✓						✓	
CO5			✓	✓				✓		✓

ITHESCN	BIG DATA TECHNOLOGIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand several key big data technologies used for storage, analysis and manipulation of data.
- To recognize the key concepts of Hadoop framework, MapReduce, and Hadoop Ecosystem.
- To analyze various big data based case studies and prepare a sample big data project.

Unit–I

Fundamentals of Big Data – Big Data Types – Basics of Distributed Computing – Big Data Technology Components – MapReduce Fundamentals - Defining Big Data Analytics – A Brief History of Hadoop - The Hadoop Foundation and Ecosystem.

Unit–II

The Hadoop Distributed File system: The Design of HDFS - HDFS Concepts - The Command-Line Interface - Hadoop Filesystems - The Java Interface - Data Flow. Setting Up a Hadoop Cluster: Cluster Specification - Cluster Setup and Installation - SSH Configuration - Hadoop Configuration - YARN Configuration

Unit–III

MapReduce: Analyzing the Data with Hadoop - Scaling Out - Hadoop Streaming - Hadoop Pipes. Developing a MapReduce Application: The Configuration API - Configuring the Development Environment - Writing a Unit Test - Running Locally on Test Data - Running on a Cluster - Tuning a Job - MapReduce Workflow - Anatomy of a MapReduce Job Run - Failures - Job Scheduling - Shuffle and Sort - Task Execution

Unit–IV

Pig: Installing and Running - An Example - Pig Latin - User-Defined Functions - Pig in Practice

Hive - Installing Hive - An Example - Running Hive - Comparison with Traditional Databases - HiveQL - Tables - Querying Data - User-Defined Functions

Hbase: Hbasics - Concepts - Installation - Clients – Example

Unit–V

ZooKeeper: Installing and Running ZooKeeper - An Example - The ZooKeeper Service - Building Applications with ZooKeeper

Sqoop: Getting Sqoop - A Sample Import - Generated Code - Database Imports - Working with Imported Data - Importing Large Objects - Performing an Export.

Case Studies: Hadoop Usage at Last.fm - Hadoop and Hive at Facebook - Nutch Search Engine - Log Processing at Rackspace

TEXT BOOKS

1. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
2. Judith Hurwitz, Alan Nugent, Fern Halper, and Marcia Kaufman, *Big Data for Dummies, First Edition,* For Dummies, 2013.

REFERENCES

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, 2015.
2. Borko Furht and Flavio Villanustre, "*Big Data Technologies and Applications", First Edition,* Springer Publishing Company, Incorporated, 2016

COURSE OUTCOMES

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

1. categorize and summarize big data and its importance.
2. differentiate various big data technologies like Hadoop, MapReduce, and Hadoop Ecosystem
3. apply tools and techniques to analyze big data.
4. earn tips and tricks for big data use cases and solutions.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2		✓	✓							
CO3	✓	✓	✓							
CO4				✓	✓	✓		✓		✓

ITHESCN	**NEURAL NETWORKS AND DEEP LEARNING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.
- Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
- Implement deep learning algorithms and solve real-world problems.

Unit–I

Basics of Artificial Neural Networks - Characteristics of Neural Networks, ANN Terminology, Models of Neuron, Topology, Basic Learning Laws.

Deep Learning Applications - Large Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications

Unit–II

Activation and Synaptic Dynamics – Introduction - Activation Dynamics Models - Synaptic Dynamics Models - Learning Methods - Stability and Convergence - Recall in Neural Networks.

Functional Units of ANN for Pattern Recognition Tasks -Pattern Recognition Problem , Basic Functional Units.

Unit–III

Feedforward Neural Networks - Introduction, Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks.

Feedback Neural Networks – Introduction, Analysis of Linear Autoassociative FF Networks, Analysis of Pattern Storage Networks, Stochastic Networks and Simulated Annealing, Boltzmann Machine.

Unit–IV

Machine Learning Basics - Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning.

Unit–V

Regularization for Deep Learning - Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

TEXT BOOKS

1. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
2. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.

