SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

Master of Business Administration in Information Technology (MBA-IT)

Revised Syllabus 2020-2021-2022

2 year, 4 Semester Full time Programme

Choice Based Credit System **(CBCS)** and Grading System

Outcome Based Education Pattern

M.B.A.(IT) Part I From Academic Year 2020-2021,
M.B.A.(IT) Part II From Academic Year 2021-2022

1.0 Preamble: The revised MBA-IT-IT Curriculum 2020 builds on the implementation of the Choice Based Credit System (CBCS) and Grading System initiated in the AY 2013. The curriculum takes the MBA-IT programme to the next level in terms of implementing Outcome Based Education along with the Choice Based Credit System (CBCS) and Grading System.

2.0 Definitions:

2.1 Outcome Based Education:

2.1.1 Outcome Based Education (OBE) Approach: Outcomes are about performance, and this implies:

a) There must be a performer – the student (learner), not only the teacher
b) There must be something performable (thus demonstrable or assessable) to perform
c) The focus is on the performance, not the activity or task to be performed

2.1.2 Programme Educational Objectives (PEOs): Programme Educational Objectives are a set of broad **future- focused student performance outcomes** that explicitly identify what students will be **able to do with what they have learned**, and **what they will be like** after they leave school and are **living full and productive lives**. Thus PEOs are what the programme is preparing graduates for in their **career and professional life** (to attain within a few **years** after graduation[1]).

2.1.3 Graduate Attributes (GAs): Graduate Attributes (GAs) are the **qualities, knowledge and capabilities that** students are encouraged to take responsibility for developing throughout their studies and are the **defining characteristics** of the students passing out of the MBA-IT program**.** These attributes include, but go **beyond, the disciplinary expertise or technical knowledge**.

2.1.4 Programme Outcomes (POs): Programme Outcomes are a set of **narrow statements that** describes what students (learners) **of the programme** are expected to know and be able to perform or attain **by the time of graduation**.

2.1.5 Programme Specific Outcomes (PSOs): Programme Outcomes are a set of narrow **statements that** describes what students (learners) **of a particular specialization of the programme** are expected to know and be able to perform or attain **by the time of graduation**. PSOs are also a function of the various course combinations offered by the Institute.

2.1.6 Learning Outcomes: A learning outcome is what a student CAN DO as a result of a learning experience. It describes a **specific task** that he/she is able to perform at a **given level of competence under a certain situation**. The three broad types of learning outcomes are:

a) Disciplinary knowledge and skills
b) Generic skills
c) Attitudes and values

2.1.7 Course Outcomes (COs): A set of specific statements that describes the **complex performances** a student should be capable of as a result of **learning experiences within a course.**

2.1.8 Teaching and Learning Activities (TLAs): The set of **pedagogical tools and techniques** or the teaching and learning activities that aim to **help students to attain** the intended learning outcomes and engage them in these learning activities through the teaching process.

2.1.9 Outcome Based Assessment (OBA): An assessment system that asks course teachers to first identify what it is that we expect students to be able to do once they have completed a course or program. It then asks course teachers to provide evidence that they are able to do so. In other words, how will each learning outcome be assessed? What **evidence of student learning** is most **relevant for each learning outcome** and **what standard or criteria** will be used to evaluate that evidence? Assessment is therefore a key part of outcome-based education and used to determine whether or not a qualification has been achieved.

2.2 **Credit:** *In terms of credits, for a period of one semester of 15 weeks:*

a) *every ONE hour session per week of L amounts to 1 credit per semester*
b) *a minimum of TWO hours per week of T amounts to 1 credit per semester,*
c) *a minimum of TWO hours per week of P amounts to 1 credit per semester,*

Each credit is a combination of 3 components viz. Lecture (L) + Tutorials (T) + Practice (Practical / Project Work / Self Study) (P) i.e. LTP Pattern. Indicative LTP, for each course, is documented in the syllabus.

The course teacher may modify the LTP of the course in view of the course requirements, nature of the course, the level of learners and the type of pedagogy and assessment tools proposed. The modified LTP shall have to be approved by the Director / Head of the Department / Designated academic authority of the Institute.

2.3 **Session:** Each teaching-learning, evaluation session shall be of 60 minutes. However, institutes shall have the flexibility to define their time slots in a manner as to use their faculty and infrastructure resources in the best possible way and ensure effective learning.

2.4 **Course Announcement:** The institute shall announce the elective courses and specializations it proposes to offer the students out of the wider course basket. It is not mandatory to offer all the specializations and all the electives. The decision of the Director shall be final in this case. However, in the spirit of Choice Based Credit System, institutes should offer choices to the students for the elective courses and not offer only the minimum number of electives.

2.5 **Course Registration:** It is mandatory for every student, to register every semester, for the courses opted for that semester. Each student, on admission shall be assigned to a Faculty Advisor who shall advise her/him about the academic programs and counsel on the choice of courses considering the student's profile, career goals and courses taken in the earlier semesters. With the advice and consent of the Faculty Advisor, the student shall register for a set of courses he/she plans to take up for the Semester. Students shall have to register for the courses for the semester within first week of Semester I and immediately after conclusion of the preceding term for subsequent Semesters II, III and IV.

3.0 MBA-IT Programme Focus:

3.1 Programme Educational Objectives (PEOs):

PEO1: Graduates of the MBA-IT program will *successfully integrate core, cross-functional and inter-disciplinary* aspects of Information Technologies theories, models and frameworks with the real world practices and the sector specific nuances to provide solutions to real world business application, policy and social issues in a dynamic and complex world with the help of Application Programming, Software Testing and Network Administration.

PEO2: Graduates of the MBA-IT program will possess excellent *communication skills*, excel in *cross-functional, multi-disciplinary, multi-cultural teams,* and have an appreciation for *local, domestic and global contexts* so as to manage *continuity, change, risk, ambiguity and complexity*.

PEO3: Graduates of the MBA-IT program will be appreciative of the significance the knowledge and skills required to plan, design and build complex application software systems are highly valued in all industry sectors including business, health, education and the services.

PEO4: Graduates of the MBA-IT program will be ready to *engage in successful career pursuits* covering a broad spectrum of areas in *Software Development, Software Testing and Networking.*

PEO5: Graduates of the MBA-IT program will be recognized in their chosen fields for their *managerial competence, creativity & innovation, integrity & sensitivity* to local and global issues of social relevance and earn the *trust & respect* of others as *inspiring, effective and ethical leaders, managers, entrepreneurs, entrepreneurs* and change agents *programmer, developer, tester, network administrator, data admin. Etc*.

3.2 **Programme Outcomes (POs):** At the end of the MBA-IT programme the learner will possess the

1. **Generic and Domain Knowledge -** Ability to articulate, illustrate, analyze, synthesize and apply the knowledge of principles and frameworks of Application Software and allied domains to the

solutions of real-world complex business issues.

2. **Problem Solving & Innovation** - Ability to Identify, formulate and provide innovative solution frameworks to real world complex business and social problems by systematically applying Application software with modern quantitative and qualitative problem solving tools and techniques.
3. **Critical Thinking** - Ability to conduct investigation of multidimensional business problems using research based knowledge and research methods to arrive at data driven decisions
4. **Effective Communication** - Ability to effectively communicate in cross-cultural settings, in technology mediated environments, especially in the business context and with society at large
5. **Leadership and Team Work** - Ability to collaborate in an organizational context and across organizational boundaries and lead themselves and others in the achievement of organizational goals and optimize outcomes for all stakeholders.
6. **Global Orientation and Cross-Cultural Appreciation:** Ability to approach any relevant business issues from a global perspective and exhibit an appreciation of Cross Cultural aspects of business and management.
7. **Entrepreneurship** - Ability to identify entrepreneurial opportunities and leverage managerial & leadership skills for founding, leading & managing startups as well as professionalizing and growing family businesses.
8. **Environment and Sustainability** - Ability to demonstrate knowledge of and need for sustainable development and assess the impact of managerial decisions and business priorities on the societal, economic and environmental aspects.
9. **Social Responsiveness and Ethics** - Ability to exhibit a broad appreciation of the ethical and value underpinnings of managerial choices in a political, cross-cultural, globalized, digitized, socio-economic environment and distinguish between ethical and unethical behaviors & act with integrity.
10. **Life Long Learning** – Ability to operate independently in new environment, acquire new knowledge and skills and assimilate them into the internalized knowledge and skills.

3.3 **Programme Specific Outcomes (PSOs):** It is expected that **Institutes define the PSOs** for **each specialization** / **major-minor combination**. PSOs shall also vary based upon the **customized combination** of Generic Core, Generic Elective, Subject Core, Subject Elective, Foundation, and Enrichment & Alternative Study Credit Courses that they offer.

3.4 **Graduate Attributes (GAs)**: At the end of the MBA-IT programme the learner shall exhibit:

GA1: Software Application competence
GA2: Proficiency in Communication, Collaboration, Teamwork and Leadership
GA3: Competence in Creativity & Innovation IT Application
GA4: Global Orientation Thinking
GA5: Proficiency in ICT & Digital Literacy
GA6: Entrepreneurship & Entrepreneurship Orientation
GA7: Cross-functional & Inter-disciplinary Orientation
GA8: Results Orientation
GA9: Professionalism, Ethical, Values Oriented & Socially Responsible behaviour
GA10: Life-Long Learning Orientation

4.0 **MBA-IT Programme Course Types & Evaluation Pattern:**

Sr. No.	Course Type	Credits	Nature	Comprehensive Concurrent Evaluation (CCE)	End Semester Evaluation (ESE) Marks	Total Marks
1.	Generic Core	3+1	Compulsory (Specialization with Practical)	50	50	100
2.	Subject Core	3	Compulsory	50	50	100
3.	Generic Elective (GE - UL)	2	Elective	0	50	50
4.	Generic Elective (GE - IL)	2	Elective	50	0	50
5.	Subject Elective	2	Elective (Specific	50	0	50

	(SE - IL)		Specialization)			
6.	Mini Project	7	Project (Compulsory)	100	100	200
7.	Internship Project (IP)	12	Project (Compulsory)	150	150	300

4.1 Course Types

4.1.1 **Core courses** are the compulsory courses for all the students. Core courses are of two types: Generic Core & Subject Core.

4.1.2 **Generic Core:** This is the course which should compulsorily be studied by a candidate as a core requirement to complete the requirement of a degree in a said discipline of study. Therefore, Generic Core courses are mandatory and fundamental in nature. These courses cannot be substituted by any other courses. Such courses are also known as Hard Core Courses.

4.1.3 **Subject Core:** A Core course may be a Subject Core if there is a choice or an option for the candidate to choose from a broad category (grouping) of subjects (specializations / electives). These are also known as Soft Core Courses.

4.1.4 **Elective Course:** Elective course is a course which can be chosen from a pool of courses. It may be:

a) Very Specialized or advanced course focusing on a specific aspect
b) Supportive to the discipline of study
c) Providing an extended scope
d) Enabling an exposure to some other discipline/domain
e) Nurturing candidate's proficiency/skills.

4.1.5 **Generic Elective:** An elective course which is common across disciplines / subjects is called a generic elective. 'Generic Elective' courses develop generic proficiencies amongst the students.

4.1.6 **Generic Elective – University Level**: These elective courses are supportive to the discipline of study and focus on the knowledge aspect of competence building. The course outcomes for such courses can be better assessed through traditional End Semester Evaluation.

4.1.7 **Generic Elective – Institute Level:** These elective courses are aimed to develop inter-personal, technical and other skills aspect of competence building. The course outcomes for such courses can be better assessed through Comprehensive Concurrent Evaluation.

4.1.8 **Subject Elective:** A 'Discipline (specialization) centric' elective is called 'Subject Elective.' Subject Elective courses, in the Semester II, III and IV are focused on a specialization.

4.1.9 **Open Elective:** A subject elective course chosen generally from another Discipline / specialization / subject, with an intention to seek cross-functional exposure is called an Open Elective. A Subject Elective offered in one specialization area may be treated as an Open Elective by another specialization area and vice-a-versa.

4.1.10 **Enrichment Course:** This is a course generally offered to bright learners / fast learners for advanced inputs beyond the curriculum. Enrichment / Add-on Course shall be a 1 Credit Course. The course is of the nature of Course of Independent Study (CIS) and is designed for learners who have the ability and inclination to work independently with limited guidance, supervision and interaction with the faculty member(s).

4.1.11 **Alternative Study Credit Courses:** These courses prepare the learners for a VUCA (Volatile Uncertain, Complex and Ambiguous) world by going beyond the boundaries of their campus. Apart from core and elective courses, these courses engage students in discussion, debate and solution of real world challenges.

4.1.12 **Massive Open Online Courses (MOOCs)[2]**: Massive Open Online Courses (MOOCs) are such online courses which are developed as per the pedagogy stated in the AICTE regulation (2016) or equivalent; following the four quadrant approach and made available on the SWAYAM platform of Government of India.

5.0 Specializations offered: The following specializations shall be offered as

1. **Software Development** 2. **Networking** 3. **Software Testing**

Note:

1. Institutes may offer ONLY SELECT specializations based on industry needs, faculty strength & competencies, student demands, employability potential, etc.
2. Institutes MAY NOT offer a specialization if a **minimum of 20% of students** are not registered for that specialization.
3. The Institute MAY NOT offer an elective course if a **minimum of 20% of students** are not registered for that elective course.

6.0 Practical Training and Project Work:

At the end of the fourth semester of study, a student will be examined in the course "Project work".

1. The Major Project work will be in the Semester IV. It may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
2. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" back to back print (one copy) which is to be submitted to the Director of the Institute. Wherever possible, a separate file containing source-code listings should also be submitted. Every student should also submit soft copy of their project synopsis.
3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, ERDs, File designs and a list of output reports should be included if required as per the project title and scope.
4. The project Work should be of such a nature that it could prove useful or be relevant from the commercial/management angle.
5. Selected project must have relevant scope for 300 marks.
6. The progress of the project must be communicated to project guide.
7. The project report will be duly accessed by the internal guide and marks will be communicated by the Director to the University along with the marks of the internal credit for theory and practical to be communicated for all other courses.
8. The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation.
9. The major project work carry 150 marks for internal assessment and 150 marks for external viva. The external viva shall be conducted by a minimum of one university external examiner and one internal examiner.

Project work can be carried out in the Institute or outside with prior permission of the Institute authority.

7.0 Comprehensive Concurrent Evaluation (CCE) / Concurrent Internal Evaluation (CIE):

1. The course teacher shall prepare the scheme of Comprehensive Concurrent Evaluation (Formative Assessment) before commencement of the term. The scheme of Comprehensive Concurrent Evaluation shall explicitly state the linkages of each CCE with the Course Outcomes and define the targeted attainment levels for each CO.
2. The Director / Head of the Department / designated academic authority shall approve the scheme of Comprehensive Concurrent Evaluation with or without modifications.
3. The course teacher shall display, on the notice board, the approved CCE scheme of the course and the same shall also be hosted on the website, not later than the first week of the term.
4. Each CCE item shall be of minimum 25 marks.
5. For a 3 Credit Course there shall be a MINIMUM of three CCE items. The final scores shall be converted to 50, using an average or best two out of three formula.
6. For 2 Credit Course there shall be a MINIMUM of two CCE items. The final scores shall be converted to 50.
7. For a 1 Credit Course there shall be a MINIMUM of one CCE item.
8. CCE shall be spread through the duration of course and shall be conceptualized, executed, assessed and documented by the course teacher along with student-wise and class-wise attainment levels of the COs and the attainment levels of the course.
9. The assessment outcome of each CCE shall be duly signed by the course teacher, programme

coordinator / academic head and the Director / Head of the Department / designated academic authority of the Institute.

10. A copy of the duly signed CCE *outcome* shall be displayed on the notice boards, within a week of the assessment and course teachers shall guide the students on a need basis.
11. Institute may conduct additional make up / remedial CCE items at its discretion.
12. At the end of the term aggregate CCE scores / grades shall be calculated and the CO attainment levels shall be calculated by the course teacher. The same shall be displayed on the notice board

8.0 End Semester Evaluation (ESE):

1. The End Semester Evaluation (Summative Evaluation) for the Generic Core (GC), Subject Core (SC) and the Generic Elective (GE - UL) course shall be conducted by the Savitribai Phule Pune University.
2. The ESE shall have 5 questions each of 10 marks.
3. All questions shall be compulsory with internal choice within the questions.
4. The broad structure of the ESE question paper shall be as follows:

Question Number	Cognitive Abilities Evaluated	Nature
Q.1	Remembering	Answer any 5 out of 8 (2 marks each)
Q.2	Understanding	Answer any 2 out of 3 (5 marks each)
Q.3	Applying	Answer 3 (a) or 3 (b) (10 marks)
Q.4	Analyzing	Answer 4 (a) or 4 (b) (10 marks)
Q.5	Evaluating	Answer 5 (a) or 5 (b) (10 marks)
	Creating	

9.0 Programme Flexibility:

9.1 Average Credits per semester, Fast & Slow Learners:

1. It is expected that a student registers for 30 credits in Semester I, II, III each and balance 20 credits in Semester IV.
2. **Fast learners** (under accelerated plan), may be permitted to register for up to 6 additional credits per semester, subject to fulfilling the pre-requisites defined for a course, if any. However the degree shall be awarded not earlier than the end of the 2 academic years since the first admission to the MBA programme.
3. **Slow learners,** may be permitted to register for less than the normal credits defined for a semester but shall have to complete the programme within the stipulated maximum duration of 4 academic years since the first admission to the MBA programme.

9.2 Dropping an Elective Course:

1. Students who opt for an elective course and fail to earn the credits for the elective course (generic / subject / open) are permitted to opt for another elective course (generic / subject / open) in case they feel to do so.
2. In such a case they shall be said to have dropped the original course and opted for a new one.
3. Generic Core (GC), Subject Core (SC) CANNOT be dropped.
4. Generic Elective (GE - UL), Generic Elective (GE - IL) & Subject Elective (SE - IL) can be dropped and replaced with equivalent alternative courses
5. Not more than four courses can be dropped and replaced with equivalent alternative courses during the entire MBA programme.

10.0 Passing Standards:

1. A student shall be said to have earned the credits for a course if he/she earns minimum 40% marks.
2. Formative Evaluation and Summative Evaluation shall be separate heads of passing.

10.1 Grading System: The Indirect and Absolute Grading System shall be used, i.e. The assessment of individual Courses in the concerned examinations will be on the basis of marks. However the

marks shall later be converted into Grades by a defined mechanism wherein the overall performance of the learners can be reflected after considering the Credit Points for any given course. The overall evaluation shall be designated in terms of Grade. The 10 point standard scale mandated by UGC shall be used.

The performance of a student will be evaluated in terms of two indices, viz.

(a) Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester
(b) Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point in time

10.2 **Scaling Down of CCE Scores:** The marks obtained by the student for the CCE shall be scaled down, to the required extent, if percentage of the marks of CCE exceeds the percentage of marks scored in the ESE (End Semester University Examination) by 25% for the respective course.

10.3 **Degree Requirements:** The degree requirements for the MBA –IT programme are completion of minimum 110 credits.

10.4 **Maximum Attempts per Course:**

1. A student shall earn the credits for a given course in maximum **FOUR** attempts.
2. Dropping a course and opting for another equivalent course can be done ONLY in the case of Generic Elective (GE - UL) , Generic Elective (GE - IL) and Subject Elective (SE - IL).
3. If a student drops a course and opts for another course in lieu of the dropped course the attempts utilized for the dropped course shall be included in the maximum 4 attempts available to earn the credits for a course.
4. The facility of dropping a course and opting for a new course in lieu of the dropped course shall be availed by the student only once per course during these four attempts available to him.
5. A student may drop at the most 4 courses (GE – UL / GE – IL / SE – IL).

10.5 **Maximum Duration for completion of the Programme:** The candidates shall complete the MBA Programme **within 4 years** from the date of admission.

10.6 **Grade Improvement:**

1. A Candidate who has secured any grade other than F (i.e. passed the MBA-IT programme) and desires to avail the Grade Improvement option, may apply under Grade Improvement Scheme within five years from passing that Examination.
2. He/she can avail not more than three attempts, according to the syllabus in existence, for grade improvement.
3. He /she shall appear for University Evaluation of **at least 1/3rd** of the Generic Core / Subject Core Courses (except SIP) for the purpose of Grade Improvement.
4. Generic Elective (GE - UL), Generic Elective (GE - IL) & Subject Elective (SE - IL) cannot be selected for Grade Improvement.

11. Miscellaneous

11.1 **Attendance:** The student must meet the requirement of **75% attendance per semester per course** for grant of the term. The institute may condone the shortage in attendance in exceptional circumstances, up to a maximum of 10%. The institute shall have the right to withhold the student from appearing for examination of a specific course if the above requirement is not fulfilled.

11.2 **Medium of Instruction:** The medium of Instruction & Evaluation shall be English.

11.3 LTP indicated in the syllabus is indicative.

11.4 Numbers indicated against each unit indicate L+T. These are indicative in nature. Course teachers may modify based on teaching & assessment, evaluation methods adopted.

11.5 Text Books and Reference Books refer to latest edition.

12. Detailed Course List for each category of courses is provided in Annexure I.

13. Detailed syllabus of each course is provided in Annexure II.

Annexure I			
Semester I			
Course No	**Core/UL/IL**	**Subject**	**Credit**
101	Core	C Programming & Data Structure	3+1
102	Core	Software Engineering with UML	3+1
103	Core	DBMS	3
104	Core	PPM & OB	3
105	Core	Fundamentals of Information Technology	3
106	Core	Digital Marketing	3
107	UL	E-Commerce	2
108	UL	Web Designing	2
109	UL	Cyber Security	2
110	IL	Soft Skills- I	2
111	IL	Office 365	2
112	IL	Basics of Research Methodology	2
			28

Semester II						
Course No	**Core /UL/IL**	**Subject**	**Software Development**	**Networking**	**Software Testing**	**Credit**
201	Core		JAVA Programming	Basics of Networking	Introduction to Software Testing Life Cycle - (STLC)	3+1
202	Core		Mobile Programming using Android	Server & Desktop Technologies	Software Quality Assurance	3+1
203	Core	Business Process Domain				3
204	Core	Oracle				3
205	Core	Cloud Infrastructure & Services				3
206	Core	Software Project Management				3
207	UL	Current Trends in IT				2
208	UL	Basic of Business Analytics				2
209	UL	Information System Audit				2
210	IL	Soft Skills- II				2
211	IL	Startups and New Venture Planning				2
212	IL	Internet of Things (IoT)				2
						28

Semester III						
Course No	**Core /UL/IL**	**Subject**	**Software Development**	**Networking**	**Software Testing**	**Credit**
301	Core		Program and Design with ASP.NET	Advanced Computer Networks	Software Test Planning and Documentation	3+1
302	Core		Advanced JAVA	Parallel Computing	Agile Model & Methodology	3+1
303	Core	Management Information System (MIS)				3
304	Core	Data Mining				3
305	Core	Mini Project				7
306	Core	Introduction to Animation				3
307	UL	Data Ware Housing				2
308	UL	OOPs With CPP				2
309	UL	E-Governance & Framework of ICT				2
310	IL	Linux Administration				2
311	IL	Test Case & Design Techniques				2
312	IL	Tableau				2
						32

Semester IV						
Course No	**Core /UL/IL**	**Subject**	**Software Development**	**Networking**	**Software Testing**	**Credit**
401	Core	ERP				3
402	Core	Multimedia and Animation				3
403	Core	Project Work				12
404	UL	Open Source IoT Platform				2
405	UL	Debugging of Application Programming (IoT)				2
406	IL	Introduction to Python				2
407	IL	Artificial Intelligence				2
						22
					Total	**110**

Semester – I			
Subject Code	**Subject Title**	**Internal**	**External**
101 Core	**C Programming & Data Structure**	**50**	**50**

Course Objectives:

1. To learn the problem-solving techniques by solving smallproblems.
2. To learn features of the C programming language .
3. To enhance problem solving and programming skills in C with extensiveprogramming projects.
4. To understand and write programs by using C language along with basic concepts of Data Structures.

Course Outcomes:

After the completion of this course, a student will be able to

1. Use the algorithm paradigms for problemsolving.
2. Develop programs with features of the C programminglanguage.
3. Develop simple applications usingC

Develop programs in the Windows/Linux programmingenvironment

Unit. No	Chapter Details	Nos. of Session	%	Reference Books
1	**C Fundamentals** A Brief History of C, C is middle-level Language, C is a Structured Language, C Character Set, Identifiers and Keywords under ANSI C. Data Types, Constants: int, float, double, char. Qualifiers: long, short, unsigned and signed. Escape sequences (like\n,\b etc.). Arithmetic Expressions and different built-in Operators.Pre-processor directives (like #include, #define), concept of header files, Symbolicconstants, Comments, sizeof, steps involved in translation of C Program. Concept of typedef for renaming a built-in data type.	**3**	**8**	**1,2,3,4**
2	**Flow Charts and Decision Table** Flow Diagram, Flow Chart symbols and their use, System flowcharts, program flowcharts, outline flowcharts, detail flowcharts, flowcharts and signs of communications, flow lines, process decisions, connectors, terminals, flowcharts for simple programs-problems.	**2**	**5**	**1,2,3**

3	**Built-in operators and functions**. Console based I/O and related built-in I/O functions: printf(), scanf(), getch(), getchar(),putchar(), gets(), puts().	**2**	**4**	**1,2,3,4**
4	**Decision and Case Control Structure** if statement, if-else construct, use of logical operators and Compound Relational Tests, Nested if statements, The else if construct, the relational operators, the conditional expression (ternary) operator. The Switch Statement with or without break, concept of a case label, goto statement, concept of a goto label, comparison between goto and case labels.	**2**	**5**	**1,2,3,4**
5	**Loop Control Structure** Concept of Loop, loops supported by 'C', concept of top tested and bottom tested loops, the for loop statement, Nested for Loop , for loop variants, the while loop statement, simple and nested while loop, Increment/decrement operators; Use of Break and Continue, the do-while loop, comparison betweenfor, while and do while loops.	**2**	**5**	**1,2,3,4,5**
6	**Storage Classes** Automatic, Register, Static (local and global),External. Scope rules.	**1**	**4**	**1,2,3,4,5**
7	**Arrays** Concept of a collection, types of collections supported by 'C', Array collection and its features, concept of indexing, index variable, index type, positional value of a member of array collection, concept of dimension and size of an array, 'C' syntax for declaration of array, name of the array and its type, Referring individual elements, Entering data into an array, reading data from an array, concept of Array initialization and list of initializers, size option, Bounds checking, the concept of two dimensionarrays and related syntax, similarities between dimension and nesting String	**4**	**10**	**1,2,3,4,5,8**

8	**Functions** Concept of a subprogram, the interface of a subprogram, role of a interface,Arguments of a subprogram, kinds of subprograms supported by C, return statement as an interface, local variables, Default Return type and the type void, Passing values between functions through interfaces, Declaration of function type, iterative and recursive subprograms, Recursion, concept of call by value, call by reference, return and their underlying implementation should be explained, similarities and differences between Function & Macros, concept of nested macros and their use, recursion as a special nestedcall.	4	**12**	**1,2,3,4,5,8**
9	**Pointers** Concept of Pointers, Pointer as an address variable, concept of a pointer data type and its syntax, built-in address operator, Pointers to existing variables of different data types and their uses, use of indirection operator, the name of the array as a pointer variable, Pointers and Arrays, Pointers arithmetic, use of unary operators (++, --), One Dimension Arrays and Pointer, concept of array of pointers and simple use, command line arguments for the main, pointer as a return type of a function.	4	**8**	**1,2,3,4,5,8**
10	**Structures** Structure as a homogeneous and heterogeneous collection, possible applications, syntax of declaring structure, Initializing structures, structure variables, accessing structure elements using member operator, Arrays of Structures, and array as member of structure, conceptual difference between array and structure collection, Functions and Structures, nested structures, concept of anonymous structures and their use, Concept of self referential structure, pointer as member of structure and pointer to structure use of member selector operator(->), comparison between indirection (*) operator and member selector operator (->), structure as an argument to function and return type of a function.	3	**8**	**1,2,3,4,5,7,8**
11	**Unions** Concept of Union collection, Syntax of declaration and its use, comparison of Array, Structure and Union, array of unions and union as a member of structure, structure as a member of union and array asmember of union, concept of memory saving and union,unionas a generic data type, concept of anonymous union.	2	**2**	**1,2,3,4,5,7,8**

12	**Console based I/O** use of console as a file environment, use of keyboard and VDU as I/O files: Use of stdin, stdout, stdprn and stderr as built-in file pointers for console environment, use of printf(), scanf() as fprintf() and fscanf(), use of fflush().	2	**5**	**1,2,3,4,5,7,8**
13	**File based I/O** Concept of a file, text files in 'C', concept of a predefined FILE pointer and its definition as given in header file stdio.h, meanings of different members of the structure representing FILE, Disk I/O Functions: High level file I/O or standard functions- fopen(), putc(), getc(), fclose(), fgets(),fputs(),feof(), simple file based programs showing the working of different members of FILE structure.	3	**10**	**1,2,3,4,5,7,8**
14	**Dynamic Memory Allocation and Memory functions** Concept of dynamic environment as run time environment, concept of dynamic memory management, use of built-in dynamic memory management tools of 'C' viz. malloc(), free(), simple programs using malloc ( ) and free()	2	**6**	**1,2,3,4,5,7,8**
15	**Bitwise Operator** Concept of modifying the value using bit shifting, built-in bit shift operators left bit shift operator(<<) and right bit shift operator (>>) their uses, limitations of bitwise operators, use of bitwise relational operators.	2	**5**	**1,3,4,5,7,8**
16	**Data Structure Concepts** Definition of data structure, Concept of Link list, Stack, Trees and Queue**.**	**2**	**3**	**10,11,12**

Books:

1. Let us C by YashwantKanetkar, BPB,10thEdition
2. C Programming by Balgurusamy, Tata Mc-Graw Hill,5thEdition
3. Turbo C/C++ - The Complete reference by H.Schildt.
4. Programming in C by S.Kochan,CBS
5. Born to code in C by H. Schildt.
6. The Art of C by H. Schildt.
7. C Programming by Kerninghan and Ritchie – PHI pub,2nd Edition.
   Programming in ANSI C by Agarwal
8. C Programming with Problem Solving by Jacqueline A Jones, Keith Harrow

Subject Code	Subject Title	Internal	External
102 Core	**Software Engineering with UML**	**50**	**50**

Course Objective:

1. To study basic concepts of softwareengineering
2. To study phases of SDLC and different processmodels
3. To learn & understand the Requirement analysis and systemDesign.
4. To get acquainted with the agile software developmentmethodology

Course Outcome:

After completing this subject student will be able to understand the issues involved in implementing SSAD and OOAD concepts.

CO1: Distinguish different process model for a software development.

CO2: Design software requirements specification solution for a given problem definitions of a software system.

CO3: Apply software engineering analysis/design knowledge to suggest solutions for simulated problems

CO4: Recognize and describe current trends in software engineering

CO5: To analyze project requirements and produce a*n* initial design.

Unit No.	Chapter Details	Nos. of Sessions	%	References
1	**Overview of Software Development with SSAD** Introduction to System, Basic component and Characteristics of System, Types of System, Software and Nature of software, Software Engineering, Software development approach with SSAD 1.1 Basic System Development Life Cycle with different users and their role inSDLC. 1.2 Different Approaches and Models for SystemDevelopment. 1.2.1 WaterfallModel 1.2.2 Spiral Model,Prototyping 1.2.3 RAD 1.2.4 Rational Unified Process with Four Major phases:- Inception , Elaboration, Construction, Transition.	**8**	**10**	**1,4,5,6, 9**
2	**Overview of Software Development with OOAD** 2. Introduction to Object orientation and basic concept of development approach with OOAD 2.1 Object andClasses 2.2 Abstraction andEncapsulation 2.3 Methods andMessage 2.4 Interfaces, Inheritance and Polymorphism 2.5 Associations and links 2.6 Aggregation , Composition andcontainment 2.7 Inheritance, Sub Types and IS-Ahierarchy	**8**	**10**	**7,11,12, 13,14**

3	**Requirement Determination and Specifications** 3.1 Introduction Requirement Determination & Specification. Fundamental problems in defining Requirements. 3.1.1 Requirement Investigation & Fact Finding Methods. 3.1.2 Requirements definition, Types of Requirements - Functionaland Non-Functional, 3.1.3 Software requirement Specification (SRS) - Structure and contents of the requirements specification. **Requirement Analysis and Design Tools** 3.2 Introduction to Requirement Analysis and Design Tool 3.2.1 Decision Tables and Decision Trees, Pseudo Code and StructuredEnglish 3.2.2 Functional Decomposition Diagram (FDD) 3.2.3 Process modeling through Logical Data FlowDiagrams. 3.2.4 CLD, DFD, ERD & Normalized File Layouts.	**8**	**10**	**1,2,4,5,6,8, 9,10**
4	**UML** 4. Introduction to UML. 4.1 Use-case Driven Object oriented Analysis - The UML approach, Develop use-case Model & Description of Use caseDiagram. 4.2 Class Diagram 4.3ActivityDiagram 4.4 Sequence diagram and Collaboration Diagram. 4.5 State TransitionDiagram. 4.6 Deployment Diagram. Case studies should be covered on the above topic	**8**	**10**	**7,11,12, 13,14**
5	**User Interface Design** 5. Introduction to User Interface Design-Input Design and Output Design. Eight golden rules for design. 5.1 User Interface design: Elements of good design, design issues, Features of modern GUI, Menus, Scroll bars, Windows, Buttons, Icons, Panels, Error Messagesetc. 5.2 Design of output, Design Types ofOutput.	**8**	**10**	**1,4,,8,10**

References

1. Software Engineering Pressman, TMH,7thEd.
2. System Analysis and Design Jalote, Narosa Pub, 3rdEd
3. Software Engineering Sommerville, Pearson,8thEd
4. Software Engineering W S Jawadekar, TMH.
5. Software Engineering with UML, Mohammad Ali Shaikh, ISBN 9781643243566
6. System Analysis & Design methods Whiten, Bentley, ,TMH,7thEd.
7. System Analysis & Design Elias Awad, GalgotiaPub,
8. Object Oriented Modelling& Design James Rumbaugh,PHI.

9. Analysis & Design of Information System James Senn, TMH, 2nd Ed.
10. Analysis & Design of Information System V. Rajaraman, ,PHI,3rd Ed.

Subject Code	Subject Title	Internal	External
103Core	**Database Management System (DBMS)**	**50**	**50**

Objective:

1. This Course is to expose the students to the fundamentals & basic concepts in relational Database Management Systems.
2. This course discusses architecture of Database Systems with concept of relational model & ER model.
3. This course explains techniques for database design, Normalization and database recovery and protection.

Couse Outcomes: At the end of this course the students should be able to:

CO1 : Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS.

CO2 : Develop a clear understanding of the conceptual frameworks and definitions of specific terms that are integral to the Relational Database Management Systems.

CO3 :Develop clear concepts about Relational Model.

CO4 : Examine techniques pertaining to Database design practices

CO5 : Understand the basic concepts of Concurrency Control & database security

CO6 : Understand the basic concept how storage techniques are used to backup data and maintain data access performance in peak hours

CO8 : Evaluate options to make informed decisions that meet data storage, processing, andretrieval needs.

CO9 : Able to design and documents data structures incorporating integrity constraints to satisfy business rules by applying the relational model.

Unit No.	Chapter Detail	No. of Session	%	References
1	**Basic concepts** 1.1 Database and Need for DBMS 1.2 Characteristics of DBMS 1.3 Database Users 1.4 3-tier architecture of DBMS(its advantages over 2-tier) 1.5 Views of data-schemas andinstances 1.6 Data Independence	**2**	**10 %**	**1, 2**
2.	**Data Models** 2.1 Introduction to various data models – Record based & Object based 2.2Cardinality Ratio & Relationships 2.3 Representation of entities, attributes, relationship attributes, relationship set 2.4 Generalization, aggregation 2.5 Structure of relational Database and different types of keys.	**7**	**15%**	**1,2,3,4**
3.	**Relational Model**			

	3.1 Codd's rules 3.2 Relational data model & relational algebra 3.2.1 Relational model concept 3.2.2 Relational model constraints 3.2.3 Relational Algebra 3.3Relational database language Data definition in SQL, Views and Queries in SQL, Specifying constraints and Indexes in SQL, Specifying constraints management systems, Oracle / Ingres/ SQL Server / My SQL	**8**	**20%**	**1,2,3,4,6**
4	**Relational Database design** 4.1 Database Design – ER to Relational 4.2 Functional dependencies 4.3 Normalization Normal Forms based on Primary key (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF) 4.4 Loss less joins and dependency preserving decomposition	**8**	**20%**	**6,7**
5	**Transaction And Concurrency control** 5.1 Concept of transaction, ACID properties 5.2 Serializibility 5.3 States of transaction, 5.4 Concurrency control 5.4.1 Locking techniques 5.4.2 Time stamp based protocols 5.4.3 Granularity of data items 5.5 Deadlock	**6**	**15%**	**5,6,7,8**
6	**Crash Recovery and Backup** 6.1 Failure classifications 6.2 Storage structure 6.3 Recovery & Atomicity 6.4 Log base recovery 6.5 Recovery with concurrent transaction 6.6 Failure with loss of Non-Volatilestorage 6.7 Database backup & recovery from catastrophic failure 6.8 Remote Backup System	**5**	**10%**	**4,7,8**
7	**Security and privacy** 7.1 Database security issues 7.2 Discretionary access control based on grant & revokingprivilege 7.3 Mandatory access control and role based access control for multilevel security 7.4 Encryption & public key infrastructures	**4**	**10%**	**9**

Reference Books:

1. Introduction To Database Systems By C.J.Date, Pearson.
2. Data Base System Concept by Korth, TMH, 5th Ed.
3. Data Management Systems by Alexis Leon, Mathew Leon
4. Principals of Database Management by James Martin, PHI.
5. Computer Database Organization by James Martin,PHI,3rd Ed.
6. Relational database design for Micro Computers applications by Prentice Hall(Jackson)
7. Introduction to Data Management Systems by AtulKahate, Pearson Education Pub.
8. Fundamentals of Database Systems by Elmasri, Navathe, Pearson,5th Ed
9. Database systems : "Design implementation and management"- Rob Coronel, 4th Edition, (Thomson Learning Press)

Subject Code	Subject Title	Internal	External
104 Core	**Principles of Management and Organizational Behavior**	**50**	**50**

Course Objective:

1 To understand individual behavior in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making, and motivationaltheories.

2 To understand group behavior in organizations, including communication, leadership, power and politics, conflict, andnegotiations.

3 To understand the organizational system, including organizational structures, culture, human resources, andchange.

Course Outcomes:

After completion of the course students will be able to

1. Describe and analyze the interactions between multiple aspects of management.
2. Analyze the role of planning and decision making in Organization
3. Justify the role of leadership qualities, Motivation Group dynamics and Team Building
4. Compare the controlling process

Unit No	Chapter Details	Nos. of Sessions	%	Reference Books
1	**Essence of Management** The need, scope, Meaning and Definition The process ofManagement, Managerialleveles/Hierarchy, Managerial Function, Planning Organizing Staffing, Directing Controlling Managerial skills Technical Conceptual HumanResource Historicalperspective-ClassicalTheories, Taylor Fayol Behavioral Science and Approach HR Approach Management Science Approach System approach-with reference to management, organization andMIS,Contingency Approach	**4**	**10**	**1-4**

2	**Managerial Decision Making** Introduction Decision making environment OpenSystems Closed system Decision making under certainty Decision making under uncertainty Decision making under risk Decision Types /models Structured decisions Unstructured decisions Programmabledecision s Non programmable Decisions Decision making tools Autocratic Participative Consultative	**4**	**10**	**1-4**
3	**Organization** Introduction–definition Need forOrganization **Organizational Behavior** Definition /Concepts Need /importance/relevance Anoverview **Individual Behavior and Self Understanding** EgoState TransactionalAnalysis Johari Window	**4**	**10**	**5-13**
4	**Motivation and Leadership:** Concept of Motivation, Benefits to organization and Manager Maslow's need Hierarchytheory Herzberg's Motivation- HygieneTheory Theory X and Y, TheoryZ Definition, Nature, Qualities of Leader Leadership Styles(Autocratic, Participative, Laissez faire or subordinate-centered ,Bureaucratic leadership, Transformational leadership, Transactional leadership)	**4**	**10**	**5-13**
5	**Group and Group Dynamics:** Concept of Group, Effect & Characteristics of group Types ofgroups The Five-Stage Model of GroupDevelopment Group Properties (Roles, Norms, Status, Size, and Cohesiveness) **Team Building** Concept of Team, Nature, Benefits fromteam, Types ofTeams Creating Effective Teams, Turning Individuals into Team	**4**	**10**	**5-13**

	Player. **Stress Management and Conflict management:** Work stress: Meaning of stress, Stressors, Sources of Stress, Types ofstress Stress Managementstrategies Concept of Conflict, Functional versus Dysfunctional Conflict Managing Conflict (Styles for HandlingDysfunctional Conflict, Third-Party Interventions)			

Reference Books:

1. Principles and Practices of Management-Shejwalkar
2. Essential of management- 7th edition Koontz H &Weitrich HTMH
3. Management Today Principles And Practices - Burton &Thakur
4. Mgmt. Principles and Functions - Ivancevich& Gibson,Donnelly
5. Organizational behavior KeithDavis
6. Organizational behavior Fred Luthans TMH 10thedition
7. Organizational behavior Dr.Ashwatthapa THI 7thedition
8. Organizational Behaviour - FredLuthans
9. Organizational Behaviour - StephenRobbins
10. Organizational Behaviour - K. Aswathappa (8th revised edition)
11. Business psychology and Organizational Behaviour – Eugene
12. McKenna 12.Understanding Organizational Behaviour daipareek
13. Organization Development – Wendell L. French and Cecil H. Bell Jr

Subject Code	Subject Title	Internal	External
105 Core	**Fundamentals of Information Technology**	**50**	**50**

Course Objective:

1. To understand what is computer systems and different units of it.
2. To know what different code support to computer
3. To understand different Microprocessors and its applications.
4. To know the various Operating Systems and its functions.
5. To understand the different programming languages and basics of Networking.

Course Outcome:

After completing this subject student will be able to understand the issues involved in basic of information technology.

CO1 : Remembering types of computers, various devices of computers.

CO2 : Understand different computer code and its utility

CO3 : Learn Enhancement of Microprocessors and differences between them.