REFERENCES

1. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
3. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

COURSE OUTCOMES

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

1. Explain different network architectures and how these are used in current applications
2. Implement, train, and evaluate neural networks using existing software libraries
3. Present and critically assess current research on neural networks and their applications
4. Relate the concepts and techniques introduced in the course to your own research
5. Plan and carry out a research project on neural networks within given time limits

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓							
CO2	✓	✓	✓	✓	✓	✓	✓			✓
CO3	✓	✓	✓			✓				✓
CO4	✓	✓	✓		✓					✓
CO5	✓	✓	✓							

ITHESCN	**DATA ANALYTICS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To introduce fundamental techniques and tools required for data analytics
- To learn basic tools for statistical analysis, R, and key methods used in machine Learning
- To learn MapReduce techniques for parallel processing and Hadoop

Unit–I

Introduction: Data science process – roles, stages in data science project – State of the practice in analytics – Role of data scientists – Key roles for successful analytic project – Main phases of life cycle-Working with data from files – Exploring data – Managing data – Cleaning and sampling for modeling and validation – Challenges of conventional systems – Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting – Modern data analytic tools. Introduction to Big Data Platform – Big Data and its importance, Five Vs. Drivers for Big data, Big data analytics, Big data applications.

Unit–II

R Programming: R basics – Reading and getting data into R – Ordered and unordered factors – Arrays and matrices – Lists and data frames – Reading data from files – Probability distributions – Statistical models in R – Manipulating objects – Data distribution – Simple programs using R.

Unit–III

Map Reduce: Introduction – Distributed file system – Algorithms using map reduce, Matrix–Vector Multiplication by Map Reduce-Hadoop – Understanding the Map Reduce architecture-Writing Hadoop MapReduce Programs – Loading data into HDFS – Executing the Map phase-Shuffling and sorting – Reducing phase execution.

Unit–IV

Data Analysis Techniques: Linear and logistic regression modeling – Naïve Baye's classifier – Support vector machine-Neural networks – Principal component analysis – Linear Discriminant Analysis – Decision Trees – Fuzzy logic – Clustering Techniques : Hierarchical, agglomerative, K– Means – Associative Rule Mining.

Case Studies: Social Network Analysis – Text analysis –Marketing analysis.

Unit–V

Data Visualization: Documentation and deployment – Producing effective presentations – Introduction to graphical analysis – plot() function – Displaying multivariate data – Matrix plots – Multiple plots in one window – Exporting graph – Using graphics parameters – Visualizations – Visual data analysis techniques, interaction techniques; Systems and applications.

TEXT BOOKS

1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
2. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012.

REFERENCES

1. Mark Gardener, "Beginning R – The Statistical Pr ogramming Language", John Wiley & Sons, Inc., 2012.
2. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, 2015.
3. David Hand, Heiki Mannila, Padhria Smyth, "Principles of Data Mining", PHI 2013.
4. Nathan Yau, "Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics", Wiley, 2011.
5. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, "Practical Data Science Cookbook", Packt Publishing Ltd., 2014.
6. V.K. Jain, "Big Data and Hadoop", Khanna Publishing House.
7. V.K. Jain, "Data Science and Analytics", Khanna Publishing House.

COURSE OUTCOMES

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

1. Understand fundamental techniques and tools required for data analytics.
2. Use basic tools for statistical analysis, R, Hadoop, and key methods used in machine learning.
3. Apply Map Reduce techniques for parallel processing.
4. Apply fundamental algorithmic ideas to process data, and apply hypotheses and data into actionable predictions.
5. Document and transfer the results, and effectively communicate the findings using visualization techniques.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓									
CO2	✓	✓								
CO3	✓	✓	✓	✓	✓					
CO4	✓	✓	✓	✓	✓					
CO5	✓					✓		✓	✓	✓

MINOR ENGINEERING ELECTIVES

ITMISCN	INTRODUCTION TO INFORMATION TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce the fundamentalsof computer programming languages, Operating system, database terminology.
- To introduce the basics of information technology, its role and present scenario and basics of multimedia.
- To introduce network concepts, internet tools and search engines.
- To elaborate on future trends of information technology.

Unit–I

Classification of computers, computer architecture and Memory. Computer Basics - Introduction, Evolution of Computers, Generations of Computers, Classification of Computers, The Computer system, Applications of Computers. Computer organization and Architecture - Introduction, Central Processing Unit, Types of Number Systems. Computer Memory and Storage - Introduction, Memory Hierarchy. Input Output Media - Introduction.

Unit–II

The generations of programming languages, operating system and Database basics. Computer Programming and Languages - Introduction, Algorithm, Programming Paradigms, characteristics of a good program, programming Languages, generations of programming Languages, Features of a Good Programming Language. Operating System - Introduction, Operating System Definition, Evolution of Operating System, Types of Operating Systems. Database Fundamentals - Introduction, database definition.