CO4 : Understand OS and functions of different OS

Unit No	Chapter Details	Nos. of Sessions	%	References

1	**a. Introduction to Computer Systems** Computer definition,Characteristics of Computers, Computer Generations (with example), Types of Computers, Digital Block Diagram and function of each unit of block diagram. **b. Input and Output Units** 1. **Input devices** (I : Keyboard, II : Pointing devices - Mouse, Joystick, Touch Screen, Light Pen, Stylus) III : Scanning devices (Optical Scanners, Bar Code readers,MICR, OCR, OMR) IV : Image capturing devices (Digital Camera, Digital video camera) V: Audio input devices-Microphone. 2. **Output devices** (I : Monitors – Cathode ray tube, Flat panel monitor, II : Printers (Ink jet printer, Laser printer, Thermal printer, 3D printer, Plotter, Photo printer) III : Audio output device – Speakers, Head phones) c. **Storage devices**(I : Types of Memory – Primary and Secondary / RAM and ROM) II (Storage Capacity : Bit, Byte, MB, KB, GB, TB) III : Primary Storages (RAM, ROM, PROM, EPROM, Cache Memory, function of Cache Memory, Virtual Memory), IV : Secondary Storages(Magnetic Disk, CD, DVD, Hard Disk, Pen Drive, SD Card)	**12**	**20**	**1,2,3,7**
2	**Number System and Coding System** a. **Number Systems** (I : Types - Non Positional Number System, Positional Number System (Binary, Octal, Hexadecimal Number Systems),II : Conversion of One Number System to Another, III : Coding systems : BCD, EBCDIC, ASCII, Unicode	**05**	**20**	**1,2,3**
3	**Micro Processors and Operating System** a. **Process Devices** : (I : Microprocessor, II: Types of Processor III : Specialty processor – (Graphics co-processor, Parallel processor) b. **Operating System** : Definition and Functions (Process Management, CPU Scheduling, Memory Management, File Management etc), Types of Operating System, Difference between Windows and Open source OS**,** Introduction to Android, Ios.	**08**	**20**	**2,4,5**
4	**Software System and Computer Language** a. **Software** : I - Definition, II - Types of Software, III - Batch Processing, Spooling, Multiprocessing, Multiprogramming, Time- Sharing, On-Line Processing, Real-Time Processing. b. I. **Computer Languages** : High Level Language, Low Level Language, Object Oriented Languages II. Language Converter: Compiler, Interpreter, Assembler	**08**	**25**	**1,2,3,5**
5	**Computer Networking** Networking, I : Computer network and its benefits II : Types of networks - LAN, WAN, MAN, Internet, Intranet, Extranet III : Network Topologies, IV : OSI	**07**	**15**	**1,5,6,7**

	Model (Seven layers) V : Introduction to Communication Media			

References:

1. Computer Fundamentals by P.K. Sinha,BPB Pub,6thEd.
2. Introduction to Computers by Peter Norton 6th Ed.
3. Computer Fundamental by Rajaraman,PHI,4thEd.
4. Operating System by Galvin,TMH,8thEd.
5. Operating System by AchyutGodbole,TMH, 2ndEd.
6. Computer Networks by Andrew S. Tanenbaum, Pearson,6thEd.
7. Fundamentals of computer networks by SudakshinaKundu

Website Links:

1. www.olearyseries.co

Subject Code	Subject Title	Internal	External
106 Core	**Digital Marketing**	**50**	**50**

Course Objectives :

1. Get strategic understanding of Digital Marketing.
2. Understand its advantages & limitations.
3. Become familiar with Best Practices, Tools & Technologies available for Digital Marketing.
4. Blend digital and social marketing with offline marketing.
5. Understanding the concept of Youtube Marketing
5. Plan and manage digital marketing budget.
6. Manage Reporting & Tracking Metrics.
7. Understand the future of Digital Marketing and prepare for it.

Course Outcomes: On successful completion of the course the learner will be able to –

CO1: Remembering the basic concepts related to Digital Marketing
CO2: Understanding the tools and technologies for Digital Marketing
CO3: Applying the digital marketing concepts on social media marketing.
CO4: Analyzing the effect of digital marketing.
CO5: Evaluating the marketing analytics through Digital Marketing

Unit No	Chapter Details	No. of Sessions	%	Reference Books
1	**Digital Marketing and Social Networks –** a. **Social Networks** :Enterprise Social Networks, The Benefits and Limitations of Social Commerce, Benefits to Customers, Retailers, Employees, players in the ecosystem. Social Collaboration (Collaboration 2.0) - Essentials of Social Collaboration, Consumer-to-Consumer(C2C) Electronic Commerce, Person-to-Person models. b. **Digital Marketing:** History of Digital Marketing, Importance of Digital Marketing, Effective use of Digital Marketing, Effects of wrong Digital Marketing, Digital Marketing to develop brands, Digital Marketing for sales, Digital Marketing for product and service development.	**6**	**20**	**2,4,5,6**
2	**Mobile Marketing and e-Mail Marketing** Shopping and Advertising. M- Commerce: M- Commerce, M-Business(Enterprise), Mobile Business Networks, Social Media, Platforms for digital media ; Digital MediaMarketing, Enterprise	**6**	**25**	**1,4,5,6**

	2.0, Improved Business Models. Entrepreneur Networks. Techniques for effective Email Marketing and pitfalls, Various online email marketing platforms such as Campaign Monitor and Mail Chimp, Web content, web usability, navigation and design, Bookmarking and News Aggregators, Really Simple Syndication (RSS),Blogging, Live Chat, User Generated Content (Wikipedia etc),Multi-media - Video (Video Streaming, YouTube etc),Multi-media - Audio & Podcasting (iTunes etc), Multi-media - Photos/Images (Flickr etc),Google Alerts and Giga Alert (Brand, product and service monitoring online),Crowdsourcing, Virtual Worlds.			
3	**Search Engine Optimization (SEO)** Search Engine Optimization (SEO) tips and techniques, Google Adwords, Google various applications such as 'Google Analytics', Maps, Places etc to enhance a brand's products, services and operations.	**6**	**15**	**2, 5**
4	**Social Media Marketing** Facebook &LinkedIn and other Social Media for a real marketing, Utilizing Facebook and LinkedIn's Advertising functionality and Applications, Brand reputation management techniques, Systems for 'buzz monitoring' for brands, products and services, Effective Public Relations (PR) online and business development.	**6**	**20**	**1,5,7**
5	**YouTube Marketing:** Video Flow, Google Pages for YouTube Channel, Verify Channel, Webmaster Tool –Adding Asset, Associated Website Linking, Custom Channel URL, Channel ART, Channel Links, Channel Keywords, Branding Watermark, Featured Contents on Channel, Channel Main Trailer, Uploading Videos, Uploading Defaults, Creator Library, Case Studies. Channel Navigation, Video Thumbnail, CTA –Annotation, CTA –Extro, CTA –Cards for Mobile, Redirect Traffic to Website, Post Upload Enhancements, Live Broadcasting, Managing Playlists, Managing Comments, Managing Messages, Monetization with Adsense, Paid YoutubeChannel, Channel Analytics, Real Time Analytics, Case Studies.	**6**	**20**	**2,3,5,6**

Reference Books :

1. Digital Marketing for Dummies, By Ryan Deiss, Russ Henneberrywiely Publications
2. VandanaAhuja, Digital Marketing, Oxford Press, ISBN: 9780199455447, 1 stEdition.
3. Email Marketing: An Hour a Day, Wiley, Jeanniey Mullen, David Daniels, David Gilmour- ISBN: 978-0- 470-38673-6, 1 stEdition.
4. The New Rules of Marketing and PR, David Scott, Wiley India, ISBN: 978-1-119-07048-1, 1 stEdition.
5. Introduction to E Commerce & Social Commerce, Turban E , Whiteside J , King D, Outland J Springer
6. Digital Marketing for Dummies, By Ryan Deiss, Russ Henneberrywiely Publications
7. Social Media Marketing All-In-One for Dummies, Jan Zimmerman and Deborah

Subject Code	Subject Title	Internal	External
107 UL	**E-Commerce**	**---**	**50**

Course Objective:

1 To understand an entire flow of E-Commerce
2 To demonstrate awareness of ethical, social and legal aspects of E-Commerce
3 Analyze features of existing E-Commerce businesses and propose future directions or innovations for specific business

Course Outcomes:

4 After completion of the course students will be able to
5 Identify and apply relevant problem solving methodologies
6 Design components, systems and/or processes to meet required specifications for a web presence
7 Demonstrate research skills
8 Communicate effectively in ways appropriate to the discipline, audience and purpose.

Unit No	Chapter Details	No. of Sessions	%	References
1	**Introduction to E-Commerce:** Defining Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce – Communication, Process Management, Service Management, Transaction Capabilities;	**4**	**10**	**1,2**
2	**Process of E-Commerce**; Types of E-Commerce; Role of Internet and Web in E-Commerce; Technologies Used; Pre-requisites of E-Commerce; Scope of E-Commerce; E-Business Models	**4**	**10**	**1,2**
3	**E-Commerce Activities:** Various Activities of E-Commerce; Various Modes of Operation Associated with E-Commerce;	**4**	**10**	**1,2**
4	**The Backbone for E-Commerce:** Early Ages of Internet; Networking Categories; Characteristics of Internet; Components of Internet – Internet Services, Elements of Internet, Uniform Resource Locators Internet Protocol; Shopping Cart, Cookies and E-Commerce;	**4**	**10**	**1,2**

5	**Implementation of E-Commerce:** WWW.EBAY.COM - B2C Website – Registration Growth of eBay; PayPal – New Trend in Making Payments Online; National Electronic Funds Transfer.	**4**	**10**	**1,2**

Reference Books:

1. Introduction to E-commerce and Social Commerce Turban
2. Electronic Commerce by HosseinBidgoil

Subject Code	**Subject Title**	**Internal**	**External**
108 UL	**Web Designing**	**-**	**50**

Objectives :

1. Define the principle of Web page design.
2. Define the basics in web design.
3. Visualize the basic concept of HTML.
4. Recognize the elements of HTML.
5. Introduce basics concept of Javascript& VBScript.

Couse Outcomes : At the end of this course the students should be able to :

CO1 :Develop the skill & knowledge of Web page design.

CO2 :Understand the knowhow and can function either as an entrepreneur or can take up jobs in the multimedia and Web site development studio and other information technology sectors.

Unit No.	**Chapter Details**	**No. of Sessions**	**%**	**References**
1	**HTML :** Introduction to HTML, WWW and W3CWeb Publishing, Process & phases HTML Template, Common HTML Tags Physical & logical html Links and Addressing –I: Introduction to Links and Addressing Links and Addressing –II: Types of links, Protocols, URL Types of images, Using images in web pages Images & links, image mapping. HTML and Layouts lists tables HTML form and form element Frames divisions and layers	**14**	**40%**	**1,4,5,6**
2	**JavaScript :** **I**ntroduction to Client side scripting, Java Script Introduction Identifiers and operators	**13**	**30%**	**2,4,5,6**

	Control structures Functions Web Browser/Document Object Model (DOM) Dom Objects- Window, Navigator, History, location etc . Collections in DOM Predefined Functions Number and String Functions Arrays in Java Script Javascript and DHTML, Event Handing in Java script Form validation using scripting			
3	**VBScript :** Introduction to VB Script Operators, Data types Control structures VB Script functions Arrays and string manipulation VB script and HTML form	**13**	**30%**	**3,4,5,6**

Reference Books:

1. Complete HTML-Thomas A. Powell by Tata McGRAW Hill
2. JavaScript The Definitive Guide by David Flagan- O'reilly
3. VB Script Programmers reference by Wrox Press
4. Active Server Pages 3.0 (in 21 days) by Techmedia
5. Beginning Active Server Pages 3.0 by Wrox Press
6. Internet Technology at work by Hofstetter Fred

Subject Code	Subject Title	Internal	External
109 UL	**Cyber Security**	**-**	**50**

Objective :

This course will cover the concept of security, types of attack experienced, encryption and authentication for deal with attacks, what is Network Perimeter Security, Access Control Lists and Virtual Private Networks.

Couse Outcome : At the end of this course the student will have :

CO1 : Understand the broad set of technical, social & political aspects of Cyber Security

CO2 : Appreciate the vulnerabilities and threats posed by criminals to national infrastructure.

CO3 : Understand the nature of secure software development, operating systems and data base design.

CO4 :Recognized the role security management plays in cyber security.

CO5 : Understand the security management methods to maintain security protection

Unit No.	Chapter Details	No. of Sessions	%	References

1	**Pre-requisites in Information and Network Security** 1.1 Overview of Networking Concepts Basics of Communication Systems Transmission Media Topology and Types of Networks TCP/IP Protocol Stacks Wireless Networks 1.2 Information Security Concepts Information Security Overview: Background and Current Scenario Types of Attacks Goals for Security E-commerce Security Computer Forensics Steganography 1.3 Security Threats and Vulnerabilities Overview of Security threats Weak / Strong Passwords and Password Cracking Insecure Network connections Malicious Code Programming Bugs Cyber Crime and Cyber terrorism Information Warfare and Surveillance 1.4Cryptography / Encryption Introduction to Cryptography / Encryption Digital Signatures Public Key infrastructure Applications of Cryptography Tools and techniques of Cryptography	**12**	**30%**	**1,2,3**
2	**Security Management** 2.1 Security Management Practices Overview of Security Management Information Classification Process Security Policy Risk Management Security Procedures and Guidelines Business Continuity and Disaster Recovery Ethics and Best Practices 2.2 Security Laws and Standards Security Assurance Security Laws IPR	**11**	**20%**	**1,2,3**

	International Standards Security Audit SSE-CMM / COBIT etc.			
3	**Information and Network Security** 3.1 Access Control and Intrusion Detection Overview of Identification and Authorization Overview of IDS Intrusion Detection Systems and Intrusion Prevention Systems Server Management and Firewalls User Management Overview of Firewalls Types of Firewalls DMZ and firewall features 3.2 Security for VPN and Next Generation Technologies VPN Security Security in Multimedia Networks Various Computing Platforms: HPC, Cluster and Computing Grids Virtualization and Cloud Technology and Security	**09**	**30%**	**1,2,3,4**
4	**System and Application Security** 4.1 Security Architectures and Models Designing Secure Operating Systems Controls to enforce security services Information Security Models 4.2 System Security Desktop Security email security: PGP and SMIME Web Security: web authentication, SSL and SET Database Security 4.3 OS Security OS Security Vulnerabilities, updates and patches OS integrity checks Anti-virus software Configuring the OS for security OS Security Vulnerabilities, updates and patches 4.4Wireless Networks and Security Components of wireless networks Security issues in wireless	**08**	**20%**	**1,2,3,5**

Reference Books:

1. Cyber Security for Beginners
2. Cyber Security: Law and Guidance
3. Cyber Security for Seniors
4. Cyber Security: Threats and Responses for Government and Business
5. Cybersecurity: What You Need to Know About Computer and Cyber Security, Social Engineering, The Internet of Things + An Essential Guide to Ethical Hacking for Beginners
6. Ghost in the Wires: My Adventures as the World's Most Wanted Hacker

Semester – I			
Subject Code	**Subject Title**	**Internal**	**External**
110 IL	**Soft Skills-I**	**50**	**--**

Course Objectives:

1. To encourage the all round development of students by focusing on softskills.
2. To make student aware about the importance, the role and the content of soft skills through instruction, knowledge acquisition, and practiceetc.

Course Outcome:

After completion of this course student will able to

1. Face any challenges in Interviews
2. To present themselves with proper way
3. To expand their innovations

Unit No.	Chapter Details	No. of Sessions	%	Reference Books
1	**Team Building** To know the nature of the team, To understand personal as well as professional goals of the members of the group, To work effectively in a team through building relation and interpersonalcommunication	**03**	**10**	**1,2,3,4**
2	**Art of Negotiation** To understand what is negotiation, Ways of negotiating and being successful in it, To understand the power of language and non-verbal communication	**03**	**10**	**1,2,3,4**
3	**Dress for Success** To learn selection of proper attire as per the situation, How to carry one's self, How to project one's self in the right frame and spirit	**03**	**10**	**1,2,3,4**
4	**Table Manners** To learn the manners during professional meetings over lunch/dinner, Basics of the tablemanner	**03**	**10**	**1,2,3,4**

5	**Organizing Meetings** How to call the meeting, How to organize a meeting in the smooth manner, How to design the agenda and prepare minutes of the meeting	**03**	**10**	**1,2,3,4**
6	**Time Management** Goal setting, To make students understand the importance of time, How to prepare the time line and allocate time to complete different tasks, How to successfully follow the prepared time-schedule	**03**	**20**	**1,2,3,4**
7	**Multi-Tasking** How to prioritize the work, Importance of multi-tasking and concerns related to multi-tasking, To identify what to multi-task	**02**	**10**	**1,2,3,4**
8	**Presentation Skills** To learn the skill of presentation, How to prepare the presentation,handleaudience,use multimedia presentation	**03**	**20**	**1,2,3,4**

Reference Books:

1. The Hard Truth about SoftSkillsby Peggy Klaus,The hard truth publishing
2. Effective Communication and Soft Skills byNitinBhatnagar, Pearson publishing
3. TeamBuilding by Peter Mears,Taylor& Francis publishing
4. Personality Development & Soft skills by BarunMitra,Oxford publishing

Semester – I			
Subject Code	**Subject Title**	**Internal**	**External**
111 IL	**Office 365**	**50**	**--**

Course Objectives:

Objective:

1. Students have to use and apply the latest Microsoft applications
2. Students will learn how office 365 is essential to the 21st century Classroom.
3. To create and organize the productive academic atmosphere.

Course Outcome:

After completion of this course student will able to

CO1 :Students can easily adapt new technological skills.

CO2 : Students can use innovative applications for daily academics.

Unit No.	Chapter Details	No. of Sessions	%	References
1	Starting MS Word a. Working with symbols and pictures b. Working with tables c. Working with headers, footers and other controls d. Working with shortcuts	**5**	**10**	**1-2**
2	Starting MS Excel a. Starting MS Excel b. Working with Graphics c. Formatting a worksheet d. Working with Charts and other controls	**5**	**10**	**3-5**
3	Starting MS Power Point a. Starting MS Power point working with different controls b. Features of Power Point c. Presentation with different Topics	**5**	**30**	**6-7**
4	Internet Applications a. Internet and its applications b. Google forms/docs c. Google classrooms	**2**	**30**	**1-2**

Reference Books :

1. Microsoft Word in 30 Minutes by Angela Rose,Quick Guides publishing
2. Step by step Word 2016 by JoyceCox and Joan Lambert,Microsoft Publishing
3. Excel Basic by Ian Lamont,Quick Guides publishing
4. Excel 2016 BIBLE by John Walkenbach,WILEY publishing
5. Excel 2019 All in One by LokeshLalwani ,BPB publishing
6. Power point 2010 by Dummies,WILEY publishing
7. Power point 2016 by Ray Antony,Visual Publishing
8. Internet &WWW by Paul Deitel,Pearson publishing
9. Information Technology and its application by ReemaThareja,Oxford Publishing

Semester – I			
Subject Code	**Subject Title**	**Internal**	**External**
112 IL	**Basics of Research Methodology**	**50**	**--**

Course Objective:

4 To understand an overview of Research Methodology including basic concepts

5 Along with research to learn new computer applications for research

Course Outcomes:

After completion of the course students will be able to

5. Students can explain the terms and concepts used in research
6. Make use of computer applications for research data analysis

7. Formulate research designs according to live research problems

Unit No	Chapter Details	No. of Sessions	%	References
1	**Foundation of Research** a. Meaning b. Objectives c. Motivation d. Utility	**4**	**10**	**1.2.3**
2	**Expanded view of Research** a. Research Types b. Research Approaches c. Significance of Research d. Research Methods Vs Methodology e. Research Process	**4**	**10**	**1.2.3**
3	**Research Design** a. Concept and Importance in Research b. Features of good research design	**4**	**10**	**1.2.3**
4	**Qualitative and Quantitative Research** a. Concept of Measurement b. Difference in both	**4**	**10**	**1.2.3**
5	**Data Analysis** a. Data Preparation b. Univariate analysis (Frequency tables,Barcharts,PieCharts,Percentage)	**4**	**10**	**1.2.3**

Reference Books:

1. BRM by Donald Cooper and Pamela Schindler ,TMGH ,9th Edition
2. Research Methodology by C.R.Kothari
3. BRM by Alan Bryman and Emma Bell,Oxford University Press

Semester II

Subject Code	Subject Title	Internal	External
201NT Core	**Basics of Network Technologies**	**50**	**50**

Objectives : Students will able to learn networking concepts with practical as well as theoretical concepts after studying this subject

Course Outcome : After completing this subject student will be able to understand the issues involved in network technologies

CO01 : To get types of protocols, components of network, Windows servers

CO02 : To learn Network Installations

Unit	Chapter Details	No. of	%	References

No.		Sessions		
1.	**Basic Theory** Types of Networks Peer-Peer Networks, Client/Server Networks, Host Terminal Network, Wireless Network Wi-Fi Network, Virtual Private Network, Internet Intranet	**4**	**5**	**1,2**
2.	**Protocols** **Network Protocols** - TCP/IP (IP4 & IP6) SPX/IPX, NETBEUI, Tunneling Protocols PPTP, L2TP,IP,SEC **Application Protocols**-FTP, TELNET, HTTP, HTTPS SPX/IPX, NETBEUI, Tunneling Protocols PPTP, L2TP,IP,SEC **Mail Protocols**- SMTP,POP,IMAP **Frame Formats & Standards** – Ethernet 802.2,802.3, Wireless 802.11a, 802.11g	**5**	**15**	**2**
3.	**Network Components** Connectivity Components- Connectors RG45, Cables CAT 5, CAT 5E, CAT 6, Ethernet Cards, Switches, Routers Modems- Dial-up Modem , ISDN Modem, DSL(Cable) Modem Using Ethernet Card for Accessing Internet, Wi-Fi Access Adapter	**4**	**10**	**3**
4.	**Topologies** us, Star, Ring, Mesh, Hybrid and Wireless loop	**2**	**5**	**3**
5.	**Windows 2008 Server** Features and functionality of Active Windows 2008 Server Different Roles, Concept of Domains, Directory Domain Services. Manage users and service accounts, Manage groups. Manage computer accounts Implement a Group Policy infrastructure. Secure administration. Configure Domain Name System. Administer AD DS domain controllers. Manage sites and Active Directory Replication. **Installing Windows 2008 Server** Installation of Windows 20*08* Creating Windows Partition Configuring Network Card, Installing Active Directory, Installing DNS Server, Installing DHCP Server, Structure of Active Directory, Group policies, Creating User and User Group & management, Setting user and Group policy	**4**	**10**	**3,4**
6.	**Microsoft Network Technology** **Features of Microsoft Windows Server 2012**	**6**	**15**	**2,3**

	Server Roles- Active Directory Certificate Services, Active Directory Domain Services, Active Directory Federation Services, Active Directory Lightweight Directory Services, Active Directory Rights Management Services, Application Server, DHP Server, DNS Server, Fax Server, File and Storage Services, Hyper-V, Networking Policy and Services, Print and Document Services, Remote Access, Remote Desktop Services, Volume Activation, Web Server (IIS) , Windows Deployment Services, Windows Server Backup Feature, Windows Server Essentials Experience, Windows Server Update Services. Windows System Resource Manager			
7.	**Services-** Clustering Services Network load Balancing Security, Common Language Runtime Internet Information Services(IIS), File and Print Services, Active Directory, Microsoft Software Update Services, Storage Management Terminal Service. Windows Rights Management Service(RMS) Windows SharePoint Service	**5**	**15**	**3,4**
8.	**Features of Various Types of Servers** Foundation Edition, Essentials Edition, Essentials Edition, Datacenter Edition	**4**	**10**	**4**
9.	**Installation** Installing 2012 Server Server Application Installation, Installing and Configuring terminal Server, Remote Installation Services, Implementing Active Directory and domain, Implementing Group Policy Implementing Web services using IIS Implementing Remote Access Services Implementing Windows 2012 VPN Configuring Printer, Configuring Backup, Adding users to groups, Domain Security Policy, Domain Controller Security Policy Installing .NET Frame on Clients Windows Internet Naming Service(WINS)	**6**	**15**	**4,8**

Reference Books:

1. Introduction to Networking Richard McMohan Tata McGraw Hill Publication
2. Computer Network Fundamentals and application - R S Rajesh Vikas Publication
3. Computer Networks by J S Katre
4. The complete Reference – Networking by Craig Zacker, TMH.

7. The complete reference – Linux (6th Edition),TMH,6th Ed.
8. Windows Server 2012 R2 Standard Microsoft Manual

Subject Code	Subject Title	Internal	External
202 NT Core	**Server & Desktop Technologies**	**50**	**50**

Course Objective:

1. To introduce the hardware components and their internal architecture.
2. To know how to assemble a PC or Server machine and carryout basic trouble shooting.
3. It also gives and insights about the contemporary desktop OS like Windows 8 and Windows 10 and their installation and administration.
4. To Understand installation process of local and Network printers

Course Outcome: After completing this subject student will be able to understand the issues involved in desktop technologies.

CO1: Learn different components of computer hardware
CO2: Get the process architecture.
CO3: Install desktop OS
CO4: Understands the printers and their installations

Unit No	Chapter Details	No of Sessions	%	Reference Books
1	**Computers Hardware & CPU Organization** **a. Introduction to Hardware** Types of RAMs-SDRAM,DDR1,DDR2 etc BIOS Mother boards SMPS Graphic adapter cards Ethernet cards USB, Serial and parallel ports Rack and Tower Servers **b. CPU Organization** CPU Building Blocks CPU Registers and BUS Characteristics Registers & System Bus Characteristics. Interface Basics (Only Block Diagram) + Local Bus features & Types should be covered. Addressing Modes Interrupts: Concepts and types Instruction and Execution Interrupt cycle Hardwired and Micro Program control RISC and CISC Pipelining – Data Path, Time Space Diagram, Hazards. Instruction + Arithmetic Pipelining + RISC Pipelining **c. Booting problems and their rectification**	**12**	**25**	**2, 3,5,8**
2	**Processor Architecture** Components of Microprocessor, I/O Ports 32-Bit (Intel 80386)Architecture, 64-Bit (Intel i3)Architecture, Super scalar Architecture in Pentium Processors 64-Bit (Pentium Dual-Core) Architecture	**8**	**20**	**5,6**

3	**Introduction to Windows 8** Installing Windows 8 Professional Edn. User management Disk management-Basic and dynamic disks, Disk backup and restore Recovery Console Repairing windows 8 Partition types Hardware and driver installation Software installation TCP/IP based network installation Installtingautoupdates and Service packs Security policies User profile management: Roaming and mandatory	**6**	**25**	**1**
4	**Introduction to Windows 10 operating System** Upgrading from windows 8 to Windows 10, Windows 10 install, Partition types, Hardware and driver installation Network installation, Configuring wi-fi and Bluetooth	**7**	**15**	**7,8**
5	**Introduction to Printers, Drivers & Recovery tools** **a.** Printers -Types of printers, Parts to printers, Installing and troubleshooting printers **b.** Drives – HDD,FDD,CD,DVD, Removable drives, Pen Drives, Wireless devices, Fault finding devices **c.** Other software's – Antivirus, Diagnostic tools, Data Recovery tools	**7**	**15**	**5**

Reference Books:

1. MCSA/MCSE Self-Paced Training Kit (Exam 70-270): Installing, Configuring, and Administering Microsoft® Windows® XPProfessional
2. Intel Micro Processors Barry Brey Pearson's Pub,6thed.
3. Computer Organization & Architecture Carpinell, Pearsonpub.
4. An Introduction to Intel Family of Processors -James Antonolcos, PearsonPub.
5. Computer fundamental by Peter Norton, McGraw-Hill Professional Publishing

Websites:

6. www.intel.com
7. en.wikipedia.org
8. www.pcguide.com
9. www.netlib.org

Subject Code	Subject Title	Internal	External
201 SDCore	Java Programming	50	50

Course Objectives:

1. To understand OOPs concepts
2. To enable the students to understand the core principles of the Java Language
3. To use visual tools to produce well designed, effective applications and applets.

Course Outcomes:

After the completion of this course, a student will be able to

1. Develop programs with features of the oops programminglanguage.
2. Develop simple applications using Java
3. Develop programs in the Windows programmingenvironment

Unit No	Chapter Details	Nos. of Session	%	Reference Books
01	**Fundamentals of OOP** What is OOP Difference between Procedural and Object oriented programming Basic OOP concept - Object, classes, abstraction,encapsulation,inheritance, polymorphism	04	5	1,2,3,4
02	**Introduction to Java** History and Features of Java JDK,JRE,JIT , Bytecode and JVM Simple java program Data Types Variable: final, static, abstract Array, Function	04	15	1,4
03	**Object and Classes** Definition of Class Access Specifiers, Constructors Use of ―this‖ keyword String , String Buffer and Wrapper class Inner classes, Nested classes, local classes, Anonymous classes(Anonymous object) Introduction to Packages Garbage Collection (finalize() Method)	06	20	1,2,3,4
04	**Interface and Collection** Inheritance Basics , Types of Inheritance Use of 'super' and _Final‘ Keyword Usage of abstract class and abstract methods Interface Introduction to Collection	08	20	2,3,4
05	**Exception Handling and I/O** Introduction to Exception handling Exception types , Exception class User defined exception Introduction to Java.io package Byte streams , Character streams File IO basics Object serialization – Reader and Writer	08	20	1,2,3,4
06	**Swing and Applet Programming** MVC(Model View Controller) Architecture Swing Applet fundamentals, Applet lifecycle, Creating and running applets Applets: Event Handling using applets	10	20	1,2,3,4

Reference Books:

1. Programming with java by E. Balguruswamy,TMH,4thEd
2. Java: The Complete Reference Patrick **by** Naughton, Herbert Schildt,TMH,7thed.

3. Java Programming Cookbook By Schildt, TMH,7thEd.
4. Java Programming by RohitKhurana Vikas Publishing House Pvt. Ltd.

Subject Code	Subject Title	Internal	External
202 SD Core	Mobile Programming using Android	50	50

Objective :

1. This course introduces mobile application development for the Android platform.
2. Studentswill learn skills for creating and deploying Android applications, with particular emphasis on software engineering topics including software architecture, software process, usability, and deployment.

Course Outcome : At the end of this course the students should be able to:

CO1 :Write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.

Unit No.	Chapter Details	No. of Sessions	%	References
1	**Introduction to Android** A little Background about Mobile Technologies Android – An Open Platform for Mobile development Android SDK Features Android versions and features	6	15	1,2,5
2	**Tools for Development** Installing Android First Android application Running on Emulator Android development Tools Eclipse, IDEs and Tools	2	5	1,3,4,5
3	**Android Architecture and OOPS** Building Blocks of Android Java Classes and Objects Class Methods and Instances Inheritance and Polymorphism in Java Interface and Abstract class	4	10	1,3,6
4	**Android UI and Advance Java** Fundamental Android UI Design Introducing Views In Creating new Views Introducing Layouts Creating new Views Using resources Complex UI components Building UI for performance Using themes Debugging Android Code	8	20	1,5,6

5	**Android Graphics and Multimedia** Basic Graphics Input Handling Playing Audio & Video Recording Audio and Video Adding new media to media store Raw Audio Manipulation	**6**	**15**	**1,3,6**
6	**Database and Content Providers** Introducing Android Databases Introducing SQLite on Android SQLiteOpenHelper and creating a database Opening and closing a database Working with cursors Inserts, updates, and deletes Creating new content Provider Using Content providers Native Android Content provider	**8**	**20**	**1.3,5,6**
7	**Services, Broadcast Receivers, Preferences** Overview of services in Android Implementing a Service Service lifecycle Bound versus unbound services Broadcast Receiver Life Cycle Introduction to Preference Types of Preference	**6**	**15**	**1.5.6**

References:

1. Professional Android 2 Application Development Paperback Author, Reto Meier, Wrox Publications
2. Hello, Android by Ed Burnette,SPD,3rd Ed.
3. Professional Android Application Development by Reto Meier, Wiley India Pub.
4. Android In Action By W. Frank Ableson,dreamTech Pub.
5. ANDROID DEVELOPMENT FOR DUMMIES by Android guru DonnFelker
6. Programming Android by ZigurdMednieks, G. Blake Meike, Laird Dornin and Masumi Nakamura

Subject Code	Subject Title	Internal	External
201 ST Core	**Introduction to Software Testing Life Cycle**	**50**	**50**

Course Objective:

1. To study basic concepts of Software Testing and Its Life Cycle.
2. To learn & understand the various Principles, Levels and Control of Software Testing.
3. To manage security in Software Testing.
4. To aware the new technologies in Software Testing.

Course Outcome:

After completing this subject student will be able to understand the issues involved in Software Testing.

CO1: To aware the Software Testing Life Cycle and its phase.

CO2: To aware the usability of Software Testing Levels and it importance's.

CO3: To apply Testing Process, Techniques and Environment in Software Testing.

CO4: Recognize and describe the security controls in Software Testing.

CO5: To adopt the new techniques in Software Testing.

CO6: To make students aware with the changes in process, technologies, and systems around us.

Sr.No	Chapter Details	No of sessions	%	References
1	**Software Testing Principle** Fundamentals of testing, Principle, Objectives and Purpose, Defect or Bug, Its life cycle, Fundamental of Test Process, Factors affecting software testing, Testing constraints, Life cycle of testing, Tester's workbench, Level of Testing, Verification and Validation Functional and structural testing Static and dynamic testing, V Concept of testing with testing stages	**10**	**10**	**1,2,3,4,5**
2	**Testing Process and Techniques** Software testing process Structural testing techniques Functional testing techniques White box and black box testing Incrementaltesting Thread testing, Requirement tracing	**6**	**10**	**1,2,3,4,5**
3	**Testing software developed by contractor** Building Test Environment, Managements support Test work processes Test Tools, Challenges in testing acquitted software COTS Software Test Process, Contracted software test process	**8**	**10**	**1,4,5**
4	**Testing Software Controls&Security Controls** Principles and concepts of Internal controls Internal control models, Testing of internal controls Building a Penetration Point Matrix Creation of security awareness policy, strategy, Technique to test security	**8**	**10**	**1,4,5**
5	**Testing new Technologies** Testing Web Based , distributed Applications Testing Wireless Technologies Testing e-Commerce application	**8**	**10**	**1,4,5**

Reference Books:

1 CSTE Common Body of Knowledge (www.softwarecertifications.org)

2 Software Engineering, R. Pressmen,TMH,7th Ed.

3 Software Engineering, Sommerville,Pearson,8th Ed.

4 IntroducingSoftwareTesting, LouiseTamres
5 Effective Methods for software Testing WilliamPerry
6 Software Testing inRealWorld, EdwardKit
7 Software Testing Techniques, Boris Beizer, dreamTech pub,2nd Ed.

Subject Code	Subject Title	Internal	External
202 ST Core	**Software Quality Assurance**	**50**	**50**

Course Objective :

01. To understand how Software Project Management done
02. To know what is software Quality.
03. To learn SQA Components
04. To learn Software Quality Factors
05. To understand software standardization

Course Outcome :

CO 1 : Prevent/ Find out the software defects
C0 2 : Evaluate the software performance, usability and reliability.
CO 3 : Verify and validate the user requirements.
CO 4 : Ensure the quality of products
CO 5 : how to do software standardizations

Unit No	Chapter Details	No of sessions	%	Reference books
1	**Software quality** 1.1 Definition 1.2 Software errors, software faults and softwarefailures 1.3 Software quality assurance – definition and objectives 1.4 Software quality assurance vs. software quality control 1.5 The objectives of SQAactivities	**9**	**15**	**1,2,3,4**
2	**SQA Components** **a. Pre-project SQA Components** 2.1 ContractReview 2.2 Development and QualityPlan **b. Project life cycle activities assessment** 2.3 Verification andValidation 2.4 Various types ofReviews 2.5 Inspections 2.6 Walkthrough 2.7 Softwaretesting 2.8 Impact of CASETools	**9**	**10**	**1**
3	**SQA Infrastructure Components & Quality Factors** **a. SQA Infrastructure Components** 3.1 Procedures and procedure manuals 3.2 Templates and Checklists 3.3 Staff training 3.4 Corrective and preventive actions 3.5 Documentation control	**8**	**10**	**1**

	b. Software Quality Factors 3.6 Mccall's Quality Model 3.7 Product, Process quality metrics			
4	**Standardization** 4.1 ISO 9001 and ISO 9000-3 4.2 SEI-CMM, 4.3 IEEE 1012 standard 4.4 ISO/IEC 12207 standard.	**8**	**15**	**1,2,3,4**
5	**Configuration Management** 5.1 Change control 5.2 Release and version control 5.3 Software configuration management audit	**6**	**10**	**1, 2,3**

Reference -

1. Software Quality Assurance from theory to implementation – DanialGalin
2. Software Project management - Edwin Bennatan
3. Software Engineering Roger S. Pressman,TMH,7^{Th}Ed.
4. Software Quality Assurance : Principles and Practices NinaGodbole,
5. Project Management Body of Knowledge –PMI

Website -

6. www.softwarecertifications.org

Subject Code	**Subject Title**	**Internal**	**External**
203 Core	**Business Process Domain**	**50**	**50**

Course Objective :

1. To learn and understand the processes and practices in business and their applications.
2. To know the work order management
3. To understand the sales analysis and market segments with Customer order Processing
4. To learn the financial aspect of business and management.
5. To introduce advance business applications like CRM and SCM.

Course Outcome :

CO1 : Learn the Business Process and its application with respect to ERP
CO2 : Know how work order management carried out
CO3 : Know the different steps in customer order processing
CO4 : Learn financial and HR aspects of Business
CO5 : Understand how Supply Chain works

Unit No	**Chapter Details**	**No. of Sessions**	**%**	**Reference Books**
1	**Manufacturing:** Product Life Cycle(PLC, PLC Management, BOM processing with product configuration, MPS, Capacity Requirements Planning for Equipment, Manpower and Time, MRP, Production Planning - work order management - EOQ, EBQ, Shop floor control - calculation of labourefficiency and productivity with example, Material procurement - Indenting, Purchasing, Vendor analysis, supplier's, Bill passing and receipt of material.	**10**	**25**	**1,2**

2	**Sales And Distribution:** Sales Budgeting - Market segments / Customers / Products Customers Enquiry and preparation of Quotation Customer Order processing - from Order acknowledgement to dispatch and invoicing Pending Customer orders - follow up. Sales Analysis Network of Sales outlet - Distributed Databases While explaining this application consider an organization manufacturing multiple products withsales outlets spread across the country. Retail Marketing- New trends – Growth	**10**	**25**	**2**
3	**Human Resource** 3.1 Employee Database 3.2 Recruitment – Techniques 3.3 Employee Appraisal – Performance, efficiency Leave Accounting and Payroll – Salary calculation and reporting, Income Tax calculation and reporting, Loan Accounting, PF and gratuity, Bonus, Ex-Gratia, Incentive, Super-annuation, Arrears Calculation. 3.4 Introduction- E-HR	**5**	**15**	**3,4**
4	**Financial Accounting** 4.1 Double Entry Accounting system, Concepts and conventions in accounting, Accounting process, Depreciation 4.2 Journal Entries – Rules for Journal entries, posting in a Ledger, subsidiary books, preparation of Trial balance 4.3 Ratio Analysis – Types of ratio with examples 4.3 Final Accounts – Preparation of Trading and profit and loss, Account and Balance sheet of a Proprietary Firm.	**8**	**20**	**6**
5	**Supply Chain Management(SCM)** – 5.1 Introduction, Concept, Scope and advantages 5.2 Customer Relationship management (CRM) – Introduction, Concept, Scope and advantages 5.3Forecasting : Demand forecasting and Planning	**7**	**15**	**1**

References -

1. Supply Chain Management - Strategy, Planning & Operation by Sunil Chopra, Peter Meindl, D. V. Kalra, Pearson Education.
2. Management Information Systems by Jaiswal and Mittal, Oxford University Press
3. Personnel/ Human Resource Management by David DeCenzo, Stephen Robbins, Prentice Hall of India,2008, 3rd Edition
4. Human Resource Management by J. John Bernardin, Tata McGraw Hill Publishing, 4thEdition
5. Personnel Management C B Mammoria, Himalaya, 29th Ed.
6. Management Accounting Khan and Jain, TMH

Subject Code	Subject Title	Internal	External
204 Core	**ORACLE**	**50**	**50**

Objectives :

This subject will enhance database handling , data manipulation and data processing skills through SQL & PL/SQL, which will help them in developing data centric computer applications.

Course Outcome :

At the end of this course the students should be able to:

CO1 :Write simple and advanced SQL queries.

CO2 :Able to use advanced features such as cursors, Triggers and bulk fetches.

CO3 : The student will also become familiar with the internals of PL/SQL and will be able to compile PL/SQL for super-fast performance.

Unit No.	Chapter details	No. of Sessions	%	References
1	**Queries** Select with all options Operators Arithmetic Comparison Logical (in, between, like, all, %, _, any, exists, is null, and ,or, not, Distinct) Order by clause	2		1,2,3,4,5
2	**SQL Functions** Date Functions - Sys_date , next_day, Add_months, last_day, months_between, Numeric Functions - round, trunc, abs, ceil, cos, exp, floor Character Functions - initcap, lower, upper, ltrim, rtrim, translate, length, lpad, rpad, replace Conversion Functions - to_char, to_date, to_number Miscellaneous Functions - Uid, User, nvl, vsize, decode, rownum Group functions - avg, max, min, sum, count, with Group by and Having Clause Nested functions	3	12.5	1,2,3,4,5

3	**Joins** Simple join Equi join Non equi join Self join Outer join Set operators (Union, union all, intersect, minus)	**4**	**12**	**1,2,3,4,5**
4	**Sub queries and Correlated query**	**2**		**1,2,3,4,5**
5	**DML statements** (Insert, Update, Delete with Where clause) **TCL (Commit, Rollback, Savepoint)** **Locks in Oracle** DDL Statements	**4**	**7.5**	**1,2,3,4,5**
6	**Data Types** Character - Char,Varchar/varchar2, Long Number Number (p) - fixed point, Number (p,s) - floating point Long raw Introduction to LOB data types (CLOB,BLOB, BFILE)	**1**	**5**	**1,2,3,4,5**
7.	**Table** Create, Alter, Drop, Truncate, Rename Constraints (Primary key, Foreign Key, Unique Key, Check, Default, Not Null, On delete, Cascade) Column level and Tablelevel constraints **Oracle Objects** Views, Sequences, Synonyms, Index (Define, Alter and Drop) **Introduction to Oracle Architecture** **Creating Users and assigning privileges**	**7**	**12.5**	**1,2,3,4,5**
8.	**PL / SQL** Introduction to PL/SQL Advantages of PL/SQL PL/SQL Character Set Data types -Character, Raw, rowid, boolean, binary, integer,number, Variable, constant PL/SQL blocksAttribute - % type, % rowtype operators function comparison, numeric, character, date control structure sequential - goto Error handling concept of exception - pre defined exceptions -no_data_found, cursor_allready_open,program_error,zero_divide, invalid_cursor,login_denied,invalid_number, too_many_rows, dbms_output, user_defined exceptions	**5**	**12.5**	**8,9**
9.	**Cursor** Explicit & implicit Cursor, Cursor for loop, Parametric cursor, Declaring cursor variables - cursor variables, Opening a cursor variable from a query,	**2**		**8,9**

	Closing cursor variables, Restrictions using cursor variables			
10.	**Composite Data Types** Record, Declaration, refer, record assignment Table declaration, table attributes (count, delete, exists, first,last, next, prior)	**1**	**5**	**8,9**
11.	**Database Triggers** Types of Triggers Enabling, disabling Predicates- inserting, updating, deleting **Procedures and Functions** Definition, Implementation and Execution **Packages**	**4**	**12**	**8,9**
12.	**Creating an Oracle Database** Use DBCA to create a database, to delete a database, to manage templates **Managing the Oracle Instance** Use Enterprise Manager Use SQL*Plus and iSQL*Plus to access the Oracle Database Modify database initialization parameters Describe the stages of database startup Describe the database shutdown options View the database alert log Use dynamic performance views	**2**	**5**	**10,11,12**
13.	**Performing Database Backup** Create consistent database backups Back up your database without shutting it down Create incremental backups Automate database backups Backup a control file to trace Monitor flash recovery area **Performing Database Recovery** Recover from loss of a Control file Recover from loss of a Redo log file Recover from loss of a system-critical data file Recover from loss of a non system-critical data file	**2**	**10**	**10,11,12**
14.	**Moving Data** Describe the general architecture of Data Pump Use Data Pump export and import to move data between Oracle databases Load data with SQL Loader Use external tables to move data	**1**	**6**	**10,11,12**

Books:

1. SQL - The complete Reference by Groff James & Weinberg Paul.,TMH,2nd Ed.
2. SQL for Professionals by Kishore Swapna&NaikRajesh,TMH.

3. SQL from the ground up by Pyofinch Mary
4. SQL Unleashed by Ladanyi Hans.
5. Oracle 7 by Ivan Bayross,BPB Pub.
6. Understanding SQL by Gruber Martin,BPB Pub.
7. Teach yourself SQL in 14 days by Morgan Bryan & Perkins Jeff
8. Oracle PL/SQL Programming by Scott Urman
9. Teach yourself PL/SQL in 21 days by Lucus Tom,techmedia,2nd Ed.
10. OCP: Oracle 10g Certification Kit (1Z0-042 and 1Z0-043)
11. Oracle Database 10g OCP Certification All-In-One Exam Guide (Oracle Database 10g Handbook) by DamirBersinic, John Watson
12. Oracle Database 10g DBA Handbook by Kevin Loney, Bob Bryla, PublisherMcGraw-Hill

Websites:

13. http://education.oracle.com

Subject Code	Subject Title	Internal	External
205 Core	**Cloud Infrastructure and Services**	**50**	**50**

Course Objective:

1. To enrich the students with cloud deployment.
2. To know different cloud data centers.
3. To understand cloud infrastructure technologies.
4. To understand cloud security and migrations.
5. TO know the services of cloud.