Unit–III

The Information Technology and Multimedia Basics. Information Technology Basics - Introduction, Information, Technology, Information Technology, Present scenario, Role of Information Technology, Information Technology and the Internet. Multimedia: Introduction, Multimedia - definition, Multimedia Applications.

Unit–IV

The Basics of Networks, Internet and Internet Tools. Computer Networks - Computer Network, Network Topologies, Network Devices. Internet - Introduction, Evolution of Internet, Basic Internet Terms, and Getting connected to the Internet, Internet Applications. Internet Tools - Introduction, Web Browser, Browsing Internet using Internet Explorer, E-mail Address Structure, Search engines.

Unit–V

Know the Future Trends in IT. Current and Future Trends in IT - Introduction, Electronic commerce, Electronic data interchange, Smart card, internet protocol television, Blogging, Radio frequency identification, Imminent Technologies.

TEXT BOOKS

1. "Introduction to Information Technology", ITL Education solutions limited, PEARSON.

REFERENCES

1. Alexis Leon, Mathews Leon, "Fundamentals of Information Technology", Second edition, (Leon VIKAS)

COURSE OUTCOMES

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

2. Identify system components and utilize computer hardware.
3. Describe basics of programming, components of a database and operating system.
4. Understand the strategic importance of information technology.
5. Understand the fundamental terminology of data communication and internet tools.
6. Recognize the applications of IT in various sectors and future trends.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓		✓	✓	✓	✓		✓	
CO2	✓		✓	✓		✓				
CO3		✓				✓	✓		✓	✓
CO4	✓		✓		✓		✓	✓		✓
CO5	✓	✓		✓		✓		✓	✓	

ITMISCN	**FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To introduce the object oriented concepts.
- To learn object oriented programming using C++.
- To understand the challenges in developing object oriented programming.

Unit–I

Introduction: Evolution of programming methodologies-Disadvantages of conventional programming-programming paradigms.

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism.

Unit–II

C++ Program Elements: -Limitations of C – Introduction to C++ – Structure of the C++ program – Tokens- Expressions- Data types- variables- dynamic initialization- scope and life time of variables

Control structures: Decision making statements – jump statement – switch case statement – looping statements.

Unit–III

Functions:– Passing arguments – LValues and RValues – return by reference – default arguments – Inline functions – function overloading– const and volatile functions – static Members data hiding or encapsulation.

Classes and objects: Defining member functions function and data members – objects and memory – static object – array of objects – objects as function arguments, friend functions, member functions and non-member functions – overloading member functions.

Unit–IV

Constructors & Destructor – default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructors.

Overloading Functions: Overloading unary operators — overloading binary operators – overloading with friend functions.

Inheritance: Introduction – public, private, and protected derivations-Types of Inheritance

Unit–V

Polymorphism and Virtual Functions: Binding in C++ –Virtual functions-Runtime polymorphism –pure virtual functions –Abstract classes – Virtual functions in derived classes – constructors and virtual functions – virtual destructors – destructors and virtual functions.

Exception Handling: Fundamentals of Exception Handling – Using Multiple catch statements – Catching All Exception – Rethrowing Exception – Specifying Exception - controlling uncaught Exceptions.

TEXT BOOKS

1. Ashok N.Kamthane, "Object Oriented Progemmaing with ANSI and Turbo C++", Pearson Edition
2. Deitel & Deitel, "C++ How to program", Prentice Hall, Eighth Edition, 2011.

REFERENCES

1. Eric Nagler, "Learning C++ A Hands on Approach", Jaiho publishing house.
2. E Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, 2nd Edition.
3. Sotter A Nicholas and Kleper J Scott, "Professional C++", Wiley Publishing Inc.

COURSE OUTCOMES

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

1. Analyze and design a problem using an object-oriented approach.
2. Implement the problem using C++ programming Language.
3. Understand the concepts of Features of object oriented programming.
4. Learn the programming details of object oriented programming.
5. Develop C++ programs for various real time applications.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓	✓	✓					
CO2			✓	✓	✓	✓			✓	
CO3	✓	✓								
CO4	✓	✓	✓		✓					
CO5			✓	✓	✓				✓	

ITMISCN	**DATA COMMUNICATION AND COMPUTER NETWORKS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**4**

COURSE OBJECTIVES

- Gets the idea of choosing the required functionality at each layer for a given application and trace the flow of information from one node to another node in the network.
- Then gives the understanding of division of network functionalities into layers, the component required to build different types of networks and identifying the solution for the functionalities in each layer.