Course Outcome:

After completing this subject student will be able to understand the issues involved in Cloud Infrastructure.

CO1 **:**Remembering how cloud deployment is done.
CO2 : Usage and utility of cloud data centers.
CO3 : Build the cloud infrastructure.
CO4 : Overview cloud security and services

Unit No	Chapter Details	Nos. of Sessions	%	Reference Books
1	**JOURNEY TO THE CLOUD –** Definition, essential characteristics, and phases of journey to the Cloud. Business drivers for Cloud computing, Definition of Cloud computing, Characteristics of Cloud computing as per NIST, Steps involved in transitioning from Classic data center to Cloud computing environment.	**4**	**15**	**1,2,3,4**

2	**CLASSIC DATA CENTER (CDC) –** Elements of CDC – compute, storage, and network, with focus on storage networking, business continuity, and data center management. Application, DBMS, Compute, Storage and Networking, Object based and Unified storage technologies, Business continuity overview and backup, Replication technologies, CDC Management.	**5**	**15**	**1,2,3,4**
3	**VIRTUALIZED DATA CENTER (VDC) –** Virtualization of core technologies in a data center, leading to Virtualized Data Center (VDC), Fundamental concepts of compute, storage, networking, desktop and application virtualization. Concepts and techniques employed for ensuring business continuity in a virtualized data center. Compute, Storage, Network virtualization techniques, Virtual machine (VM) components and process of converting physical to VMs, Block and file level storage virtualization, Virtual provisioning and automated storage tiring, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits., Methods for implementing desktop virtualization, their benefits, and considerations, Application virtualization methods, benefits, and considerations, Backup and recovery of Virtual Machines (VMs), VM replication and migration technologies, Recovery options from total site failure due to a disaster.	**6**	**20**	**1,2,3,4**
4	**CLOUD COMPUTING AND INFRASTRUCTURE** Different Cloud services and deployment models, the economics of Cloud, Cloud infrastructure components, and Cloud service creation processes. Cloud service management processes that ensure that the delivery of Cloud services is aligned with business objectives and expectations of Cloud service consumers.	**6**	**15**	**1,3**
5	**CLOUD SECURITY AND MIGRATION TO CLOUD –** Security concerns and migration considerations to cloud. Key security concerns and threats and details Cloud model suitable for different categories of users. Security concerns and counter measures in a VDC and Cloud environment, Governance, Risk, and Compliance aspects in Cloud, Cloud security best practices.	**5**	**20**	**1,3**
6	**QUALITY OF SERVICE (QOS) :** QoS of Cloud Taxonomy and survey of QoS management and service , Selection methodologies for cloud computing, Auto scaling, Load balancing and monitoring in open source cloud, Resource scheduling for Cloud Computing.	**4**	**15**	**5,6**

References -

1. Cloud Computing: A Practical Approach Author: Anthony T. Velte, Publisher: Tata Mcgraw Hill Education Private Limited(2009), ISBN: 0070683514
2. Cloud Computing For Dummies Author: Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, and Publisher: Wiley India Pvt. Ltd. (2009), ISBN: 8126524871
3. Dr. Kumar Saurabh,"Cloud Computing", Wiley Publication
4. BorkoFurht, "Handbook of Cloud Computing", Springer
5. VenkataJosyula,"Cloud computing – Automated virtualized data center", CISCO Press
6. Greg Schulr,"Cloud and virtual data storage networking",CRC Press
7. Mark Carlson,"Cloud data management and storage", McGraw hill

Subject Code	Subject Title	Internal	External
206 Core	**Software Project Management**	**50**	**50**

Course Objective:

1. To understand different aspects of Software Project Management as an important field of practice under IT Management.
2. To understand some problems and concerns of software project managers.
3. To explain the main elements of the role of management.
4. To learn process of software project management, cost estimation, tools and techniques of Software Project Management and configuration management.
5. To understand importance of, and learning techniques to ensure software quality.
6. To learn to use a Software Package for Software Project Management.

Course Outcome:

After completing this subject student will be able to understand the issues involved in Software Project Management.

CO1: Understand the scope of Software Project management.

CO2: Aware distinguish between software and other types of development project.

CO3: Aappreciates the need for careful planning, monitoring and control

CO4: Identify the stakeholders of a project and their objectives and ways of defining the success in meeting those objectives.

CO5: Make students aware with the changes in technologies, applications and systems around us.

Unit No.	Chapter Details	No. of Sessions	%	References
1	**Introduction to Software Project Management** 1.1. Software Projects Vs. Other Projects 1.2. Contract Management and Technical Project Management 1.3. Activities under technical project management 1.4. Plans, Methods and Methodology 1.5. Stakeholders 1.6. Role of - Project Manager, Team members, Client & Users in project management.	**8**	**10**	**1,4,7,8,9**

2	**Project Planning, Evaluation and Program Management** 2.1 Steps in Project Planning and Project Evaluation 2.2 Strategic and Technical Assessment 2.3 Cost Benefit Analysis 2.4 Cash Flow Forecasting 2.5 Process Models and Prototyping 2.6 Dynamic Systems Development 2.7 Extreme Programming 2.8 Managing Iterative Processes.	**8**	**10**	**1,4,7,8,9**
3	**Software Effort Estimation** 3.1 Estimation Techniques, Expert Judgment and Analogy. 3.2 Function Point Analysis – Object Points, Procedural Codes 3.3 COCOMO Model Activity Planning, Delphi Technique. 3.4 Project Schedules – Sequencing and Scheduling – Using Gantt Chart. 3.5 Network Planning – Using PERT and CPM for activity 3.6 planning – Forward Pass – Backward Pass 3.7 Activity-on-arrow networks Managing Contracts	**8**	**10**	**3,4,9**
4	**Risk Management in Software Projects** 4.1 Nature and Types of risk 4.2 Managing risks – Risk Analysis, Planning, Process and Control 4.3 Strategies for risk reduction, Risk Closure. 4.4 PERT as a tool of Risk Management Resource Monitoring and Control 4.5 Creating Control Framework and Reporting for Control	**8**	**10**	**3,4,9**
5	**Software Quality Management & Control, Quality Assurance & Standards:** 5.1 The SEI Capability Maturity Model CMM; 5.2 Concept of Software Quality, Software Quality Attributes, 5.3 Software Quality Metrics and Indicators, 5.4 Quality assurance & Validation plan (SQA Activities , reviews, walkthroughs, inspection, testing) 5.5 Automation to improve Quality in testing 5.6 Defect Management 5.7 Configuration management & Maintenance plan 5.8 Change Management Version and Release Management 5.9 Configuration Management Tools	**8**	**10**	**2,3,4,5,6**

Reference Books :

1. Software Project Management, 5th Edition, Hughes, Cotterel, Rajib Mall, Tata McGraw Hill
2. Software engineering principles and practice, McGraw-Hill, Waman S. Javadekar
3. Effective software project management, Willy india edition, Robert K. Wysocki
4. Software quality, producing practical, consistent software, Mordechai Ben-Menachem
5. Software project management in practice, Pearson, PankajJalote

6. Software testing and quality assurance , Theory and practice, Willy-India edition, KshirsagarNaik
7. Software project management, A Concise Study, S. A. Kelakar.
8. Software Project management in practice by PankajJalote
9. Software project management by Rajendra Mishra
10. Step by Step - Microsoft Project 2013 (Paperback, Carl Chatfield, Timothy Johnson)
11. Planning and Control Using Microsoft Project and PRINCE2, by Paul E. Harris

Subject Code	Subject Title	Internal	External
207 UL	**Current Trends in IT**	**--**	**50**

Course Objective:

1. To study basic concepts of Current Trends in IT.
2. To learn & understand the various models of IT used in word.
3. To manage security and architectures used in IT.
4. To get acquainted with the Electronic / Digital Medias.
5. To aware the various fund transaction in e/m - commerce.

Course Outcomes:

After completing this subject student will be able to understand the issues involved in Current Trends in IT.

CO1: Distinguish different types of Social Media and Digital Media.
CO2: To aware the usability of Cloud computing and its Models.
CO3: Apply Privacy Fundamentals, business practices' in different Current Trends in IT
CO4: Recognize and describe Electronic / Digital Medias and E-Learning.
CO5: To analyze the Electronic content used in IT.
CO6: Recognize and describe E/M-Commerce.
CO7: To make students aware with the changes in technologies, applications and systems around us.

Unit No.	Chapter Details	No. of Sessions	%	References
1	**Social Media and Networking:** Definition, Overview of Social Networking Sites. **Types of Social Networking Sites:** General purpose, Advantages of Social Networking Sites, Drawbacks of Social Networking Sites, Features And Need of Social Networking, Security Issues with Social Networking Sites, Examples.	**8**	**10**	**9,10**
2	**IT Infrastructure** Introduction, Definition, What is infrastructure, The infrastructure model, IT systems model Application building blocks, Application Integration building blocks Infrastructure building blocks, Systems management building blocks,Challenges in IT Infrastructure Management, Design Issues of IT Organizations and IT Infrastructure, IT System Management Process, IT Service ManagementProcess, Information System Design Process	**8**	**10**	**2,6,7,8,9**

3	**Enterprise Content Management(ECM)**: Introduction, Definition, Process, Types of Content, Examples **Content Management System(CMS):** Overview and examples, **Electronic Document Management(EDM) :** introduction, Need, Examples	**8**	**10**	**4,5**
4	**E-Learning**: Definition, Introduction, Types of e-Learning: Learner-led e- Learning, facilitated e-Learning, Instructor-led e-Learning, and Embedded e-Learning. Tele-monitoring And e-Coaching **e-Learning Models**: 1. WBT, 2.CBT, 3.LMS, 4.LCMS, and Virtual SchoolSystems **e-Learning Tools And Technologies:** E- Mail, Online Discussion, Chat and Instant Messaging, Voting, Whiteboard, Application Sharing, Conferencing, Online Meeting Tools **Standards for e-Learning & Case Study on E-Learning.**	**8**	**10**	**1,11**
5	**e/m-Commerce:** **e-Commerce** definition, Models of e- Commerce, **Electronic Payment Systems:** Credit/Debit Cards, Smart Cards, PayPal, e-Billing, e- Micropayments Point Of Sales System(POS): Meaning, Uses **m-Commerce:** Overview of mobile- Commerce, Attributes of m-Commerce, Drivers of m-Commerce, m-Commerce Securityissues, Mobile ATM(ICICI Bank Case Study) **Applications of m-Commerce:** 1.Mobile Financial Applications, m-wallet 2.Mobile Shopping 3.Advertising And Content provision **Case-Study on e/m-Commerce.**	**8**	**10**	**3**

References:

1. E-Learning ToolsandTechnologies, William Hortan, Katherine Hortan, WileyPub.
2. IT Infrastructure & Its Management: Phalguni Gupta, Surya Prakash&UmaraniJayaraman, Tata McGraw-HillEducation
3. E-World(ExcelPublications), ArpitaGopal and ChandraniSingh
4. Electronic Commerce AManagerialPerspective, Efraim Turban, PearsonPub.
5. Decision Support Systems andIntelligentSystems, Efraim Turban, Jay Aronson, Pearson, 7^{th}Ed
6. Infrastructure Management: Integrating Design, Construction, Maintenance, Rehabilitation, and Renovation: W. Ronald Hudson, Ralph C. G. Haas, WaheedUddin
7. I.T. Infrastructure Management (2nd Edition): AnitaSengarInternet (Use of Search Engines Google & yahooetc).
8. IT Infrastructure Architecture - Infrastructure Building Blocks and Concepts

Second Edition Hardcover – Import, 24 Feb 2013 by SjaakLaan
9. IT Infrastructure Management Paperback – 2012 by AnitaSengar
10. Social Media: A Reference Handbook *Contemporary world issues* by Kelli S. Burns.
11. Social Network Analysis: History, Theory and Methodology 1st Edition, Kindle Edition by Christina Prell.
12. E-Learning Fundamentals: A Practical Guide by Diane Elkins (Author), Desiree Pinder

Subject Code	Subject Title	Internal	External
208 UL	**Basics of Business Analytics**	**--**	**50**

Course Objective:

1. IDENTIFY opportunities for creating value using business analytics.
2. DESCRIBE the basic concepts in Business Analytics, DATA Science and Business Intelligence.
3. EXPLAIN the applications of Business Analytics in multiple business domains and scenarios.
4. DEVELOP a thought process to think like a business analyst.

Course Outcomes:

After completion of the course students will be able to

CO1. Students can describe and analyze the concept of Business Analytics.

CO2. Students got the knowledge about Data Science and Business Intelligence.

CO3, They can work on various business domains.

CO4. Familiar with role & responsibilities of data scientist/business analyst according to recent trends.

Unit No.	Chapter Details	Nos. of Sessions	%	References
1	**Business Analytics Basics:** Definition of analytics, Evolution of analytics, Need of Analytics, Business analytics vs business analysis, Business intelligence vs Data Science, Data Analyst Vs Business Analyst, Types of Analytics.	**6**	**20**	**1,2**
2	**Tools for Analytics**: Introduction of different tools for analytics, Concept of insights. Importance of data in business analytics, Differences between data, information and knowledge, various stages of an organization in terms of data maturity, Options for organizations in the absence of good quality data.	**6**	**20**	**1,2**
3	**Analytical decision-making**: Analytical decision-making process, characteristics of the analytical decision- making process. Breaking down a business problem into key questions that can be answered through analytics, Characteristics of good questions, Skills of a good business analyst.	**6**	**20**	**3,4**

4	**Business analytics applications in** : Marketing Analytics, HR Analytics, Supply Chain Analytics, Retail Industry, Sales Analytics, Web & Social Media Analytics, Healthcare Industry, Energy Analytics, Transportation Analytics, Lending Analytics, Sports Analytics. Future of Business Analytics.	**6**	**20**	**3,4**
5	**Introduction of Big Data &Hadoop:** Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, AnalysingData with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to InfosphereBigInsights and Big Sheets.	**6**	**20**	**5,6,7,8**

References Books :

1. Data science in R: a case studies approach to computational reasoning and problem solving, Deborah Nolan. Boca Raton: CRCPress
2. The analytics revolution: how to improve your business by making analytics operational in the big data era, Bill Franks. Hoboken:Wiley
3. The analytics revolution: how to improve your business by making analytics operational in the big data era, Bill Franks. Hoboken:Wiley
4. Taming the big data tidal wave: finding opportunities in huge data streams with advanced analytics, Bill Franks. Hoboken: John Wiley &Sons
5. Text Books•Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
6. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
7. Pete Warden, "Big Data Glossary", O'Reily, 2011.
8. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012

Subject Code	Subject Title	Internal	External
209 UL	**INFORMATION SECURITY AUDIT**	**--**	**50**

Course Objective:

1. To study basic concepts of Information System
2. To learn & understand the Threats in Information System Security.
3. To manage security treats in the Organization for their Information System.
4. To get acquainted with the Physical Security, Network Security and Biometric Security.
5. To aware the various Information System Audits.

Course Outcome:

After completing this subject student will be able to understand the issues involved in Information System and Security.

CO1: Distinguish different types of Information System with different approaches.

CO2: Finding threats and applies the different tools and techniques in their Organizational

Information System.

CO3: Apply Privacy Fundamentals, business practices' in different Information System Services.

CO4: Recognize and describe Information security best practices.

CO5: To analyze Security models, frameworks and standards in their Organizational Information System.

CO6: Recognize and describe Ethical issues and intellectual property concerns for information security professionals.

Unit No.	Chapter Details	No. of Sessions	%	References
1	Global information systems and their evolution, basics of information systems, role of the Internet and the World Wide Web. Understanding about the threats to information systems security Building blocks of InfoSec, How Organizations manage security of theirinformation systems	08	10	1,10
2	**Information Security Management in Organizations** Information Security Management (ISM), Security Policy, Standards, Guidelines & Procedures ISMS. The 3 pillars CIA of Information Security Information Classification. Risk Analysis & Management, Security considerations for the mobile work force. Cryptographic techniques and Encryption, Intrusion Detection Systems and Firewalls, security of virtual private networks	10	10	1,10
3	**Security models and frameworks :** A structure and framework of compressive security policy, policy infrastructure, policy design life cycle and design processes, PDCA model. introduction to the ISO 27001, SSE-CMM (systems security engineering - capability maturity model), COBIT (Control Objectives for Information and related technologies) and the Sarbanes-Oxley Act(SOX) and SAS 70 (statement on auditing standards)	06	10	1,4,10
4	**Information security best practices** : Privacy Fundamentals, business practices' impact on data privacy, technological impact on data privacy, privacy issues in web services and applications based on web services. Staffing, audits, disaster recovery planning and business continuity planning and asset Management. Ethical issues and intellectual property concerns for information security professionals - copy right, data protection etc. matters	08	10	3,5,10
5	**Auditing for Security** Security Audits what are they? Need for Security audits in organizations Auditors responsibility in Security audits Types of Audits & approaches to Audits. Technology based Audits – vulnerability scanning and penetration testing. Resistance to Audits. Key success factors for Security Audits	08	10	8,9

Reference Books:

1. Information security policies, procedures and standards by ThomasPettier.
2. Information security Management Hand book- 5th Edition-HAROLD F.TIPTON
3. Computer security by Alfred Basta, Wolf Halton
4. Information security policies- Thomas R.Peltier, Peltier R.Peltier
5. Electronic Signature law by LPadmavathi
6. Network Security by AnkitFadia
7. Security Plus study guide by Michael Cross, NorrrisJohnson
8. Information systems control and Audit by Ron Weber, PearsonPub.
9. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices (With Cd) : NinaGobole
10. Information Security policies made easy version 10: Charles CressonWood

Semester – II			
Subject Code	**Subject Title**	**Internal**	**External**
210 IL	**Soft Skills-II**	**50**	**--**

Course Objectives:

3. To encourage the all round development of students by focusing on softskills.
4. To make student aware about the importance, the role and the content of soft skills through instruction, knowledge acquisition, and practiceetc.

Course Outcome:

After completion of this course student will able to

4. Face any challenges in Interviews
5. To present themselves with proper way
6. To expand their innovations

Unit No.	Chapter Details	No. of Sessions	%	References
1	**Self Development and Assessment** Self-Assessment Self-Awareness, Perception and Attitudes Values and Belief System Personal Goal Setting Career Planning, Self-Esteem, Building of Self-Confidence	5	10	1-3
2	**Stress Management** Introduction, Stress Management Techniques (Games, Yoga, and Music Therapy), Emotional Quotient, Dealing With People, Failure, Issues (difference of opinions), Discrimination on the grounds of Ethnicity, Nationality, Gender, Sexual Orientation, Zero and No Tolerance Zones, Team Work, Creating and Maintaining Impression, Counseling, Motivation.	5	10	4-5

3	**Components of communication, Principles of Communication** Definition, Communication Block Diagram, barriers, listening skills, Verbal Communication Planning, Human as an Information Processor, Preparation, Delivery, Feedback and Assessment of activities like; - Public speaking - GroupDiscussion - Oral Presentation skills, - PerfectInterview - Listening and observation skills, Bodylanguage - Use of Presentationgraphics - Use of Presentation aids, Study of communication.	**10**	**30**	**6-9**
4	**Written Communication** Technical Writing-Technical Reports - ProjectProposals - Brochures, - Newsletters, o TechnicalArticles o TechnicalManuals o Official/BusinessCorrespondence - Businessletters - Memos Progress report, Minutes of meeting, Event reporting, Use of style, Grammar and Vocabulary for effective technical writing, Use of : Tools, Guidelines for technical writing, Publishing.	**10**	**30**	**10-19**
5	**Morals, Ethics and Etiquettes** Indian Moral System, Business Ethics, Etiquettes in social as well as Office settings, Email etiquettes Telephone and Short Message Service (Mobile SMS) Etiquettes, Engineering ethics and ethics as an IT professional, Civic Sense.	**05**	**10**	**20-21**

References :

1. You Can Win - Shiv Khera - Macmillan Books - 2003 RevisedEdition
2. 7 Habits of Highly effective people - Stephen Covey, , PocketBooks
3. You Can Heal Your Life – LouiseHay
4. Tim Hindle, "Reducing Stress", Essential Manager Series DKPublishing
5. Robert Heller, "Effective Leadership", Essential Manager series DKPublishing

6. Business Communication - AshaKaul, ,PHI
7. Business Communication - M. Balasubramanyam
8. Business Communication – K. K. Sinha
9. Business Communication – Dr. AnjaliGhanekar
10. John Collin, "Perfect Presentation", Video ArtsMARSHAL
11. Jenny Rogers " Effective Interviews", Video ArtsMARSHAL
12. Raman Sharma, " Technical Communications",OXFORD
13. Sharon Gerson, Steven Gerson "Technical writing process andproduct",
14. Pearson Education Asia, LPE thirdedition.
15. R. Sharma, K. Mohan, Business correspondence and reportwriting",
16. TAG McGraw Hill ISBN0-07-044555-9
17. Video for technical education catalog, National education and Information Films Ltd.Mumbai.
18. Management training and development catalog, National education and Information Films Ltd. Mumbai.
19. XEBEC, "Presentation Book 1,2,3", Tata McGraw-Hill, 2000,ISBN0-40221-3
20. Sheila Cameron, "Business Student Handbook", PitmanPublishing
21. Newstrom Keith Davis," Organizational Behavior", Tata McGraw-Hill,0-07-460358-2

Subject Code	Subject Title	Internal	External
211 IL	**Startup and New Venture Planning**	**50**	**--**

Course Objectives

1. To instill a spirit of entrepreneurship among the student participants
2. To provide an overview of the competences needed tobecome an entrepreneur
3. To give insights into the Management of Small Family Business

Course Outcomes

CO1:DESCRIBE the strategic decisions involved in establishing a startup.
CO2:EXPLAIN the decision making matrix of entrepreneur in establishing a startup.
CO3:.IDENTIFY the issues in developing a team to establish and grow a startup
CO4:FORMULATE a go to market strategy for a startup.
CO5:DESIGN a workable funding model for a proposed startup.
CO6:.DEVELOP a convincing business plan description to communicate value of the new venture to customers, investors and other stakeholders

Unit No.	Chapter Details	No. of Sessions	%	References
1	**1.1 Concept and Definitions**: Entrepreneur &Entrepreneurship, Entrepreneurship and Economic Development; A Typology of Entrepreneurs **1.2 Entrepreneurial Competencies:** The Entrepreneur's Role, Task and Personality - Entrepreneurial Skills: creativity, problem solving, decision making, communication, leadership quality; McClelland's N-Ach theory, personal efficacy, culture & values, risk-taking behaviour, technology backup. **1.3 Factor Affecting Entrepreneurial Growth:** Economic,	**7**	**20**	**1,2,3**

	Non-Economic Factors; EDP Programmes; Entrepreneurial Training; **1.4 Traits/Qualities of an Entrepreneurs:** Entrepreneur; Manager Vs. Entrepreneur, The Early Career Dilemmas of an Entrepreneur, Defining Survival and Success,Entrepreneurship as a Style of Management, The Entrepreneurial Venture and the Entrepreneurial Organization. Entrepreneurial Process. **1.5 Steps of entrepreneurial process:** Deciding – Developing – Moving – Managing – Recognizing.			
2	**2.1 Opportunity / Identification and Product Selection:** Entrepreneurial Opportunity Search and Identification; **2.2 Product Selection:** Criteria to Select a Product **2.3 Conducting Feasibility Studies:** Project Finalization; Sources of Information. **2.4 Entry strategies:** New product, Franchising, Partial Momentum, Sponsorship and Acquisition. **2.5 Intellectual Property:** Creation and Protection.	**7**	**20**	**1,2,3**
3	**3.1 Small Enterprises and Enterprise Launching Formalities:** Definition of Small Scale; Rationale; Objective; Scope; Role of SME in Economic Development of India; SME; Registration; NOC from Pollution Board; Machinery and Equipment Selection. **3.2 Project Report Preparation:** Specimen of Project Report; Project Planning and Scheduling using Networking Techniques of PERT / CPM; Methods of Project Appraisal - economic viability and market feasibility, requirements of financialinstitutions, projected financial statement preparation.	**7**	**20**	**1,2,3**
4	**4.1 Role of Support Institutions and Management of Small Business:** Director of Industries; DIC;SIDO; SIDBI; Small Industries Development Corporation (SIDC); SISI; NSIC; NISBUED; State Financial Corporation (SFC); Information : assistance from different organizations in setting up a new venture, technology parks, industrial corporations, SISI, Khadi& Village Industries Corporation / Board. DGS & DNSIC, export & import, how to apply for assistance – procedure, forms, procedures for obtaining contract from Railways, Defense, P & T etc., SIDBI. Startup India, government incentives and subsidy **4.2 Laws parting to SSI**	**7**	**20**	**1,2,3**
5	**Case Studies: Diagnostic** case studies of successful / unsuccessful entrepreneurs explaining success /failures	**7**	**20**	**1,2,3**

Text Books:

1. New Venture Management: The Entrepreneur's Roadmap (Entrepreneurship Series), Donald F. Kuratko and Jeffrey S. Hornsby, Pearson

2. The Manual for Indian Start-ups: Tools to Start and Scale-up Your New Venture, Vijaya Kumar Ivaturi, Meena Ganesh, Penguin Random House India.

3. Managing New Ventures, AnjanRaichoudhuri, Prentice-Hall of India Pvt.Ltd
4. Develop Your Idea!: Get Off to a Flying Start With Your Startup. Guided Exercises, Templates & Resources for Exploring New Business Ventures, K. N. Kukoyi
5. Managing Small Business by Longenecker, Moore, Petty and Palich, Cengage Learning, India Edition.
6. Entrepreneurship: New Venture Creation by David H. Holt
7. The Dynamics of Entrepreneurial Development & Management by Desai, Vasant , Himalaya Publishing House, Delhi
8. Entrepreneurship and Small Business Management by Siropolis
9. Lead like an Entrepreneur by Neal Thornberry

Reference Books:

1. Fundamentals of Entrepreneurship, Nandan H, PHI
2. Cases in Entrepreneurship by Morse and Mitchell, Sage South Asia Edition.
3. Entrepreneurship – Indian Cases on Change Agents by K Ramchandran, TMGH.
4. Entrepreneurship – The engine of growth, edited by Mark Rice and Timothy Habbershon, Published by Praeger Perspectives.
5. Entrepreneurship: Theory, Process and Practice by Kuratko, D.F. &Hodgetts, R.M. Thomson Press.
6. Entrepreneurship Development: Small Business Enterprises by Charantimath, P. , Pearson.
7. A Guide to Entrepreneurship by David, Otes ,Jaico Books Publishing House, Delhi.
8. Indian Entrepreneurial Culture by A Gupta , New Age International.
9. Make The Move: Demystifying Entrepreneurship by Ishan Gupta, RajatKhare

Subject Code	Subject Title	Internal	External
212 IL	**Internet of Thing (IoT)**	**50**	**--**

Course Objectives

The Course Objective s are to

1. Provide an overview of concepts, main trends and challenges of Internet of Things.
2. Develop the ability to use Internet of Things related software and hardware technologies.
3. Provide the knowledge of data management business processes and analytics of IoT.

Course Outcomes

After learning the course, the student will be able:

CO1. Understand the vision of IoT from a global context.
CO2. Understand the application of IoT.
CO3. Determine the Market perspective of IoT.
CO4. Use of Devices, Gateways and Data Management in IoT.
CO5. Building state of the art architecture in IoT.

Unit No.	Chapter Details	No. of Sessions	%	References
1	**Introduction to IoT** Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs	**6**	**20**	**1,2,8,9**

2	**IoT & M2M** Machine to Machine, Difference between IoT and M2M, Software define Network	**6**	**20**	**1,2,8,9**
3	**Network & Communication aspects** Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination	**6**	**20**	**4**
4	**IoT Architecture -State of the Art –** Introduction, State of the art **Architecture Reference Model-** Introduction, Reference Model and architecture, IoT reference Model, **IoT Reference Architecture-** Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	**6**	**20**	**1,2,8,9**
5	a.**Domain specific applications of IoT** Home automation, Industry applications, Surveillance applications, Other IoT applications b.**Internet of Things Privacy, Security and Governance** Introduction, Overview of Governance, Privacy and Security Issues	**6**	**20**	**1,2**

TEXT BOOKS:

1. WPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. OvidiuVermesan, Dr. Peter Friess, River Publishers
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann
4. Internet of Things : A hands- on Approach by ArshdeepBahga, Vijay Madisetti
5. IoT Programming: A Simple and Fast Way of Learning IOT by David Etter

REFERENCES:

1. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T. Yang, HuanshengNing
2. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally
3. "Mobile Computing," Tata McGraw Hill, Asoke K Talukder and Roopa R Yavagal, 2010.
4. Computer Networks; By: Tanenbaum, Andrew S; Pearson Education Pte. Ltd., Delhi, 4th Edition
5. Data and Computer Communications; By: Stallings, William; Pearson Education Pte. Ltd., Delhi, 6th Edition
6. "Fundamentals of Mobile and Pervasive Computing," F. Adelstein and S.K.S. Gupta, McGraw Hill, 2009.
7. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
8. Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013
9. CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-

Semester III

Subject Code	Subject Title	Internal	External
301 NT Core	**Advanced Computer Networks**	**50**	**50**

Objectives : The Students will able to learn networking concepts with practical as well as theoretical concepts after studying this subject

Course Outcome : After completing this subject student will be able to understand the issues involved in Advanced network technologies

CO01 : To study different Network layers, Multimedia Networking, Windows servers

CO02 : To study and learn Network Security in wireless network.

Unit No.	Chapter Details	No. of Sessions	%	References
1.	**Introduction & Asynchronous Transfer Mode** Computer networks and layered architecture, ATM layered model, switching and switching fabrics, network layer in ATM, QOS, LAN emulation.	**6**	**20**	**1,2,3**
2.	**Networking Layers** **Transport Layer:** Elements of transport protocols; Internet transport protocols: TCP and UDP, TCP connection management, congestion control. **Application Layer:** Network application architectures: Client-server, P2P and hybrid; Application layer protocols: DNS, FTP, TFTP, TELNET, HTTP and WWW, SMTP and electronic mail; Network management and SNMP.	**8**	**20**	**1,2,3,6**
3.	**Wireless and Mobile Networks** Wireless links and network characteristics, 802.11 wireless LANs, mobility management, addressing and routing, mobile IP, WAP, mobility in cellular networks.	**8**	**20**	**1,2,3,5,7**
4.	**Multimedia Networking** Streaming audio and video, RTSP, jitter removal and recovery from lost packets; Protocols for real-time interactive applications: RTP, RTCP, SIP, H.323; Content distribution networks; Integrated and differentiated services, RSVP.	**8**	**20**	**1,2,3,5,7**
5.	**Introduction to Network Security** Cryptography, symmetric and public-key algorithms, digital signatures, communication security, authentication protocols, E-mail security, PGP and PEM.	**6**	**20**	**4,5,6,7**

Reference Books

1. Tanenbaum, A. S., "Computer Networks", 4th Ed., Pearson Education
2. Forouzan, B. A., "Data Communication and Networking", 3rd Ed.,
3. Kurose, J. F. and Ross, R.W., "Computer Networking", 3rd Ed.,
4. Stallings, W., "Network Security and Cryptography", 4th Ed., Prentice-Hall of India.
5. Comer, D.E. and Droms, R.E., "Computer Networks and Internets", 4th Ed., Prentice-Hall.
6. Stevens, W.R., "TCP/IP Illustrated, Volume 1", Pearson
7. Walrand, J. and Varaiya, P., "High Performance Communication Networks", 2nd Ed., Morgan Kaufmann

Subject Code	Subject Title	Internal	External
302 NT Core	**Parallel Computing**	**50**	**50**

Objectives: The students will have a deep understanding of how parallel systems are designed and what are the fundamental methods to program and analyze them.

Course Outcome : The course focuses on hardware, algorithm, and programming of parallel systems, providing students a complete picture to understand pervasive parallel computing.

CO01 : An ability to analyze a problem and identify the computing requirements

CO02 : An ability to apply design and development principles in the construction of software systems of varying complexity..

Unit No.	Chapter Details	No. of Sessions	%	References
1.	**Introduction to Parallel computing** Introduction, Objectives, Problem Solving in Parallel, Performance Evaluation , Elementary Concepts , Need of Parallel Computation , Levels of Parallel Processing , Dataflow Computing , Applications of Parallel Processing	**8**	**15**	**1,2,3,4**
2.	**Classification of Parallel computers** Introduction, Objectives , Memory distribution and connection Topology Parallel systems ,Types of Classification, Flynn's Classification, Handler's Classification, Structural Classification, Classification Based on Grain Size .	**8**	**20**	**1,2,3,4**
3.	**Principles of Parallel Computer Architecture** Network Properties, Performance Metrics, Pipeline Processing and its classification, vector processing, Array Processing, Superscalar Processors and Multi-threaded Processors.	**8**	**20**	**1,2,3,4,5**
4.	**Parallel Programming Models** Introduction, Objectives, Parallel Programming Models and its types, Implicit Parallelism and Explicit Parallelism ,Parallel Programming, Message Passing, Data Parallel Programming, Shared Memory, and Hybrid.	**8**	**20**	**1,2,3,5,**
5.	**Recent Trends In Parallel Computing** Introduction, Objectives, Parallel virtual Machine, Grid and Cluster computing Hyper Threading.	**6**	**20**	**1,2,3,4,5**

Reference Books

1. Thomas L. Casavant, Pavel Tvrdik, Frantisck Plasil, Parallel Computers: Theory and Applications, IEEE Computer Society Press

2. Advanced Computer Architecture: Parallelism, Scalability and Programmability, Tata-McGraw-Hill.

3. Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar. Introduction to parallel computing, second edition, Addison-Wesley, 2003, ISBN: 0201648652

4. An Introduction to Parallel Programming Kindle Edition Peter Pacheco.

5. Advances in Parallel Computing Christian Bischof, Martin Bücker, ISBN:78-1-58603-796-3.

Subject Code	Subject Title	Internal	External
301 SD Core	**ASP.NET using C#**	**50**	**50**

Course Objectives:

1. To understand ASP.NET programming Language.
2. To enable the students to understand the core principles of the .NET Language .
3. To understand the DOTNET framework, C# language features and Web development using ASP.NET **.**

Course Outcomes:

After the completion of this course, a student will be able to do

CO0 1 : Development of various websites on asp.net .

CO0 2: Development of simple applications using C#.

CO03 : To provide the capability for Multiple users in the real time applications .

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Introduction to C#** a. Language features i. Variables and Expressions, type conversion ii. Flow Control iii. Functions, Delegates iv. Debugging and error handling, exception handling (System Defined and User Defined) b. Object Oriented Concepts i. Defining classes, class members, Interfaces, properties ii. Access modifiers, Implementation of class, interface and properties iii. Concept of hiding base class methods, Overriding iv. Event Handling c. Collections, Comparisons and Conversions i. Defining and using collections, Indexers, iterators ii. Type comparison, Value Comparison iii. Overloading Conversion operators, as operator.	**6**	**10**	**1,3, 4,9,**
2	**ASP.NET 3.5** .NET Framework , Types of Websites , Webpage Syntax, Solution Files, Intrinsic Objects in ASP.net.	**2**	**8**	**3,5,10,12**

3	**Web Forms: Standard Controls(i)** Web Control Class Buttons, Text Boxes Labels Literals, Place Holders, Hidden Field Control, File Upload Control.	**2**	**7**	**3,5,10,12**
4	**Web Forms: - Standard Controls(ii)** Image Controls, Image Buttons, Image Maps, List Boxes, Dropdown, Lists Bulleted Lists, Hyper Links Link Buttons Check Boxes Check Box Lists Radio Buttons ,Radio Button Lists , Tables Panels, View Multiview, Calendar.	**3**	**6**	**3,5,10,12**
5	**Validation Controls:-** Required Field Validators, Comparison Validators, Range Validators , Regular Expression Validators, Custom Validators Validation Summaries Validation Groups.	**2**	**6**	**3,5,10,12**
6	**ADO.NET (Working with Database)** connections , Executenonquery, Executescalar , Executereader , DataAdapter,Dataset , GridView,DataList , DetailsView FormView, Repeater SqlDataSource, AccessDataSource, ObjectDataSource XmlDataSource, SiteMapDataSource.	**6**	**18**	**4,5,7,11,12**
7	**Login Controls:-** Login Control, Login View Control, LoginStatus Control, Login Name Control, Password Recovery Control, CreateUserWizard Control, ChangePassword Control.	**2**	**6**	**4,5,7,11,12**
8	**Master Pages & Themes** Simple Master Page Nested Master Page Configuring Master Page Creating Themes Applying Themes, Applying Stylesheet.	**2**	**5**	**4,5,7,11,12**
9	**ASP.NET Web Services** Creating Web Service, Declaring WebService, Setting the WebService Attribute Deploying the WebService Simple Object Access Protocol.	**3**	**5**	**10,11,12**
10	**ASP.NET AJAX** AJAX Server Controls, Creating AJAX Application, AJAX Control Toolkit.	**2**	**5**	**5,10,11,12**
11	**Exception Handling**	**1**	**2.5**	**5,10,11,12**
12	**Crystal Reports** Creating Crystal Reports.	**2**	**5**	**5,10,11,12**
13	**XML** Creating XML , Documents Read and Write XML Repeater.	**1**	**2.5**	**5,7, 10,12**
14	**Deployment** Deploy Windows Application, Deploying Website, Publishing Website	**1**	**3**	**5,7, 10,12**

Reference Books

1. Beginning Visual C#, Wrox Publication
2. Professional Visual C#, Wrox Publication
3. Inside C#, by Tom Archer ISBN: 0735612889 Microsoft Press Ac 2001, 403 pages
4. Beginning ASP.NET 3.5, Wrox Publication
5. Programming ASP.NET 3.5 by Jesse Liberty, Dan Maharry, Dan Hurwitz, O'Reilly
6. Illustrated C# 2008, Solis, Publication APRESS, ISBN 978-81-8128-958-2
7. Professional C# 4.0 and .NET 4by Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson,

8. Morgan Skinner, WROX
9. Beginning C# Object-Oriented Programming By Dan Clark , Apress Pub
10. ADO.NET Examples and Best Practices for C# Programmers, By Peter D. Blackburn Apress Pub.
11. Database Programming with C#, By Carsten Thomsen, Apress Pub.
12. Mastering ASP.Net - BPB Publication

Subject Code	Subject Title	Internal	External
302 SD Core	**Advanced JAVA**	**50**	**50**

Course Objectives:

1. To understand the features of Advance JAVA.
2. To enable the students to understand the concept of socket programming .
3. To enable the students to understand the concept of develop server side applications.

Course Outcomes:

After the completion of this course, a student will be able to
CO01 : Develop programs with features of Servlet.
CO02.Develop programs in the advanced database handling.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Networking** Networking basics, Socket, port, Proxy servers, Internet addressing and URL, java.net -networking classes and interfaces, Implementing TCP/IP based Server and Client. Classes to be covered Socket, ServerSocket, IPAddress, URL connections; Programs on chatting 1-1 & 1-M (Threading) .	**5**	**15**	**1,2**
2	**Introduction of JDBC** Types of JDBC Drivers, Writing JDBC applications using select, insert, delete, update; Types of Statement objects (Statement, PreparedStatement and CallableStatement); ResultSet, ResultsetMetaData; Inserting and updating records, Connection Pooling.	**5**	**15**	**3,4**
3	**Introduction of RMI** Architecture (No programming is expected).	**1**	**5**	**Web link 1**
4	**Introduction to Java Bean** Rules for writing a Simple Bean.	**1**	**5**	**5**
5	**Java Naming Directory Interface** Concept JNDI Architecture.	**1**	**5**	**6**
6	**Introduction of Servlet** Student should know how to configure TOMCAT; directory structure for a web Application; Servlet API Overview; Writing and running Simple Servlet. Servlet Life Cycle, GenericServlet and HttpServlet , ServletConfig & servletContext; Writing servlet to Handle Get and Post Methods, Reading user request data; Writing thread safe servlets, Http Tunneling, Concept of cookie, Reading and writing cookies; Need of Session Management. Types of Session management; Using HttpSession Object ; Servlet	**10**	**20**	**7,8,9**

7	**JSP (Java Server Pages)** Why JSP? JSP Directives, writing simple JSP page; Scripting Elements; JSP Actions: JSP & Java Beans; JSP Actions: include, forward and plugin, Managing sessions using JSP; JSP & Databases; Error Handling in JSP; Writing custom tags; **JSTL** - c, x, frmt, sql, fn, Expression Language, Implicit objects -(request, response, pageContext, session, application), Comments; Java Beans and JSP; Different scopes in a JSP page; Using JDBC in JSP; Study and Development of a Web Application and an Assignment. Tags c:out, c:set, c:if, c:catch, c:choose, c:when, c:otherwise,c:redirect,c:forEach, fmt:parseDate, fn:escapeXml sql:query, sql:update "	**10**	**20**	**9,10,11,12**
8	**Introduction of eclipse** Overview Of eclipse ,Sample Program execution using eclipse	**2**	**5**	**Web link 2**

Reference Books

1. Java All-In-One Desk Reference For Dummies By Doug Lowe.
2. Java 2 Programing Little Black Book By Alain Trottier.
3. Java Programming With Oracle Jdbc By Donald Bales.
4. Jdbc, Servlets, And Jsp Black Book, New Edition.
5. Enterprise Java Beans By By Valesky.
6. Java Server Programming Java Ee5 Black Book 2007 ed., Platinum Ed By Kogent Solutions Inc
7. Developing Java Servlets James Goodwill Techmedia.
8. Inside Servlets – Dustin R. Callway- Pearson Education.
9. O'Reilly Book on Servlet and JSP.
10. JSP Professional Wrox Press.
11. Java Server Programming Volume I and II Wrox Press.
12. Jdbc, Servlets, And Jsp Black Book, New Edition.
13. Professional Hibernate By Eric Pugh, Joseph D. Gradecki.

Website Links:

1. http://www.roseindia.net/ Java and network programming By Krishmurty.
2. www.ibm.com Eclipse 2 For Java Developers By Berthold Daum.

Subject Code	Subject Title	Internal	External
301 ST Core	**Software Test Planning and Documentation**	**50**	**50**

Course Objectives:

1. To understand various test plan formats, risk management in testing,
2. To study defect management and test report generation tools, using various case studies..

Course Outcomes:

After the completion of this course, a student will be able to analyze the

CO01: Various Test Plan and Documentation.

CO02: Developed system by the application of defect management.

CO03 : System according various tools.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Pre requisites of Test Planning** Risk associated with software development ,Risk associated with software testing Risk Analysis, Risk Management	5	12	1,2,3
2	**Preparation of Test Plan** Test Objectives, acceptance criteria Assumptions , Constraints, Characteristics of software being developed, Develop test Matrix, Define Test Administration, Test Plan standards	8	22	1,4,5,6
3	**Test Case Design** Functional test cases , Structural test cases, Erroneous test cases Stress test cases, Test Script, Use Cases	7	20	1,2,3,4
4	**Perform tests and recording** Use of tools in testing, perform Unit test, Perform Integration test Perform System Test	5	10	1
5	**Defect Management**	3	8	5,6
6	**Tools used to prepare test report** Pareto Charts and voting ,Cause and Effect Diagrams, Check sheet Histogram, Run charts, control charts ,Scatter Plot diagram Regression analysis and Multivariate analysis, benchmarking and QFD	4	12	1,4,5,6,7
7	**Test Result Reporting Current status** test reports , Final Test reports	4	8	1,4,5,6,7
8	**User Acceptance Testing** User's Role and tester's role , Acceptance test plan and execution	3	5	1,2,3,4,5
9	**Introduction to TMM**	1	3	1

Reference Books

1. CSTE Common Body of Knowledge (www.softwarecertifications.org).
2. Software Engineering with UML, Mohammad Ali Shaikh, ISBN 9781643243566.
3. Introducing Software Testing Louise Tamres.
4. Effective Methods for software Testing William Perry.
5. Software Testing in Real World Edward Kit.
6. Software Testing Techniques Boris Beizer.

Subject Code	Subject Title	Internal	External
302 ST Core	Agile Model & Methodology	50	50

Course Objectives:
This course makes student learn the fundamental principles and practices associated with each of the agile development methods. To apply the principles and practices of agile software development on a project of interest and relevance to the student.