Unit–I

Introduction: Introduction to Networks and Communication Media: History of Computer Networking and the Internet-Need for Networking- Uses – Network Hardware- Network Software – Reference Models – Example Networks – Network Standardization.

Basis for data communication - Transmission media – Wireless Transmission – Telephone Systems – Satellite Communication.

Unit–II

Data link layer: Layer Services– Framing - Error correction and detection – Link Level Flow Control – Medium Access – Ethernet – Token Ring –FDDI – Wireless LAN – Bridges and Switches.

Unit–III

Network layer : Network Layer design issues – Circuit Switching - Packet Switching Virtual Circuit Switching – IP – ARP – DHCP – ICMP – Routing –RIP – OSPF – Sub netting – CIDR – Inter domain Routing – BGP – IPV6 Basic Features Routing algorithms – Congestion- Control algorithms.

Unit–IV

Transport Layer: Transport Layer Services – Multiplexing and Demultiplexing – Internet Transport Protocols- UDP – Reliable Data Transfer –Connection-Oriented Transport: TCP – TCP Structure.

Unit–V

Application Layer: DNS – Name space – Resource records – name servers – e-mail - Message Formats - Message Transfer - Final Delivery – WWW - Static Web

Pages - Dynamic Web Pages and Web Applications - HTTP – Network Security-Basic Cryptography - DES - RSA.

TEXT BOOKS

1. Andrews S. Tanenbaum, "Computer Networks", Prentice Hall of India Private Limited, (4th Edition), 2003.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", Elsevier, Fourth edition, 2007.

REFERENCES

1. Leon Garcia and Widjaja, Communication Networks - Fundamental concepts and key architecture, Tata McGraw Hill, 2001.
2. William Stallings, Data and Computer Communication, Sixth Edition, Pearson Education, 2000.
3. Behrouz A. Forouzan, Data communication and Networking, Tata McGraw-Hill, 2004.

COURSE OUTCOMES

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

1. Analyze the requirement of various hardware components and software to be developed to establish a network.
2. Understand the Layered Architecture of Computer Networks.
3. Understand the operation of the main components of computer networks.
4. Acquire the required skill to design simple computer networks.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓	✓		✓	✓				
CO2	✓	✓	✓		✓					
CO3	✓	✓	✓				✓			
CO4	✓	✓	✓		✓					

ITMISCN	**BASICS OF COMPUTER GRAPHICS AND MULTIMEDIA**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- The purpose of this subject is to introduce the concepts and techniques used in Computer Graphics, Animations & Multimedia.
- The students should have general idea about input/output devices and computing fundamentals.
- In addition, a familiarity with general mathematical transformations is required.

Unit–I

Pixel, frame, buffer, application of computer graphics, Raster Graphics fundamentals. Display Devices- Random Scan, Raster Scan Monitors, Color CRT Monitor, DVST and Plasma Panel.

Unit–II

Graphics Primitives: Algorithms for line Generation, circle generation, Polygon generation and polygon filling algorithm, Anti aliasing. 2D Transformation: Translation, Scaling, Rotation, Reflection,Homogeneous Coordinates.

Unit–III

3-D Transformation: Translation, Scaling, Rotation, windowing & clipping windows, view port, line clipping, polygon clipping, windows & view port transformation. Display file, Segment table, Segment creation, deletion, rename.

Unit–IV

Multimedia: Text – Font, Faces, animating Text, Hyper Text. Sound: MIDI, Digital audio basics, auto file formats, audio editing, MCI-multimedia control interface. Image - Bitmap, Vector drawing, color palate, concept of 3D Modeling, Image file formats (BMP, JPG). Animation: principle of animation, cell animation, kinematics, Morphing.

Unit–V

Video – Broadcast video standards (NTSC, PAL), Integrating computer and Television, video capture board, video, color, shooting and editing video, video hardware resolution, video compression (JPEG, MPEG). Hard copy devices: Printers & plotters, Input devices: mouse, Trackball, Light pen, Scanner, Digital Camera.