Course Outcomes:
After the completion of this course, a student will be able to provide
CO01 :Apply a thorough understanding of Agile principles and specific practices.
CO0 2: Analyze existing problems with the team, development process and wider organization.
CO0 3 : Show how agile approaches can be scaled up to the enterprise level.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Introduction to Agile and Product Management** Communication, Planning, Estimation Managing the Agile approach Monitoring progress, Escalating issue. Quality, Risk, Metrics and Measurements, Managing the Agile approach Monitoring progress.	5	15	1,2,3
2	**Agile requirements** User Stories, Backlog Management. Agile Architecture: Feature-Driven Development. Agile Risk Management: Risk and Quality Assurance, Agile Tools	8	20	1,4,3,
3	**Agile Processes** Lean Production – SCRUM, Crystal, Feature Driven Development- Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.	8	20	1,2,4
4	**Agility and Knowledge Management** Test Objectives, acceptance criteria Assumptions , Constraints, Characteristics of software being developed, Develop test Matrix, Define Test Administration, Test Plan standards	6	15	1,2
5	**Agility and Quality Assurance** Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Test Driven Development -Agile Approach in Global Software Development.	4	10	3,4

Reference Books

1. Robert C. Martin ,Agile Software Development, Principles, Patterns, and Practices
2. Craig Larman, Agile and Iterative Development: A Managers Guide, Addison-Wesley.
3. Kevin C. Desouza, Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann .
4. Succeeding with Agile : Software Development Using Scrum, Pearson

Subject Code	Subject Title	Internal	External
303 Core	Management Information System	50	50

Course Objectives:

1. To develop conceptual understanding about latest developments in the field of Information Technology and the impact of I.T. in managing a business
2. To learn to use Information Technology to gain competitive advantage in business.
3. To learn from, with a view to emulate, entrepreneurial ventures in e-Commerce and m-Commerce

Course Outcomes:

After the completion of this course, a student will be able to

CO0 1 :Describe the major technological, organizational, behavioral, and ethical issues facing today's information systems professional.

CO0 2: Describe IT strategy formulation and explain its alignment with organizational strategy .

CO0 3 :Describe ways in which technology can provide an organization with competitive advantages.

CO0 4: Describe how technology facilitates enhances both operational and strategic decision making in an organization.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Management Information Systems** Need, Purpose and Objectives - Data, Information, Knowledge – Types of Information Systems - Information as a strategic resource - Use of information for competitive advantage Information Technology Infrastructure: Information Systems Architecture – Mainframe, Client Server, Web Based, Distributed, Grid, Cloud -	5	15	1,2,3
2	**Introduction to Information Technology** Concept DBMS – Relational Model Applications – DBMS Architecture Enterprise Information requirements – Alternative System Building Approaches - Prototyping - Rapid Development Tools – CASE Tools – Object Oriented Systems	8	20	1,4,3,
3	**Types of information systems** Data Warehousing and Data Mining -Business Intelligence and Analytics - Group Decision Support Systems – Executive Information Systems - Executive Support Systems – Geographical Information Systems - Expert Systems and Knowledge Based Expert Systems – Artificial Intelligence	8	20	1,2,4,5
4	**Information Systems Analysis & Design** Stages of SDLC - Feasibility study, systems study and systems design - Resource utilization, implementation, audit, operation, maintenance and modification .	6	15	1,2,5
5	**Functional Information Systems** Marketing, Finance, HR, Production/Operations information systems and Applications	4	10	3,4

Reference Books

1. MIS-Bidgoli/Chattopadhyay- Cengage Learning 2.
2. Management Information Systems by Obrien, Marakas and Ramesh Behl, TMGH
3. Management Information Systems by Dr. D. B. Bharati & Rohan Dahivale Himalaya Publications
4. Management Information Systems by Jawadekar, TMGH, 4 th Edition
5. Management Information System by Akhtar Ali Sayyed.
6. Management Information Systems – Managing the Digital Firm – Tenth Edition, Kenneth C. Laudon and Jane P. Laudon
7. Management Information System- Jame O Brien- Tata Mcgraw Hill is very good for this course.
8. Software Engineering with UML, Mohammad Ali Shaikh, ISBN 9781643243566

Subject Code	Subject Title	Internal	External
304 Core	**Data Mining**	**50**	**50**

Course Objectives:

1. To introduce the concept of Data Mining as an important tool for enterprise data management as well as to effectively identify sources of data and process it for data mining.
2. To make students well versed in all data mining algorithms, methods of evaluation and the tools used for data mining
3. To provide knowledge on how to gather and analyze large sets of data to gain useful business understanding.
4. To impart skills that can enable students to approach business problems analytically by identifying opportunities to derive business value from data

Course Outcomes:

After the completion of this course, a student will be able to understand

CO0 1: Demonstrate an understanding of the importance of data mining and the principles of business Intelligence.

CO0 2 : Organize and Prepare the data needed for data mining using pre preprocessing techniques

CO0 3 : Perform exploratory analysis of the data to be used for mining.

CO0 4 : Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.

CO0 4 : Define and apply metrics to measure the performance of various data mining algorithms.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Introduction to Data Mining** Introduction , Scope , Definition , Working and Functionality of Data Mining, Predictive Modeling in Data Mining , Architecture for Data Mining , Profitable Applications, Data Mining Tools .	**5**	**15**	**1,2,3,4**
2	**Technologies related to Data Mining** Introduction, Business Intelligence, Business Intelligence tools, Machine Learning, DBMS, OLAP, Statistics , BI versus Data Mining.	**6**	**20**	**1,2,3,4**
3	**Data Mining Techniques** Introduction, Data Mining, Data Mining Versus Database Management System, Data Mining Techniques, Association rules, Classification, Regression, Clustering, Neural networks.	**8**	**20**	**1,2,3,4**

4	**Clustering and Web Mining** Introduction, Clustering, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering, clustering and segmentation software, evaluating clusters. Introduction, Terminologies, Categories of Web Mining – Web Content Mining, Web Structure Mining, Web Usage Mining, Applications of Web Mining, and Agent based and Data base approaches, Web mining Software.	**8**	**20**	**1,2,3,4**
5	**Data Mining software and applications** Introduction, Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature construction, Medical applications (diabetic screening), Scientific Applications using Data Mining, Other Applications.	**4**	**10**	**1,2,3,4**

Reference Books

1. Data Mining and Business Analytics with R, Johannes Ledolter, Wiley, 2013, ISBN: 978-1118447147 .
2. Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (2nd ed.), Bing Liu, Springer, 2011, ISBN: 978-3642194597 .
3. Practical Data Science with R, Nina Zumel and John Mount, Manning Publications 2014, ISBN: 9781617291562 .
4. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005, ISBN: 0-12-088407-0.

Subject Code	**Subject Title**	**Internal**	**External**
305 Core	**Introduction to Animation**	**50**	**50**

Course Objectives:

1. To make the students with various approaches, methods and techniques of Animation.
2. To develop competencies and skills needed for becoming an effective Animator.
3. Exploring different approaches in computer animation.
4. To enable students to create Animation Projects 3-D characters
5. To develop expertise in life-drawing and related techniques.

Course Outcomes:

After the completion of this course, a student will be able to
CO0 1: identify the 12 principles of animation .
CO0 2 :Define and apply design principles and theories to animation production.
CO0 3:Demonstrate skills in the use of industry standard tools for animation.
CO0 4 : Create traditional and computer generated animation based on current industry trends.
CO0 5: Critically analyze your creative work and the work of others.

Sr. No	**Chapter Details**	**No. of Sessions**	**%**	**Reference Books**
1	**Basic Introduction & system configuration** Introduction computers , algorithm & flowcharts , Operating system , HTML , and Graphics.	**4**	**10**	**1,2**

2	**Fundamental of Visual Arts** Introduction, Elements of Design Art, colour, shape, texture , space, form of Drawing , Graphics software.	**4**	**10**	**2,3,4**
3	**Basic element of drawing** Introduction, Elements of drawing, Principles of Design , harmony, Balance, hierarchy, contrast, scale , emphasis, rhythm .	**4**	**10**	**3,4,5**
4	**Fundamental Perspective** Basics of graphics hardware and software, Graphics display devices, Hard copy technologies, Display technologies, Raster and random scan display systems.	**6**	**15**	**2,3,4**
5	**Animation Concept applications** Introduction, animation concepts., Principles of animations , Types of animation, script writing.	**8**	**20**	**3,4,5,6**
6	**Storyboard** Introduction & Context for 3 D Studio Max, Exploring the Max Interface, 3DS Max Workflow.	**6**	**15**	**6,7**

Reference Books

1. Fundamental of Computers – By P. K. Sinha
2. The Animator's Survival Kit by Richard Williams Expanded Edition.
3. The Complete Animation course by Chris Patmore, By – Barons Educational Series .
4. Anatomy of the Artist – Thompson & Thompson.
5. Figure Study Made Easy By- Aditya Chari -- Grace Publication
6. Flash CS4 Professional Bible Published by Wiley Publishing (Robert R & Snow D.)
7. FLASH MX For PC/Mac Published by – FIREWALL MEDIA – Laxmi Publications.

Subject Code	**Subject Title**	**Internal**	**External**
306 Core	**Mini Project**	**100**	**100**

Course Objectives:

A mini project objective is to solve a real time applications . The title, synopsis and implementation should be approved by the faculty coordinator.

Course Outcomes:

After the completion of this course, a student will be able to

CO0 1: Initiate and manage a minor project.

CO0 2: Propose research question and present them in a clear and distinct manner through different techniques.

CO03 : Propose internship possibilities and discuss time-plans and strategies for obtaining internship.

Subject Code	Subject Title	Internal	External
307 UL	Data Warehousing	-	50

Course Objectives:

1. To introduce the concept of Data warehousing as an important tool for enterprise data management.
2. To make students well versed in methods of evaluation and the tools used for data warehousing..
3. To provide knowledge on how to gather and analyze information for business understanding.
4. To impart skills that can enable students to approach business problems analytical methods.

Course Outcomes:

After the completion of this course, a student will be able to understand

CO0 1: Demonstrate the importance of data warehousing in BI .

CO0 2: Collection of data needed for pre preprocessing techniques.

CO0 3 : Perform exploratory analysis of the data to be used for warehousing.

CO0 4 : Define and apply metrics to measure the performance of various data warehousing algorithms.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Data Warehouse Fundamentals** Introduction to Data Warehouse, OLTP Systems; Differences between OLTP Systems and Data Warehouse, characteristics of Data Warehouse; Functionality of Data Warehouse, Advantages and Applications of Data Warehouse; Advantages, Applications, Top- Down and Bottom-Up Development Methodology, Tools for Data warehouse development, Data Warehouse Types.	6	15	1,2,3
2	**Planning and Requirements** Introduction, Planning Data Warehouse and Key Issues: Planning and Project Management in constructing Data warehouse , Data Warehouse Project; Data Warehouse development Life Cycle, Kimball Lifecycle Diagram, Requirements Gathering Approaches: Team organization, Roles, and Responsibilities:.	6	20	1,2,3,4
3	**Data Warehouse Architecture** Introductions, Components of Data warehouse Architecture: Technical Architectures; Data warehouse architectures 1,2,3 Tool selection, Federated Data Warehouse Architecture:	8	20	1,2,3
4	**Dimensional Modeling** Introduction, E-R Modeling: Dimensional Modeling: E-R Modeling VS Dimensional Modeling ,Data Warehouse Schemas; Star Schema, Inside Dimensional Table, Inside Fact Table, Fact Less Fact Table, Granularity, Star Schema Keys, Snowflake Schema, Fact Constellation Schema.	8	20	1,2,3,4
5	**Extract, Transform and Load** Introduction, ETL Overview , ETL requirements and steps ,Data Extraction, Extraction Methods, Logical Extraction Methods, Physical Extraction Methods, Data Transformation, Basic Tasks in Transformation, Major Data Transformation Types, Data loading, Data Loading Techniques, ETL Tools:.	6	10	2,3,4
6	**Data Warehouse & OLAP** Introduction, definition OLAP, Characteristics of OLAP, Steps in the OLAP Creation Process, Advantageous of OLAP, Multidimensional Data, OLAP Architectures, MOLAP, ROLAP,	6	10	1,2,4,5

	HOLAP, Data Warehouse and OLAP , Hypercube & Multicubes.			
7	**Meta data Management in Data Warehouse** Introduction, Metadata, Categorizing Meta data, Meta data management in practice, Meta data requirements gathering, Meta data classification, Meta data collection strategies,Meta Data Management in Oracle and SAS, Tools for Meta data management:	**6**	**10**	**1,3,4,6**

Reference Books

1. Data Warehousing, Data Mining, and OLAP Alex Berson, Stephen J. Smith
2. Data Warehousing and Mining: Concepts, Methodologies, Tools, and Applications John Wang Montclair State University, USA
3. Complete Reference Data Warehouse Design: Modern Principles and Methodologies by Golfarelli & Rizz
4. Data Mining and Business Analytics with R, Johannes Ledolter, Wiley, 2013, ISBN: 978-1118447147 .
5. Practical Data Science with R, Nina Zumel and John Mount, Manning Publications 2014, ISBN: 9781617291562 .
6. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005, ISBN: 0-12-088407-0.

Subject Code	Subject Title	Internal	External
308 UL	**OOPS with CPP**	**-**	**50**

Course Objectives:

1. The student will be able to understand Provide flexible and powerful abstraction allow programmers to think in terms of the structure of the problem rather than in terms of the structure of the computer.
2. Decompose the problem into a set of objects
3. Objects interact with each other to solve the problem
4. Create new type of objects to model elements from the problem space.

Course Outcomes:

After the completion of this course, a student will be able to understand

CO0 1: Master the fundamental principles of OO programming.

CO0 2: Master key principles in OO analysis, design, development, implementation.

CO0 3:The application of the Unified Modeling Language (UML) towards analysis and design.

CO0 4 :Be familiar with alternative development processes, projects , technical writing and oral presentations.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Provide flexible and powerful abstraction** Object Oriented Programming Paradigm, Basic Concepts of Object Oriented Programming, Benefits of Object Oriented Programming, Object Oriented Languages, Applications of Object Oriented Programming, Begining with C++.	**5**	**12**	**1,2,3,4**
2	**Token Expressions & Control Structures** Tokens, Keywords, Identifiers and Constants, Data Types, Type Compatibility, Variables, Operators in C++,Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures.	**5**	**18**	**1,2,3,4**
3	**Functions in C++, Classes & Objects** The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Function Overloading, Friend and Virtual Functions. Specifying a class, Member Functions, Arrays within a class, Static Member Functions, Arrays of Objects, Friendly Functions.	**10**	**18**	**1,2,3,4**
4	**Constructors & Destructors, Operator Overloading, Inheritance** Constructors, Parameterized Constructors, Copy Constructors, Dynamic Constuctors, Destructors, Defining Operator Overloading, Overloading Operators, Rules for Overloading Operators, Type Conversions	**10**	**18**	**1,2,3,4**
5	**Pointers, Virtual Functions & Polymorphism, Working with Files, Exception handling** Pointers, Pointers to Objects, this pointer, Pointer to Derived Classes, Virtual Functions, Classes for File Stream Operations, Opening and Closing a File, File Modes, File Pointers, Input Output Operations, Updating a File.	**9**	**18**	**1,2,3,4**
6	**An Object Oriented Approach in Real Life Problems** Object Orientation O Development O Themes, Modelling, Abstraction Models.	**6**	**16**	**1,2,3,4**

Reference Books

1. Object Oriented Design by Rumbaugh (Pearson publication).
2. Object-oriented programming in Turbo C++ By Robert Lafore, Galgotia Publication.
3. Object-oriented programming with C++ by E.Balagurusamy, 2nd Edition, TMH.
4. Herbert Schildt, —C++ The complete reference‖, Eighth Edition, McGraw Hill Professional, 2011, ISBN:978-00-72226805

Subject Code	Subject Title	Internal	External
309 UL	E-Governance & Framework of ICT	-	50

Course Objectives:

1. To comprehend the basic tenets of e-Governance.
2. To understand the technical, legal and institutional framework supporting e- governance implementation in India with special reference to Digital India.
3. Respond professionally to the security incidents and potential threats that confront professional as well as individual lives.
4. To appreciate the lessons offered by various national and international cases

Course Outcomes:

After the completion of this course, a student will be able to understand

CO0 1: Understand the basic tenets, trends, issues and opportunities of ICT implementation in the processes of Governance.

CO0 2: Identify the maturity of ICT implementation in public sector from its initial phases of e-government.

CO0 3 : Identify the key management and technical components responsible for ensuring objectives of good governance through e-governance.

CO0 4: Understand the process of preparing and outsourcing software projects using RFPs, DPRs as well as prepare software contracts for outsourcing the related ICT based projects.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Fundamentals of e-Governance** Role of ICT in governance, e-government v/s e- governance, Maturity models of e-Governance.	5	12	1 web links 1,2,3,4
2	**Technology Trends** Emerging ICT trends such as SMAC, Utility computing, Pervasive Computing, Big-data, Green IT, e-Waste Management, Satellite Pollution; other related concepts - e-Commerce, Cashless India, Mobile Wallet, Telemedicine, Digital library.	5	18	1 web links 1,2,3,4
3	**E-Governance Project Management** E-Governance Life Cycle, Request for Proposal-RFP, Detailed Project Report for e-Governance projects (DPR), and PPP models (BOO/ BOOT).	10	18	1 web links 1,2,3,4
4	**Evolution of e-Governance in India** Past, NeGP, NeGP ver 2.0 till Digital India, Smart Cities, Smart Villages, JAM and Implementation structures in India (CERT, NIC, STQC, NIELIT etc.)	10	18	1 web links 4,5,6,7
5	**Emerging national and international issues** New emerging topics, Debate on Individual Privacy v/s National Security, Open Web Application Security Project - OWASP, Information Warfare and Surveillance etc.	9	18	1 web links 4,5,6,7
6	**Issues and Opportunities in India** Overview of issues: Digital Divide, Government Process Reengineering-GPR, Risk Management, Change management, Open Government Data (OGD), Standards and Interoperability, Data Security and Privacy concerns.	6	16	1 web links 1, 5,6,7

Reference Books

1. E-Governance by pankaj sharma. ISBN-13: 978-8176485166.

Web links

1. http://www.digitalopportunity.org/articles.
2. http://informatics.nic.in/, www.iitd.ac.in/iceg
3. http://goidirectory.nic.in
4. http:// districts.nic.in
5. www.iceg.net.
6. http: meity.gov.in.
7. http:/mygov.in

Subject Code	Subject Title	Internal	External
310 IL	**Linux Administration**	**50**	**-**

Course Objectives:

To impart knowledge and skills on various practical and theoretical aspects of Linux operating system (OS) basics and Linux OS based server configuration, management and administration.

Course Outcomes:

After the completion of this course, a student will be able to understand

CO0 1 : Implement file, user and group permission management in operating system environment.

CO0 2 : Apply configuration files and parameters of DNS and web servers for different web services.

CO0 3 : Distinguish KVM and bare metal virtualization performance in Linux environment.

CO0 4 : Design RC & shell scripts to control core and booting system service (Create).

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Management of File using Command Line** Introduction to BASH, Command-line shortcuts, File Types, Ownership and Permissions, File management and manipulation, Moving users & its directories, Miscellaneous Tools, Editors	**4**	**10**	**1,2**
2	**Managing Users and Groups** Creating and managing user/s and group commands, User management Tools, Users and Access Permissions, Updating users and group attributes, PAM (Pluggable Authentication Modules).	**4**	**10**	**1,2**
3	**Booting and Shutting down** Boot Loaders, Theinit process, rc scripts, enabling and disabling services, Booting in recovery mode	**4**	**10**	**1,2**
4	**File Systems** Makeup of file systems, Managing file systems, Adding a new disk, Volume Management, Creating file systems.	**6**	**15**	**1,2**
5	**Core System Services** The init Daemon, xinetd and inetd, The Logging Daemon, Configuring Logging Daemon, The CRON program	**6**	**15**	**1,2**
6	**Compiling the Linux Kernel** Kernel concepts, Finding Kernel Source Code, Building the Kernel, Patching the Kernel	**4**	**10**	**1,2**

7	**DNS** Installing DNS Server, Configuring DNS server, DNS records types, Setting up BIND database file, The DNS Toolbox, Configuring DNS clients	**6**	**20**	**1,2**
8	**Apache Web Server** HTTP Protocol, Installing Apache HTTP Server, Starting up and shutting down apache, Testing Apache Installation, Configuring Apache, Troubleshooting Apache	**4**	**10**	**1,2**
9	**Virtualization** Virtualization Implementation, Kernel based Virtual Machines (KVM)	**4**	**10**	**1,2**

Reference Books

1. E Steve Shah and Wale Soyinka " Linux Administration: A Begineer's Guide", 4th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, ISBN: 978-0072262599.
2. Susan Lauber, Philip Sweany, Rudolf Kastl and George Hacker, "REDHAT System Administration-1 Student Work book", REDHAT Inc. 2014

Subject Code	**Subject Title**	**Internal**	**External**
311 IL	**Test case & Design Techniques**	**50**	**-**

Course Objectives:

To impart knowledge and skills on the methods and techniques that can be followed to design test cases in such a way that we get the maximum coverage using an optimal set of test cases. This course will focus on highlighting the various Methods and Techniques in designing test cases for both Black Box and White Box testing.

Course Outcomes:

After the completion of this course, a student will be able to understand

CO0 1: The need for using test design techniques for writing test cases.

CO0 2: The various test design techniques available for white and Black Box Testing.

CO0 3 : Apply the techniques to write good test cases.

CO0 4 : Find out when to use each test design technique for best results.

CO0 5 : Know the tools available in the market for test design.

CO0 6 : Use the Test Design tools for effective design of Test Cases.

Sr. No	**Chapter Details**	**No. of Sessions**	**%**	**Reference Books**
1	**Software Testing Methodologies** Introduction, Software Testing Methodology , strategies and testing types , White Box Testing. Black Box Testing. Grey Box Testing.	**4**	**10**	**1,2**

2	**Test Case Design Techniques** Methods and Techniques in designing test cases Black Box Testing and White Box testing. Static Techniques: Informal Reviews , Technical Reviews , Inspection Dynamic Techniques: Structural Techniques , Statement Coverage Testing Branch Coverage ,Testing Path ,Coverage Testing ,Conditional Coverage Testing, Loop Coverage Testing, Boundary Value Analysis , Graph Decision Table, Use Case Testing, Experienced Based Techniques: Error guessing, Exploratory testing.	**4**	**10**	**1,4**
3	**Levels of Testing** **Functional Testing:** Unit Testing, Integration Testing, System Testing, User Acceptance Testing, Sanity/Smoke Testing, Regression Test, Retest. **Non Functional Testing :** Performance Testing, Memory Test, Scalability Testing, Compatibility Testing, Security Testing, Cookies Testing, Session Testing, Recovery Testing, Installation Testing, Adhoc Testing, Risk Based Testing, L1ON Testing, Compliance Testing.	**4**	**10**	**1,2,3**
4	**Software Testing Life Cycle** Test Life Cycle, importance of Test Plan , roles and responsibilities of Test Manager, Test Lead, Test Engineer, Requirements Analysis/Design , Prepare Traceability Matrix.	**6**	**15**	**1,3**
5	**Test Planning** Scope of Testing, Schedule, Approach, Roles & Responsibilities, Assumptions, Risks, & Mitigations, Entry & Exit Criteria. Test Automation, Deliverables.	**6**	**15**	**1,3,4**
6	**Test Cases Design** Write Test cases, Review Test cases, Test Cases Template, Types of Test Cases, Difference between Test Scenarios and Test Cases, Test Environment setup ,Understand the SRS, Hardware and software requirements, Test Data.	**4**	**10**	**1,2,4**
7	**Test Execution** Execute test cases, Defect Tracking and Reporting, Types of Bugs, Identifying the Bugs, Bug/Defect Life Cycle, Reporting the Bugs, Severity and priority, Test Closure , Criteria for test closure, Test summary report , Test Metrics , Definition of Test Measurements, need of Test Metrics, Metric Life Cycle, Types of Manual Test Metrics.	**6**	**20**	**3,4**

Reference Books

1. Software Testing Techniques Boris Beizer
2. Effective Methods for software Testing William Perry
3. Introducing Software Testing Louise Tamres
4. Software Testing in Real World Edward Kit.

Subject Code	Subject Title	Internal	External
312 IL	Tableau	50	-

Course Objectives:

To develop in the learner a deep and systematic understanding of current issues of research and analysis. To provide learners with a deep and systematic knowledge of business and technical strategies for data analytics and the subsequent skills to implement solutions in these areas.

Course Outcomes:

After the completion of this course, a student will be able to understand

CO0 1 : To describe Data Science Life cycle.

CO0 2 : To describe Data Visualization **.**

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Introduction** Introduction, Tableau , Application, Use & Differentiation from Excel , Tableau Architecture , How to Download & Install Tableau Public & Desktop.	4	10	1
2	**Tableau Desktop Software:** Workspace & Navigation , Creating Basic Visualizations, Tableau Desktop UI, Tableau Prep Connecting to Data, Tableau Prep Connecting to Data, Creating Groups and Hierarchies, Date Functionality , Mapping, Heat Map and Highlight Table, Dashboards and Actions.	4	10	1
3	**Creating basic reports.** Connect to different data sources drop some data , Tabular v/s Graphs, Marks' section Changing metadata (rename columns, create Hierarchy, create folders, change, aggregation, calculated columns etc.),Tableau Extracts , Publishing extracts. Create a new report, by connecting to a published data source.	4	10	1,
4	**Distribution Charts and Blending Data** Test Tableau setup , Connecting to Excel and SQL Server, Joining different data sources and connections (Left join, right join, Full Join etc.), Creating basic tabular and reports & graphs ,Concept of Live v/s extract, Basics of calculations, Data interpreter, Custom splits.	6	10	1
5	**graphs and grouping concepts** Relationships between: 1 measure and 1 dimension, 2 measures, Highlighting points in a graphs ,Sorting your data Grouping: Static grouping, Visual grouping, Dynamic grouping (Calculated field, Parameter controlled),Bins and Sets	6	10	1
6	**Filtering concepts** Inline filtering (keep only / Exclude), Set filters by conditions (filter configuration), Filtering Dimensions and measures, Cascading filters, Filtering using a parameter, Control Reference lines using parameters, Marks card for formatting, Annotations and tooltips , Editing axis Data.	4	10	1

7	**Tableau Maps** How is map information stored: Using Latitude and longitudes , Using geospatial data, Using combination of Cities , States, Country, or postal codes, Geographic Data Types , Marks & Shapes, Map Layering, Search and Zoom. An easier way to custom geocode.	**6**	**20**	**1**
8	**Tableau Calculated fields** Calculations are like excel formulas, Calculations can be performed on String, Number, Dates etc. LOD - Level of detail (Fixed, Include and Exclude) Table calculations Using IF clause , % of totals, running Totals, using ATTR Date, Logical and String functions.	**6**	**20**	**1**

Reference Books

1. Foundations of Data Science By Avrim Blum, John Hopcroft, and Ravindran Kannan

Semester IV

Subject Code	Subject Title	Internal	External
401 Core	Enterprise Resource Planning	50	50

Course Objectives:

1. To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.
2. To focus on a strong emphasis upon practice of theory in Applications and Practicaloriented approach.
3. To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.
4. To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills.

Course Outcome : After completing this subject student will be able

CO0 1 : With the basic concepts of ERP systems for manufacturing or service companies, and the differences among (Material Requirement Planning) MRP, MRP II, and ERP systems.

CO0 2 : Apply the principles of ERP systems, their major components, and the relationships among these components.

CO0 3 :with the knowledge of typical ERP systems, and the advantages and limitations of implementing ERP systems.

CO0 4 : To comprehend the technical aspects of ERP systems .

CO0 5 : To be able to map business processes using ERP concepts and techniques.

Unit No.	Chapter Details	No. of Sessions	%	References
1.	**Introduction to Enterprise Resource Planning** Introduction of the term Business Process Reengineering(BPR) ,BPR Methodology, Current BPR Tools ,Introduction to material requirement planning (MRP), Definition of Enterprise Resource Planning (ERP); Evolution of ERP; Characteristics, Features, Components and needs of ERP; ERP Vendors; Benefits & Limitations of ERP Packages	8	20	1,3
2.	**Enterprise Modeling and Integration of ERP** Need to focus on Enterprise Integration/ERP; Information mapping; Role of common shared Enterprise database; System Integration, Logical vs. Physical System Integration, Benefits & limitations of System Integration, ERP's Role in Logical and Physical Integration	8	20	1,2,3
3.	**ERP Architecture and Implementation Methodology of ERP** Generic Model of ERP system; Core Modules functionality; Types of ERP architecture, Client Server Architecture, Web-based Architecture, Service Oriented Architecture (SOA) ; Difficulty in selecting ERP, Approach to ERP selection, Request	8	20	1,2,3,5

	for Proposal approach, Proof-of-Concept approach; General Implementation Methodology of ERP, Vanilla Implementation; Evaluation Criteria of ERP packages; Project Implementation Team Structure .			
4.	**Introduction to SAP , Oracle APPS** SAP, Integrated SAP Model, SAP Architecture, SAP R/3 System & mySAP, SAP Modules; Oracle Apps, Oracle AIM Methodology, Oracle Fusion Modules; A Comparative assessment of ERP Packages.	**6**	**10**	**1,2,3,**
5.	**ERP for Supply Chain Management and Customer Relationship Management** **Supply Chain Management and ERP** Definition of Supply Chain Management (SCM); Supply Chain Council's SCOR Model; Stevens Model of Supply Chain Management; Aims of SCM; SCM Key Drivers; Collaborative Design & Product Development; Benefits of SCM; ERP Vs SCM; Key SCM Vendors **Customer Relationship Management and ERP** Definition of Customer Relationship Management (CRM); CRM Evolution; CRM Delivery Processes, CRM support Processes; CRM Analysis Processes; CRM Components; Key CRM Vendors.	**10**	**30**	**4,5,**

Reference Books

1. Enterprise Systems For Management, Luvai F. Motiwalla, Jeff Thompson, Pearson Education., 2nd Ed., 2011. ISBN-10: 0132145766 | ISBN-13: 978- 0132145763.
2. Enterprise Resource Planning, Ravi Shankar, S.Jaiswal, Galgotia Publication Pvt. Ltd., 1st Ed., 1999. ISBN 81-203-0417-9.
3. Enterprise Resource Planning – Alexis Leon – Second Edition – TMH.
4. ERP in practice – Vaman – TMH
5. Daniel E.O'Leary, Enterprise Resource Planning Systems, Cambridge University Press, 2002.

Subject Code	Subject Title	Internal	External
402 Core	**Multimedia and Animation**	**50**	**50**

Course Objectives:

1. To understand multimedia communication systems and applications
2. To understand Image, Text and Video compression methods
3. To familiarize the students with various approaches, methods and techniques of Animation Technology.

Course Outcome : After completing this subject student will be able to

CO0 1 : Understand multimedia communication systems .

CO0 2 : Develop compression algorithms for Text, Image and Video .

CO0 3 : Understand different animation techniques .

CO0 4 : Use modeling and animation tools .

Unit No.	Chapter Details	No. of Sessions	%	References
1.	**Multimedia Communications** Introduction, Multimedia information representation, Multimedia networks, Multimedia applications, Application and networking terminology, Multimedia information representation: Digitization, Principles, Text and Images, Audio and video, Digital Video/Audio/Image coding standards.	8	15	1,3
2.	**Image Compression Systems** Fundamentals of Image, Redundancy In Image, Lossless And Lossy Image Compression Techniques, Measurements Quality of Reconstructed Image (MSE, SNR, PSNR) , Huffman Coding, GIF,TIFF,JPEG.	8	15	1,2,3
3.	**Text Compression** Compression Principles, Entropy And Source Encoding, Static Huffman Coding, Dynamic Huffman Coding, Arithmetic Coding, LZW Coding.	8	15	1,2,3,5
4.	**Audio-Video Compression** Audio Compression, PCM, DPCM, ADPCM, Adaptive Predictive Coding, Linear Predictive Coding, Code-Excited Coding, Perceptual Coding, Mpeg Audio Coder, Digital Video Coding Fundamentals, Video Compression Principles, Video Compression Standards .	8	20	1,2,3,
5.	**3D Animation** Introduction, Modeling : Polygon and Splines, Animation techniques : Key Frame Animation, Forward Kinematics, Inverse Kinematics, Shape Deformation, Rendered Animation, Morphing, Character Animation, Facial Animation .	10	30	4,5,
6.	**3D Modeling and Animation tool** Blender	3	05	4,5,

Reference Books

1. Multimedia Communications- Applications, Networks, Protocols & Standards By Fred Halsall., Pearson Publications
2. Introduction to Multimedia Communications By K.R. Rao, Zoran S.B. & Dragorad A.M. – Wiley Publications
3. Principles of Three dimensional computer animation by Michael O'Rourke, W W Norton & Company
4. Data Compression :The Complete Reference by David Salomon - Springer International Edition
5. Facial modeling and animation: stop staring by Jason osipa, Wiley India Pvt. Ltd.

Subject Code	Subject Title	Internal	External
403 Core	**Project**	**150**	**150**

Project Evaluation Phases Recommended				
Phase	**Description**	**Internal**	**External**	**TimeLine**
1	SRS Document	30	30	3nd Week
2	Design document	30	50	7th Week
3	Executable/User Interface	30	30	12th Week
4	Test plan and Documentation	30	40	16th Week
5	Project Viva/Presentation	30		20th Week

General Instruction Regarding Preparation of Project Report For MBA-IT -II -SEM-IV

TYPING

1. The typing shall be standard 12 pts in double spaced using black ink only
2. Margins must be Left 2 inches Right 1.5 inches Top 2 inches Bottom 1.5 inches
3. Paper A4 size Bond Paper

COPIES

1. Two hard-bound copies (Black Rexine with Golden Embossing as per format displayed herewith)
2. One original and one clean Xerox Copy.

FORMAT FOR TITLE PAGE AND FOR EMBOSSING

PROJECT REPORT

ON

[NAME OF THE SYSTEM]

[NAME OF THE COMPANY]

BY

[NAME OF STUDENT]

Savitribai Phule Pune University

MASTER OF BUSINESS ADMINISTRATION
– Information technology

[INSTITUTE Name]

PUNE-4110..

2020-2021

The Guidelines regarding the documentation and scope of project are mentioned here

MBA-IT -II SEM-IV (COMMERCIAL SYSTEM PROJECTS)

Project Report should be submitted in following format for Commercial Application Projects viz. Payroll, Sales, Purchase, Inventory, Book Shop, Examination system etc. Where VB, Access, Oracle, ASP and Java is used.

2 Blank Pages at beginning Title Page
Certificate from Company
Certificate from Guide
Acknowledgement
Index with printed Page Numbers
CHAPTER 1 : INTRODUCTION

- Company Profile
- Existing System and Need for System
- Scope of Work
- Operating Environment - Hardware and Software

CHAPTER 2 : PROPOSED SYSTEM

- Proposed System
- Objectives of System
- User Requirements

CHAPTER 3 : ANALYSIS & DESIGN

- Data Flow Diagram (DFD)
- Functional Decomposition Diagram (FDD)
- Entity Relationship Diagram (ERD)
- Data Dictionary
- Table Design
- Code Design
- Menu Tree
- Menu Screens
- Input Screens
- Report Formats
- Test Procedures and Implementation

CHAPTER 4 : USER MANUAL

- User Manual
- Operations Manual / Menu Explanation
- Forms and Report Specifications

Drawbacks and Limitations Proposed Enhancements Conclusion Bibliography ANNEXURES:
ANNEXURE 1 : INPUT FORMS WITH DATA

Project report should be submitted in following format for project using OOAD, Embedded System, WAP and other technologies and Web Deployed Systems where C, C++, J2EE, .NET, OOAD and JAVA, SDK's, API's are used.

***** TECHNICAL PROJECTS ********

2 Blank Pages at beginning Title Page
Certificate from Company
Certificate from Guide Acknowledgement
Index with printed Page Numbers

CHAPTER 1: INTRODUCTION
Company Profile
Existing System and Need for System
Scope of Work
Operating Environment - Hardware and Software
Detail Description of Technology Used

CHAPTER 2: PROPOSED SYSTEM
Proposed System
Objectives of System
User Requirements

CHAPTER 3: ANALYSIS & DESIGN
Object Diagram
Class Diagram
Use Case Diagrams
Module Hierarchy Diagram
Component Diagram
Deployment Diagram (in case of Web Deployment)
Module Specifications
Interface Diagram (in case of WAP and Embedded Systems)
Web Site Map Diagram (in case of Web Site)
User Interface Design (Screens etc.)
Table specifications (in case back end is a database)
Test Procedures and Implementation

CHAPTER 4: USER MANUAL
User Manual
Operations Manual / Menu Explanation
Program Specifications / Flow Charts

Drawbacks and Limitations
Proposed Enhancements
Conclusion
Bibliography ANNEXURES:

ANNEXURE 1 : USER INTERFACE SCREENS

ANNEXURE 2 : OUTPUT REPORTS WITH DATA (if any)

ANNEXURE 3 : SAMPLE PROGRAM CODE

(which will prove sufficient development is done by the student)

2 **Blank Pages at the end.**

Subject Code	Subject Title	Internal	External
404 UL	**Open source IOT Platform**	**-**	**50**

Course Objectives:

The Students will able to learn Fundamentals of computer network, wireless sensor network, communication & internet technology, web technology, information security.

Course Outcomes:

After the completion of this course, a student will be able to

CO0 1 : Understand the vision of IoT from a global context.

CO0 2 : Understand the application of IoT.

CO0 3 : Determine the Market perspective of IoT.

CO0 4 : Use of Devices, Gateways and Data Management in IoT.

CO0 5 : Building state of the art architecture in IoT.

CO0 6 : Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**IoT & Web Technology** The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.	**8**	**10**	**1,2,3**
2	**M2M to IoT – A Basic Perspective** Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. **M2M to IoT-An Architectural Overview** Building architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	**10**	**10**	**1,2,3**
3	**IoT Architecture -State of the Art** Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	**10**	**10**	**1,2,3**

4	**IoT Applications for Value Creations** Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.	**8**	**10**	**1,2,3**
5	**Internet of Things Privacy, Security and Governance** Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	**8**	**10**	**1,2,3**

Reference Books

1. Dive Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014 .
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
3. Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011,
4. ISBN: 978-1-4493-9357-1 .

Subject Code	Subject Title	Internal	External
405 UL	**Debugging of Application programming (IOT)**	**-**	**50**

Course Objectives:

To Understand IoT architecture and its building blocks , and the technology and skills required in building and IoT product, To Understand the IoT Reference Architecture and RealWorld Design Constraints .

Course Outcomes:

After the completion of this course, a student will be able to

CO0 1 : Understand the vision of IoT from a global context.

CO0 2 : Understand the application of IoT.

CO0 3 : Determine the Market perspective of IoT.

CO0 4 : Use of Devices, Gateways and Data Management in IoT.

CO0 5 : Building state of the art architecture in IoT.

CO0 6 : Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Overview of IoT and High level Architecture** What Is the Internet of Things (IoT), Brief History and evolution of IoT, IoT Architecture, Trends in the Adoption of IoT, IoT Is Powerful and Pervasive, Societal Benefits of IoT, Risks, Privacy, and Security.	**5**	**10**	**1,2,3**

2	**IoT Workflow** Setup IoT Platform1 (Open source IoT Platform on local machine) , Setup IoT Platform2 (Amazon IoT platform.) IoT Use case-1 Implementation on two platform).	**4**	**10**	**1,2,3**
3	**IoT Architecture -State of the Art** Basics of C: Operators , Conditionals , Arrays , Functions , Advanced C programming: ,Structures ,Unions ,Files ,Deep dive into pointers ,Pre-processor directives ,Recursion , Project environment - Creating & Building a project, Make files , Deep dive - Logic to program translation, Creating your own library, Dry-run , Introduction to Data Structures	**12**	**20**	**1,2,3**
4	**IoT Cloud Infrastructure** IoT cloud building blocks, Using the platform specific dashboards, Device configuration and addressing, IoT Platforms in detail, MQTT Server, Injection Engine, Time Series database, Rules Engine, Data monitoring, visualization and IoT Analytics, Rest API interface, Device Management, Application Service,.	**8**	**15**	**1,2,3**
5	**Performance and Security in IoT** Benchmarking IoT applications and Platforms, MQTT vs HTTP performance, Security considerations, Firmware updates, Cryptography basics, Cryptography in IoT, Privacy considerations and design guidelines,	**6**	**15**	**1,2,3**

Reference Books

1. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM – MUMBAI.
3. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-onApproach)”, 1 st Edition, VPT, 2014.
4. Cuno Pfister, Getting Started with the Internet of Things, O‟Reilly Media, 2011,
5. ISBN: 978-1-4493-9357-.
6. 5. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”.

Subject Code	Subject Title	Internal	External
406 IL	Introduction to Python	50	-

Course Objectives:

The Students will able to learn will be introduced to Python language syntax and learn control statements, loops, functions, and lists. identify/characterize/define a problem and Design a program to solve the problem.

Course Outcomes:

After the completion of this course, a student will be able to

CO0 1 :.Students will have gained a fundamental understanding of programming in Python by creating a variety of scripts and applications for the Web and for systems development.

CO0 2 : Design a program to solve the problem.

CO0 3 : Create executable code.

Sr. No	Chapter Details	No. of Sessions	%	Reference Books
1	**Introduction** History of computers, programming languages, Internet, Web, interpretation vs. compiling.	2	5	1,2,3
2	**Control Flow Statements** The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement. **Functions** Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	12	10	1,2,3
3	**Strings and List** Strings, Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, Lists, Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.	10	10	1,2,3
4	**Dictionaries and Tuples and Sets** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, Tuples and Sets, Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.	10	10	1,2,3
5	**Files, Regular Expression Operations** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python	10	10	1,2,3

	os and os.path Modules, Regular Expression Operations, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.			
6	**Object-Oriented Programming,** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism	**11**	**10**	**1,2,3**

Reference Books

1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-081539437.
2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
3. Aurelien Geron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition,O'Reilly Media, 2017. ISBN – 13: 978-1491962299.
4. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
5. Miguel Grinberg, "Flask Web Development: Developing Web Applications with Python", 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

Subject Code	**Subject Title**	**Internal**	**External**
407 IL	**Artificial Intelligence**	**50**	**-**

Course Objectives:

The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software tools or programming environments.

Course Outcomes:

After the completion of this course, a student will be able to

CO0 1 : Identify problems where artificial intelligence techniques are applicable

CO0 2 : Apply selected basic AI techniques; judge applicability of more advanced techniques.

CO0 3 : Participate in the design of systems that act intelligently and learn from experience.

Sr. No	**Chapter Details**	**No. of Sessions**	**%**	**Reference Books**
1	**Introduction to AI** Introduction to Artificial Intelligence, Course structure and policies, History of AI, Proposing and evaluating AI applications, Case study: Google Duplex	**4**	**5**	**1,2,3**
2	**Intelligent agents** reactive, deliberative, goal-driven, utility-driven, and learning agents , Artificial Intelligence programming techniques.	**5**	**10**	**1,2,3**

3	**Problem-solving through Search** forward and backward, state-space, blind, heuristic, problem-reduction, A, A*, AO*, minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms, sample applications.	**10**	**10**	**1,2,3**
4	**Knowledge Representation and Reasoning:** ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications.	**12**	**15**	**1,2,3**
5	**Planning:** planning as search, partial order planning, construction and use of planning graphs **Representing and Reasoning with Uncertain Knowledge**: probability, connection to logic, independence, Bayes rule, bayesian networks, probabilistic inference, sample applications. **Decision-Making**: basics of utility theory, decision theory, sequential decision problems, elementary game theory, sample applications. Sample Applications of AI, student project presentations.	**12**	**15**	**1,2,3**
6	**Machine Learning and Knowledge Acquisition:** learning from memorization, examples, explanation, and exploration. learning nearest neighbor, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications.	**12**	**15**	**1,2,3**

Reference Books

1. Artificial Intelligence: A Modern Approach, 3rd Edition, by Stuart Russell and Peter Norvig.
2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
3. Aurelien Geron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition,O'Reilly Media, 2017. ISBN – 13: 978-1491962299.