TEXT BOOKS

1. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
2. Donald Hearn and M.P. Becker, “Computer Graphics”, Pearson Pub.
3. Parekh, “Principles of Multimedia”, Tata McGraw Hill

REFERENCES

1. Maurya, “Computer Graphics with Virtual Reality System “, Wiley India
2. Pakhira, “Computer Graphics, Multimedia & Animation”, PHI learning
3. Andleigh, Thakral, “Multimedia System Design”, PHI Learning

COURSE OUTCOMES

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

1. Identify system components and utilize computer hardware.
2. Describe basics of programming, components of a database and operating system.
3. Understand the strategic importance of information technology.
4. Understand the fundamental terminology of data communication and internet tools.
5. Recognize the applications of IT in various sectors and future trends.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓								
CO2		✓								
CO3	✓	✓						✓		
CO4	✓									
CO5			✓	✓	✓	✓	✓	✓	✓	✓

ITMISCN	INFORMATION SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the number theory used for network security.
- To understand the design concept of cryptography and authentication.
- To understand the design concepts of internet security.
- To understand Intrusions and intrusion detection

Unit–I

Introduction: Security-Threats-Harm-Attacks-Computer criminals-Method of defence Program Security: Secure programs-Non-malicious program errors-Viruses and other malicious code-Targeted malicious code- Controls against program threats

Unit–II

Operating System Security: Protected objects and methods of protection-Memory address protection-Control of access to general objects-File protection mechanism-Authentication: Authentication basics- Password-Challenge-response-Biometrics

Unit–III

Database Security: Security requirements-Reliability and integrity-Sensitive data-Interface- Multilevel database-Proposals for multilevel security

Unit–IV

Security in Networks: Threats in networks- Network security control-Firewalls-Intrusion detection systems- Secure e-mail-Networks and cryptography-Example protocols: PEM- SSL-Ipsec.

Unit–V

Management and Incidents: Security planning- Risk analysis-Organizational security policies-Physical security -Legal-Privacy-Ethical Issues in Computer Security -Protecting programs and data- Information and law-Rights of employees and employers- Software failures-Computer crime-Privacy-Ethical issues in computer society-Case studies of ethics.

TEXT BOOKS

1. C. P. Pfleeger, and S. L. Pfleeger, "Security in Computing", Pearson Education, 5th Edition, 2015.
2. Matt Bishop, "Computer Security: Art and Science", Pearson Education, 2005

REFERENCES

1. Stallings, "Cryptography And Network Security: Principles and practice", 5th Edition, 2011.
2. Kaufman, Perlman, Speciner, "Network Security", Prentice Hall, 3rd Edition, 2005.
3. Eric Maiwald, "Network Security : A Beginner's Guide", TMH, 1999.
4. Macro Pistoia, "Java Network Security", Pearson Education, 2nd Edition, 1999.
5. Whitman, Mattord, "Principles of information security", Thomson, 2nd Edition,2005

COURSE OUTCOMES

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

1. Understand basic cryptographic a algorithms, message and web authentication and security issues.
2. Identify information system requirements for both of them such as client and server.
3. Understand the current legal issues towards information security.

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓			✓	✓		✓			
CO2	✓	✓	✓	✓					✓	✓
CO3		✓				✓	✓	✓		✓

ITMISCN	**FUNDAMENTALS OF DATA MINING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**4**

COURSE OBJECTIVES

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

Unit–I

Introduction: Why Data Mining? What Is Data Mining?1.3 What Kinds of Data Can Be Mined?1.4 What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity

Unit–II

Data Pre-processing: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

Unit–III

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction. Alternative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

Unit–IV

Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan & Vipin)

Unit–V

Cluster Analysis: Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. (Tan & Vipin)

TEXT BOOKS

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

REFERENCES

1. Hongbo Du, "The Data Mining Techniques and Applications: An Introduction", Cengage Learning.
2. Vikram Pudi and P. Radha Krishna, "Data Mining", Oxford.
3. Mohammed J. Zaki, Wagner Meira, "Data Mining and Analysis – Fundamental Concepts and Algorithms", Oxford
4. Alex Berson, Stephen Smith, "Data Warehousing Data Mining & OLAP", TMH.

COURSE OUTCOMES

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

1) Understand stages in building a Data Warehouse
2) Understand the need and importance of preprocessing techniques
3) As Understand the need and importance of Similarity and dissimilarity techniques
4) Analyze and evaluate the performance of algorithms for Association Rules.
5) Analyze Classification and Clustering algorithms

Mapping with Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	✓	✓		✓	✓		✓	✓		✓
CO2	✓							✓		
CO3		✓	✓	✓		✓	✓			
CO4	✓		✓		✓			✓		✓
CO5		✓		✓	✓		✓			